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Penile Fracture: Our Experience in a Tertiary Care Hospital

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Abstract

Introduction: Penile fracture is rare, but it is a urological emergency that always requires immediate attention. Moreover, penile fracture has been reported more frequently in recent years. It may have devastating physical, functional, and psychological consequences if not properly managed in time.

Materials and Methods: The objective of this study was to highlight the causes, clinical presentations, and outcomes of cases of penile fracture. This was a Case Series extending from November 2011 to November 2015. Every patient underwent a thorough clinical evaluation and received proper treatment.

Results: In this study, 40 patients of penile fracture included, ages were 19 to 56 years. Vaginal intercourse was the most common mechanism of injury. Most of the patients (95%) were diagnosed clinically with a proper history and clinical examination. Thirty Six patients were treated surgically. The patients underwent six months of follow-up, and were evaluated with local examinations, questionnaires, and colour Doppler ultrasonography as necessary.

Conclusions: Although penile fracture is an under-reported urological emergency, its incidence is increasing. It is diagnosed based on a clinical examination, but ultrasonography can be very helpful in diagnosis. Especially in cases where treatment is delayed, surgery is preferable to conservative management, because it is associated with better outcomes and fewer long-term complications.

Keywords: Penile fracture; Penis injuries; Urological emergency; Doppler ultrasonography.

Introduction

Injuries to the genitalia are uncommon, in part because of mobility of penis and scrotum. Blunt phallic traumatic injuries is usually of concern only with an erect penis, when fracture of tunica albuginea may result. In general, prompt surgical reconstruction of most penile injuries usually leads to adequate and acceptable cosmetic and functional results.

Penile fracture is the disruption of the tunica albuginea with rupture of the corpus cavernisum. Fracture typically occurs during vigorous sexual intercourse, when the rigid penis slips out of the vagina and strikes the perineum or pubic bone, producing a buckling injury.[1]

The tunica albugenia is a bilaminar structure (inner circular, outer longitudinal) composed of collagen and elastin. The outer layer determines the strength and thickness of the tunica, which varies in different location along the shaft and is thinnest vetrolatarlly. The tensile strength of the tunica albuginea is remarkable, Strength of the tunica albuginea is remarkable, resisting rupture until cavernous pressure rise to more than 1500 mmHg.

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When the erect penis bends abnormally, the abrupt increase on intracavernosal pressure exceeds the tensile strength of the tunica albuginea, and a transverse laceration of the proximal shaft usually results.[2–4]

Whereas the penile fracture has been reported most commonly with sexual intercourse, It has also been described with masturbas cenarios in the Middle East, self–infected fractures predominate, the erect penis is forcibly bent during masturbation or as a means to achieve rapid detumscence, the practice of taghaandan (Zargooshi, 2000).[5]

It isreported that 91% of fractures in philadelphia, Pennsylania, were a result of sexual intercourse[2], Zargooshi (2000) described 69% of fractures in Kermanshah, Iran as being due to self—manipulation. The tunical tear is usually transverse and 1 to 2 cm in length.[5] The injury is usually unilateral, although tears in both corporeal bodies have been reported.[3] Although the site of rupture can occur anywhere along the penile shaft, most fracture are distal to the suspensor ligament. Injures associated with with coitus are usually ventral or lateral (Mydlo, 2001; Lee *et al*., 2007), where the tunica albuginea is the thinnest.[6,7]

The diagnosis of penile fracture is often straightforward and can be made reliably by history and physical examination, patient usually describe a cracking or popping sound as the tunica tears.

Materials and Methods

This was a case series extending for Nov 2011 to Nov 2015 including all patient admitted for fracture to the erect penis.

An effort was made to keep all patient in active follow up in the urology out patient department.

During this period, 40 cases of penile fracture were treated in our institute. Each patient underwent a thorough clinical evaluation and received proper treatment. Penile fracture was mainly diagnosed on clinical grounds, based on a proper history and clinical examination. The mode of injury, time of presentation history of erotic distention, Penile swelling, bleeding per urethra etc assessed during examination. USG was performed in 38 cases, and RGU was performed in one case. Both surgical and conservative treatment strategies were employed. Distal degloving was performed in 35 cases, and a direct lateral incision was performed in one cases.

Evacuation of the haematoma and repair of the tunical tear with absorbable sutures was carried out. Limited distal circumcision was performed in 15 cases. Perioperative catheterisation was performed in 16 cases, including the two cases involving urethral injuries. In 18 cases, six months of follow-up were completed., The patients were locally examined for penile deviation, fibrotic scarring, nodules, or other wound-related complication. In the third month after treatment, each patient's erectile function was evaluated. patients with a partner were evaluated with the IIEF-5.[8] The sexual function symptom score global self assessment position while unmarried patients without a partner were evaluated with the GASP. The IIEF-5 instrument classifies the severity of erectile dysfunction (ED) into five categories: severe (5–7), moderate (8–11), mild to moderate (12–16), mild (17–21), and none (22–25). The GSAP contains self-assessment questions about the severity of ED adapted from the Massachusetts Male Aging Study, with patients providing their own global self-rating for ED. ED severity was rated as none, mild, mild to moderate, moderate, or severe, depending on whether the patients were able to attain and maintain an erection adequate for satisfactory sexual intercourse always/almost always, usually, sometimes (approximately half of the time), infrequently (with only a minority of attempts at sexual intercourse being successful), or never, respectively. Color Doppler studies were performed in patients with ED. Serial measurements of peak systolic velocity (PSV), end diastolic velocity (EDV), and resistive index (RI) were performed. Cavernous arterial insufficiency is likely when the PSV is <25 cm/s, as a PSV consistently >35 cm/sec defines normal cavernous arterial inflow. The vascular RI was defined as follows: RI=(PSV−EDV)/PSV. RI values > 0.9 have been associated with normal penile vascular function, while RI values < 0.75 are consistent with veno-occlusive dysfunction.[9]

Results

The patients were between 19 to 56 years old. The time interval from injury to presentation was 6-156 hours (mean, 37.66 hours; median, 28 hours). The most common mechanism of injury was vaginal intercourse (50). Masturbation (25) and rolling over on an erect penis during sleep (25%) accounted for the rest of the cases (Table 1). When the penile fracture occurred, four of the patients were having sexual intercourse with the woman on top, three were watching an erotic film during masturbation, and two had ingested sildenafil tablets as a sexual stimulant. The injury occurred between 12 AM and 7 AM in 11 patients, six of whom were injured in the early morning hours, between 3 AM and 7 AM.

In a majority of the cases, the clinical presentation involved an audible popping sound (85%), followed by pain (50%), rapid detumescence (95%), and the development of swelling and discoloration (90%). Two patients experienced bleeding through the urethra. A typical 'eggplant deformity' was seen in 65% of the cases. A palpable gap in the penile shaft (the 'rolling sign') and a deviation of the penis to the opposite side of the fracture were seen in 55% and 65% of cases, respectively.

Diagnosis was possible on the clinical grounds in 35 cases. One patient had a typical history, but the findings of a physical examination were not conclusive. USG was performed in 38 cases. A tunical tear was observed in 15 cases, and a tear of 2 to 3 mm was sufficient for diagnosis in the case in which a clinical diagnosis was not possible. RGU was performed in one case, in which the patient was suspected to have a urethral injury. The mean duration of transurethral catheterization was 13 days (Range: 10–16 days). The overall results were excellent.

Surgical treatment was provided in 36 cases, while Four case with a small tear was treated conservatively. A right corporal tear was observed in 12 cases and 24 cases had.

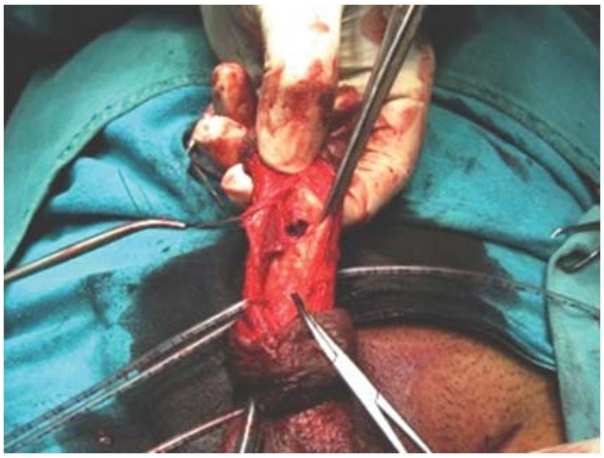
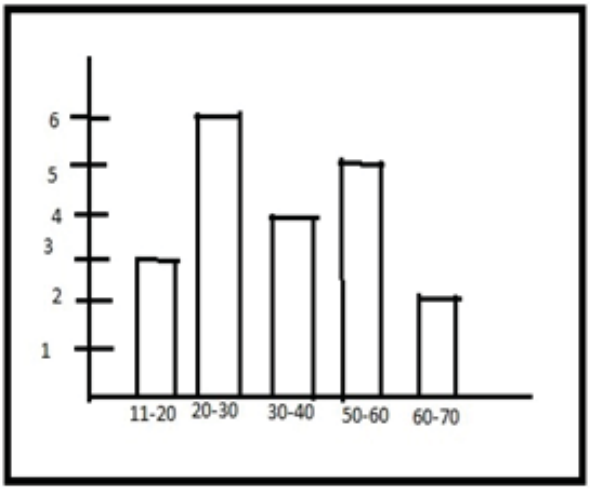


Fig. 1: Penile Fracture and Trauma Treatment

Table 1: Patient characteristics and etiology (n = 20)

General characteristics of patient	Value
Age (yr) 11–20	4 (10%)
21–30	16 (40%)
31–40	5 (12.5%)
41–50	7 (17.5%)
51–60	8 (20%)
Marital status Married	30 (75%)
Unmarried	10 (25%)
Mechanism of injury Vaginal intercourse	10 (25%)
Rolling over on erect penis during sleep	5 (12.5%)
Masturbation	5 (12.5%)



Graph 1: Values are presented as number (%)

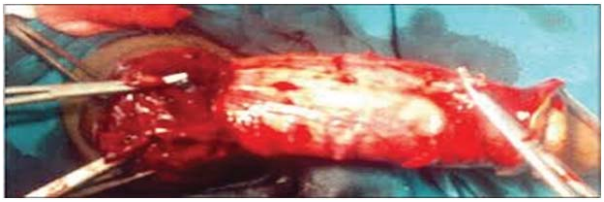


Fig. 2: False Fracture of Penis

Table 2: Surgical technique (n = 19)

Technique	Value
Anesthesia General anesthesia	12 (30%)
Spinal anesthesia	4 (10%)
Local anesthesia	3 (7.5%)
Incision Distal circumcising (degloving) incision	20 (50%)
Direct lateral incision	4 (10%)
Suture material Absorbable	19 (47.5%)
Nonabsorbable 0 Repair Continuous	4 (10%)
Interrupted	15 (37.5%)
Circumcision Done	12 (30%)
Not done	7 (17.5%)
Catheterization Done	16 (40%)
Not done	3 (7.5%)

Values are presented as number (%).

Table 3: Postoperative outcome (n = 19)

Postoperative event	Value
Antibiotics, analgesics and compressive dressing	19 (47.5%)
Erection suppressant Oral estrogen	6 (15%)
Oral diazepam	9 (22.5%)
None	4 (10%)
Complications Mild wound infection	2 (05%)
Distal skin necrosis	2 (05%)
Catheter removal	
(n = 16) After 48 hours	14 (35%)
After 7 days	2 (5%)
Discharge	
At third postoperative day	15 (37.5%)
After third postoperative day	4 (10%)

Values are presented as number (%).

A tear in the proximal third of the penis. Repair was performed using absorbable sutures in all cases (Table 2). Urethral injury was observed in two cases; in one case, the urethral injury was detected preoperatively by RGU, and in the other case it was detected during exploration.

Table 4: Follow-up after penile fracture repair (n = 20)

Follow-up	No. of case
Clinical examination (at third week)	(n = 20)
Small non-tender nodule	20
Visible scar	5
Penile deviation/chordee	0
Evaluation of erectile function (at third month)	(n = 18)
IIEF-5/GSAP No ED	16
ED	2

Two patients showed distal skin necrosis and were managed conservatively. Follow-up was planned, involving a clinical evaluation during the third week and an evaluation of sexual function during the third month. At the first follow-up, all of the patients were evaluated, and two patients found to have a small nodule, which regressed spontaneously. At the second follow-up, 18 patients were evaluated, of whom 16 patients answered the IIEF-5 questionnaire (range of scores, 14–25; mean, 22; median, 22). Two patients complained of ED, with IIEF scores of 14 and 17, respectively. On further evaluation, one of these patients was found to exhibit cavernosal insufficiency (PSV = 25 cm/s).

Discussion

The tunica albuginea, 2 mm thick in the flaccid state, is one of the toughest fasciae in the human body. Its thickness is reduced to 0.25–0.5 mm during erection and becomes vulnerable to traumatic injury.[10–12] Most penile lesions occurs as a result of sexual activity, i.e., 'a false step' during coitus, e.g. during impact of the erect penis against female perineum or the pubic symphysis. The rupture is usually followed by haematoma that can spread to the scrotum, perineum and supra-pubic area when Buck's fascia is disrupted. No concomitant urethral or corpora cavernosa injury was seen in any of our patient.

The typical history and clinical Presentation of fractured penis usually make adjunctive imaging studies unnecessary, Ultrasonography although noninvasive and easy to perform.[10,11] Our literature review found that no data have been published regarding the time of occurrence of penile fractures. Most of the patients in our series were injured in the late night and early morning, which may reflect the circadian rhythm of testosterone secretion. The diagnosis of penile fracture can be reliably made through a proper history and physical examination, as in 95% of our cases. However, numerous recent studies have assessed the diagnostic role of various imaging modalities, such as USG[4,13,14], cavernosography[15,16], RGU[17,18], and magnetic resonance imaging.[6,19] We found USG to be a very helpful tool in the diagnosis of penile fracture. USG was able to show a tunical fracture in 38 out of the 40 cases in which USG was performed and in one case, was able to show a 2–3 mm tear that confirmed the diagnosis despite an inconclusive clinical examination. In an article by Agarwal *et al.*[11], USG was found to be sensitive in only 50% of cases. The results of USG are operator-dependent and USG requires specific expertise, which may explain the relatively poor results of USG in the previous study. RGU is highly sensitive, but is not essential for the diagnosis of urethral injury, since a history suggestive and proper surgical exposure with intraoperative retrograde instillation of methylene blue may be sufficient to diagnose urethral injury.

Immediate surgical reconstruction result in faster recovery, decreased morbidity, lower complication rates, and lower incidence of long-term penile curvature.[20–22]

In our series, surgical exploration was performed in 36 cases[16], while conservative management was employed in four case involving a small fracture with no signs of swelling or deviation. Hinev[21] has recommended conservative management when the cavernosal body is intact. Saita H, *et al.* found that spontaneous healing without complications is probable for tears in the tunica albuginea without extensive haematoma or concomitant urethral injury, which may explain the outcome of our case. Agarwal *et al.*[11] also reported a similar case in their case series. The conservative management of penile fracture has been associated with penile curvature in more than 10% of patients, abscess or debilitating plaques in 25% to 30% of patients, and significantly longer hospitalization times and recovery.[23,24]

In contrast to the above mentioned reports, the conservatively treated patient in our case series had a very good outcome. The proper selection of patients for conservative treatment may have led to the good outcome of conservative treatment in this case.

In out study, distal skin necrosis in two out of three cases seen where a distal degloving incision was made but circumcision was not performed. The differential diagnosis of penile fracture may

include false fracture or rupture of the dorsal vein or the artery of the penis.[25–28] An incidence of 4% to 10% false fractures has been reported[18], but we did not observe any such cases in our series.

Surgery and its timing influences its long-term success. Patients undergoing repair within eight hours of injury have been found to have significantly better long-term results than patients who underwent surgery 39 or more hours after the fracture occurred.[2,18] In our study, the range of the time interval from injury to operation was 10 to 160 hours (mean ± standard deviation, 43.27 ± 38.06 hours; median, 31 hours). One patient underwent surgery 160 hours after trauma, and the only complication was a mild wound infection. The two patients who had ED in the follow-up were operated on 17 and 88 hours after injury. Thus, in our study, delays in surgery did not seem to have a particularly strong effect on the outcome. Moreover, a lack of consensus exists regarding the need for postoperative suppression of penile erection with diazepam or oestrogen; this approach has been routinely used in some studies, but declared to be unnecessary in others.[28] The use of diazepam helps prevent early erections that might have harmful effects, and helps to allay the anxiety that may occur with such trauma. In our series, All the patients were given antibiotics to prevent infection and antierectile medication to reduce the possibility of fracture recurrence. Analgesics were given as and when required.

No definite protocol regarding the use of erectile suppressants was followed, and they were used according to the surgeon's preference. In this regard, no supportive evidence available. However, pain during erection causes detumescence in and of itself, meaning that the use of such drugs is unnecessary. The immediate postoperative outcomes also have varied in different case series. In our series, all patients were discharged on the third postoperative day, with the exception of four patients who developed complications.

Two had mild skin infections and two had distal skin necrosis. All were managed conservatively and discharged between the fifth and tenth postoperative day. Different follow-up protocols and strategies have been reported in different published series. In this study, the first follow-up was in the third week after the operation, and all patients underwent clinical evaluation. Two had a small non-tender nodule over the injury site, and both nodules had resolved spontaneously by the next follow-up. Five patients had visible scars: four had direct lateral incisions and one had skin necrosis in the postoperative period. The next follow-up was at the third month, and only encompassed 18 patients. In this follow-up, postoperative sexual function was evaluated.

Two patients had ED with low IIEF scores. On further evaluation with a Doppler study, one patient was found to have normal vascular flow and the other was found to exhibit cavernosal insufficiency. The most common causes of ED after penile fracture are corporeal veno-occlusive dysfunction, site-specific leaks, and cavernous artery insufficiency.[28] Zargooshi[5], in a personal surgical series incorporating 170 patients, reported that the surgical management of penile fractures resulted in erectile function comparable to that of a control population. A study performed by Nane *et al.*[28], evaluating the long-term erectile status of patients in whom penile fracture was immediately repaired, noted ED in eight out of 36 patients after a mean follow-up period of 3.6 ± 1.9 years. ED in the above patients was due to cavernosal and/or penile arterial insufficiency. Other reported complications include urethral stricture, urethra cavernosal fistulae.[4] A case of urethrocutaneous fistula following penile fracture has also been reported.[12] However, our prospective study did not contain any such complications.

Conclusion

Immediate surgical reconstruction results in faster recovery, decreased morbidity, lower complication rates penile fracture is a urological emergency, should be managed promptly. Delay in presentation is mainly due to fear and embarrassment. Mechanism of injury depends on socio cultural characteristic, masturbation habits and indulgence in sexual activities. Diagnosis is usually clinical, but, USG is helpful. Surgery is the treatment of choice. However, conservative treatment may be given in properly selected patients. Early intervention gives better outcome, but, surgery should be offered in delayed presentation also to prevent long term sequelae.

Conflict of Interest: No potential conflict of interest relevant to this article was reported.

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Original Research Article

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Can We Prevent Port Site Infections? Our Experience at a Tertiary Care Centre

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Abstract

Background: In the era of minimal access surgery laparoscopic cholecystectomy is the gold standard of treatment for calculous cholecystitis. But laparoscopic surgery comes with its fresh set of complications. Port Site Infections (PSI) is one of the most bothersome complications that overshadow the benefits of a minimal invasive procedure and delays recovery. Atypical mycobacterial infection complicates the situation as it is difficult to diagnose and is resistant to treatment. In our institute (a tertiary level centre) the incidence of PSI was very high and we were in search of alternate methods of sterilisation for laparoscopic instruments as well as any prophylactic treatment that would prevent the development of PSI.

Aims and Objectives: The aim was to study the role of low temperature gas plasma technology (STERRAD) as an appropriate method of sterilisation for laparoscopic instruments to reduce the incidence of PSI and to study the role of prophylactic port site Amikacin in preventing PSI.

Methodology: This is a prospective non randomized study which was done over 15 months. During this study period patients admitted in general surgery wards of IPGME & R and SSKM Hospital with cholelithiasis were included in the study. After undergoing laparoscopic cholecystectomy they were followed up for 3 months.

Results: Among the 220 cases of laparoscopic cholecystectomy done during this period a total of 30 cases of PSI were noted. There was a drastic reduction in the incidence of PSI when patients were operated using instruments sterilised by the low temperature gas plasma technology (STERRAD). In patients where surgery was done with instruments using the usual 2% glutaraldehyde sterilisation technique, prophylactic port site amikacin injection therapy reduced the incidence of PSI.

Conclusion: The use of low temperature gas plasma technology (STERRAD) is an appropriate method of sterilisation of laparoscopic instruments to reduce the incidence of PSI. Prophylactic use of port site Amikacin might be another cost effective solution in preventing PSI.

Keywords: Port site infection; Sterrard; Low temperature gas plasma technology; Sterilisation of laparoscopic instruments; Port site amikacine.

Introduction

Rapid progress in the field of health care technology has not only improved the capability of treating diseases surgically but has also limited its invasiveness. It was since the 8th decade of the 20th century that laparoscopic surgery became eminent and thereafter gradually became the procedure of choice of various surgical manoeuvres.[1] Less pain, early post-operative recovery, improved aesthesis, minimal scar and ability to return to work early were the major advantages of laparoscopic surgery.

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Despite beinga popular choice, laparoscopic surgery comes with its fresh set of complications. Among those, Port Site Infections (PSI) is one of the most bothersome complications that sometimes overshadow the benefits of a minimal invasive procedure.[2] It often delays the recovery and tests the patience of the patient as well as that of the surgeon. Patient becomes worried of this nagging infection affecting the quality of life. Despite performing a successful surgery PSI might hamper the reputation of the surgeon.

Infections at the port site are mostly of two types. The first variety occurs within the first week of recovery and is due to gram positive or gram negative infections acquired during the surgery from local skin flora, infected gall bladder or contaminated surgical field. It can be easily treated by common antibiotics and wound dressings. The second variety is caused by atypical mycobacteria like *M.chelonae* and *M.fortuitum*, which has a long incubation period of 3–4 weeks. Such organisms can contaminate tap water and liquid disinfectants used in the operation theatres and gains its way into the host tissues.[3,4] These organisms have a high affinity for the dermis and subcutaneous tissues and protective factors within the peritoneum prevent its deeper invasion. These are resistant to treatment by the common antibiotics.[5] Diagnosis is primarily made by clinical examination as the organisms are very difficult to culture.

Infections caused by atypical mycobacteria are primarily limited to the laparoscopic surgery because these instruments have a protective insulation because of which they can't be autoclaved. Therefore we are dependent on other sterilisation procedures which are often incompetent to kill the resistant spores. Improper cleaning leaves residues of blood and charred tissue within the crevices. Contaminated instruments deposit the endospores in the subcutaneous tissues and eventually lead to infections by atypical mycobacteria.[6] Using boiled tap water to clean the instruments after being immersed in 2% glutarayldehyde for 20 mins is thought to be a major culprit. Repeatedly using the same sterilising solution over 100 cycles is another point of concern.[7]

Therefore improper cleaning and using erroneous methods of sterilisation of laparoscopic instruments seems to be the major cause of these infections. Major efforts are underway to improve the methods to prevent and treat this Port Site Infections (PSI).

Our work focussed on prevention of PSI in laparoscopic cholecystectomies which is the Gold standard treatment for Gallstone disease.

Aims and Objectives

A. To study the role of low temperature gas plasma technology (STERRAD) as an appropriate method of sterilisation of laparoscopic instruments to reduce the incidence of PSI.

B. To study the role of prophylactic port site Amikacin in preventing PSI.

Materials and Methods

This is a prospective non randomized study which was done over 15 months. During this study period patients admitted in general surgery wards of IPGME & R and SSKM Hospital with cholelithiasis were included in the study. After undergoing laparoscopic cholecystectomy they were followed up for 3 months.

A. Study area: IPGME & R AND SSKM Hospital, Kolkata (a Tertiary care Centre).

B. Study population: Patients admitted in general surgery wards of IPGME & R and SSKM Hospital with diagnosis of cholelithiasis.

C. Sample size: 220.

D. Sample design: Non randomized.

E. Study design: Prospective and observational study.

F. Parameters to be studied: Role of STERRAD as an appropriate sterilising equipment for laparoscopic instruments, role of prophylactic port site Amikacin therapy and subsequent incidence of PSI following laparoscopic cholecystectomy.

G. Study tools: Pre designed and pretested proforma.

H. Data collection procedure:

- Clinical examination
- Review of investigations
- Follow up data

I. Data analysis procedure: Relevant analytical statistical methods.

Inclusion Criteria

Patients of all age group with a working diagnosis of cholelithiasis, who were planned to undergo laparoscopic cholecystectomy.

Exclusion Criteria

Patients in whom conversion to an open procedure was needed.

Results

During the period between June 2017 and May 2018, a total of 220 laparoscopic cholecystectomies were done under our care. The patients were followed up for a minimum duration of 3 months to look for development of any Port Site Infection (PSI).

A) The distribution of cases among male and females were as follows; (Fig. 1)

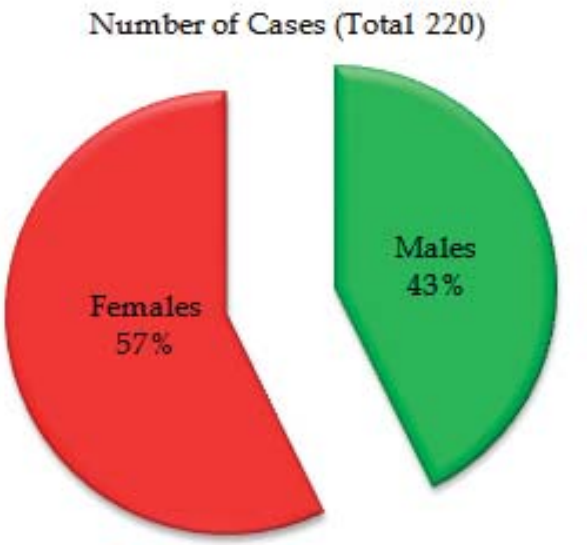

Fig. 1:

Total numbers of male patients were 94 and females were 126.

B) There were 30 patients who developed PSI following laparoscopic cholecystectomy. Majority of them were females. (Fig. 2)

C) We tried to assess whether there were any relationship between sex of the patient and development of PSI. (Table 3)

Table 3:

	Yes	No	Total
PSI in Males	9	85	94
PSI in Females	21	105	126
Total	30	190	220

Using the Fisher exact test;

The 2 tailed p value was 0.1650

The association was considered to be not statistically significant.

Therefore no significance of sex of the patient was found in the development of PSI.

D) Patients were randomly assigned to surgeries using instruments sterilised by the low temperature gas plasma technology (STERRAD) and the usual 2% glutarayldehyde sterilisation technique followed at our institute. The incidences of PSI in these patients were noted during the 3 month follow up period. The aim was to note any change in the incidence of PSI using the STERRAD technique when compared to the regular methods. (Table 4)

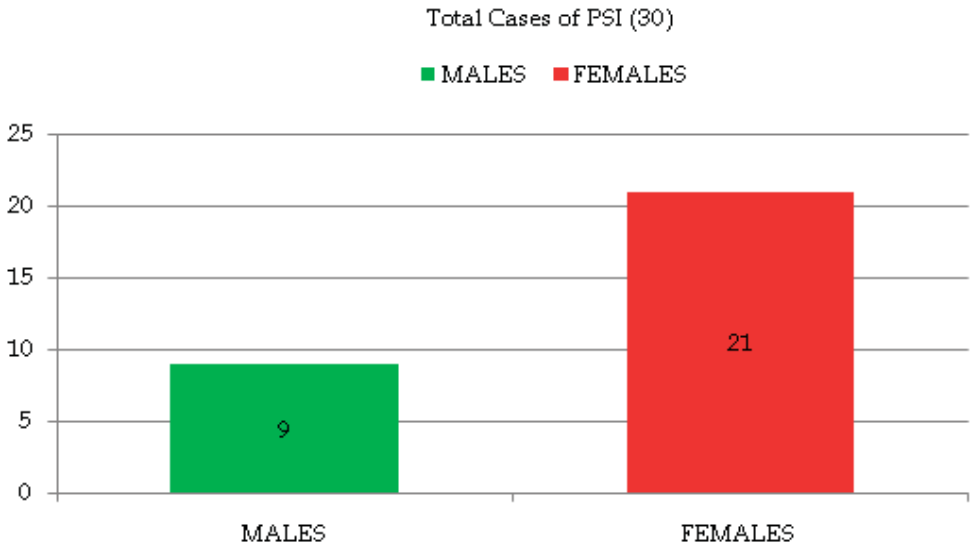

Fig. 2:

Table 4:

	PSI	No PSI	Total
STERRAD cases	1	82	83
NON STERRAD cases	29	108	137

Using the Fisher exact test; The 2 tailed p value was less than 0.0001. The association was considered extremely statistically significant.

Therefore the finding of such drastic reduction in cases of PSI using low temperature gas plasma technology (STERRAD) was found to be statistically significant indicating that it might be the better way to provide an uneventful post-operative PSI free recovery.

E) Among the patients who were not operated using the STERRAD sterilised instruments were randomly considered for prophylactic port site Amikacin after skin incision closure to note whether it had any impact on the prevention of PSI. The results were as follows; (Table 5).

Table 5:

	PSI	No PSI	Total
With AMIKACIN	11	108	119
Without AMIKACIN	18	0	18

Using the Fisher exact test;

The 2 tailed p value was less than 0.0001.

The association was considered extremely statistically significant.

Therefore using prophylactic Amikacin at the port sites could be an effective way to prevent PSI.

Discussion

Port site infections following laparoscopic cholecystectomies has been reported in all age groups and gender. Most laparoscopy wounds are either clean or clean contaminated in variety. The reported incidence of PSI is around 21 cases per 1,00,000 patients.[8] The commonest site is the umbilical port followed by the epigastric port.[9] Some of the notable risk factors for PSI were post-operative hospital stay for >2 days[10], operative duration more than 2 hours[10] and immunocompromised state.[11] Sex of the patient was not found to be a risk factor for developing PSI.[11]

PSI can be early or delayed. Early infections are caused by gram positive and negative organisms acquired during surgery from the colonised skin surface or the infected gall bladder contents. The main point of concern is the delayed PSI caused by the atypical mycobacteria like *M.fortuitum* and *M.chelonae*. They have an incubation period of 3–4 weeks and do not respond to the commonly prescribed antibiotics.[3] Diagnosis is primarily clinical as isolation of the organisms from the wound is often not possible by culture or demonstration by the AFB stain.

Thus prevention of such atypical mycobacterial infection is the top priority. Routine sterilisation procedure ofusing boiled tap water to clean the laparoscopic instruments after being immersed in 2% glutaraldehyde for 20 mins was thought to be a major culprit. This procedure was unable to kill the spores. Also repeatedly using the same solution was that of a concern.

Thus to reduce the burden of Port site infections, use of low temperature gas plasma technology (STERRAD) was introduced. The laparoscopic instruments were dismantled and cleaned by the surgical residents. The parts were thoroughly dried and then put into the STERRAD sterilisation system for a standard cycle time of 47 minutes. As shown by our study there was a drastic reduction in the number of PSI. Recent studies have shown similar results.

Once there is development of PSI, injection of Amikacin directly to the nodules for 5 consecutive days is one of the well-known treatment regimens. We used prophylactic port site Amikacin injection in the intra-operative period just after closing the skin incisions. 1 gram of undiluted amikacin was utilised for all the 4 ports. It was done for the NON-STERRAD cases and the aim was to achieve a cheap alternative to prevent PSI. It was noted that without using the STERRAD and prophylactic port site Amikacin, PSI was inevitable. Whereas using a prophylactic Amikacin therapy leads to a significant reduction of PSI. These findings were corroborative to other studies which showed that prophylactic port site Amikacin was a better option than intravenous Amikacin to prevent PSI.[12]

Other options to prevent PSI are to use disposable instruments and ports for every case as done in the western world. The cost would increase significantly making it a less preferable choice in our country.

Conclusion

Though PSI is an infrequent complication following laparoscopic surgeries yet it can be bothersome and affect the quality of life. Strictly

abiding by the methods of cleaning and sterilising of the laparoscopic instruments can prevent the development of PSI. The use of low temperature gas plasma technology (STERRAD) is an appropriate method of sterilisation of laparoscopic instruments to reduce the incidence of PSI. Prophylactic use of port site Amikacin might be another cost effective solution in preventing PSI.

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Original Research Article

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A Comparative Study of Onlay and Preperitoneal Mesh Repair in Management of Umbilical and Para-Umbilical Hernia

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Abstract:

Background: The study was conducted to compare the onlay mesh repair with the preperitoneal mesh repair in adult patients with paraumbilical /umbilical hernias.

Aim: The study compares the operative time, the hospital stay and postoperative complications and recurrence in onlay and preperitoneal mesh repair for umbilical hernia. It is a non randomized clinical trial.

Method: 44 patients underwent mesh repair by onlay or preperitoneal. These patients were more than 18 years but less than 70 years of age. All the other hernias like groin hernia, incisional hernia, epigastric hernia, recurrent hernia and divercation of recti were excluded. A detailed history with demographic parameters were noted. Local examination and routine labs were done. After written informed valid consent patients underwent onlay or preperitoneal. In the postoperative period patients were monitored for immediate and long term complications upto 6 months. The results were statistically were analysed and tabulated into results.

Results and discussion: Like most of the studies our results showed that operative time for preperitoneal is more than onlay repair. Althoughin our study the time of drain removal was almost same in contrast to the result of most studies where drain in the onlay repair group was removed before preperitoneal repair group. Patients of the preperitoneal group were discharged before the onlay group just like the result of most studies. Pain score (VAS) showed preperitoneal group had less pain on day 3 compared with onlay group but both had similar pain score on day 1. Complications like seroma formation, surgical site infection and chronic pain was more in the onlay group as compared to preperitoneal group. There was no case of recurrence in our study.

Conclusion: Umbilical hernias are less as compared to inguinal hernia and incisional hernia. Obesity remains the main risk factor and it occurs most commonly in middle age group 31–50 years. A mesh repair with non absorbable polypropelene mesh is the treatment of choice nowadays. A preperitoneal mesh repair demonstrates better outcomes in terms of hospital stay, severity of pain after day 3 and complications like seroma formation and surgical site infection as compared to onlay mesh repair. On long term follow up, a preperitoneal mesh repair shows less incidence of chronic pain and recurrence though more long term follow up warranted to validate the result.

Keywords: Umbilical Hernia; preperitoneal mesh repair; polypropelene mesh.

Introduction

A hernia is an abnormal protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity.[1]

As a result of man's erect posture anterior abdominal wall is the site of variety of hernias through a weak spot. Umbilicus is one of the weak areas of the abdomen and a common site of

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herniation.In adults the hernial site is rarely located at umbilicus, it is either above [supra-umbilical] or occasionally below the umbilicus [infra-umbilical] hence referred to as para-umbilical hernia. Umbilical hernia in adults are usually acquired and is more common in females than males. The average age of presentation is between 30 to 40 years.[2]

Obesity is the most common risk factor. The acquired type of umbilical hernia does not resolve spontaneously and are prone to complication, hence should be treated as early as possible. Nowadays, synthetic mesh repair is the treatment of choice which has reduced the rate of recurrence drastically.[3]

Mesh repair can be done in various ways like onlay, inlay or sublay (Pre-peritoneal and rectorectus). Controversy exist among surgeons regarding the use of either type of meshplasty; due to differences in the ease of performing surgery, time of surgery, hospital stay, complications occurring in the post operative period and recurrence. Nowadays laparoscopic mesh repair can be done instead of open mesh repair but need expertise and is not cost effective in Indian set up. So this prospective study had been performed focussing mainly on adult umbilical and para-umbilical hernia managed by open meshplasty in the given hospital set up and above mentioned parameters were compared in two groups namely onlay (ON) and preperitoneal(PR) meshplasty technique for hernia repair.

Anatomy

The umbilical ring is a fibrotic opening in the linea alba which measures about 8–10 mm in diameter[4] The fibroligamental layer is constituted by four ligaments. The round ligament of liver descends from above and the three other ligaments ascend from below to converge into the same point of the umbilical ring. These are median and two medial umbilical ligament, which are the obliterated remnants of urachus and the two umbilical arteries respectively. This creates relatively weak area in the fascia superiorly. Posterior to fibro ligamental layer lies the fascia transversalis. At the level of umbilical region, this fascia may show condensation, which is known as Ritchets fascia or fascia umbilicus. This thickened fascia may cover the umbilical ring entirely or partially. So when this fascia is absent or located outside the limits of umbilical ring or it only partially covers the ring, the area appears much weaker and is predisposed to hernia formation.

Thus, there are two structures, the round ligament and Ritchets fascia that protects the umbilical area. If both are absent, the floor of the umbilical ring is relatively unsupported. The herniation through such a ring has been called direct umbilical hernia, where the Ritchets fascia partly covers the ring, the superior and inferior edges may form a fold or recess through which hernia may occur. This is called as indirect umbilical hernia.

Such indirect hernia descends into the umbilical ring from superior fascial fold or ascends into the umbilical ring from inferior fascial fold.

There are tendinous intersections along rectus muscle. The lower most is a critical spot for development of para-umbilical hernias. Severe contractions of powerful lower part of rectus muscle as during labour leads to tear at this spot, thus causing hernia.

Closure of the umbilical ring is spontaneous in most of the cases by the age of 2 years and represent the only hernia in the body that is genetically programmed to close. arrested closure results in a clinically significant umbilical hernia. clear indication for repair in children include hernia which are not closed spontaneously by the age of 2 years in symptomless children and children presented with incarceration or the presence of symtoms. Para-umbilical hernias are mostly acquired and do not tend to get close spontaneously. It is more common in middle age >35 years and old age. Female: Male ratio is approximately 5:1. It is more commonly seen in obese and multiparous women.

Symptoms: Pain and the swelling are the main symptoms. Traction on omentum stomach or transverse colon often gives rise to GIT symptoms.

Materials and Methods

This study includes 44 cases of adult umbilical and para-umbilical hernia who were admitted and treated at a Government Medical College and Hospital, Aurangabad (Mahrashtra, India) between December 2014 to October 2016. This study was a prospective cohort study

Inclusion Criteria

1. Patients presenting with umbilical and para-umbilical hernia above 18 years and less than 70 years.

Exclusion Criteria

1. Patients less than 18 years and above 70 years

2. Patient with Groin hernia, Incisional hernia, Epigastric hernia, Divarication of recti, Recurrent hernia.

A detailed history was obtained from the patient or his relatives. The demographic parameters like age, sex, occupation of the patients as well as their weight, height, BMI were noted. During the local examination of the swelling, the size, site, reducibility, cough impulse and the condition of the overlying skin were examined and noted. A routine laboratory investigations were done. paients were distributed in 2 groups based on the type of meshplasty done either Onlay or Preperitoneal.

Onlay technique involves primary closure of the fascia defect and placement of a mesh over the anterior fascia, avoiding direct interaction with the abdominal viscera. Technically easy to perform. Large subcutaneous dissection, seroma formation, superficial location of the mesh, which places it in jeopardy of contamination if incision becomes infected and repair is usually under tension, which leads to chronic pain or discomfort. all above factors leads to high rate of recurrence in this group as high as 28%.

Sublay repair involves placement of the mesh below the fascial component. It includes **preperitoneal or retrorectus** placement of the mesh. It is highly desirable to have the mesh placed beneath the fascia the natural forces of the abdominal cavity act to hold the mesh in place and prevent migration. This technique has reported less complications like seroma formation, surgical site infection as this space protects the mesh from superficial wound infection and intra peritoneal content.it is Surgically more challenging and complex to perform. Dissection of this plane can risk damaging the muscle, blood supply, nerves to the rectus abdominis.[5]

Postoperative monitoring was done for any immediate complications and long term follow up was done to look for any recurrence.

Statistical Test used

For comparison of quantitative data of two groups unpaired t-test was used with the help of SPSS (Statistical Software for Social Sciences) Version 23 software and for comparison in within group paired t-test was used. P-value was checked at 5% level of significance.

Results

Table 1: Operative Time

Procedure	Expert	Time	Trainee	Time
Onlay	11	51 ± 10 Min	13	71 ± 7 Min
Preperitoneal	13	61 ± 11 Min	07	80 ± 11 Min

Table 2: Day of Drain removal

Avg day of drain removal	J Gleysteen *et al.*	Godara R *et al.*	Present study
Onlay	4 days	5 days	5.8 ± 1.7 day
Preperitoneal	6 days	7 days	5.2 ± 1.2 days

(*p* value=0.458)

Table 3: Duration of mean Hospital stay in each study

Duration of mean hospital stay	J Gleysteen *et al.*	De Vries Reilingh *et al.*	Bantu raj siddharth *et al.*	R Godara *et al.*	Present study
Onlay	7.9	8.2	7.5	4.6	9.7 ± 3.4 days
Preperitoneal	5.9	6.1	5.9	6.8	7.8 ± 2.2 days

Table 4: Pain Score

Procedure	At Day 1	AT DAY3
Onlay	6.91 ± 0.9	3.61 ± 0.6
Preperitoneal	6.78 ± 0.7	3.13 ± 0.6

p value=0.402 *p* value =0.002

Table 5: Incidence of complications

Complication	Preperitoneal	Onlay	Preperitoneal	Onlay	*p* value
Seroma formation	4	7	20	29.1	0.726
Surgical site infection	1	4	5	12.5	0.461
Chronic pain	3	8	7.6	18	0.450
Recurrence	0	0	–	–	–

Fig. 1: Paraumbilical Hernia

Fig. 2: Preperitoneal Mesh Placement

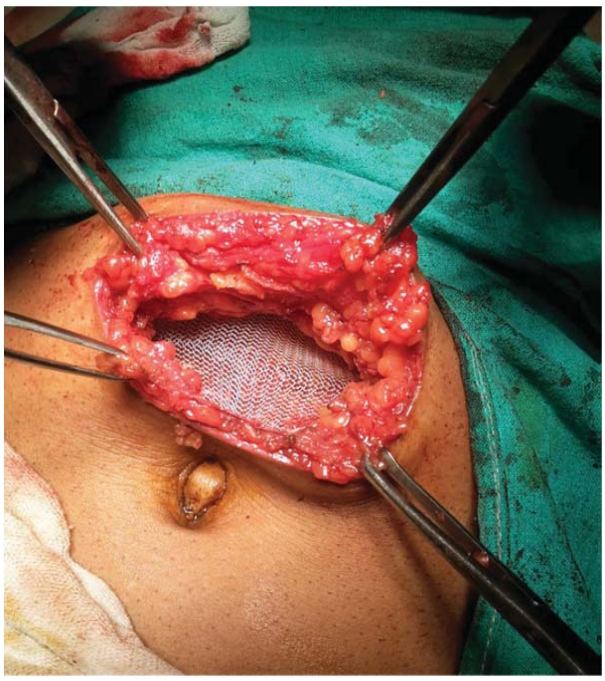

Fig. 3: Onlay mesh repair

Fig. 4: Postoperative day 10 showing Surgical site infection in onlay repair patient

Fig. 5: Patient with preperitoneal repair had healthy scar at 6 months

Discussion

Umbilical and para-umbilical hernia incidence in general population ranges from 3% to 10%. In present study incidence of umbilical and para-umbilical hernia was 8.7%.

Which is comparable with other studies and literature. In the present study 70.5% of umbilical hernias were para-umbilical, out of which supraumbilical hernia patient were more common than infraumbilical. The present study shows that incidence is highest in the age group of 35–50 years and mean age of incidence is 44 years. These findings correlate with the international figures. The Male to Female ratio in present study was 1:1. This finding was in contrast to most of the literature.

In this study, percentage of female population was 50%. Reason for high incidence in middle age female according to most of the literature is high incidence of obesity with multiparity in this age group. It was

found that, majority patients had more than one risk factor, main risk factor being obesity. Out of 44 cases, 81.8% of the patients were obese, 31% were multiparous, 5% had chronic cough due to COPD. Moschcowitz, A.V.[6] (1915), hypothesized that all conditions causing an increase in intra abdominal pressure like obesity, ascitis, smoking, chronic cough leads to development of umbilical hernia.

In the present study out of 44 patient, 24 patient underwent onlay mesh repair while rest 20 patient underwent preperitoneal mesh repair (Table 2).

In present study separate sub groups made in each group i.e. mesh repair done by expert (experience of 3 years and above) and by trainee surgeon (experience of less than 3 years). Mean time taken for the meshplasty by expert was 51 ± 10 min for Onlay and 61 ± 11 min for Preperitoneal (p value = 0.042), which shows there was significant time difference between the two procedures. Similarly operative time by trainee for Onlay was 71 ± 7 Min and for preperitoneal was 80 ± 11 Min (*p* value = 0.035), which is also a significant time difference to perform two procedures. This time difference observed between the 2 groups may be due to more dissection needed for creating preperitoneal space plus securing reasonable hemostasis in the preperitoneal repair. This proves preperitoneal repair is technically a more challenging and complex surgery than Onlay mesh repair. It also emphasize expertise also a significant factor to determine time of surgery.

Bantu Rajsiddharth *et al.*[7] which shows that the mean operative time for onlay was 45 min and for preperitoneal was 60 min, which was comparable with the findings of our study. J. Gleysteen *et al.*[8] showed that the mean duration of Onlay repair was 42 min as compared to preperitoneal repair with mean operative time was 70 min.

R Godara *et al.*[9], study the mean duration of surgery in Onlay was 49 ± 8 min while in sublay was 63 ± 15 min (*p* value <0.001). The difference was highly significant.

Duration of hospital stay indicates the degree of morbidity in terms of post operative complication. Also more the hospital stay more are the chances of wound infection. The Mean duration of hospital stay in "onlay" group was 9.33 days as compared to "preperitoneal" group with 8.40 days ($p < 0.041$). Thus the difference is statistically significant proving that average hospital stay and thus postoperative morbidity and complication is less in preperitoneal repair.

J Gleysteen *et al.*[8] 2009, stated that average hospital stay for onlay was 7.9 days as compared to pre-peritoneal repair was 5.9 days. De Vries Reilingh et al.[11] 2004, quotes "The mean duration of surgery in their study was 8.2 days in onlay while 6.1 days for preperitoneal repair."

Bantu rajsiddharth *et al.*[7] 2015, this study shows mean duration of onlay repair was 7.5 days and 5.9 days for preperitoneal repair.

One study showing contradictory results is R Godara et al.[9] 2005, in this study mean hospital stay in onlay was 4.6 days while in Preperitoneal repair was 6.8 days.

In present study in "onlay" group average day of drain removal was 5.75 days as compared to pre-peritoneal group where drain removal on 5.5 days (*p* value=0.45).

J Gleysteen *et al.*[8] 2009: Stated that in Onlay repair drain remained for 4 days while in sublay repair drain remained for 6 days.

Seroma formation is most common complication in umbilical hernia. In present study, 29.1% (7 cases) had seroma formation in the Onlay group as compared to 20% (4 cases) in the Preperitoneal group. (p value = 0.726). The Onlay mesh repair had more cases of seroma formation, due to more subcutaneous dissection to place the mesh which leads to formation of more devitalised tissue and subcutaneous fat necrosis.

Shahidaparveen *et al.*[10] 2015, reported 28% (14 cases) seroma formation in onlay repair was compared to 16% in sublay repair.

Bantu Rajsiddharth *et al.*[7] 2015, stated that Onlay repair showed seroma formation in 20% patient and preperitoneal repair showed 10% cases with seroma formation.

The surgical site infection is more frequent following Umbilical hernia repair than other hernia repair because umbilical skin may not be cleaned of all bacteria even with the use of modern antiseptic solution. A recent study reported a 19% infection rate following open umbilical hernia repair despite giving preoperative prophylactic antibiotic. Surgical site infection includes wound infection and wound dehiscence and can be superficial wound infection or deep mesh infection. It is prevented by suction drain, Injectable antibiotics, regular sterile dressing. In present study there were 5 patient (11.3%) that reported with surgical site infection, 4 patients (12.5%) were of onlay group and 1 patient (5%) of preperitoneal group (*p* value= 0.46). It shows onlay group is more susceptible for surgical site infection. Deep mesh

infection was not reported during our study in any of the two groups. John J Gleysteen *et al.*[8] 2009 published a study which reported wound infection in onlay group was 12% while in preperitoneal group was around 4%. Bantu Rajsiddharth *et al.*[7] 2015 reported wound infection of 13% in onlay group while 6% in preperitoneal group.

Mesh removal is considered in case of deep mesh infection which is not controlled by higher antibiotics and regular dressing. It further leads to increased chances of hernia recurrence. In present study no such case of mesh removal was reported in either of the 2 groups.

Postoperative pain was gauged using VAS score. In present study, equal doses of analgesic injection tramadol on day of surgery and injection diclofenac from post operative day one given till the time patient stop complaining of pain. VAS score measured at day one and day three. Pain score was compared in 2 groups at post operative day one and three.

At day 1

Average pain score for onlay and preperitoneal group was 6.91 and 6.73 respectively. (p > 0.648). This shows there was no significant difference in pain at day 1 in either of the two procedure.

At day 3

Average pain score for Onlay and Preperitoneal group was 3.58 and 3.13 respectively. Which was statistically significant (p > 0.048)

Thus we concluded, there is significant reduction in pain in preperitoneal repair on Day 3.

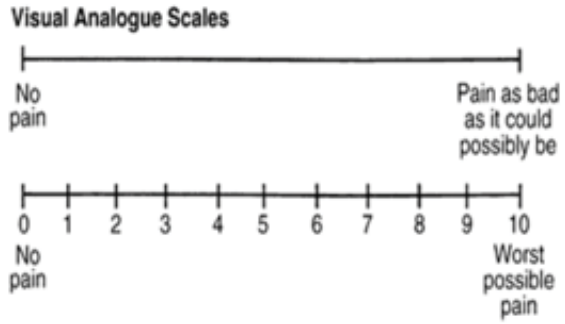

Fig. 6: Visual Analogue Scales

Chronic pain is a late complication in hernia surgery. In present study 10 patients (22.7%) complained of chronic pain after meshplasty on follow up (after 6 months), 7 patients (29%) of onlay repair in comparison to 3 patient (15%) of preperitoneal repair group. (p value >0.45). Bantu Rajsiddharth *et al.*[7] 2015, states chronic pain was complained by 7 patient (11.6%). Out of these 6 (20%) were in Onlay group while one patient (3.33%) in pre-peritoneal repair group (p value < 0.05).

Conclusion

A preperitoneal mesh repair demonstrates better outcomes in terms of hospital stay, severity of pain after day 3 and complications like seroma formation and surgical site infection as compared to onlay mesh repair. On long term follow up, a preperitoneal mesh repair shows less incidence of chronic pain and recurrence though more long term follow up warranted to validate the result.

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Original Research Article

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Assessment of Surgical Safety Checklist use and Attitude Towards it Among the Operating Room Staff: A Prospective Observational Study

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Abstract

Introduction: Inter-professional teamwork-an important factor for patient safety. World Health Organization (WHO) introduced Surgical Safety Checklist which has shown to improve intraoperative teamwork and contribute to postsurgical safety culture by reducing surgical morbidity and mortality. Our aim is assessing the use of surgical safety checklist, its completion rate and attitude of operating room staff towards its use, barriers to implementation and methods to improve compliance.

Methods: A prospective study was conducted In August 2018, a total of 262 surgeries were performed in the department of general surgery, accordingly surgeries were observed for briefing team and data collected regarding the completion of Surgical Safety Checklist (SSC). Post August questionnaires were given to operating room staff to ask their opinions regarding the checklist, beliefs and barriers.

Results: Only 16.03% of the checklist were completely performed, while 55.72% remained partially complete and 28.2% were such that none of the components of checklists in the patient files were filled in; with more usage of checklist during elective procedures, 13.14% completely performed and 73.14% were partially complete. About 57.47% of checklist remained completely unused during emergency surgery. Overall, lack of briefing team was noted in >80% of time. More than 80% of people believed that usage of checklist reduces likelihood of human error and main barrier for lack of usage being lack of training and assertiveness.

Conclusion: Appropriate utilization and compliance of Surgical Safety Checklist is dependent on the training of staff. It cannot be assumed that the introduction of a checklist will lead to improved outcomes unless followed. The functioning of checklist requires people to make one salient change particularly, the operating team has to pause during sign in (SI) time out (TO) and sign out (SO) phases before continuing as it just acts as a reminder at every stage of surgery. Actual usage of checklist has to be made rather than blindly filling in the box because compliance is important than the completeness of the checklist.

Keywords: Surgical safety checklist, Sign in, Time out, Sign out.

Introduction

Around the world surgical complications are considerable cause of death and disability. They are catastrophic to patient, costly to healthcare systems, and often preventable, though their prevention requires a change in health care systems and individual behaviours.[1] The World Health Organization (WHO) has developed a comprehensive perioperative checklist as a primary intervention of the "Safe Surgery Saves Lives" program—a sincere effort to reduce surgical deaths around the world.[2]

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This checklist is similar to those used in aviation, aeronautics and product manufacturing. The surgical safety checklist (SSC) consists of 19 items and for the timing of WHO surgical safety checklist, three phases in the work flow pattern that had naturally amended 'pause points' were identified. first prior to induction of anaesthesia, second prior to skin incision and third prior to patient leaving the operating room.[3] The items included in the SSC are aimed at preventing uncommon but serious errors, bascically by reminding the team to confirm patient identity, surgical site, and other important characteristics such as comorbid conditions or anticipated complications. Results from the initial prospective, sequential, time-series observational study showed significant reductions in complications, in-hospital mortality, rates of unplanned reoperation, and surgical site infection (SSI) compared to pre-checklist rates.[4] The assessment of patient safety perceptions and behaviors of members of surgical teams allows one to identify the most vulnerable areas so that operating surgeons can promptly intervene in order to solve problems in the operating room[5], checklist helps for the same in a organized manner. J. Bergs *et al.* showed that Reduction in postoperative complications correlates with adherence to the aspects of care embedded in WHO SSC.[6] Our aim is assessing the use of surgical safety checklist, its completion rate, compliance attitude of operating room staff towards its use, barriers to implementation and methods to improve compliance, though we haven't looked into the postoperative complications of surgeries performed.

Materials and Methods

An observational study was conducted in august 2018 in the department of general surgery, a total of 262 surgeries were performed out of which 87 were emergency and 175 were elective with an average of 6–7 elective and 2–3 emergency surgery's per day, accordingly surgeries were observed for the presence of briefing team and data collected regarding the completion of Surgical Safety Checklist (SSC). Post august a total of 16 questions were given pertaining to Attitude, Knowledge, Adaptation and Practicability of surgical safety checklist [SSC] to operating room staff i.e -surgeons, anesthetist, OT nursing staff. Circulated by e-mail, whats up groups and other messengers. Responses were collected, compared and statistically analysed using surveymonkey. Com. [questionare described in annexure].

Results

Only 16.03% (42) of the checklist were completely performed, while 55.72% (146) remained partially complete and 28.2% were such that none of the components of checklists in the patient files were filled in i.e about 74 out of 262 SSC were completely unused. So, the overall completeness being 71.75%.

With breifing team noted 16% of the time, as found in sections completely performed and eventually lack of briefing team in >80% of time.

More usage of checklist was noted during elective procedures about 86.2% (151) .13%(23) were complete and 73.14% (128) were partially complete with time out section to be filled maximally. Whereas during emergency surgeries 42.5%(37) of checklist were used (completely and partially filled) and 57.4% (50) remained unused (Fig. 1).

Among 262 checklist, 188 were filled in 71.75% with 146 checklist 55.7% being partially filled in, the following table depicts the number of checklist that were filled partially in separate components of both elective and emergency surgery. The time out component of checklist was the most commonly performed 56.87% and sign in component was the

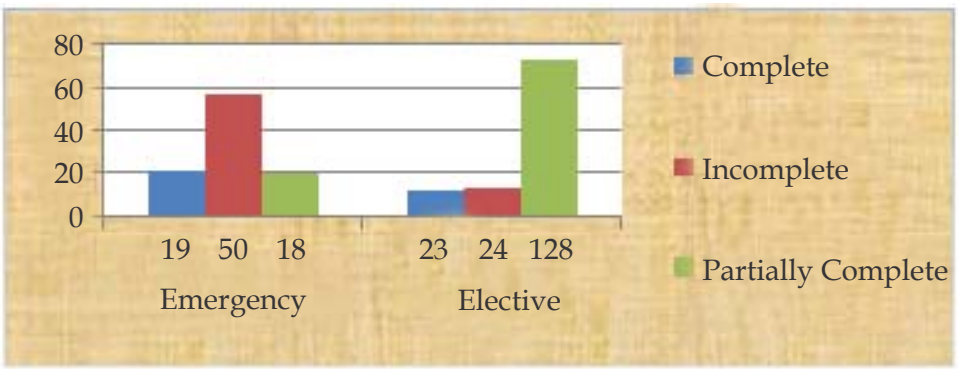

Fig. 1: Completeness of checklist-elective vs emergency

most poorly done section 27.48% (Table 1) (Fig. 2).

Post study questionnaire were distributed to the operating room staff. 116 members filled the questionnaire of which 62 were surgical personal, 21 were anesthetic personal and 33 were nursing staff. Of which 50% of the people knew that WHO introduced checklist (Fig 3).

Amongst all the people in operating room nursing staff support the use of checklist-58% (Fig 4).

Four questionnaire were such that it would assess the need of man power, their compliance and their indulgence into the right use of checklist at right time (Table 2).

Eight questionarrie were to assess the attitude of operating room staff towards the checklist and factors affecting its regular usage. Regarding man power when asked if number of people in OT affect completion rate,72% felt it to be true, which is significant @ p <0.01. while 53% felt the position of surgery in OT affect completion rate which is insignificant @ $p < 0.05$ (Fig 5).

Though 100% of people thought it to be useful only 59.32% had initited the use of it in the past and rest 40.66% would like to initiate the use of it in future. Among OT staff 23.93% of them think SSC causes delays and 6.78% think it doesn't work, all values were significant @ $p < 0.05$. (Fig. 6).

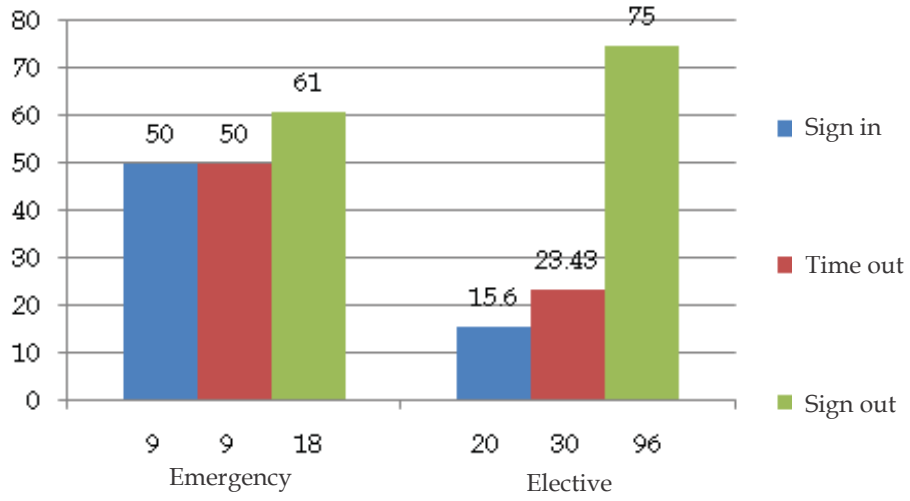

Fig. 2: Components of checklist-completion rate

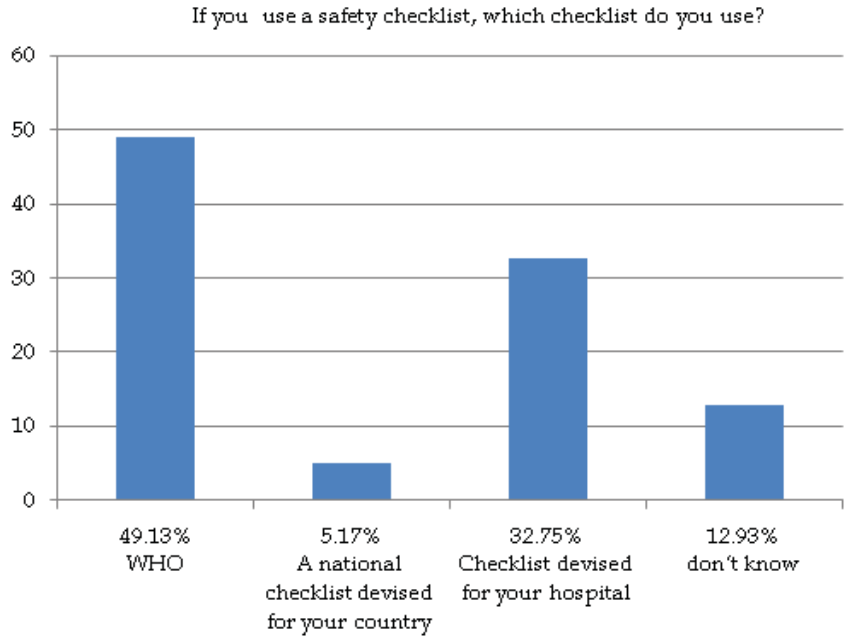

Fig. 3: Knowledge

Regarding belief and barriers for implementation –multiple responses were recorded. 77.78% of people believe checklist reduces the likelihood of human error, 66.7% believe it improves patient safety (Fig. 7).

And the main barrier for lack of usage being lack of training and assertiveness 42.59 and 35.19% respectively. 11.11% feel failure of documentation being the cause though precautions are followed All found to be significant @ $p < 0.01$ and lack of training significant @ $p < 0.05$ (Fig. 8).

Discussion

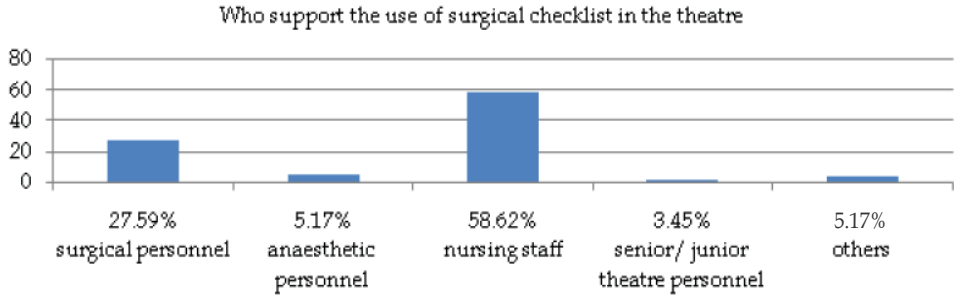

Fig. 4: who support the use of surgical checklist in the theatre

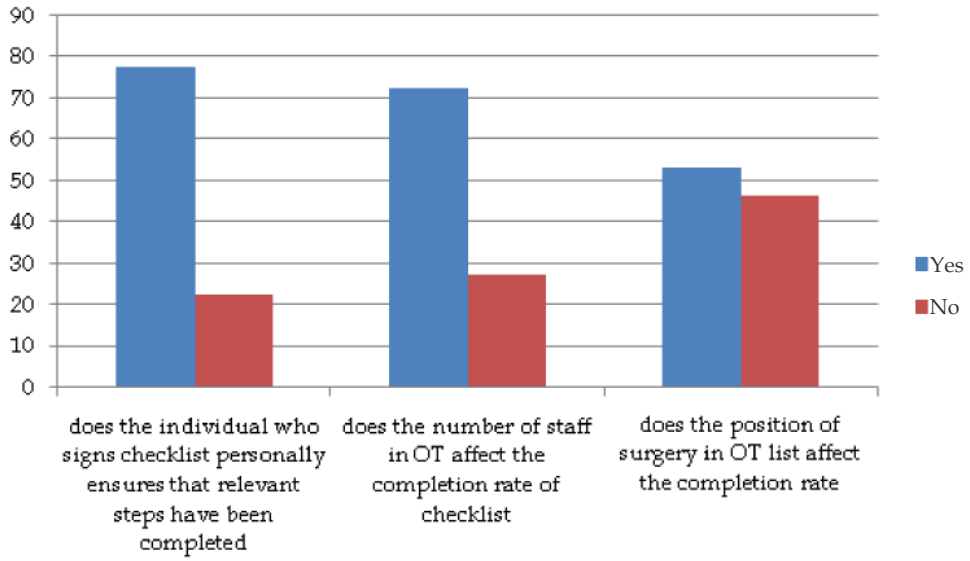

Fig. 5: Adaptation

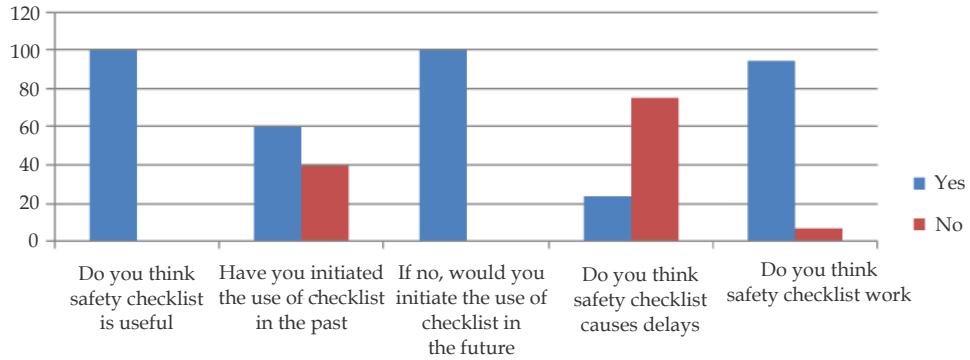

Fig. 6: Adaptation

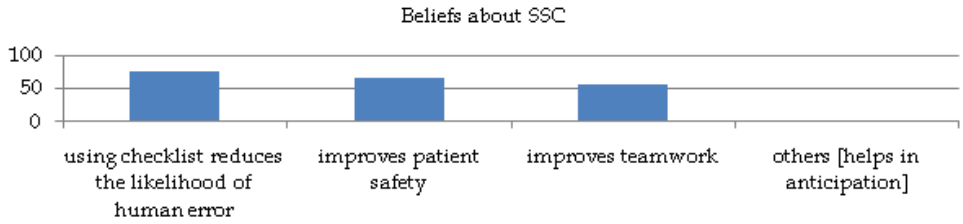

Fig. 7: Practicability

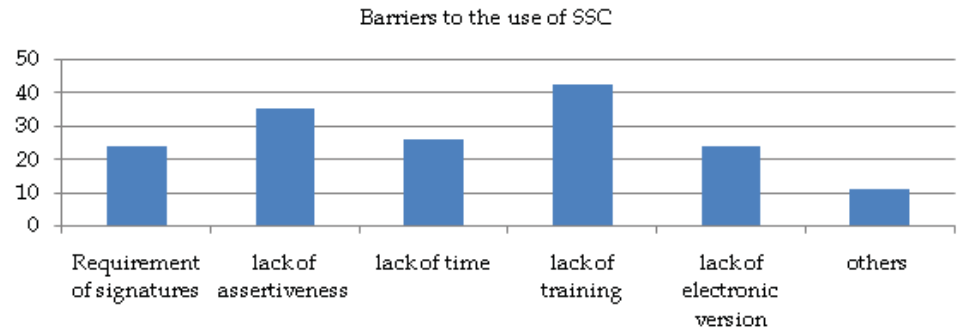

Fig. 8: Practicability

Table 1: Completeness of Components of SCC

		Only sign in	Only sign out	Only time out
Emergency Surgery	With signatures	2	5	0
	Without signatures	0	0	0
		Sign in + time out	Time out + sign out	Sign in + sign out
	With signatures	7	4	0
	Without signatures	0	0	0
Elective Surgery		Only sign in	Only sign out	Only time out
	With signatures	2	14	80
	Without signatures	1	0	0
		Sign in + time out	Time out + sign out	Sign in + sign out
	With signatures	3	6	6
	Without signatures	6	1	3

Table 2: Checklist

	Never	Occasionally	Most of the time	All the time
In the operating room, do you use a safety checklist?	5.17%	25.86%	34.48	34.48
Before the start of first case in the operating room, do you have a team briefing to discuss the patients on the operating list?	25.86	40.5	25.86	7.75
Before the surgical incision is made, do you stop and confirm the patient's identity; the operation to be performed; the consent form has been signed; cross-matched blood is available; and that antibiotic prophylaxis has been commenced if appropriate?	8.62	18.97	43.1	29.31
At the end of the operation, do you have a 'sign out' session to check the name of the procedure performed; that the instrument count is correct; that any specimens have been labelled?	17.24	15.51	23.27	43.96

Table 3: Adaptation

	Yes	No	Chi- Square Value
Does the individual who signs checklist personally ensures that relevant steps have been completed	90	26	35.31**
Does the number of OT staff in OT affect the completion of the checklist	84	32	23.31**
Does the position of surgery in OT affect the completion of the checklist	62	54	0.55
Do you think the safety checklist is useful?	116	0	116.00**
Have u initiated the use of checklist in the past	70	46	4.97*
If no, would u initiate the use of checklist now [sub question of previous question]	46	0	46.00**
Do you think the safety checklist causes delays?	28	88	31.03**
Do you think the safety checklist doesn t work	110	6	93.24**

Table 4: Beliefs about SSC [Practicability]

	Yes	No	Chi-Square Value
Using checklist reduces likelihood of errors	84	32	23.31**
Improves patient safety	72	44	6.76**
Improves team work	62	54	0.55
Others	2	114	108.14**

Table 5: Barriers to the use of checklist [knowledge]

	Yes	No	Chi-Square Value
Requirement of signatures	26	90	35.31**
Lack of assertiveness	38	78	13.79**
Lack of time	28	88	31.03**
Lack of training	46	70	4.97*
Lack of electronic version	26	90	35.31**
Others	13	105	71.73**

Note: * - Significant at $p < 0.05$, ** - Significant at $p < 0.01$

Our study showed moderate completeness rate of SSC, with positive attitude towards the checklist, but with a lack of briefing team in >80% of time indicating low compliance.

Conley *et al.* 2010 investigated the factors influencing implementation of the checklist in five Washington hospitals and concluded that effectiveness was dependent on the ability of leaders to explain and show how to use the checklist and why it has to be used.[7] Which has to be inculcated in the current setup to improve the compliance rate.

Borchard *et al.* complied the results as overall compliance rate ranging from 12% to 100% (mean of 75%) and for time out from 70 to 100% (mean of 91%)[8] similarly our study showed a compliance rate of about 71.75% with varying degree of completeness with time out section being maximally performed of about 56.87% compared to other sections.

Most of the checklists were filled in maximally during emergency surgery in regard to results of melekie *et al.*[9], but with regard to current context maximal usage was found in elective surgery and propable reason being despite of non usage of checklist-most of the components were filled in and hence completeness rate was satisfactory.

Similar to the research by Nilsson *et al.* (2010) all the operating room personnel had positive attitude towards the checklist. Majority of the operating room personnel believed that checklist improves communication and collaboration among personnel. It is easy to use in surgery and valued as important tool in every patient's case.[10]

Santana *et al.* showed that 90.0% of respondents agreed that checklist helps in prevention of errors in the operating room, and our study showed 77.78% acceptance for the same. over all, the use of checklist at pause points helps in the completion of important aspects which if missed can cause significant postoperative unwanted outcome.[11]

Limitation of study being audit cycle is not completed. Effects on morbidity or mortality is not discussed, completion of SSC in different departments are not considered.

Conclusion

The functioning of checklist requires people to make one salient change particularly, the operating team has to pause during sign in (SI) time out (TO) and sign out (SO) phases before continuing as it just acts as a reminder at every stage of surgery. Actual usage of checklist has to be made rather than blindly filling in the box because compliance is important than the completeness of the checklist.

Annexures

Questionnaries

Attitude

- Before the start of first case in the operating room, do you have a team briefing to discuss the patients on the operating list?
- Before the surgical incision is made, do you stop and confirm the patient's identity; the operation to be performed; the consent form has been signed; cross-matched blood is available; and that antibiotic prophylaxis has been commenced if appropriate?
- At the end of the operation, do you have a 'sign out' session to check the name of the procedure performed; that the instrument count is correct; that any specimens have been labelled?

Knowledge and Usage

- Do you use a checklist
- Which checklist do you use
- Who supports the use of checklist

Practicability

- Beliefs about SSC
- Barriers to implementation

Adaptation

- Does the individual who signs checklist personally ensures that relevant steps have been completed
- Does the number of OT staff in OT affect the completion of the checklist
- Does the position of surgery in OT affect the completion of the checklist
- Do you think the safety checklist is useful?
- Have u initiated the use of checklist in the past
- If no,would u initiate the use of checklist now [sub question of previous question]
- Do you think the safety checklist causes delays?
- Do you think the safety checklist doesn't work

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Original Research Article

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Comparative Study of No Mesh (Desarda) Technique Versus Mesh (Lichtenstein) Technique of Inguinal Hernia Repair

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Abstract

Context: Inguinal hernia repair is the most commonly performed operations. In the early 1980s, Lichtenstein popularized the tension free repair, supplanting tissue-based repairs with the widespread acceptance of prosthetic materials for posterior wall of inguinal canal. No surgeon has ideal results, and complications remain. This study was taken as the Desarda's technique recently gaining popularity as physiological repair not using the mesh and Desarda's technique short term outcomes not much evaluated in comparison with Lichtenstein' repair in this region.

Aims: To compare the short term outcomes and recurrence rate between Lichtenstein's and Desarda's technique in the following ways:

Source of data: Narayana Medical College and Hospital Nellore, during 2 years from October 2014 to October 2016.

Research design: A prospective experimental study.

Sampling procedure: Simple random sampling technique.

Sample size: A total of 60 patients were studied, 30 of these undergoing Desarda's hernia repair and 30 undergoing Lichtenstein mesh repair.

Conclusions: Desarda's technique and Lichtenstein's technique both are have similar rates of wound infection and post operative pain. Desarda's technique was easy to do, has no recurrence in short term follow up period, lower operative time, less chances of post operative morbidities, lower cost, less incidence of seroma.

Keywords: Hernia; Desarda's technique; Lichtenstein's technique.

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Introduction

The earliest record of inguinal hernia dates back to 1500 BC. It has been said that the history of groin hernias is the history of surgery Itself.[1,2] Evidence of surgical repair of inguinal hernias can be traced back to ancient civilizations of Egypt and Greece.[3,4]

Inguinal hernia repair is the most commonly performed operation in the United States, owing to a significant lifetime incidence and variety of successful treatment modalities. Approximately 800,000 cases were performed in 2003.[3,5]

Bassini (1844–1924) transformed inguinal hernia repair into a successful venture with minimal morbidity. The success of the Bassini repair over its predecessors ushered in an era of tissue-based repairs. Modifications of the Bassini repair were manifest in the McVay and Shouldice repairs. All three of these techniques, as well as modern variations such as the Desarda operation, are currently practiced.[3,6]

In the early 1980s, Lichtenstein popularized the tension free repair, supplanting tissue-based repairs

with the widespread acceptance of prosthetic materials for inguinal floor reconstruction. This technique was superior to previous tissue-based repair in that mesh could restore the strength of the transversalis fascia, thereby avoiding tension in the defect closure.

Inguinal hernia repair underwent its most recent transformation. Laparoscopic inguinal hernia repair as the Trans Abdominal Pre Peritoneal (TAPP) repair and the Totally Extra Peritoneal repair (TEP).

Despite the frequency of this procedure, no surgeon has ideal results, and complications such as postoperative pain, nerve injury, infection, and recurrence remain.[6] In spite of these, inguinal hernia still remains unconquered and poses a lot of challenges for all surgeons practicing hernia repair.

There are more than 200 techniques for inguinal hernia repair, and every technique author claiming that their technique is superior to others. As the Desarda's technique recently gaining popularity as physiological repair not using the mesh and it's short term outcomes not much evaluated in comparison with Lichtenstein' repair in this region and hence took the study.

Materials and Methods

Source of data: Patients at Narayana Medical College and Hospital Nellore.

Study duration: 2 years from October 2014 to October 2016.

Research design: A prospective experimental study

Sampling procedure: Simple random sampling technique

Sample size: A total of 60 patients were studied, 30 of these undergoing Desarda's hernia repair and 30 undergoing Lichtenstein mesh repair.

Inclusion criteria

1. Above 18 years of age.
2. With a primary, reducible inguinal or inguinoscrotal hernia; unilateral or bilateral hernias.

Exclusion criteria: Patients with

1. Obstructive uropathy or chronic obstructive pulmonary disease, poor general condition.
2. Patients with strangulated hernia, Recurrent hernias.

Study method: All patients were evaluated as per proforma. Institutional ethical committee approval was taken prior to commencement of study. The patients were divided into two groups. *Group A* cases undergoing repair by Lichtenstein's technique. *Group B* cases undergoing repair by Desarda's technique.

Results

Table 1: Age Distribution

Age in years	Group A	Percentage	Group B	Percentage
21–30	9	15	3	5
31–40	5	8.3	6	10
41–50	5	8.4	7	11.7
51–60	6	10	10	16.7
61–70	5	8.3	4	6.6
Total	30	50	30	50

Table 2: Comparison of Age in Group A and Group B

Parameters	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
	Mean	SD	Mean	SD		
Age	43.7	14.56	47.4	12.5	1.41	>0.05

Table 3: Comparison of Type of Hernia in Group A and Group B

Type of hernia	Group A	Group B	Total
Direct	16 (26.6%)	16 (26.67%)	32 (53.33%)
Indirect	14 (23.33%)	14 (23.33%)	28 (46.67%)
Total	30 (50%)	30 (50%)	50 (100%)

Table 4: Comparison of Duration of Surgery in Group A and Group B

Surgery	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
	Mean	SD	Mean	SD		
Duration	76.67	16.04	62.8	16.74	3.36	<0.001

Table 5: Comparison of Cost of Surgery in Group A and Group B

Surgery	Group A (n= 30)		Group B (n=30)		Z Value	*p* Value
	Mean	SD	Mean	SD		
Cost	1370	61.03	715	198.33	17.29	<0.0001

Table 6: Comparison of Post Operative Pain in Group A and Group B

Post op Pain	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
	Mean	SD	Mean	SD		
Day 1	5.433	1.27	5.1	1.16	1.14	>0.05
Day 3	4	1.67	3.65	1.38	0.68	>0.05
Day 6	2.55	1.91	2	1.63	1.27	>0.05

Table 7: Comparison of Infection Score in Group A and Group B

ASEPSIS score	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
	Mean	SD	Mean	SD		
	15.16	9.1	11.47	7.51	2.39	<0.05

Table 8: Comparison of Seroma Formation in Group A and Group B

Seroma formation	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
	4	13.33%	1	3.33%	1.42	>0.05

Table 9: Comparison of Chronic Pain in Group A and Group B

Chronic Pain	Group A (n = 30)		Group B (n = 30)		Z Value	*p* Value
1 month	5	16.67%	2	6.67%	1.22	>0.05
3 months	5	16.67%	2	6.67%	1.22	>0.05
6 months	5	16.67%	2	6.67%	1.22	>0.05

Table 10: Comparison of Recurrence in Group A and Group B

Chronic Pain	Group A (n = 30)	Group B (n = 30)
1 month	0	0
3 months	0	0
6 months	0	0

Discussion

Operative time

The mean operative duration of group A (Lichtenstein's) in this study was 76.67 minutes with a SD of 16.04 and in the group B (Desarda's) it was 62.33 minutes with a SD of 16.98. The Z value for comparison of operative time was 3.36 and P value of ≤0.001. This difference between these two groups is statistically significant and also these results are comparable with the following studies like Manyilirah *et al.*[7]

Situma *et al.*[18] Desarda repair in 13.26 minutes, 2.73 minutes longer than the Modified Bassini repair.

Imran Ahmad *et al.*[9] Desarda's group time taken for surgery was average 30 minute, while in Lichtenstein group average time was 40 minute (*p* value <0.0001). In a study conducted by P.R.l. Rodríguez *et al.*[10] observed that the mean duration of surgery was 39 minutes for Lichtenstein and 48 minutes for Desarda group ($p < 0.05$). In a study conducted by Iftikhar Ahmad Bhatti *et al.*[11] It is concluded that there is no difference in frequency of seroma formation and mean operative time in Desarda's or Lichtenstein's technique of hernia repair.

Cost of the surgery

The mean cost of the surgery in the patients undergoing inguinal hernia repair by Desarda's technique was Rs 715 /- and had SD of 198.33 whereas the mean cost of the patients undergoing repair by Lichtenstein's technique was Rs 1350/- and had SD of 61.03. This was statistically significant difference with *p* value ≤.0001 and z value of 17.29 which is comparable to following studies.

Szopinski *et al.*[12] Sowmya *et al.*[13] Nadeem *et al.*[14] Yong *et al.*[15] Gopal Sharma *et al.*[16] supports this.

Post-operative pain

The pain experienced by the all patients in both the groups of the study was scored on a visual analogue scale of 0–10 on the post operative days 1, 3 and 7. The overall analysis showed a trend of lower mean pain score in group B. The differences in the mean pain scores were not statistically significant and was comparable to the results demonstrated in studies by Szopinski *et al.*, Manyilirah *et al.*, P.R.l. Rodríguez *et al.*, Situma et al.

Seroma formation

Seroma formation was observed 13.33% in group A and 3.33% in group B. Even though higher incidence of seroma in group A than group B, these results are not statistically significant. These results are comparable with following studies Grant *et al.*, Horstnmannetal, kyamanywa *et al.*, szopinski *et al.* Seromas may result from extensive tissue dissection. The studies mentioned above showed that seroma is an inherent problem of mesh based hernia repairs. The explanation for this is not clear. However it is known that the mesh is rapidly invaded by fibroblasts that fill up the pores in the mesh. This could result in a delayed absorption of the serous fluid accumulating in the wound after the operation, leading to seroma formation.[17,7]

Nadim khan *et al.*[18], in the postoperative six patients in all presented with scrotal swelling of which 4 patients (3.6%) had developed seroma and two patients (1.8%) had hematomas formed. Sowmya *et al.*[13]; Complications such as seroma and wound infection were less in Desarda repair. Iftikhar Ahmad Bhatti *et al.*[19], When cross tabulated treatment group with seroma formation, results were non-significant ($p = 0.297$). 6 patients of Desarda's group developed seroma formation and 10 patients of Lichtenstein group showed similar results, at end of study period.

Post operative wound infection

The mean ASEPSIS scores for group A was 15.17 with a SD of 9.15 and the mean score for group B was 11.47 with SD 7.51. Although not statistically not significant but the mean scores were higher in group A. This was comparable with following studies Rodriguez et al, Szopinski *et al.*, Desarda *et al.* Sowmya G et al.[25], GencV *et al.*[41], Surgical-site infections, often with clinical symptoms delayed for long time, are more frequent after insertion of mesh in the inguinal canal.

Sikandar Hayat *et al.*, Post operative wound infection in both groups is similar which is comparable with the studies of Manyilrah *et al.* in 2012 and similar results were depicted by szupinsky *et al.* in 2013.[37]

P.R.L Rodríguez *et al.*[22] However, the morbidity was higher (7.5%) in the Lichtenstein group as compared to the 3.4% Desarda group. There were 8 mesh infections after surgery in the Lichtenstein group. Two cases required partial excision of the mesh and total excision in one case. Desarda technique has lower morbidity as compared to mesh hernioplasty.

Recurrence rate

In this study there was no recurrence seen in subjects of the groups in follow ups at 1 month, 3 months, and 6 months. The incidence of recurrence in patients undergoing mesh repair (Lichtenstein's technique) is known to range from 10–15% but a longer follow up is required to assess incidence of recurrence.[43–45]

The incidence of recurrence in Desarda's technique is nil in all the studies except two studies which was statistically not significant.[9,46,47,35, 32,20]

Sowmya G *et al.*[25], there was no recurrence observed in both the groups during the followup period. In our study, there were no statistically significant differences between the patients demographics in both groups and also there was no recurrence observed in both the groups during the follow up period.

P Sumathi *et al.*[24], it has showed the chances for recurrence as 1.97% but it was observed over 10 year followup. Our study findings correlates very well with the Desarda *et al.* study findings except for the fact that to identify the recurrence it necessitates large scale and longterm followup.

Rodríguez *et al.*[22], There was no significant difference in the recurrence rate seen in both the groups (0.4% v 0.5%). The author believes that the four cases of recurrences seen in Desarda group were due to failure of proper lateralization of the cord and insufficient narrowing of the internal ring as advised by Desarda. This was evident at re-exploration in those cases that needed only narrowing of the internal ring with few more stitches.

Conclusion

Desarda's technique and Lichtenstein's technique both are have similar rates of wound infection and post operative pain. Desarda's technique was easy to do, has no recurrence in short term follow up period, lower operative time, less chances of post operative morbidities, lower cost, less incidence of seroma.

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Conflict of Interest: Nill

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Original Research Article

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Study of Perspective of Breast Conservation Therapy in Patients of Carcinoma Breast

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Abstract

Objective: To study the acceptance of Breast conservation therapy (BCT) versus Modified radical Mastectomy and the factors affecting the decision regarding the choice of surgery. *Methods:* 45 patients out of 135 patients of carcinoma breast were identified who were fit for BCT. All of them were counselled and educated with options available BCT and MRM along with forms which explained the decision making factors and grading according to LIKERT scale. *Results:* Out of 45 patients 12 patients (26.67%) accepted BCT. Fear for recurrence, fear forresurgery and cost of radiotherapy were major factors for rejecting BCT which even overruled concern regarding body image. *Conclusion:* BCT can be accepted as a surgical choice for early breast carcinoma by many patients if awareness about early diagnosis and factors affecting decision making are addressed.

Keywords: Breast carcinoma, BCT.

Introduction

"The glory of medicine is that it is constantly moving forward and always there is more to learn."{William J Mayo, MD}

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Cases of breast cancer have been recorded in medical writings for more than 5000 years. Two paradigms- "Breast cancer initially as local and regional disease or breast cancer initially as a systemic disease" - have affected the approach to detection and treatment of breast cancer throughout the history. The changes in surgical approach of Cacinoma Breast are the results of century long experience in different modalities of treatment, newer technologies and also the cultural and social aspect of the disease.

Mastectomy either radical or modified radical was the historical mainstay of treatment of breast cancer for decades. Though it is appropriate for some patients breast conservation therapy has become the preferred for many patients. National Cancer Institute (NCI) concensus conference in 1990 concluded that Breast Conservation Surgery (BCT) is an appropriate method of primary therapy for the majority of women with stage I and II breast cancer and is preferable because it provides survival equivalent to total mastectomy while preserving the breast. BCT was originally viewed with skepticism by surgeons and patients alike. Various studies have identified patient, hospital and surgeon related factors associated with BCT. Identifying these factors will be useful in targeting promotional and educational campaigns to increase the acceptance and use of BCT.

So in order to assess the views of patients for various treatment modalities this study was carried out to evaluate the acceptance of BCT Vs MRM for Carcinoma Breast and factors affecting their decision for the same.

Aims and Objectives

1. To study the acceptance of breast conservation therapy versus modified radical mastectomy (BCT Vs MRM) in patients of carcinoma breast.
2. To study the factors affecting the acceptance of BCT in patients of carcinoma breast.

Materials and methods

A prospective hospital based study of 45 patients of carcinoma breast feasible for BCT conducted for a period of two years.

Patients were evaluated with clinical examination followed by FNAC of the lump.

Further evaluation included Mammography and blood investigations. They were also subjected for investigations to rule out distant metastasis. All patients were started on Tab Tamoxifen 50 mg BD after diagnosis. Out of 45 patients 17 patients were early stage carcinoma and 33 were large operable carcinoma breastwho were fit for BCT after neoadjuvant chemotherapy. (Group 1 and 2 respectively).

Patients were explained about the treatment options, BCT and MRM.

(MRM with breast reconstruction option was not given as it is not routinely available in our institution)

Various factors affecting the decision were explained and recorded in detail.

According to LIKERT SCALE, factors affecting decision were categorized as

5: Very important

4: Important

3: Moderately important

2: Of little importance

1: Not important

Factors explained to the patient were,

Fear for resurgery

Fear for recurrence

Fear for side effects of radiotherapy

Cost of radiotherapy (direct cost of radiotherapy and indirect cost of travel and stay to the center of radiotherapy).

Cosmesis (body image)

Influence of husband or any other person.

Neoadjuvant chemotherapy was given for candidates of BCT as removing the smaller amounts of tissue is still better cosmetically.[1]

Data was analysed by using statistical software SPSS. Unpaired t-test, chi square test and fisher exact test was used to analyse the data.

Results

We studied total of 45 patients of carcinoma breast, 17 of early breast cancer (EBC) and 33 of locally advanced breast cancer (LOBC). All patients were feasible for BCT. Out of these 12 patients accepted BCT. Thus in our study acceptance of BCT was 26.67%. (for EBC 23.5% and LOBC 28.6%). 51.52% from MRM group belonged to grade 5 fear for resurgery. 23 out of 33 (69.70%) patients who accepted MRM had grade 5 fear of recurrence. Cost of radiotherapy was also important decision making factor for 81.82% patients choosing MRM. *p* value was 0.0001 for all three factors. Thus all these factors were major reasons for patients to reject BCT and accept MRM. Difference in fear for radiotherapy wasn't statistically significant between two group (*p* value=0.0008). Cosmesis and influence of husband or important relative was grade 5 importance for all those who accepted BCT. We also compared fear of recurrence and cosmesis. Out of 6 patients for whom both were the major concern 3 patients chose MRM due to unaffordability of radiotherapy and remaining three chose BCT due to influence of husband. When compared cost versus cosmesis, 7 patients for whom both were major concern chose MRM indicating cost plays major role in decision making. Age and marital status was also not significant in both the groups (Fig. 1 and 2).

Discussion

Surgical treatment of carcinoma breast is like a double edged sword, radical excision is associated with extended morbidity and conservative approach with fear for recurrence. The fact that it has been modified from time to time among the all different ranges of radicality to lumpectomy, reflects that one particular surgery is not optimal for all patients.

Increase in use of breast conservation surgery (BCS) occurred after 1990 National Institute of health consensus Development Conference, which determined that BCS was preferable for early stage carcinoma breast patients.

At TMH Mumbai[2] cases undergoing BCT shows increasing trend from 12.6% to 59.3%, similar reports from Singapore[3] and USA[4]

When we compared the age group of the patient in our study, there was no statistically significant difference in both the groups. This was the same finding in many of the studies, like Mousavi R *et al*. in Iran[5] and also Nold *et al*.[6] Though as per S Molenaar *et al.* from Netherland[7] had found BCT being preferred in younger patients.

Fear for resurgery: Greer AL *et al*.[8] and Wu ZH *et al*.[9] observed that patient as well as surgeons wished to avoid recurrence and chose mastectomy over BCT. (Fig. 3)

Fear for recurrence: Nold *et al*.[6] and S Molenaar *et al*.[7] also mentioned that the fear for recurrence was by far the most important factor for rejecting BCT. Suzanne MJ[10] used Concern About Recurrence Scale (CARS) nad noted that majority of females had moderate fear for recurrence, and it revolved around possibility of death, pain, suffering and advancement of disease (Fig. 4).

Fear for radiotherapy: Though study by Nold and S Molenaar is comparable to our study, Ibid and K.R Sepucha *et al*.[11] found that side effects of radiotherapy and complexity of treatment in BCT made almost 1/3rd of the patient to choose MRM over BCT (Fig. 5).

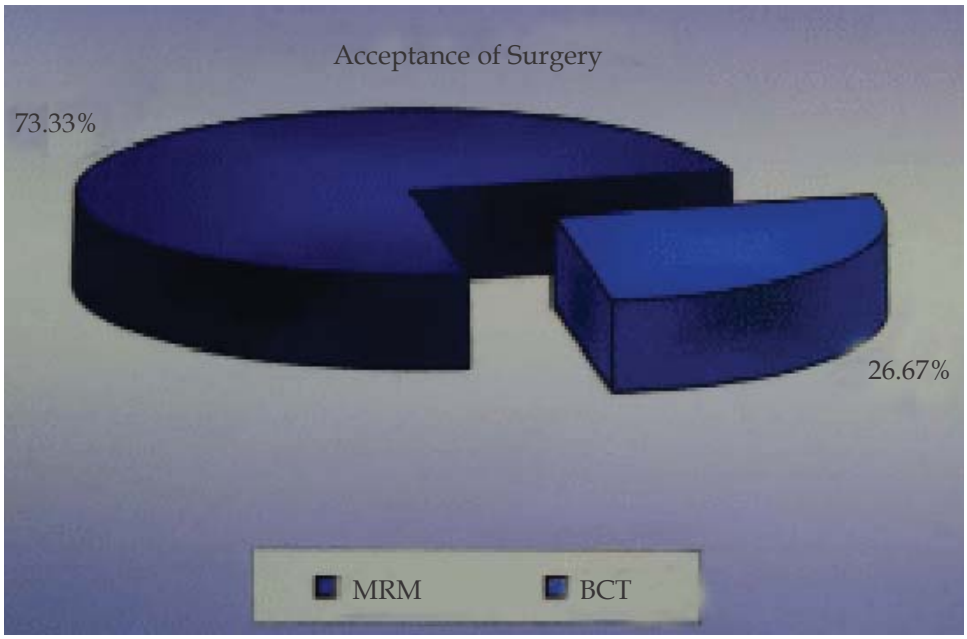

Fig. 1: Acceptance of Surgery

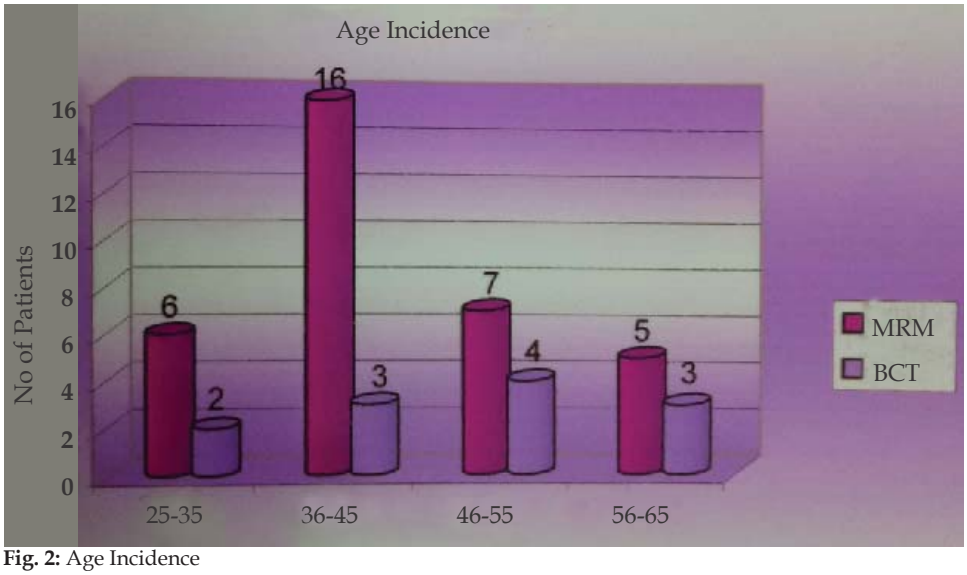

Fig. 2: Age Incidence

Cosmesis: Almost all studies support the fact that patients who chose BCT have body image concern R. Winn *et al.*[12] collected information from OLDER breast carcinoma patients as well as surgeon factors and found positive co relation between desire to have no further treatment beyond surgery and MRM, and concern about body image and BCT (Fig. 6).

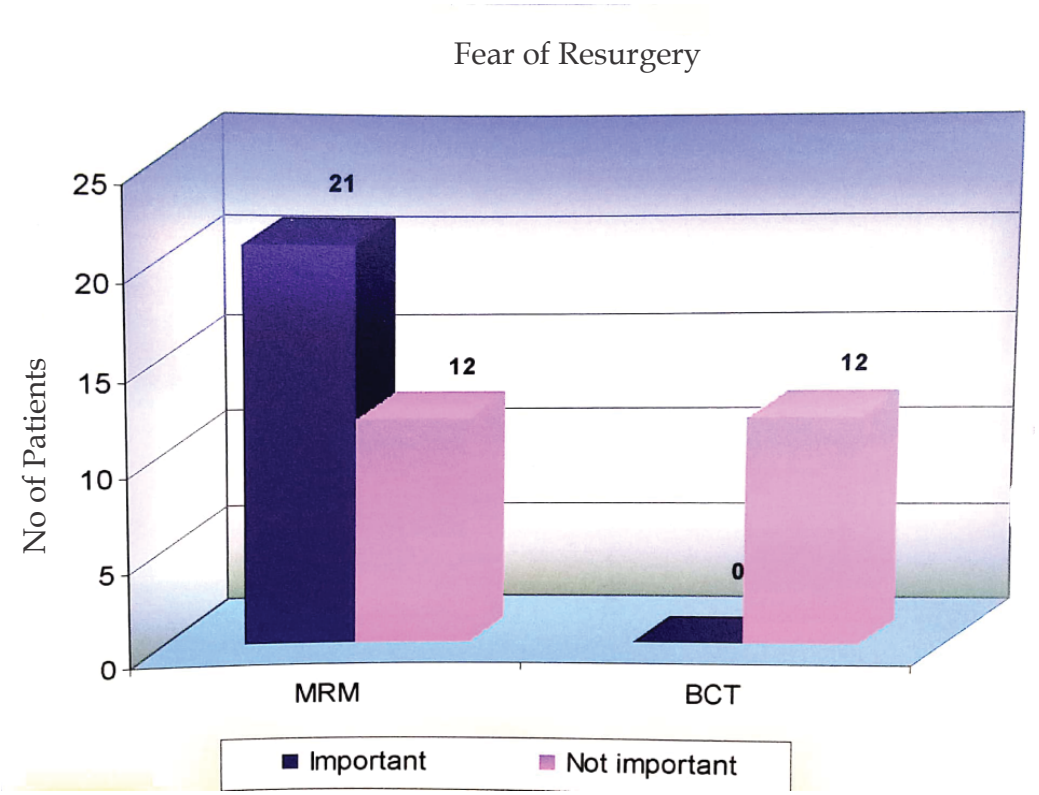

Fig. 3: Fear of Resurgery

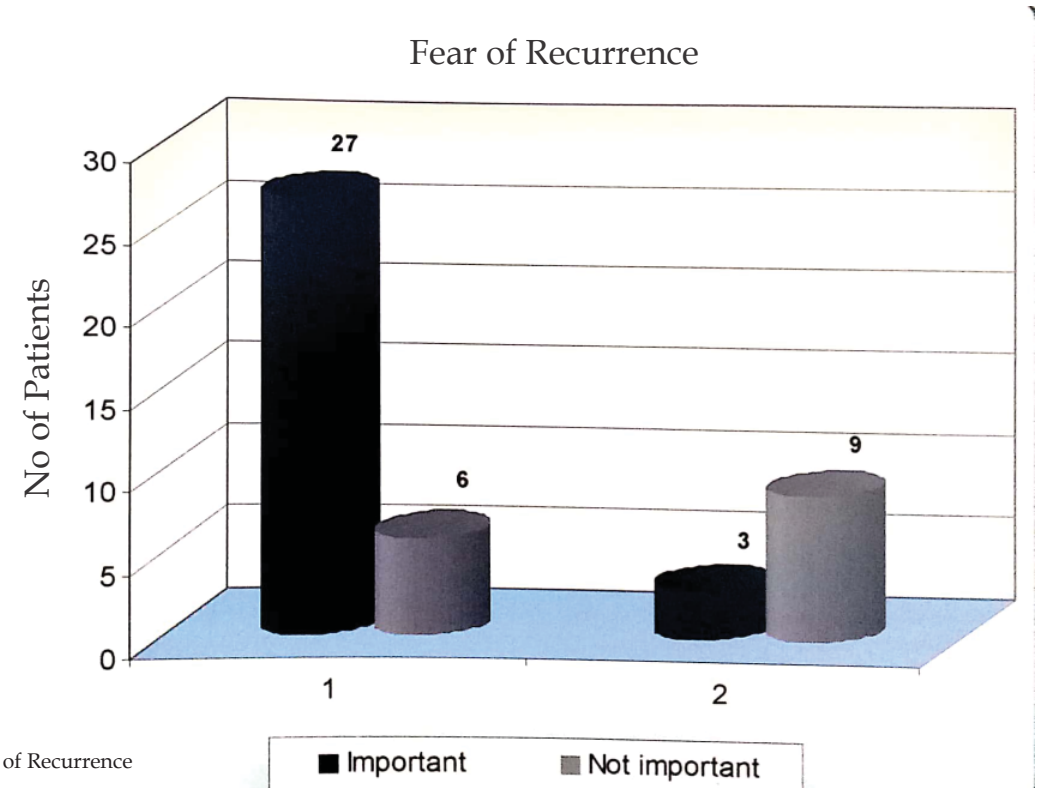

Fig. 4: Fear of Recurrence

Cost of radiotherapy: Ann Butler Nattinger *et al.*[13] found statistically significant decrease in accepting BCT if radiotherapy facility is more than 15 miles away from residence (Fig. 7).

Influence of husband or relative or for that matter even surgeon played very less role in choosing the type of surgery (Fig. 8).

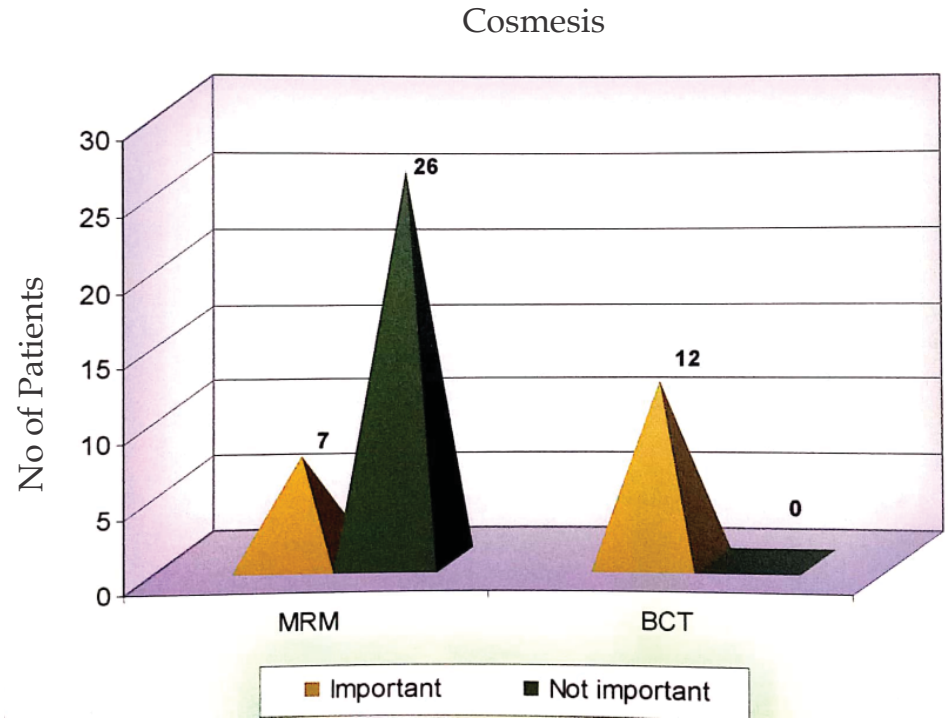

Fig. 5: Cosmesis (Body Image)

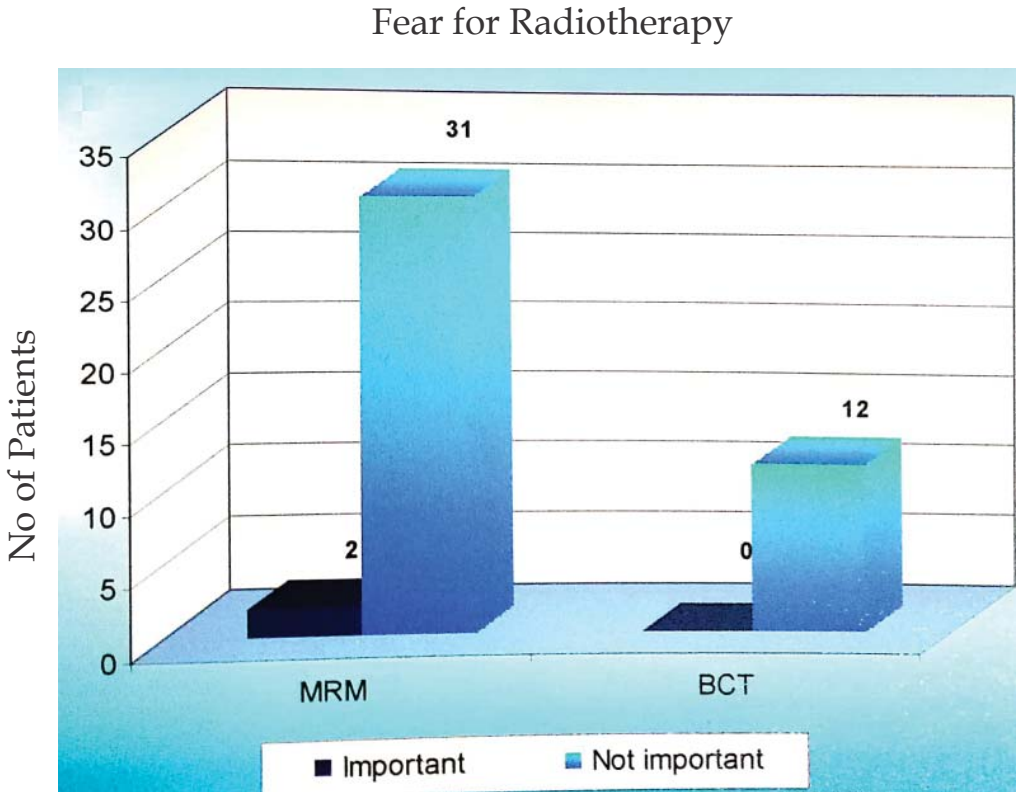

Fig. 6: Fear of Radiotherapy

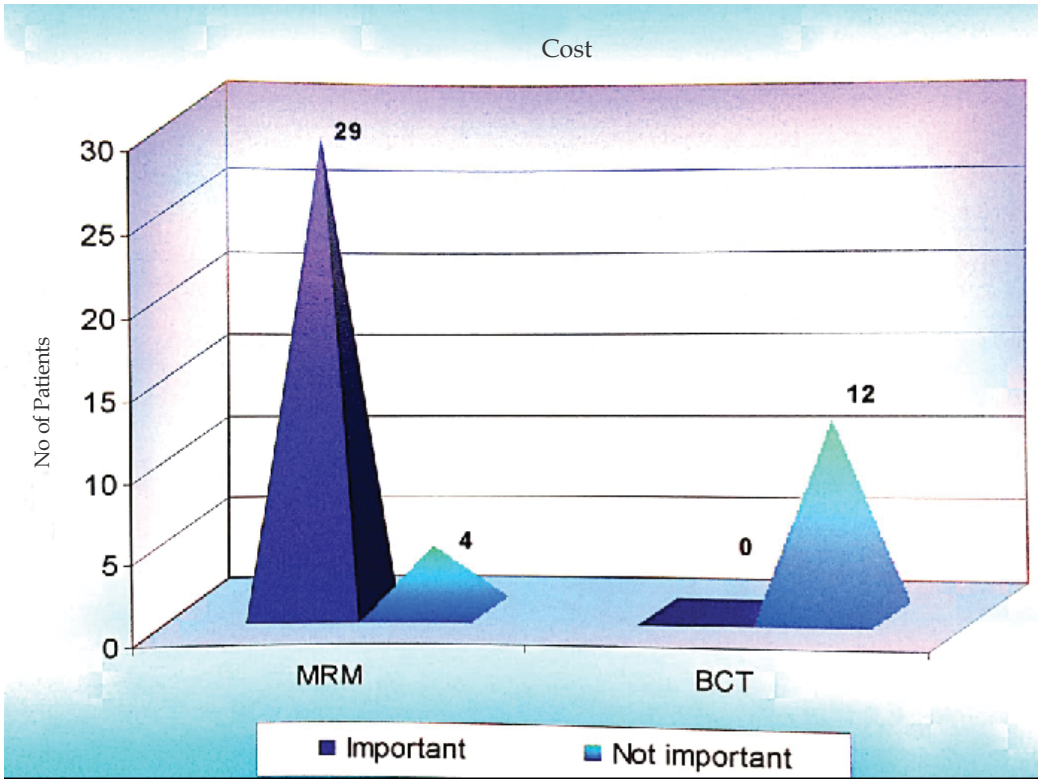

Fig. 7: Cost of radiotherapy

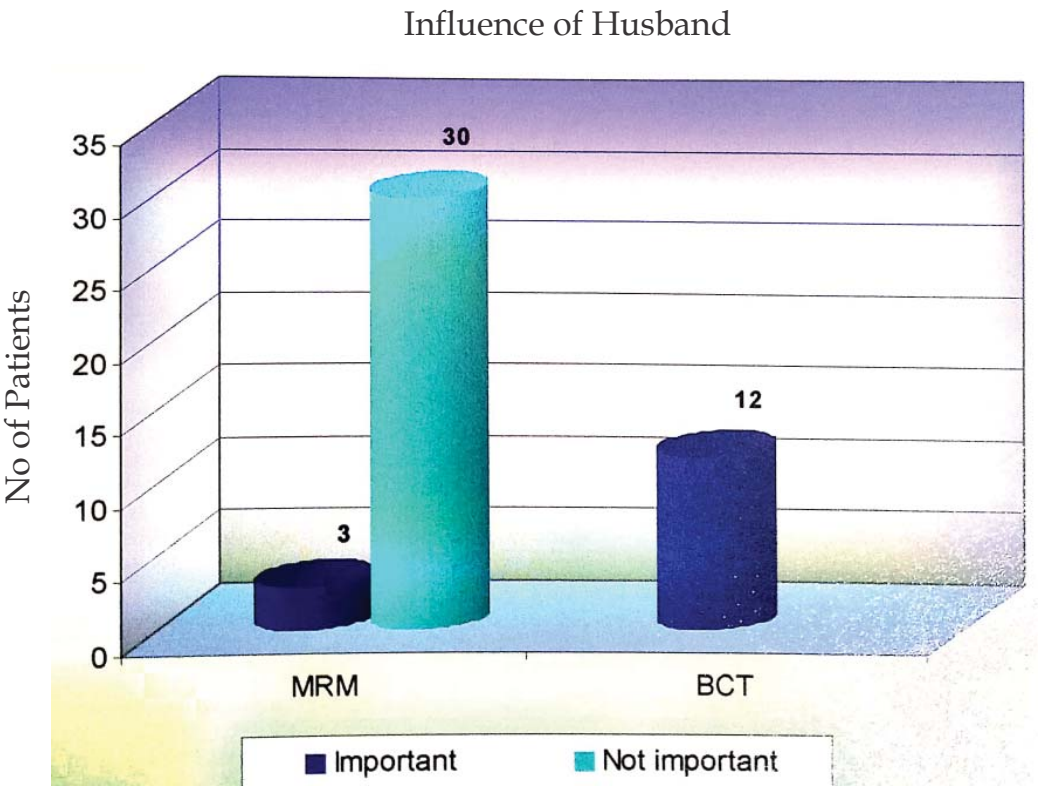

Fig. 8: Influence of Husband

Conclusion

Out of 45 patients only 12 patients accepted BCT, So the percentage of patients accepting BCT is 26.67%.

All patients for whom there was fear for re-surgery (21/21) and major concern regarding the cost of radiotherapy (29/29) whereas majority of patients who had fear for recurrence (27/30) chose MRM. Patients who were concerned about cosmesis chose BCT but 7/45 patients chose MRM due to unaffordability of cost of radiotherapy even though they were concerned about the body image.

Thus fear for recurrence, fear for resurgery and the cost for radiotherapy incurred were the most important factors for rejecting the decision for BCT, which even over-rulled the concern regarding the body image. Age and marital status had no correlation for choice of particulat type of surgery. Thus given a choice more and more patients can undergo BCT if factors affecting the decision making are addressed.

This requires

Increase in awareness of women for understanding carcinoma breast and its multimodality treatment.

Increase in awareness of self surveillance in caring one's body by self breast examination for early diagnosis.

Increase the awareness of authorities concerned to take care of factors relted to radiotherapy.

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Original Research Article

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Vacuum Assisted Closure Versus Conventional Wound Therapy in the Management of Diabetic Wounds

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Abstract

Background: Diabetic foot ulcers are a major cause of hospitalization which increases hospital stay because of multiple surgical procedures. The objective of this study is to compare Vacuum Assisted Closure and the conventional therapy for diabetic wounds with respect to time and wound healing and to prove the efficacy of one method over the other by appropriate statistical methods at the end of data collection.

Methods: A retrospective randomized hospital based observational study of 40 patients was conducted at PSGIMSR, Coimbatore, Tamilnadu, India for a period of 24 months (January 2017–December 2018). All these 40 patients were studied and the data was statistically evaluated to determine the efficacy of vacuum assisted closure in healing of diabetic wounds and to compare it with the conventional method of treatment of diabetic wounds. The patients were divided into 2 groups, Group-A which consisted of 20 patients who received vacuum therapy (VAC), Group-B which consisted of 20 patients who received conventional dressings.

Results: The patients on VAC had early appearance of granulation tissue (90% vs 60% at the end of Day 3), increased percentage of decrease in wound depth (53% vs 25% at the end of day 9) as compared to patients treated by conventional dressing. All patients developed granulation tissue by the end of Day 9.

Conclusion: We thus conclude that VAC appears to be superior in the treatment of diabetic foot ulcers in terms of early appearance of granulation tissue and decrease in wound depth when compared to conventional dressings.

Keywords: VAC; DFU; Wagners classification.

Introduction

Acute and chronic wounds are a major cause of morbidity and reduced quality of life, they affect atleast 1% of the population and present as a risk factor for hospitalization, amputation, sepsis and even death.[4]

Foot ulcers are a major cause of hospitalization in patients with diabetes mellitus which increases hospital stay because of multiple surgical procedures, prolonged length of stay. Diabetics have 25% risk of developing foot ulcers which preceeds amputation in about 85% of cases.[3]

A main stay of diabetic foot ulcer (DFU) therapy is debridement of all necrotic, callus and fibrous tissue with a primary goal to obtain wound closure. The management of DFU is determined by its severity (grade) vascularity of the limb and presence of infection.[3]

Wound healing is a complex and dynamic process that begins with removal of debris,

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control of infection, clearance of inflammation, angiogenesis, deposition of granulation tissue, contraction, remodeling of the connective tissue matrix and maturation.[2]

Saline moistened gauze has been the standard method, however, it has been difficult to continuously maintain a moist wound environment with these wound dressings. Subsequently various hydrocolloid wound gels, growth factors, hyperbaric oxygen therapy and other wound therapies have been advocated. All of these therapies are associated with increased cost and are being utilized without adequate scientific evidence favouring their efficacy.[1]

Vacuum assisted wound closure (VAC) is a wound management technique that exposes wound bed to negative pressure and provides a moist wound healing environment. VAC promotes wound healing by removing fluid from open wounds, preparing the wound bed for closure, reducing oedema and promoting formation and perfusion of granulation tissue.

This study is being done to compare the effectiveness of VAC with conventional dressings in the healing of DFU, in terms of healing rate: early appearance of granulation tissue and percentage decrease in wound depth.

Materials and Methods

A hospital based retrospective randomized control trial was conducted in the Department of Surgery, PSGIMSR, Coimbatore.

The study period was 2 years in total and both methods were tested out over a period of one and a half weeks.

All the eligible subjects fulfilling the inclusion and exclusion criteria were included in the study (sample size: 40).

Group A: Patients treated with VAC.

Group B: Patients treated with conventional dressings.

Inclusion criteria

- Above 18 years of age.
- Patients with diabetic foot ulcer more than 4 cm square.

Exclusion criteria

- Patients age less than 18 or more than 70 years
- Pregnant and nursing mothers.
- Patients on medications such as corticosteroids, immunosuppressive agents.
- Patients with severe wound ischemia and severe neuropathy.
- Deep infections such as osteomyelitis and septic arthritis.
- Patients were divided into Group-A (treated with VAC) and Group-B treated with conventional dressings, with an equal number of patients in each group. For each patient, ulcers were treated till wound closure, either spontaneously or surgically.

Patients were assessed by the following methods:

- % decrease in the wound depth.
- Early appearance of granulation tissue.

Treatment Schedule

Group A

Patients treated with vacuum assisted closure. Dressings were regularly changed every 3 days. Wound tracing and photos were taken every 3 days. Ulcers were followed up until wound closure, either spontaneously or surgically.

In patients undergoing VAC therapy, foam was autoclaved and was cut according to the shape of the wound and ryles tube placed between the two layers of the foam. Adhesive plaster applied around the foam airtight. Ryles tube connected to the wall suction using tubings. Negative pressure set to 125 mmHg. Negative pressure applied for 72 hours continuously, patient was taught to detach the tubing when ambulating. Dressing opened after 72 hours.

Group B

Patients treated with conventional dressings. Daily dressings were done. Wound tracing and photos were taken every 3 days. Ulcers were followed up until wound closure, either spontaneously or surgically.

In patients undergoing Conventional dressings, after wound wash, povidone soaked gauze pieces were used for initial 72 hours followed by dressings of normal saline soaked gauze pieces for twice daily.

Patients in both groups were insulin therapy according to blood levels and antibiotics started empirically initially and then according to culture sensitivity reports. Necessary debridement and wound toilet done before application of dressings.

Treatment outcome was assessed in terms of time taken for the appearance of granulation tissue and measurement of wound depth and area at subsequent follow up. Wound depth was measured using a sterile thread vertically in the deepest part of the wound crater to the skin surface level.

Results

Statistics

All the collected data was entered in Microsoft Excel Sheet. All the quantitative data was presented as Mean and Standard Deviation and compared using student's T-test.

Qualitative data was presented as Frequency and percentage and analysed using chi-square test. *p*-value of less than 0.05 was considered as significant.

Distribution of Patients based on age group

Mean age of study subjects was 51.2 and 50.4 years in conventional and VAC group respectively (Fig 1).

Distribution of Patients based on gender

Male preponderance was observed in both the groups (80% in conventional and 85% in VAC group respectively) (Fig. 2).

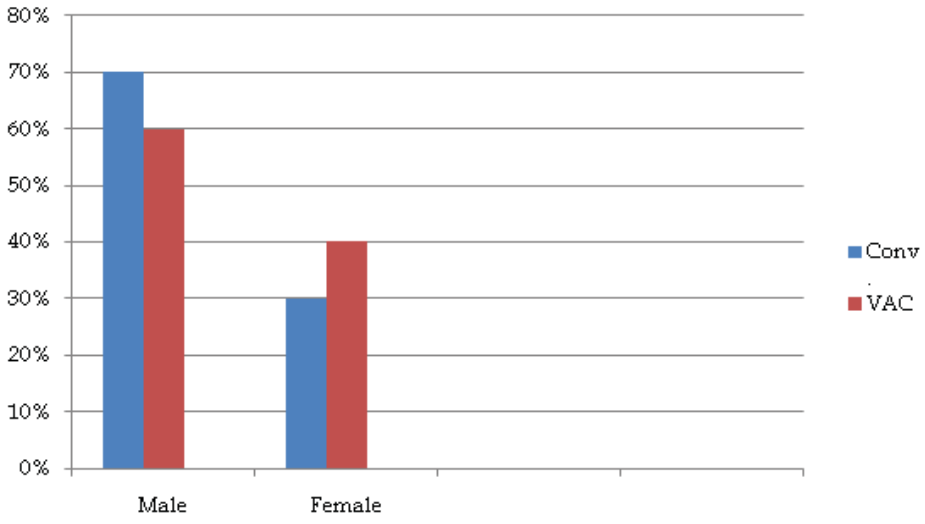

Fig. 1: Distribution graph of patients based on age.

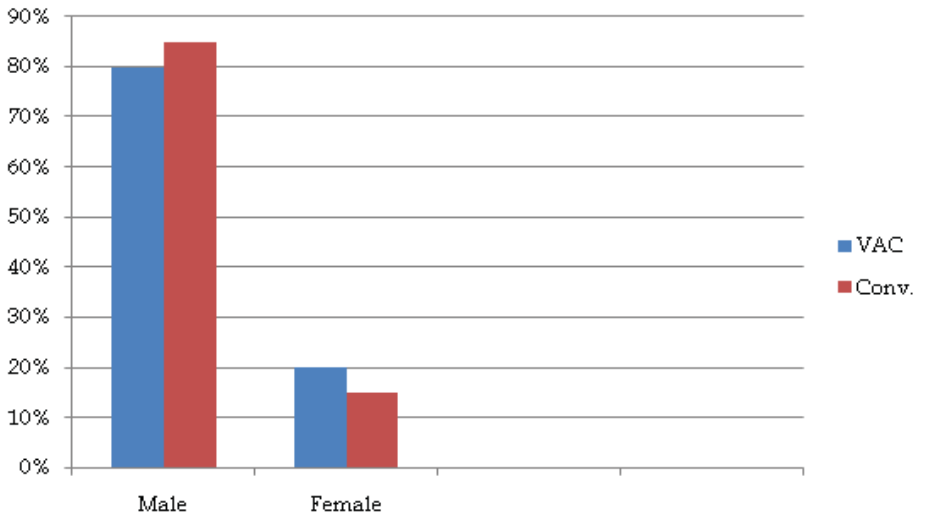

Fig. 2: Distribution graph of patients based on gender.

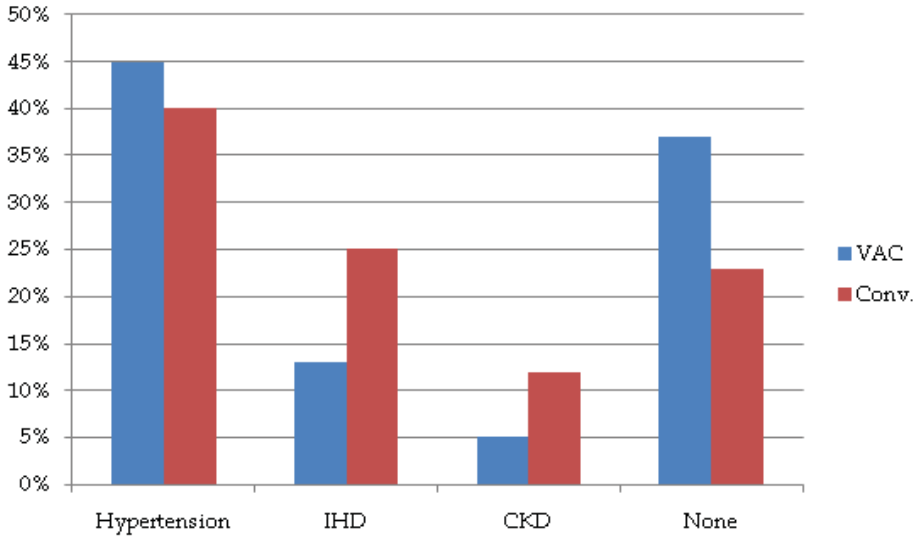

Fig. 3: Distribution of patients based on co-morbidities.

Distribution of patients based on co-morbidities

Hypertension was the most common co-morbidity observed in study subjects (40% and 45% in Conventional and VAC Groups respectively) followed by ischemic heart disease (25% vs. 13% in both the groups respectively) (Fig. 3).

Distribution of patients based on wound depth

The percentage decrease in the wound depth was more in the VAC group than conventional dressing at the end of Day 9 (53% vs 25% at the end of day 9) (Table 1).

Table 1: Distribution of patients based on wound depth.

Wound Depth	Group	N	Mean	SD	*p*-value
Before debridement	VAC	20	2.50	1.27	0.172
	Conv	20	2.00	0.97	
After debridement	VAC	20	4.30	1.17	0.023
	Conv	20	3.50	0.94	
Day 3	VAC	20	3.10	1.02	0.285
	Conv	20	2.75	1.01	
Day 6	VAC	20	2.38	0.86	0.812
	Conv	20	2.31	0.97	
Day 9	VAC	20	1.17	0.60	0.006
	Conv	20	1.90	0.92	

Distribution of patients based on granulation tissue

The patients on VAC therapy had early appearance of granulation tissue as compared to patients treated by conventional dressing (90% vs. 60% at the end of Day 3). All patients developed granulation tissue by the end of Day 9 (Table 2).

Table 2: Distribution of patients based on granulation tissue

Granulation tissue	Group		Total
	Conv	VAC	
Day 3	12	18	30
	60%	90%	75%
Day 6	19	18	37
	95%	90%	92.5%
Day 9	20	20	40
	100%	100%	100%

Discussion

Vacuum assisted closure has been recommended as a novel method in the healing of diabetic foot ulcers by stimulating the chronic wound environment in such a way that it reduces the bacterial burden and chronic interstitial wound fluid, increases vascularity and cytokine expression.

Application of negative pressure over the wound bec allows arterioles to dilate, increasing the effectiveness of local circulation, promoting angiogenesis which assists in the proliferation of the granulation tissue.

We observed that the patients on VAC therapy had an early appearance of granulation tissue as compared to patients treated by conventional

dressing (90% vs 60% at the end of Day 3). All patients developed granulation tissue by the end of Day 9.

The percentage decrease in wound depth was more in VAC group than conventional dressing at the end of Day 9 (53% vs 25% at the end of day 9).

In a study by Lone *et al.*, granulation tissue appeared in 26 (92.85%) patients by the end of week 2 in VAC group in contrast to 15 (53.57%) patients by that time in conventional group.

In a study by Eginton *et al.*, rate of wound healing with VAC was compared with conventional moist dressings in the treatment of large diabetic foot wounds. VAC dressings decreased the wound volume and depth significantly more than moist gauze dressings (59% vs. 0% and 49% vs. 8% respectively).

Priyatham K *et al.*, in a prospective study, assessed the efficacy of Vacuum assisted closure with conventional moist wound dressing in improving the healing process in chronic diabetic wounds. Shorter duration of hospital stay and better graft uptake was observed in the Vacuum dressing group.

Outcome

The primary end point in this study was a granulated wound or a wound ready for skin grafting or healing by secondary intention. Primary closure of the wound or split thickness skin grafting was done in patients of conventional and VAC group respectively.

Lone *et al.* observed that in 86.4% of patients, wounds were closed by a split thickness skin graft in VAC group as compared to 90.9% of patients in conventional.

Conclusion

Rate of granulation tissue formation, overall graft survival and patient compliance was better in VAC group as compared to conventional dressing group. It was also seen that the overall hospital stay and post operative complications were less in VAC group.

A retrospective randomized control trial was conducted for a period of 2 years in the Department of Surgery, PSGIMSR with the aim of studying the efficacy of VAC in healing of diabetic foot ulcers and to compare it with the conventional wound dressing.

A total of 40 patients with Grade 2 to 3 diabetic foot ulcers (Wagners classification) were randomly divided into 2 Groups. Group-A: Vacuum assisted closure and Group-B : Conventional dressing.

Following observations were made during the study:

- Hypertension was the most common co-morbidity observed in study subjects (40% and 45% in Conventional and VAC Groups respectively) affecting the wound healing time.
- The percentage decrease in wound depth was more in VAC group than conventional dressing at the end of day 9. (53% vs 25% at the end of day 9).
- The patients on VAC therapy had early appearance of granulation tissue as compared to patients on conventional dressing (90% vs 60% at the end of day 3). All patients developed granulation tissue at the end of day 9.

We thus conclude that VAC appears to be superior compared to conventional dressings in the treatment of diabetic foot ulcers in terms of early appearance of granulation tissue and decrease in wound depth.

Funding: No funding sources

Conflict of interest: None

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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Original Research Article

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Study on Complicated Inguinal Hernia

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Abstract

An inguinal hernia is one of the most common problems in routine surgical practice. Uncomplicated hernia possess no difficulty as many advanced techniques are available for repair. In our set up patients present very late and with complications either because of illiteracy or ignorance of patients, In the study 38% were of middle aged (51–60 years) and 28% patients were aged between 61–80 years. 2 patients were below the age of 20 and 3 patients were above the age of 80. 96% of operative wounds were drained by negative suction drain. In 86% of cases postoperative period was uneventful and patient recovered completely. In the present study the infection rate was 12%. Seroma collection and induration were found in 1(2%) patients each. The morbidity in this group was 16%. There were no long-term-post operative complications with respect to recurrence of hernia and condition of local scar.

Keywords: Complicated Inguinal Hernia.

Introduction

An inguinal hernia is one of the most common problems that we face in routine surgical practice. Uncomplicated hernia possess no difficulty as many advanced techniques are available for repair. In our set up patients present very late and with complications either because of illiteracy or ignorance. Complications generally occur in indirect inguinal hernias in form of irreducibility, obstruction, inflammation and strangulation.

Management of these complicated hernias differs from the management of uncomplicated hernias.

Most important is morbidity and mortality associated with these complicated hernias, because generally the patients of complicated hernia are of older age group and have some sort of compromised cardiorespiratory function. This study was carried out to describe the presentation and management of such patients.

Aims and Objectives

1. To study the incidence of complications in inguinal hernia, such as irreducibility, obstruction, strangulation and incarcerated inguinal hernia.
2. To study the incidence of level of obstruction.
3. To study the incidence of morbidity and mortality in these patients.

Material and Methodology

Materials

- *Study Settings:* Department of General

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Surgery in a large teaching public health hospital. All the cases were examined clinically, investigated and operated. The procedure, post-operative complications duration of hospitalisation and the recurrence rates was studied.

- *Study period:* Two year.
- *Sample Size:* 50 Cases.
- *Study Type:* Retrospective Study.

Inclusion Criteria: Patient presenting with

- Lower abdominal pain and inguinoscrotal pain.
- Associated with multiple episodes of vomiting.
- Swelling over inguinal region.
- Fever.
- Exaggeration of pain on heavy exercise and straining.

Exclusion Criteria

Patients with uncorrected coagulopathies are excluded from the study.

Results

Table 1: Complication with Respect to the Type of Repair and Surgery

Procedure	Complication				Total	%
	Seroma	Induration	Infection	Death		
Herniorrhaphy	0	0	0	0	0	0
Omentectomy with Herniorrhaphy	0	0	0	0	0	0
Resection and Anastomosis with Herniorrhaphy	0	0	1	0	1	2
Meshplasty	1	1	5	0	7	14
Omentectomy With Meshplasty	0	0	0	0	0	0
Resection and Anastomosis and Meshplaty	0	0	0	0	0	0

Complication with respect to the type of repair and surgery performed. One patient who was treated by herniorrhaphy with resection and anastomosis of small bowel developed wound infection, and 5 patients following meshplasty develop wound infection. One patient of meshplasty had postoperative induration and seroma of wound developed which responded to broad spectrum antibiotic treatment (Table 1).

Table 2: Type of Hernia

Type	No of patients	Percentage
Only irreducible hernia	37	74
Obstructed hernia	12	24
Strangulated hernia	1	2

In the present study majority (74%) of patients presented with an irreducible hernia. 2% of the patients had a strangulated hernia; these findings suggest painful, irreducible swelling is one of the presenting symptoms, thus preventing other complications in hernia by timely surgical intervention. Also taking into consideration the small number of patient studied the probable incidence of patients presenting with signs and symptoms of obstruction or strangulation cannot be known for which further detailed studies are required (Table 2).

Discussion

Age Distribution

In the study most of the patients 38% were of middle aged (51–60 years) and 28% patient of 61–80 years of age while 2 patients were below the age of 20 and 3 patients were above the age of 80. Due to the active lifestyle, inguinal hernia is more common in middle age group which can progress to complication later on as seen in present study.

In the study by Sanjay Prakash[3] the average age of the patients was 62 year (range: 50–70 years).

In the study by Manish Baria[1], the average age of the patients was 71 year (range: 26–92 years).

In the study by Hariprasad *et al.*[2], the average age of the patients was 60 year (range: 44–74 years).

In the study by Ernesto *et al.*[5], the average age of the patients was 71 year (range: 26–92 years).

In the study by J. A. Alvarej *et al.*[4], 66.7% patients were over 65 years of age and the mean age of the patients were 70 + 15.2 years ranging from 24 to 96 years.

Chief complain of the patients

From the study it is evident that a painful irreducible swelling was the chief complain of most of the patients. A few patients presented with signs and symptoms of obstruction and strangulation. Most of the time a hernia tends to get complicated when it is of a large size and if such a swelling is associated with

pain, then even those patients, who ignore swelling, seek medical advice for pain. Thus painful irreducible inguinoscrotal swelling warrants a careful scrutiny and management to prevent further complications. Most of the patients had a right sided hernia.

Sanjay Prakash *et al.*[3] reported 63% cases presenting with vomiting, constipation, abdominal distention, nausea etc. suggestive of obstruction and 14% patients had signs of peritonitis.

Hariprasad *et al.*[2] reported 30% cases presenting with vomiting, constipation, abdominal distension, nausea etc. suggestive of obstruction and 12% patients had signs of peritonitis.

Manish Baria *et al.*[1] reported 20% cases presenting with vomiting, constipation, abdominal distention, nausea etc. suggestive of obstruction and 2% patients had signs of peritonitis.

Ernesto *et al.*[5], reported 90.69% cases presenting with vomiting, constipation, abdominal distention, nausea etc. suggestive of obstruction, and 19 cases (44.18%) had dehydration and 55.8% patients had signs of peritonitis.

In the study by J.A. Alvarej *et al.*[4] 99 (67.3%) patients presented with signs and symptoms of mechanical bowel obstruction, and 133 patients (90.5%) presented with irreducible swelling and pain at local site.

Previous history of inguinal swelling

Most of the patient except 3, had previous history of inguinoscrotal swelling (an uncomplicated hernia) but they did not seek medical advice. In these patients the hernia eventually progressed to a complication for which urgent medical advice became necessary. There were 6% of patients in whom an inguinoscrotal swelling had appeared and complication taken place simultaneously at the time of admission.

In the study by Manish Baria *et al.*[1] 46 cases (92%) presented with a history of inguinal swelling.

In the study by J. A. Alvarej *et al.*[4] 74 cases (50.3%) presented with a history of inguinal swelling.

In the study by Ernesto *et al.*[5] 10 cases (23.2%) presented with recurrent inguinal swelling and 33 cases (76.7) presented with primary inguinal hernia.

Types of hernias present

In our study 37 (74%) patients had irreducible inguinal hernia, 1 (2%) patients had strangulated inguinal hernia and 12 (24%) patients had obstructed inguinal hernia.

In the study by Sanjay Prakash[3] (14%) presented with strangulated inguinal hernia and (23%) patients presented with incarcerated inguinal hernia.

In the study by Hariprasad[2] (30%) presented with strangulated inguinal hernia and (70%) patients presented with incarcerated inguinal hernia.

In the study by Manish Baria[1] 6(12%) presented with strangulated inguinal hernia and (80%) patients presented with incarcerated inguinal hernia.

In the study by J.A. Alvarez *et al.*[4], 61(41.4%) presented with strangulated inguinal hernia and 85 (57.8%) patients presented with incarcerated inguinal hernia.

All patients in the study of Ernesto *et al.*[5] strangulated hernias.

Procedure

All the patients in the present study were managed by operative intervention as early as possible. It was evident in peroperative findings that there was strangulation in one patient and resection of non-viable bowel was carried out. In 1 patient there was an omentocele and omentectomy was carried out taking into consideration the inflammation of entrapped omentum. In 12% of obstructed hernias, the obstruction was at deep inguinal ring.

The condition of bowel was dependent upon the duration of time spent before arriving to hospital. After the onset of complication when more than 12 hours had passed, the bowel was non-viable and resection and anastomosis was necessary in 2% cases.

Mesh repair was carried out in most (92%) of patients. Herniorrhaphy and mesh repair along with omentectomy or with resection of bowel was done in rest of the patients. Thus even in emergency hernia repair the treatment of the pathology (relief of obstruction or removal of dead tissue) as well as the etiology (weakness of abdominal wall) can be tackled simultaneously.

In the study by Manish Baria[1], herniorrhaphy in 16%, omentectomy and herniorrhaphy in 10%, herniorrhaphy with resection and anastomosis of small intestine was carried out in (14%) cases and hernia repair with meshplasty in 40% and omentectomy with meshplasty in 20%.

In the study by Hariprasad[2], herniorrhaphy in 75%, omentectomy and herniorrhaphy in 12.5%, herniorrhaphy with resection and anastomosis of small intestine was carried out in (10%) cases.

In the study by Sanjay Prakash[3], herniorrhaphy in 82.8%, omentectomy and herniorrhaphy in 8.6%, herniorrhaphy with resection and anastomosis of small intestine was carried out in (8.6%) cases.

In the study by Ernesto *et al.*[5], hernia repair with meshplasty with resection and anastomosis of small intestine was carried out in 4 (5.7%) cases.

Drain

Ninety six percent of operative wounds were drained by negative suction drain.

In the study by Manish Baria[1], drain was put in 96% patient.

In the study by Ernesto *et al.*[5], drain was put in 79.06% patient.

Radiological investigation

Radiological investigations as evident from present study are very useful in the diagnosis of obstruction and strangulation. Multiple air and fluid levels were seen in X-rays abdomen standing film in 26% of patients suggestive of obstruction.

Ultrasonography when performed by an experienced senior sonologist can detect free fluid in peritoneal cavity, dilated bowel loops (26%), the thickness of the intestinal wall in the sac, presence of fluid in the sac (formation of abscess) and presence of omentum in the sac.

In the study by Hariprasad[2], 25% patients showed multiple air fluid levels

In the study by Manish Baria[1], 20% patients showed multiple air fluid levels and 20% had dilated bowel loops in various radiological investigations.

In the study by Ernesto *et al.*[5], 83% patients showed multiple air fluid levels and 90.6% had dilated bowel loops in various radiological investigations.

In the study by J.A Alvarez *et al.*[4], 43.5% patients had multiple air fluid levels present.

Complication

In 86% of cases postoperative period was uneventful and patient recovered completely. The infection rate was 12%. Seroma collection and induration were found in 1 (2%) patients each. The morbidity in this group was 16%.

The seroma collection was aspirated and induration was treated with broad spectrum antibiotics.

In the study by Hariprasad[2], 22.5% patients had wound infection, 36.5% patients had seroma, hematoma and wound dehiscence.

In the study by Manish Baria[1], 10% patients had wound infection, 10% patients had seroma, hematoma and wound dehiscence.

In the study by Ernesto *et al.*[5], 6% patient had seroma, 3% patients had wound infection and 1% patients had incisional hernia.

In the study by J.A. Alvarez *et al.*[4], 28.6% patients had wound infection, 14% patients had seroma, hematoma and wound dehiscence.

Recurrence

All these patients had no long-term post operative complications like recurrence of hernia and scare related complications.

The morbidity and mortality of complicated hernias can be improved significantly by considering them as a medical and surgical emergency. Appropriate radiological investigations, resuscitation and fluid and electrolyte management, successful repair and careful postoperative management improves the outcome.

In the study by Hariprasad *et al.*[2], reported recurrence rate was 0%.

In the study by Manish Baria *et al.*[1], reported recurrence rate was 0%.

In the study by J.A. Alvarez *et al.*[4], reported recurrence rate was 0%.

Conclusion

From the present study it is evident that most patients of complicated inguinal hernias have painful irreducible inguinoscrotal swellings; which if not taken care of progress to obstruction and strangulation. Patient of irreducible hernias have thus to be clinically examined for a complication, resuscitated, investigated (more importantly with x-rays abdomen standing/lying down and ultrasonography) and must be prepared for emergency surgical intervention. In most of these patients the obstruction was at deep inguinal ring and along with repair of the defect in the abdominal wall by mesh repair or herniorrhaphy, resection of the gangrenous bowel or omentum can be carried out simultaneously in this modern era of efficient surgical care. Only in 1 case resection of bowel was done; mesh repair was not carried out due to risk of infection and rejection of the mesh.

In the present study, infection rate was 12%, morbidity rate was 14% and mortality rate was nil. These figures are probably not indicative of the true incidence of postoperative complications in the management of complicated hernias, after taking into consideration the small number of patients studied. No patients had recurrence of hernia or local wound complication in subsequent follow up period. However more such detailed studies and trials are required to effectively reduce the mortality and morbidity rates that are seen in the present study.

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Clinical Study of Amoebic Liver Abscess with Reference to Conservative Management and Ultrasound Guided Percutaneous Aspiration

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Abstract

Amoebic liver abscess is an important cause of inflammatory space occupying lesion of liver. This study is conducted to know the clinical presentation, management and efficacy of conservative management and percutaneous aspiration in amoebic liver abscess.

Materials and Methods: A total of 30 patients of amoebic liver abscess were selected for the study in Vydehi Institute of Medical Sciences and research centre, Bangalore. Their clinical presentation, lab findings and treatment in the form of conservative (abscess <5 cms) and ultrasound guided percutaneous aspiration (abscess >5 cms) were studied.

Results: The amoebic liver abscess was common in low socioeconomic middle aged male patients. Pain and fever were the most common symptoms. USG abdomen was useful in early diagnosis and assessing prognosis. Most of the abscess was solitary common in right lobe of liver. Liver function tests helps in knowing effectiveness of the treatment and the prognosis. None of the patients were positive for cysts in the stool. 27 (90%) patients were positive for anti amoebic antibody. Conservative management was effective with cavities <5 cms. Percutaneous aspiration was effective with cavities >5 cms. There was one mortality.

Conclusion: Amoebic liver abscess commonly seen in young to middle aged males. Ultrasonography helps in early diagnosis. Abscess <5 cms are effectively treated by conservative management and abscess >5 cms by percutaneous aspiration. Resolution of abscess faster in patients treated by percutaneous aspiration as compared to conservative treatment.

Introduction

Amoebic liver abscess is an important cause of inflammatory space occupying lesion of liver in the tropics[1], like India. India being a tropical country and large number of unclean food and alcohol consumption add up to the risk. Decreased immunity secondary to intake of cytotoxic drugs, diabetes mellitus, and HIV infection etc. further increases susceptibility to liver abscess.[2]

Management of this disease includes anti amoebic drugs, percutaneous aspiration in cases like (secondary infection, fever and pain persisting for more than 3 to 5 days, if rupture is suspected) and occasionally catheter drainage in case of failure of repeated aspiration. In India, however most of the patients present with large abscess cavities and toxic features needing frequent aspiration of the abscess. The review of literature reveals that the smaller Amoebic liver abscesses (multiple or single) can be treated conservatively.[3] Larger Amoebic liver abscesses or amoebic liver abscess with complications (rupture, jaundice, etc.) require intervention in the form of either percutaneous aspiration, closed or

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open drainage. Further there are no studies which show complications and need of reaspiration in patients who have been treated with radiologicaly guided percutaneous aspiration as an initial line of management. Hence this study is conducted to know the immediate and late effect of, metronidazole alone and a regimen comprising needle aspiration and metronidazole.

Aims and Objectives

a. To study the clinical presentations, investigations, diagnosis and management of amoebic liver abscess.
b. To study the efficacy of conservative management in amoebic liver abscess.
c. To study the efficacy of ultrasound guided percutaneous aspiration in amoebic liver abscess.

Materials and Methods

Source of Data

All patients diagnosed with liver abscess in Vydehi institute of medical sciences and research Centre, Bangalore, over a period of one and a half years i.e., November 2012 to May 2014.

Method of Collection of Data

Sample Size: up to of 30 cases amoebic liver abscess.

Study Design: prospective study of 30 patients.

Duration of Study: November 2012 to May 2014.

Place of Study: Vydehi institute of medical sciences and research Centre, Bangalore.

Inclusion Criteria

a. Age more than 18 years.
b. Patients of both sexes, with Amoebic liver abscess admitted to the surgical and medical wards.

Exclusion Criteria

Paediatric age group <18 years.

Liver abscess due to malignant cause.

Liver abscess due to Hydatid cyst of liver.

Pyogenic liver abscess.

Methodology

i. After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion/exclusion criteria were included in the study, after obtaining informed consent.
ii. Detailed history of all patients is taken with thorough clinical examination; required Investigations were done and entered into a proforma during their stay and follow up.
iii. Patients with the following signs and symptoms and investigations:
    a. Tender Hepatomegaly
    b. Fever
    c. Intercostal tenderness
    d. Radiological investigations (USG/CT) suggestive of liver abscess
    e. Demonstration of characteristic pus by percutaneous needle aspiration or serological tests (ELISA), suggestive of amoebic liver abscess were taken as patient with amoebic liver abscess.
iv. After establishing diagnosis, Tab. Metronidazole 800 mg TID or Inj. Metronidazole 500 mg IV TID treatment was initiated from day of admission, in case of secondary infection; antibiotics (Fluroquinalones or 3rd Generation cephalosporin's) were added in the treatment.
v. Therapeutic aspiration reserved for the following cases where:

Size of abscess is more than 5 cm.

When pain and fever persist for more than 3 to 5 days after starting Antiamoebic therapy.

Amoebic serology is in-conclusive.

Antiamoebic drugs were contraindicated (pregnancy).

Secondary infection.

If impending rupture was suspected.

vi. Four clinical variables-abdominal pain, fever, anorexia, and hepatomegaly-were assessed on first, fourth, and 10th day. Hematological (ESR, and total and differential counts) and biochemical studies (serum aspartate and alanine aminotransferase activities, and alkaline phosphatase activity) were carried out in all patients on first, fourth, and 10th day.

A raised ESR rate of more than 30 mm in 1st hour, total leukocyte count of 12.0 x 10^9 /l, serum alkaline phosphatase activity of more than 13 King Armstrong units and aspartate aminotransferase activity more than 40 U/l were considered abnormal and successful outcome was marked by a normalization of these variables.

vii. Follow up: the patients were asked to visit for reassessment every 30 days for 3 months.

viii. Each treatment modality studied separately for the proportion of patients with successful outcome under each category were calculated, Chi square test was applied.

Statistical Analysis: Descriptive statistical study.

Investigations Done

Routine Investigations: Complete hemogram, Bleeding time, Clotting time, Urine routine, Fasting blood sugar, Postprandial blood sugar, Blood urea, Serum creatinine, Erythrocyte sedimentation rate, ECG, Chest X-ray, USG abdomen and HIV & HBsAg, Liver function test, pus culture and sensitivity, Coagulation profile (Prothrombin time, Activated Partial Thromboplastin Time, International Normalized Ratio), BUN.

Special Investigations: Stool examination, Hepatic imaging (Computerized Tomography), indirect haemagglutination test, sigmoidoscopy, and colonoscopy.

Results

A total of 30 patients of amoebic liver abscess were included and studied during the time period of November 2012 to May 2014 in Vydehi institute of medical sciences and research Centre, Bangalore. Following data were collected and analyzed.

Table 1: Age wise distribution of cases

Age	Frequency	Percent
30 and below	11	36.7
31–50	16	53.3
Above 50	3	10.0
Total	30	100.0

As per the table 1 and Figure 1, liver abscess was more common in the age group of 31–50 years. Mean age was 36.7 years.

Sex distribution

Table 2: Sex distribution

Sex	No of Cases	Percentage
Male	26	87
Female	4	13

Liver abscess were commonly found in Men (87%) than women (13%). Male to female ratio 15:1 (Table 2 and Figure 2).

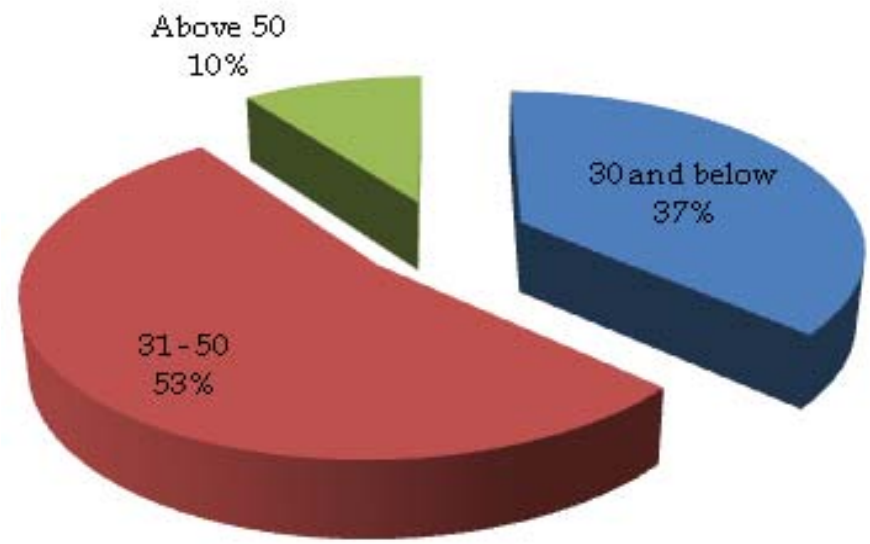

Fig. 1: Age wise distribution of cases

Table 3: Symptoms Wise Distribution of Cases

Symptom	No of Cases	Percentage
Pain	30	100
Fever	25	83
Vomiting	15	50
Diarrhoea	11	37
Joundice	5	17
Cough	3	10
Others	1	30

Pain was the commonest symptom seen in all patients, followed by fever in 83% patients, vomiting in 50% cases, diarrhoea in 37% of patients, jaundice in 17% and cough in 10% patients (Table 3 and Fig. 3).

Table 4: Distribution According to Duration of Symptoms

Duration	No of cases	Percentage
0–4	7	23
5–9	18	60
>10	5	17
Total	30	100

The duration of symptoms varied from 4 days to 20 days. 18 patients (60%) presented during the time period of 5 to 9 days of onset of symptoms. The mean duration of symptoms is 7.5 days (Table 4 and Fig. 4).

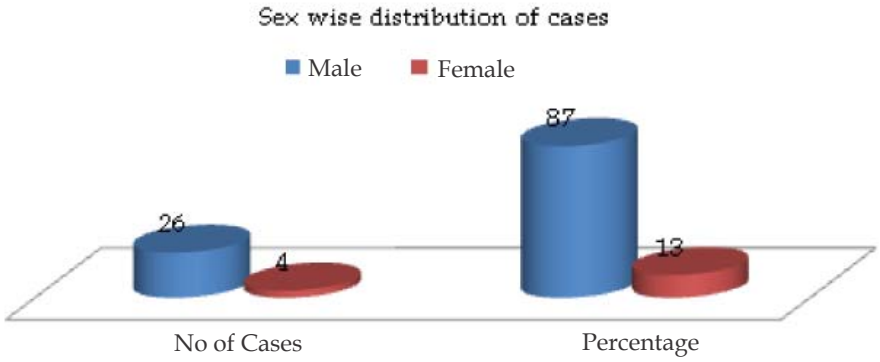

Fig.2: Sex Distribution

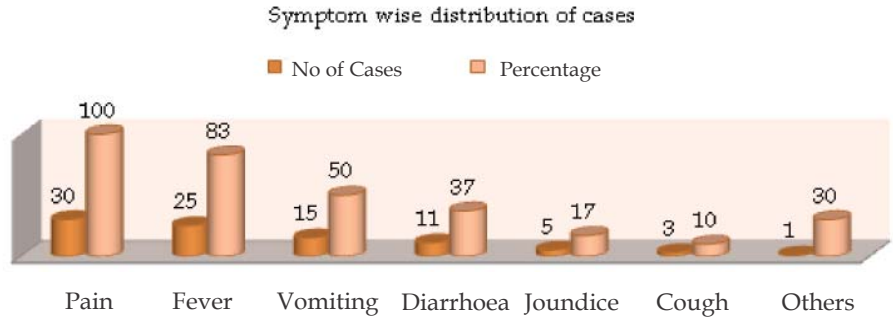

Fig. 3: Symptoms wise Distribution of Cases

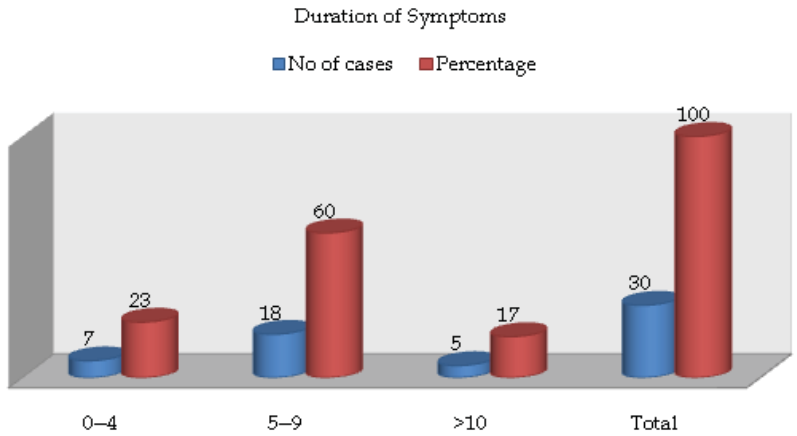

Fig. 4: Distribution According to Duration of Symptoms

Table 5: Clinical Signs

Clinical signs	No of cases	Percentage
Abdominal tenderness	30	100
Hepatomegaly	11	36
Intercostal tenderness	8	26
Pleural effusion	1	3

Abdominal tenderness was the most common clinical sign seen in 30 (100%) of patients followed by hepatomegaly in 11 (36%), Intercostal tenderness in 8 (26%) and pleural effusion in one (3%) patient who had secondary infection (Table 5 and Fig. 5).

Table 6: Lobe Involvement

Lobes	No of Cases	Percentage
Right	21	70
Left	5	17
B/L	4	13
Total	30	100

Most of the 21 (70%) of patients had right lobe liver abscesses, 5 (17%) Patients had abscesses in left lobe of liver and both lobes of liver in 4 (13%) of patients (Table 6 and Fig. 6).

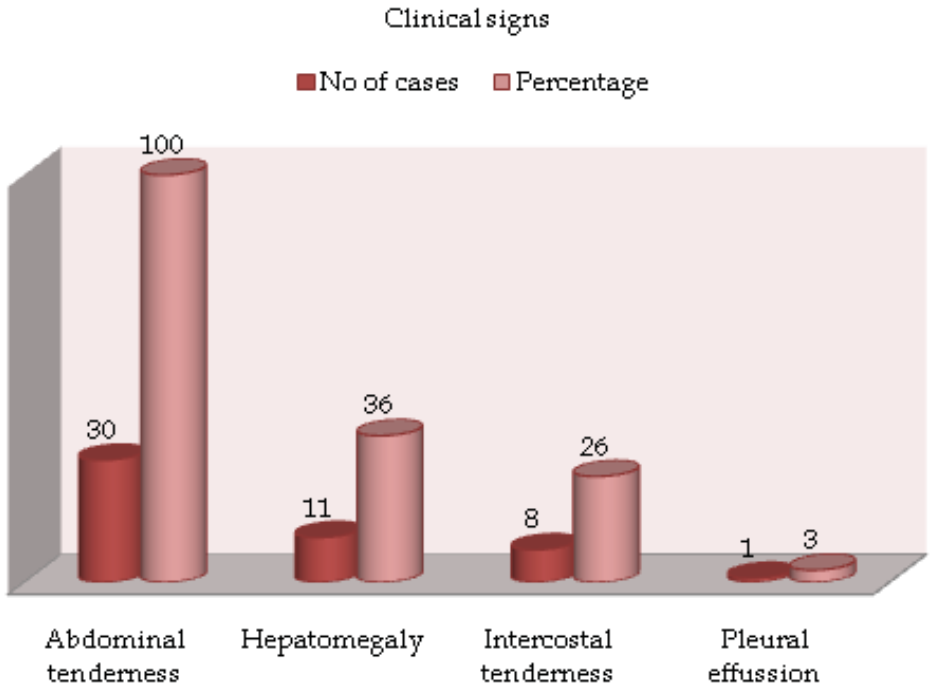

Fig. 5: Clinical Signs

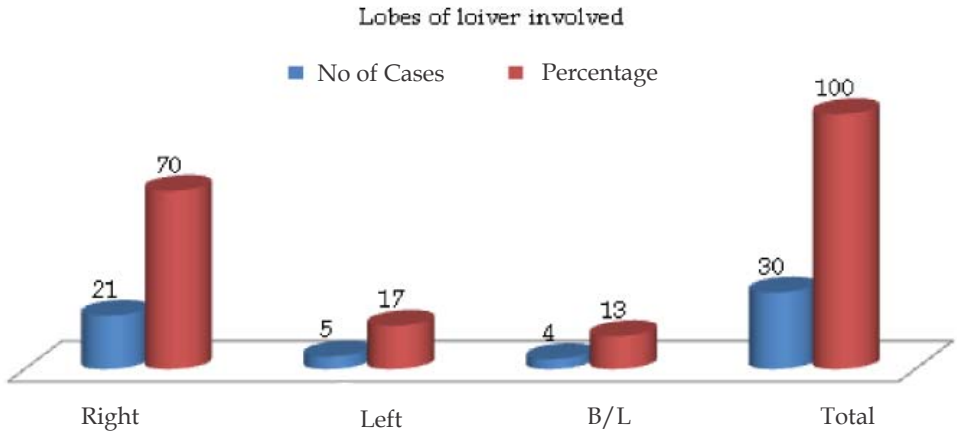

Fig. 6: Lobe Involvement

Table 7: Number of Abscess

No of Abscess	No of Cases	Percentage
1	22	73
2	6	20
3	2	7
Total	30	100

22 (73%) of patients had one abscess, 6 (20%) had two abscesses and 2 (7%) of patients had 3 abscesses (Table 7 and Fig. 7).

Table 8: Distribution of Size of ALA on the day of Admission

	No of Cases	
	C	A
<5	12	0
6–10	0	5
11–25	0	12
>25	0	1

All patients with amoebic abscess cavity size less than 5 cms were treated conservatively. In Patients treated by percutaneous aspiration, 12 were having cavities ranging 11–25 cms and 5 with cavities ranging 6–10 cms (Table 8 and Fig. 8).

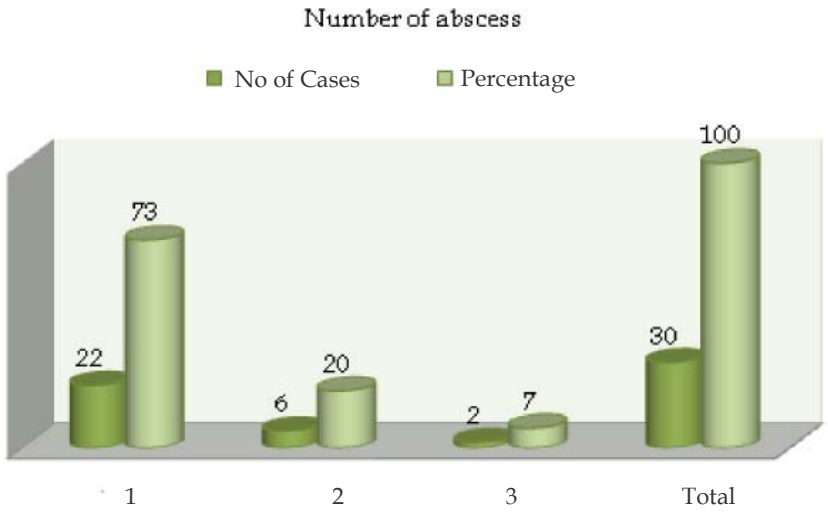

Fig. 7: Number of Abscess

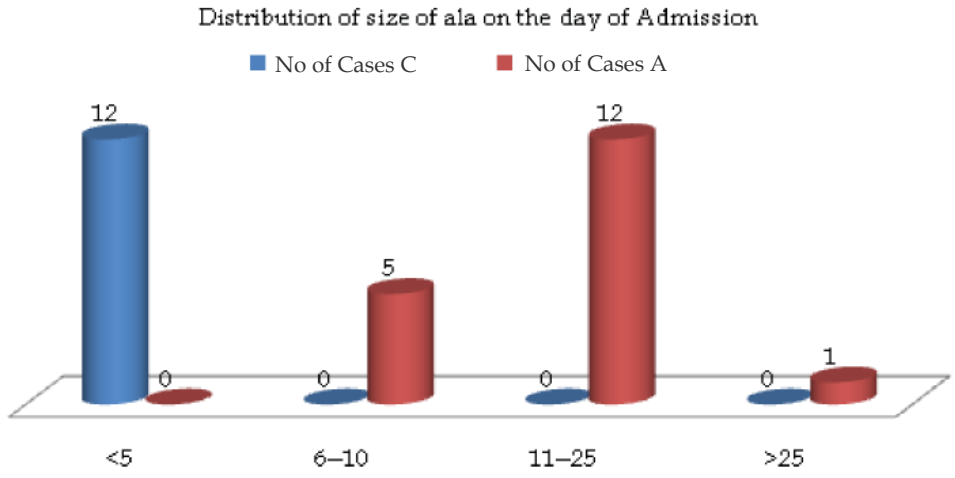

Fig. 8: Distribution of Size of ALA on day of Admission

Table 9: Treatment Modality

Treatment	No of Cases	Percentage
C	12	40
A	18	60
Total	30	100

Sixty percent of patients were treated by ultrasound guided percutaneous aspiration and 40% of patients were treated by conservative management (Table 9 and Fig. 9)

Table 10: Symptoms on day 4[Th] of Treatment

Symptoms	Conservative	Aspiration
Day 4 Improved	10 (33%)	14 (47%)
Day 4 Not Improved	2 (7%)	4 (13%)

Ten patients treated by conservative management showed improvement and two patients had no improvement in clinical and laboratory signs and symptoms. Out of 18 patients treated by ultrasound guided percutaneous aspiration 14 patients had improved symptomatically (Table 10 and Fig. 10).

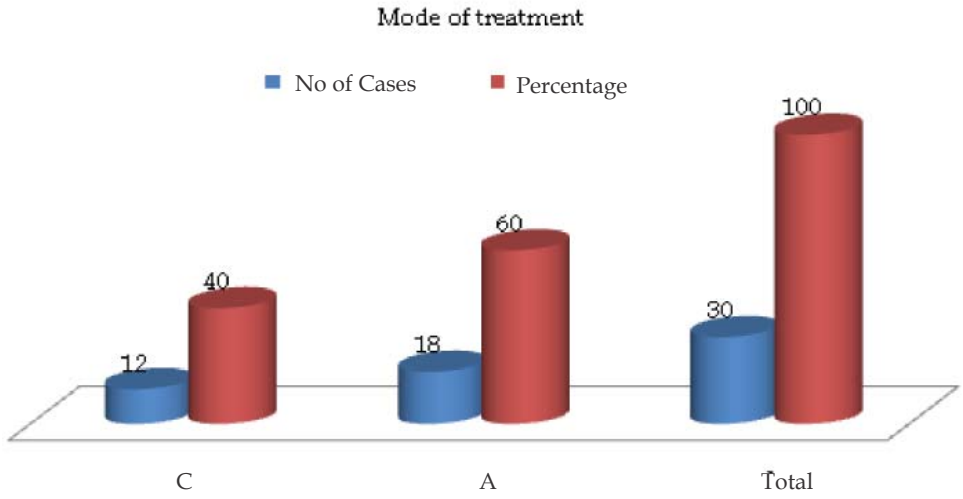

Fig. 9: Treatment Modality

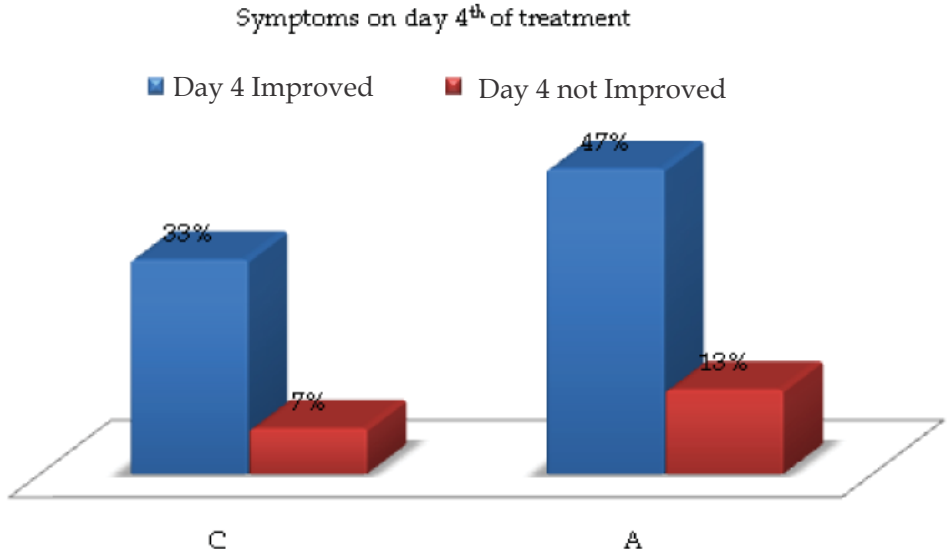

Fig. 10: Symptoms on day 4[th] of Treatment

Table 11: Distribution of Size of Ala on 4th day of Admission

Diameter of Abscess Cavity in cms	No of Cases Conservative	Aspiration
<5	12	6
6–10	0	11
11–25	0	0
>25	0	1

Patients treated by percutaneous aspiration showed marked decrease in size of abscess cavity, as 6 patients were having cavities less than 5 cms and 11 patients in the rage of 6–10 cms. Only one patient not improved (Table 11 and Fig. 11).

Table 12: Symptoms on day 10th of Treatment

		Treatment		
		C	A	Total
Day 10	I	12	17	29
		100.0%	94.4%	96.7%
	NI	0	1	1
		.0%	5.6%	3.3%
Total		12	18	30
		100.0%	100.0%	100.0%

All patients treated either by conservative or percutaneous aspiration showed statistically significant ($p < 0.001$) symptomatic improvement, except one case with secondary infection (Table 12 and Fig. 12).

Table 13: Distribution of Size of ALA on 10th day of Admission

Diameter of abscess Cavity in cms	No of Cases Conservative	Aspiration
<5	12	17
6–10	0	0
11–25	0	0
>25	0	1

All patients treated either by conservative or percutaneous aspiration showed statistically significant ($p < 0.001$) regression in size of amoebic liver abscess cavity, except one case with secondary infection (Table 13 and Fig. 13).

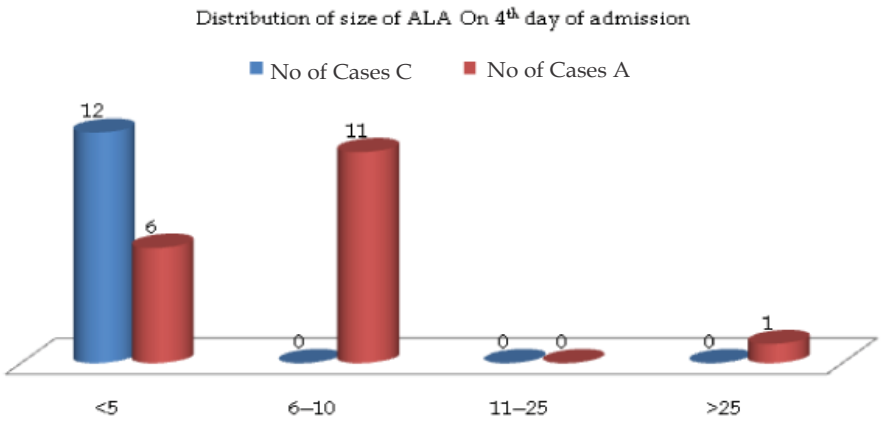

Fig. 11: Distribution of Size of ALA on 4th day of Admission

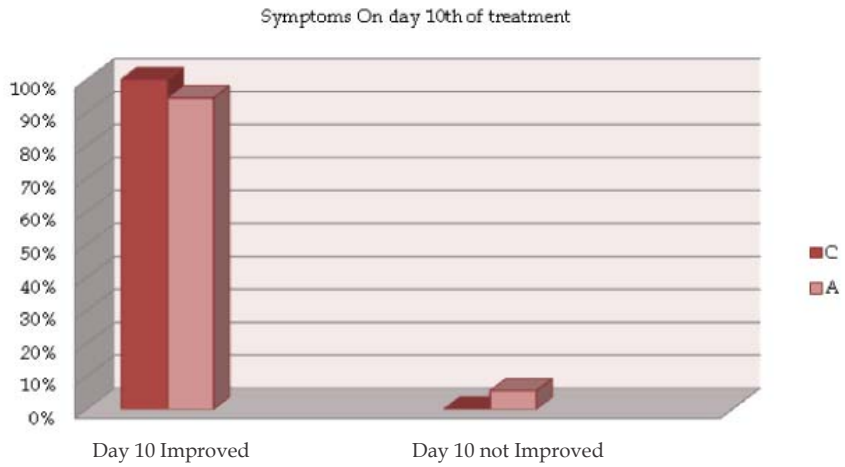

Fig. 12: Symptoms on day 10th of Treatment

Table 14: Distribution of LFT on 4th and 10th day of Treatment

LFT	I		NI		Total	
	freq	%	freq	%	freq	%
Day 4	16	53.3%	14	46.7%	30	100.0%
Day 10	29	96.7%	1	3.3%	30	100.0%

There is statistically significant ($p < 0.00$) improvement in liver function tests in all patients except one patient with secondary infection both on day 4 and day 10th of treatment (Table 14).

Table 15: Distribution of PUS and Culture Sensitivity and Serology

Tests	-		+		Total	
	freq	%	freq	%	freq	%
P/C	29	96.7%	1	3.3%	30	100.0%
AAA	3	10.0%	27	90.0%	30	100.0%

One patient was positive for pus culture and sensitivity and 27 patients were positive for anti amoebic antibody (Table 15).

Table 16: Duration of Stay in the Hospital

		Treatment		
		C	A	Total
Hospital stay	10–15	12	1	13
		100.0%	5.6%	43.3%
	16–20	0	7	7
		.0%	38.9%	23.3%
	Above	0	10	10
		.0%	55.6%	33.3%
Total		12	18	30
		100.0%	100.0%	100.0%

In our study duration of hospital stay is more in case of percutaneous aspiration as compared to conservative management (Table 16 and Fig. 14).

Table 17: Complications at the Time of Admission

Complications	No of Cases	Percentage
Rupture into peritoneal cavity	1	3.3
Rupture into plueral cavity	1	3.3

In our study one patient with secondary infection (Klebseilla Pneumoniae and Escherichia coli) had complication of abscess rupture into pleural and peritoneal cavity (Table 17 and Fig. 15).

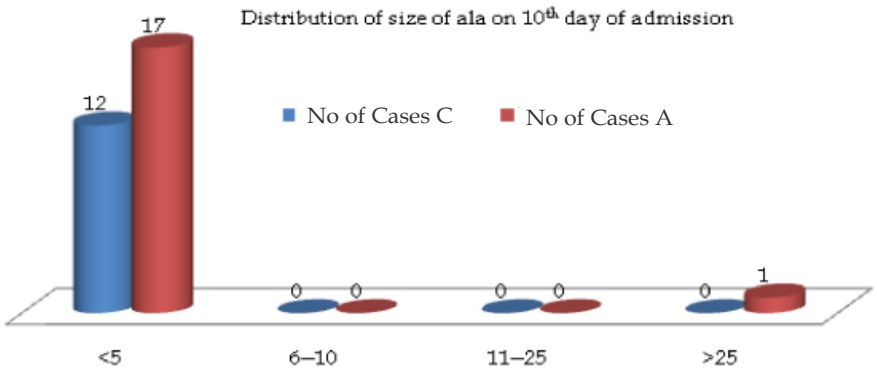

Fig. 13: Distribution of Size of ALA on 10th day of Admission

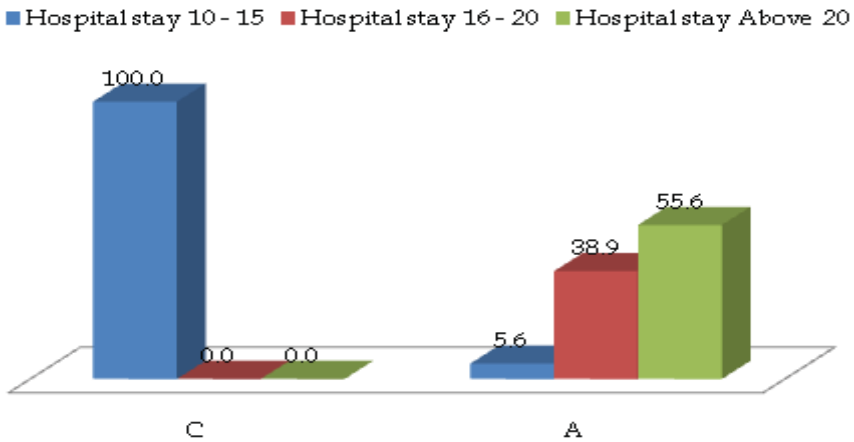

Fig. 14: Duration of Stay in the Hospital

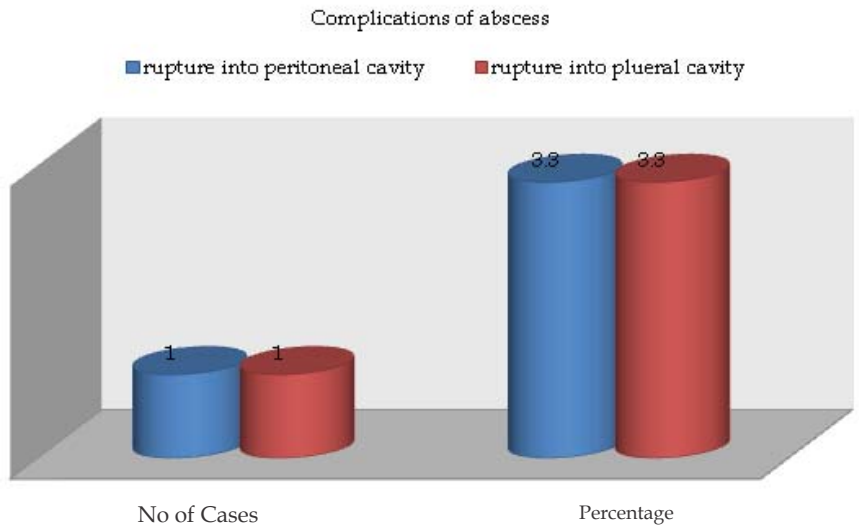

Fig. 15: Complications at the Time of Admission

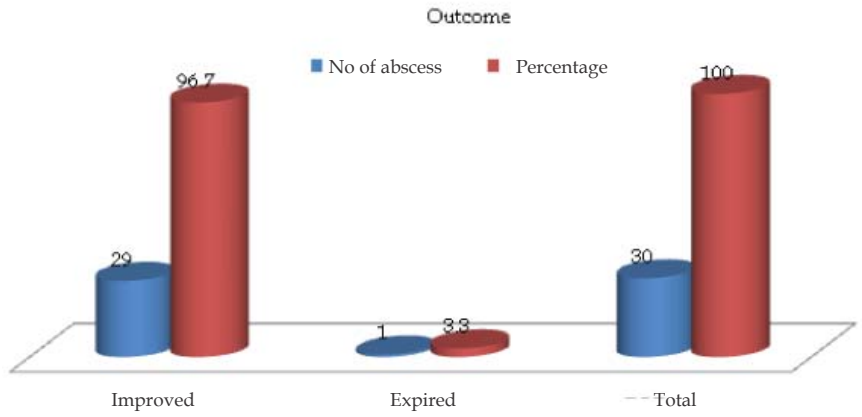

Fig. 16: Outcome

Table 18: Outcome

Outcome	No of Abscess	Percentage
Improved	29	96.7
Expired	1	3.3
Total	30	100

One patient expired in our study and remaining patients were recovered from the illness (Table 18 and Fig. 16).

Discussion

Worldwide, amebiasis, leading to liver abscess is the third most common parasitic cause of death. Except for E.histolytica the other species are regarded as non-pathogenic. 12% global incidence of infection and 50% of people may harbour amoebae in tropical and subtropical regions, ten times more common in adults than in children, 3 to 10 times more common in males.[4] Hence early diagnosis and treatment of the illness can prevent the complication and sequelae.

This study consists of 30 patients admitted to Vydehi institute of medical sciences and research centre, Bangalore. All cases met inclusion and exclusion criteria.

In the present study the common age group was found between 31–50 years comprising 16 (53.3%) cases. Similar results have been reported by several workers, which are comparable with the present study (Table 19).

Table 19: Age incidence of liver abscess in different studies

Authors	Age group	Percentage
Mishra *et al*.[5]	30–40	82%
Turrill and Burnham[6]	20–24	92%

Barbour and Juniper[7]	21–50	84%
Aptekar and Sood	31–50	64%
Raghavan *et al.*	25–50	50.7%
Present study	31–50	53.3%

In our study 30 patients were included, 26 were males constituting 87% of the study population. In the present study the male to female ratio was 15:1. The increased ratio may be due to the fact the patients in our study belonged to the lower socioeconomic status and alcohol intake in the patients (Table 20).

Table 20: Sex incidence of liver abscess in different studies

Authors	Male (%)	Female (%)
Debakey and Oschner[3]	93.4	6.6%
Habibullah *et al.*[8]	91.8	8.2%
Galen *et al.*[9]	85	15%
Turrill *et al.*[6]	86	14%
Katzenstein *et al.*[10]	85	15%
Present study	87%	13%

In present study out of 30 patients who had amoebic liver abscess, 26 were males (87%). The results of the present study are comparable with the study done other authors.

All the patients in the study were from lower socio economic status. It is well known that amoebiasis is common in slum dwellers due to bad sanitation, poverty, ignorance and their poor nutritional status.

The commonest clinical feature was pain abdomen in our study. Pain was a complaint in all the cases in this study (100%) it was present in right hypochondriac area of abdomen. The nature of the pain was dull aching in majority of the patients andsharp stabbing nature in few patients. The incidence of pain in various studies is compared with the present study in following table 21.

Table 21: Incidence of pain in various studies

Authors	Percentage
Kapoor *et al.*	100
Madangopal *et al.*	86
Debakey and Oschner[3]	88.6
Mehta and vakil[11]	87.4
Katzenstein *et al.*[10]	88
Present study	100

Fever was the next common symptom present in 25 cases (83%) in present series. In the majority of cases fever was of low grade and continuous. 20 (66%) of patients belonging to both conservative and percutaneous aspiration; in which fever has subsided by day 4th of treatment. one case with secondary bacterial infection had persistent fever. The incidence of fever in the literature and the present study is compared in the following table 22.

Table 22: Incidence of fever in various studies

Authors	Percentage
Debakey and Oschner[3]	87.0
Mehta and Vakil[11]	90.0
Galen *et al.*[6]	94.0
Present study	83.0

In the present study 11 cases (37%) had history of diarrhoea in past week. This finding is comparable with other studies. But there is wide variation in reported studies. Craig has enumerated the findings of various authors. He states that 60–90% give previous history of diarrhoea/ dysentery.

Jaundice was seen in 5 (17%) of cases. Majority of them belonging to aspiration group. Kapoor *et al.* detected jaundice in few patients, Sharma *et al.* detected jaundice in 30% of the patients. 36% (11) of patients in our study were having hepatomegaly. In our study inter costal tenderness was noted in 8 cases (26%). In the present study one case (3.3%) with secondary bacterial infection had pleural effusion, which was very minimal in quantity. Raghavan *et al.* reported pleural effusion in 19 cases (15.5%) and consolidation of the right lung base in 45 of 126 cases studied 86. Chuttani *et al.* studied 135 cases and manifestations of right basal plueropulmonary involvement were found in 27 patients (20%). Involvement of pleura manifestated as dry pleurisy in 5 cases, pleurisy with effusion in 17 cases and bursting of liver abscess into pleura into 2 cases. Lung involvement resulted into collapse in 2 cases, consolidation in 3 cases and bursting of liver abscess into lung in 1 case.

In the present study, the mean duration of symptoms at presentation in the conservative group was 7.5 days. While the mean duration of symptoms in percutaneous aspiration group was 7 days. Statistically significant difference were found between the two groups {$p < 0.05(0.003)$}. Studies in literature have reported the shortest duration was one day and the average was from ten days to two weeks in acute group; in the chronic group, the longest duration was three years and the average from three to six months. The average duration of symptoms has also been reported to be 2½ months (range 8 days to 9 months), which

is at variance with another report that the average duration of presentation was 2 to 12 weeks. The present average duration of symptoms in our study is, therefore, same as reported in earlier studies. W B C counts were ranging between 4600–13000 cells/ cu mm. mean counts were 8238 and Standard Deviation was 2007. This is one of the parameters in assessing the improvement after initiation of the drug therapy.

Usually polymorpho-nuclear leucocytes predominate. The correlation between degree of anaemia, leucocytosis and duration of illness reveal that patients with a short history tend to show no anaemia but appreciable leucocytosis, where as those with long history show appreciable anaemia with less marked leucocytosis. In the present series higher leucocytes count were noted in patients with acute history associated with moderate anaemia. Anaemia is one of the common findings accompanying liver abscess. Haemoglobin of less than 12 gms was found in 5 cases (17%) in this study. Anaemia is very common in chronic cases and is due to chronic infection. Adams and Macleod found anaemia in 63% cases of their cases studied. They studied serum iron and bone marrow and found it to be normal and concluded anaemia to be due to the presence of chronic infection. The serum Bilirubin was raised (>1 mg/dl) in 7 cases (23%) of the present study. 16.7% of patients treated conservatively and aspiration respectively had raised serum Bilirubin. M.P. Sharma *et al.* found 50.4% patients to have raised Bilirubin. Out of 30 cases of amoebic liver abscess in the present study none of cases had *Entamoeba histolytica* cysts in the stools.

In our study Amoebic serology (anti amoebic antibody) was positive in 27 patients Kraoul compared the capability of rapid enzyme immuno assay (EIA) to detect Antiamoebic antibodies during hepatic amebiasis with those of indirect haemagglutination and latex agglutination. Enzyme immuno assay of 143 sera yielded a specificity, a sensitivity, and positive and negative predictive values of 100, 93, 100, and 97.1, respectively. This test could thus be considered another valuable tool for the diagnosis of hepatic amebiasis. A study in central Vietnam had reported a 94.5% prevalence of anti-amoebic antibodies in cases of amoebic liver abscess. Asymptomatic carriers of E. Histolytica are also known to develop antibodies, thus serological tests are helpful in assessing the risk of invasive amoebas in asymptomatic cyst passers in an endemic area. The value this diagnostic test in the setting of acute disease in endemic areas is less because they remain positive for many years.

In the present study Most of the of patients 21 (70%) had right lobe amoebic liver abscesses; 5 (17%) patients had abscesses in Left lobe and both lobes of liver involved in 4 (13%) of the patients. 22 (73%) out of 30 (100%) patients had one abscess; 6 (20%) had two abscesses. 2 (7%) patients had 3 abscesses. Galen *et al.* in their studies showed that the majority of the amoebic liver abscesses were solitary.[6] Our study was consistent with their study.

Amoebic liver abscesses were studied by Navneet Sharma *et al.* in 86 indoor cases in a North Indian hospital. Their findings in the ultrasound showed 65% of right lobe abscesses, left lobe being 13% and multiple abscesses in 22%. The mean diameter of abscess cavity in a conservative group was 2.75 cms (range: 1.0 to 5.0 cm). The mean diameter of abscess cavity in percutaneous aspiration was 11.67 cms (range: >5.0 to 25.0 cm). Other studies had reported the mean largest abscess diameter as 7.0 cm. In the present study elevation of right hemi diaphragm was found in 11 patients (36%) and one (3.3%) patient with minimal pleural effusion on right side. Similar findings have been reported by the various workers. In our study 12 (40%) patients were treated conservatively and 18 (60%) patients were treated by percutaneous aspiration and conservative management. In our study; liver abscess aspiration was done in 20 patients (66.6%). The amount of pus drained, varied from 50 to 300 ml. The colour of the pus, which was aspirated from the liver, was Anchovy sauce in colour. In one patient it was reddish green that has secondary bacterial infection. If the abscess is connected with the biliary tree then the aspirate is greenish.

In our study the pus in 29 cases was sterile bacteriologically and trophozoites of *E.histolytica* were not demonstrated in any one of them. Barbour and Juniper; in 33 cases of amoebic liver abscess, could find trophozoites in the pus of only 4 cases.[7] 10 cases had trophozoites in the walls of the abscess cavity. Katzenstein *et al.* rarely found *Entamoebahistolytica* in their series of 67 cases.[10] Lamont and Wicks found *Entamoeba histolytica* in 11% of their cases.

In our study none of the cases of amoebic abscess; surgical drainage was employed. Out of 12 patients who were treated conservatively, 2 cases have not responded to conservative treatment; in whom, ultrasound-guided aspiration was performed. Rest of 10 cases have been treated using conservative line of treatment and they have responded very well. Out of 18 patients

who were treated by percutaneous aspiration responded well to the treatment and one patient not responded to aspiration and conservative management; died due to complications. The patient had secondary infection, signs of right sided pleural effusion and rupture of abscess into pleural and peritoneal cavity. Patient died on 25th day due to septicaemia.

In our study clinical, biochemical and ultrasound findings at the time of admission, on day 4th and on day 10th were considered to know the efficacy of conservative management and percutaneous aspiration of amoebic liver abscess. Out of 12 patients who were treated by conservative treatment: 2 patients were converted to pigtail catheter drainage due to persistent of fever, increased WBC count, deranged liver function tests even on day 4 of the treatment. All patients with the initial insertion of pigtail catheter improved and did not require change in the modality of treatment.

Regarding conservative treatment there are no studies indicating drawbacks of prolonged conservative treatment and there are no studies which shows efficacy of needle aspiration in such cases. In our study 11 patients had lost the follow up and one case died and in remaining cases cavity were completely resolved. But resolution of cavity size was earlier in case of percutaneous aspiration as compared to the delayed resolution in case of conservative treatment. On the basis of ultrasound findings; when the size of abscess was found to be markedly decreased; pigtail catheter removal done. The period ranged from 10 to 45 days with the mean of 15.6 days. Thus our study clearly proves that the improvement in clinical and laboratory parameters in case of conservative treatment (where cavity size less than 5 cms) on day 4th and day 10 was statistically significant; which is similar to percutaneous aspiration group. However the rate of decrease in size of the abscess cavity was lesser in the conservative group than in percutaneous aspiration group. The study clearly indicates that uncomplicated abscess measuring less than 5 cms are better treated by conservatively and cavities more than 5 cms are treated by ultrasound guided percutaneous aspiration.

Conclusion

- Amoebic liver abscess is commonly seen in young to middle aged males.
- Ultrasonography helps in early diagnosis and reducing morbidity and mortality. Liver function tests helps in knowing the effectiveness of the treatment and prognosis. Amoebic liver abscess <5 cms are effectively treated by conservative management and abscess >5 cms by percutaneous aspiration. Resolution of abscess cavity is faster in patients treated by percutaneous aspiration as compared to conservative treatment. Metronidazole effective in most of the amoebic liver abscess. Mortality encountered in one patient with secondary infection of amoebic liver abscess.

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A Randomised Study Comparing Topical Glyceryl Trinitrare, Anal Dilatation and Lateral Sphincterotomy for the Treatment of Chronic Anal Fissure

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Abstract:

Background: Anal fissure is a common and minor disorder that needs careful attention because it is a painful condition but the treatment is simple and effective. This has led to the investigation of nonsurgical treatment options that avoid permanent damage to the internal anal sphincter.

Methods: The study was conducted in Geetanjali Medical College and Hospital from year 2015 to 2017, with chronic anal fissure. A comparative study of 101 cases was done between different modalities in the treatment of anal fissure. Study cases were divided into 3 groups.

Treated with topical application of 0.2% glyceral trinitrate GTN, Treated with anal dilation under G.A. or spinal anaesthesia, Treated with lateral sphincterotomy under total intravenous anesthesia (T.I.V.A.) or spinal anaesthesia (S.A.).

Results: A follow up of 101 patients was done for 6 weeks. 30 to 50 years of age with male and female ratio of 2.48:1. Complains of pain in anal region during defecation with blood streak on stool. History of constipation was presented in 71% patients. Out of 101 patients 81 patients could be followed up to 6 weeks. 20 lost were belonging to GTN group. 100% and 93.3% patients were relieved of pain in anal dilatation and lateral sphincterotomy as compared to 75% patients with GTN application (significant; $p<0.001$).

Conclusion: This study concludes that pain relief is early with lateral sphincterotomy anal dilatation. Healing of fissures was early and 100% by lateral sphincterotomy only. Postoperative stay in hospital was short. Incidence of anal incontinence were present with anal dilatation and lateral sphincterotomy which was absent with GTN. Also, healing of fissure was seen in 70% patients at 6 weeks after GTN application. Lateral sphincterotomy is the best choice in terms of surgical treatment but GTN application is a good medical treatment in majority of patients and surgery can be offered to those failures with medical treatment.

Keywords: Fissure in ano; Sphincterotomy; Anal dilatation; Anal incontinence.

Introduction

Anal fissure is a common and minor disorder that needs careful attention because it is a painful condition but the treatment is simple and effective. It is usually common in young adults with almost equal incidences in both sexes.

Diagnosis is based on classic symptoms; i.e. pain during or after defecation often with red streak of blood on faecal matter and a split in the epithelium at or within the anal verge. Secondary features like sentinel skin tag, hypertrophied anal papillae may represent.

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Causes of anal fissure are uncertain but may be traumatic or result of posterior anal canal ischemia. It is probably due to a chronic increase in resting anal pressure with resultant decreased anodermal perfusion that causes fissure and recurrences. Chronic fissure would not heal spontaneously and nonoperative treatments like injection of botulinum toxin, nitroglycerine ointment, anal dilation; etc. or surgical procedure like anal stretching, fissurectomy and sphincterotomy.

Treatment has shifted from surgical to medical in recent years with aim to reduce the anal spasm or abnormally raised resting anal pressure and pain relief. Anal dilation is a simple procedure and needs no instrument. Fecal incontinence is commonly encountered. Fissures healed in 70%–80% and temporary incontinence is reported in 15%–20% cases. Chemical sphincterotomy using topical 0.2% nitro-glycerine is one of the best medical treatment available but headache and light headedness are common side effects. In lateral sphincterotomy, sphincter is cut in right or left lateral side. It can be divided in closed fashion by tunnelling under the anoderm or in an open method by cutting through anoderm. Following surgery, 93%–97% fissures heal.

Weaver *et al.* (1988) established that manual dilation of anus had no significant differences in outcome than the internal sphincterotomy.

In the proposed study, comparison of various medical and surgical treatment modalities was done and their outcome was studied especially in chronic anal fissure.

Materials and Methods

The present study was conducted on both surgical outdoor and indoor patients attending Geetanjali Medical College and Hospital from year 2015 to 2017, with chronic anal fissure.

A comparative study of 101 cases was done between different modalities in the treatment of anal fissure. In this study cases were divided into 3 groups.

Group 1: Treated with topical application of 0.2% GTN. (60 cases)

Group 2: Treated with anal dilation under G.A. or spinal anesthesia. (26 cases)

Group 3: Treated with lateral sphincterotomy under G.A. or spinal anesthesia. (15 cases)

Routine history was recorded in all cases which included presenting complaints with duration under following headings anorectal pain, severity (mild, moderate, severe), relation with defecation, blood in stool, sentinel pile, prolapse, history of pruritis, discharge, constipation, diarrhoea, child birth, food habit, past history, drug history.

Local Examination: site of fissure, anal tag, digital rectal examination, proctoscopy, other findings in the form of proctitis, haemorrhoids. Patients were treated randomly by 3 modalities.

Exclusion criteria

Patients with crohn's disease, pregnant woman, patients taking nitrates for other conditions or having ischemic cardiac disease were excluded (especially in GTN group).

Informed consent was taken from the patients undergoing surgical treatment.

GTN Group: patients were started on a course of 0.2% GTN. Applied digitally over perianal and intra-anally three times daily, for 6 weeks. The amount applied was minimal i.e. pea size.

ANAL Dilatation Group: the procedure was performed with the patient under spinal anaesthesia/total intravenous anesthesia.

Digital dilation was performed by controlled stretching. Use of four to six fingers inserted into anal canal for atleast 4 minutes.

Lateral Sphincterotomy Group: performed under spinal anaesthesia. Internal sphincterotomy was done either in right or left lateral side. The internal sphincter was placed on a slight stretch and closed anal sphincterotomy was done.

All the patients were followed up to 6 weeks and comparison was done with respect to pre-treatment symptoms. Patients were also assessed for fissure healing, complications and compliance.

Results

Table 1: Distributions of patients according to age and sex.

S. No.	Age	Male	Female	Total	%
1	0–10	0	0	0	0
2	11–20	2	1	3	2.97%
3	21–30	18	4	22	21.78%
4	31–40	28	16	44	43.56%
5	41–50	14	5	19	18.81%
6	51–60	4	3	7	6.93%
7	61–70	6	0	6	5.94%
	Total	72 (71.28%)	29 (28.72%)	101	

Mean age was 37.27 years (Table 1).

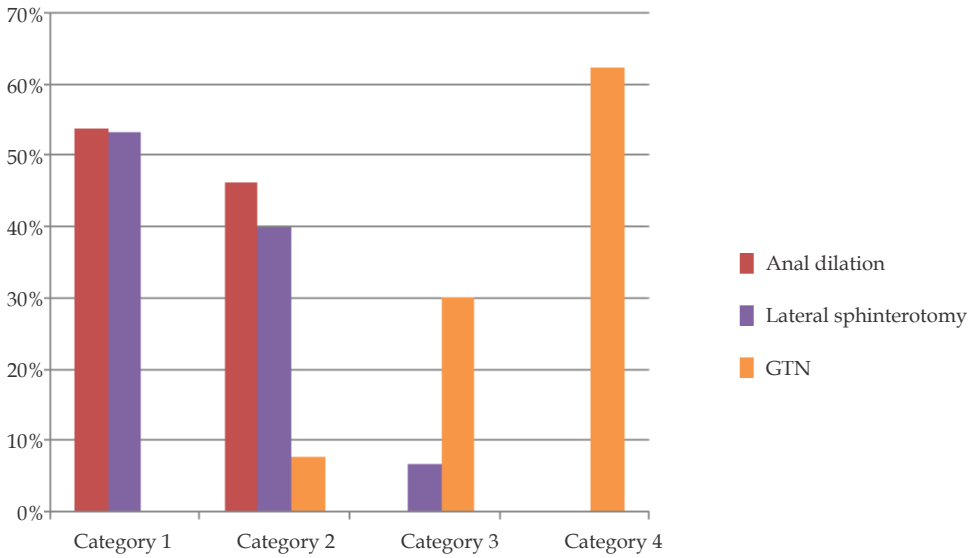

Fig. 1: Distribution of patients according to duration and pain relief post treatment in various groups.

Table 2: Distribution of patients according to chief presenting complaint.

S. No	Complaint	No. of Patients	%
1	Anorectal pain	101	100%
2	Rectal bleeding	79	78.2%

Anorectal pain and blood in stool were chief presenting complaints (Table 2).

Table 3: Distribution of patients according to associated complaints.

S. No.	Associated complaints	No. of patients	%
1	Pruritis	23	22.77%
2	Prolapsed	32	31.68%
3	Constipation	72	71.28%
4	Diarrhoea	3	2.97%
5	Child birth	4	3.96%

Mean duration of pain relief was 1.46 weeks with anal dilation, 1.53 weeks with lateral sphincterotomy and 3.54 weeks with 0.2% GTN application. Pain relief at 2 weeks was in 100% patients of anal dilation, 93.3% of lateral sphincterotomy and only 7.5% of GTN patients (highly significant; $p < 0.001$) (Fig. 1).

Discussion

This study consists of 101 cases of chronic anal fissure treated by different modalities at Geetanjali Medical College and Hospital, Udaipur in surgery outdoor and indoor during the year 2015 to 2017.

Majority of patients were between 30 and 50 years of age group. In our study, all patients were between 15 and 70 years of age, with mean age of 37.27 years. Maximum number of patients 62% were in between 30 and 50 years of age group while 2.97% below 20 years and 5.94% above the age of 60.

Similar age incidence was reported by Lund JN *et al.* (1996)–36 years, Richard *et al.* (2000)– 40.3 years, U K Srivastav *et al.* (2001)–40 years, garcea G *et al.* (2004)–33 years.

In our study it was observed that males were more affected than females. Ratio being 2.48:1. Maximum numbers of male and female patients were of 31–40 years of age. It was observed that almost 100% of patients had experienced anorectal pain during and after defecation for few minutes to few hours. It was due to spasm of anal sphincter and anal passage of hard stool.

In our study, pain was classified as mild, moderate and severe with 70.3% moderate and 9.9% had severe pain. Maximum number of patients 81.15% experienced pain during and after defecation for few minutes to half hour while 8% patients had pain lasting for more than 3 hours. Blood on stool is a common symptom. Bleeding is in the form of streak not mixed with the stool and bright red color.

In our study, approximately 78% of patients had blood on stool in the form of streak. About 22.7% had pruritis and 32% complaints of prolapsed as associated complaint.

Constipation is considered as a causative factor as well as aggravating factor of anal fissure. In our study, history of constipation was present in about 71.28% patients. Similar observation of approximately 88% cases in study by Jensen SL

et al. (1988). F.F. Ammari *et al.* (2004) reported 78.5% patients of anal fissure had constipation.

In our study, anal tags were associated in 84% cases and internal haemorrhoids in 19.8% patients.

Similar observation made by Pravin J Gupta *et al.* (2003) observed 51.6% of patients having anal tags and 17% with internal haemorrhoids.

Majority of fissures are usually single and present in posterior mid line in our study 83.17% patients had posterior fissure and 11.8% with anterior fissure.

Sajith Babu SM, Rachna Gupta, Lalmani Singh, Effectiveness of conservative management of acute fissure in ano: A prospective clinical study of 165 patients. Most of the patients were young adults with a slight female dominance. Pain during defecation and bleeding per rectum were the major presenting complaints. 73.94% of patients achieved symptom relief within 2 weeks of conservative treatment. At 6 weeks follow up after giving conservative line of management, 97.58% achieved symptom relief with healing of ulcer. Mean pain score was reduced from 9.5 ± 0.71 at the start of therapy to 1.33 ± 0.69 at the end of 6 weeks of conservative therapy.

Tayfun Yucel and Dogan Gonullu concluded that two months postoperatively, 18 patients in the CIAD group and 17 patients in the LIS group had healed completely, and had no anal incontinence or other complications. The postoperative improvement in pain, bleeding, and constipation did not differ significantly between the two groups. In the CIAD and LIS groups, the pre-operative MACRPs were 89.7 ± 16.5 and 87.6 ± 12.3 mmHg, respectively; 2 months postoperatively, the MACRPs had significantly decreased to 76.9 ± 13.7 and 78.1 ± 11.3 mmHg in the CIAD and LIS groups, respectively. No statistical difference existed in the pre- or post-treatment MACRPs between the groups.

Majid Aziz and Faran Kiani in a study of comparison between lateral internal anal sphincterotomy and diltiazem in the treatment of chronic anal fissure concluded that in group A six patients had healing of fissure after 4 weeks and a further 4 at 6th week. In group B 14 patients had healing at 2 weeks, 10 at 4 weeks, and 5 at 6 weeks. One patient in group B and 20 in group A had no healing. In this study overall healing rate after 6 weeks with diltiazem was 33.33% and 96.66% with LIS.

Out of 101 cases, 26 cases were treated by anal dilation, 15 by lateral sphincterotomy and 60 cases by 0.2% GTN application. These were followed up for 6 weeks.

In GTN group, 20 out of 60 patients did not come for follow-up.

Blood on stool was absent after a mean duration of 4.4 days with anal dilation v/s 1.3 days with lateral sphincterotomy, whereas with GTN mean duration was 3.4 days. After one-week bleeding were absent in 79% patients treated with GTN, 66% with anal dilation and 100% with sphincterotomy. Thus, absence of bleeding was earlier with lateral sphincterotomy followed by 0.2% GTN application and anal dilation.

Mean duration of pain relief with GTN was 3.55 weeks whereas 1.46 weeks with anal dilation and 1.53 weeks lateral sphincterotomy, showing earlier pain relief with anal dilation and lateral sphincterotomy.

Pain relief at two weeks was in 100% patients with anal dilation, 93.3% with lateral sphincterotomy while 37.5% with GTN (highly significant; $p < 0.001$).

Pain relief at three weeks was in 100% with anal dilation and lateral sphincterotomy while 37.5% with GTN (highly significant; $p < 0.001$).

Lund and Armitage *et al.* (1996) reported that pain relief was in 100% cases of lateral sphincterotomy.

D. Khetan *et al.* (2000) reported pain relief in 94% cases of lateral sphincterotomy v/s in 80% cases of anal dilation at 4 weeks.

Janson S.L. *et al.* (1984) reported pain relief in 90% cases with anal dilation v/s in 100% cases of lateral sphincterotomy.

At the end of 6 weeks, 70% patients got their fissure healed while 30% failed to heal with 0.2% GTN.

It was seen that 80.76% of fissures healed by anal dilation while 100% fissures healed by lateral sphincterotomy.

In our study, mean duration of healing of fissures with anal dilation was 4 weeks, 2.6 weeks with lateral sphincterotomy and 4.6 weeks with GTN application.

Fissure healing at 2 weeks was in 40% patients of lateral sphincterotomy v/s 0 in anal dilation and GTN group (highly significant; <0.001). whereas at 4 weeks, healing of fissure was in 100% patients of lateral sphincterotomy, in 65.4% of anal dilation and only 35% cases of GTN (highly significant; <0.001).

At the end of 6 weeks, 80.7% of patients in anal

dilation group got their fissure healed v/s 70% in GTN group (significant; <0.05).

With lateral sphincterotomy, Richard CS *et al*. (2000) reported healing rate of 89.5% patients at 6 weeks, D. Khetan (2000)—100% at 4 weeks, Simkovic D (1989)—100% at 3 weeks, Notaras (1971)—100% at 3 weeks, Milito (1983)— 100% at 4 weeks. Liratzopoulous *et al.* (2005)—92.5%.

Healing rate with anal dilation, NA Strugnell *et al*. (1999) reported 89%, D Khetan *et al.* (2000) 84% at 4 weeks and Pravin J Gupta *et al.* (2003) 93%.

Our study shows that healing of fissure was early with lateral sphincterotomy followed by anal dilation and GTN application. Fissure healing was in 100% cases undergoing lateral sphincterotomy while 80.7% and 70% cases healed at the end of 6 weeks follow up with anal dilation and GTN application (significant; $p < 0.05$). Thus results are comparable with previous studies.

This shows lateral sphincterotomy is the treatment of choice for chronic anal fissure followed by anal dilatation whereas chemical sphincterotomy as conservative treatment to avoid surgery in majority of patients.

Non healing of fissure was seen in 19% patients of anal dilatation and 30% patients of 0.2% GTN application group.

Summary

A follow up of 101 patients was done for 6 weeks. Majority of patients were between 30 to 50 years of age with male and female ratio of 2.48:1. Patients presented with main complains of pain in anal region during defecation with blood streak on stool. History of constipation was presented in 71% patients. Out of 101 patients only 81 patients could be followed up to 6 weeks. Rest 20 lost were belonging to GTN application group.

Mean duration of pain relief was comparable in anal dilatation and lateral sphincterotomy and 3.54 weeks with GTN application at 2 weeks. 100% and 93.3% patients were relieved of pain in anal dilatation and lateral sphincterotomy as compared to 75% patients with GTN application (highly significant; $p < 0.001$).

Conclusion

This study concludes that pain relief is early with lateral sphincterotomy anal dilatation. Healing of fissures was early and 100% by lateral sphincterotomy only. Postoperative stay in hospital was short. Incidence of anal incontinence were present with anal dilatation and lateral sphincterotomy which was absent with GTN. Also, healing of fissure was seen in 70% patients at 6 weeks after GTN application with minor side effects of headache, itching; etc. lateral sphincterotomy is the best choice in terms of surgical treatment but GTN application is a good medical treatment in majority of patients and surgery can be offered to those failures with medical treatment.

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Acetic Acid Based Dressings on *Pseudomonas aeruginosa* Infected Diabetic Ulcers: A Randomized Controlled Study

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Abstract

Wound infections had increased the risk of amputations in Diabetic patients by 90 times. *Pseudomonas aeruginosa*, has been a local deterrant to wound healing by its various properties of biofilm formation, increased virulence and multi drug resistance by various methods. Unfortunately, due to its resistance to first generation spectrum of antibiotics, and its gradual increase in resistance to third generation cephalosporins, aminoglycosides etc, the need for alternative methodologies arise. Acetic acid helps in local control of the microbe by reducing the wound pH to acidic. This was an Open labelled prospective randomized control trial. Totally 80 patients with diabetic foot ulcers with culture proven *Pseudomonas aeruginosa* positive status were included, and non diabetic ulcers were excluded. Two groups based on simple randomization into test and control groups each containing 40 patients. The control group received traditional saline dressings. The test variables and the control variables were tabulated and compared using Chi square test. The efficacy of 3% Acetic acid in eradication of *Pseudomonas aeruginosa* infected diabetic ulcers was assessed. $p<0.01$ was considered to be statistically significant. At the end of the study, it was seen that there was complete eradication of *Pseudomonas aeruginosa* in 87.5% of the individuals in the test group and 62.5% of the individuals in the control group which was statistically significant ($p = 0.009$). Thus, in conclusion, Acetic-acid based dressings are effective for management of diabetic foot.

Keywords: Acetic acid; Pseudomonas; Dressing.

Introduction

Diabetes mellitus is a disorder characterized by uncontrolled sugar levels in the blood and its various manifestations to the human body. Diabetic foot and diabetic foot ulcers occurs as a complication of its sequelae. Foster et al discovered in 1997 that nearly 30 percent of patients with diabetes mellitus have increased risk of developing foot ulcers. 15% of diabetics developing foot ulcers, accounting for 30% of the hospital admissions with the hospital stay of those patients being 60% longer than the rest of the patients. These high risk patients had an increased risk of amputations[1]. The overall healing period of the diabetic ulcer was estimated to be 3 months with persistence of a small ulcer for more than a year[2]. Various management methodologies have been implemented in treating diabetic wounds including Debridement, Dressings, Infection control, Amputation, correcting vasculopathies, Off-loading. Wound infection deters the healing process of the diabetic ulcer and leads to amputations. It was seen wound infections had increased the risk of amputations by 90 times to that of a non-infected wound[4]. It has been seen that the following microbial organisms are more

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common in diabetic foot ulcer isolates; *S. aureus, E.coli, Pseudomonas, Klebsiella, Citrobacter sp., Proteus sp.* With an overall predominance of *Pseudomonas* and *Staphyloccus aureus.* Biofilm production was seen in almost all organisms associated causing increased virulence and delayed wound healing[4]. *Pseudomonas aeruginosa* is one of the leading nosocomial pathogens worldwide. It is a gram negative microbe[10]. This micro-organism has natural resistance to most structurally unrelated antimicrobials available as studied by Mesaros et al. in 2007, attributing to the low permeability of its outer membrane (1/100 to that of *Escheria coli,* (Livermore, 1984)). The mechanism of resistance in *Pseudomonas aeruginosa* can be attributed to the following mechanisms namely Impermeability, Active efflux, Target modification, Non-enzymatic methods. Various strains of *Pseudomonas aeruginosa* with varied natural has been found to have resistance to the following antibiotics namely *Beta lactams – penicillin G, Aminopenicillins, Antibiotics* combined with beta lactam inhibitors, First, second and third generation cephalosporins, Aminoglycosides. The microbe also acquires additional resistance mechanisms via metallo-beta-lactamase (MBL)-mediated resistance which shows resistance to carbapenems[13]. Infection with micro-organisms usually causes an increase in the virulence factors and taxis of neutrophils towards organisms. In *Pseudomonas aeruginosa* infected ulcers, the organism produces a biofilm which, during taxis of neutrophils releases a series of toxic components. These toxic substances deter phagocytosis and causes oxidative stress which delays the physiological process of wound healing[3]. It is also seen that in chronic wounds, *Pseudomonas aeruginosa* infected wounds having a biofilm will deter the wound healing by increasing the inflammatory response. Acetic acid is considered an antimicrobial agent and has low toxicity[6,7]. It has the following actions[8]. Its acidic nature, ability to Neutralize electrochemical potential, Lowering pH of the wound on application. Thomas bjornsholt *et al.* have evaluated the efficacy of acetic acid in various concentrations and its role in lowering the pH of the wound. It has been seen that the unaltered acetic acid molecule is responsible for lowering the pH and its effect in removing the biofilm also helps in reducing the infective rate of the organism[14]. Kapil *et al.* (2017) have assessed the efficacy of 1% acetic acid in various concentrations towards various microbes and have seen that the local pH of the wound was altered and acetic acid is efficient in eradication of multiple organism and fungi[11]. The effect of low pH on wound healing was also studied by Basavaraj *et al.* (2015). It was seen that the acidic environment also promotes epithelization and angiogenesis. In a histopathological study on chronic wound infections, use of citric acid was shown to enhance epithelization and found to actuate the wound healing process by boosting fibroblastic growth and neovascularization, which increases microcirculation of wounds that enables the formation of healthy granulation tissue, thereby leading to faster healing of wounds[12]. Presence of an infectious component prevents wound healing by various factors. When the contamination increases to a point of critical colonisation or infection, then the infection or the bioburden in the wound becomes a major contributing factor that impedes wound healing[5]. Acetic acid, as seen from above, is bactericidal against many organisms, especially towards *Pseudomonas aeruginosa*. It can be used in concentrations from 0.5–5% as topical applicant in wounds infected with *Pseudomonas aeruginosa* and has been seen to be effective in its eradication. It does not cause removal of epithelialization from 8th day and has no effect in tensile strength of the wound[9]. Use of acetic acid in the concentrations mentioned above can provide a viable alternative to conventional antibiotics in elimination of the organism and thereby help in wound healing, decrease in morbidity and attaining locoregional control. *Pseudomonas aeruginosa*, has been a local deterrant to wound healing by its various properties of biofilm formation, increased virulence and multi drug resistance by various methods. Unfortunately, due to its resistance to first generation spectrum of antibiotics, and its gradual increase in resistance to higher spectrum of antibiotics (third generation *cephalosporins, aminoglycosides*), the need for alternative methodologies arise. It has been shown that the local pH (alkaline) is essential for the ideal growth of the organism. Acetic acid being a weak acid has been used as a time old ingredient which helps in local control of the microbe by its various attributes, one of those including reducing the wound pH to acidic.This study will compare the efficacy of acetic acid based dressings and conventional dressings on *Pseudomonas aeruginosa* infected diabetic ulcers.

Materials and Methods

This was an Open labelled prospective randomized control trial with an aim toanalyse the effect of 3% acetic acid dressings in eradication of *Pseudomonas aeruginosa* in comparison to conventional saline dressings in *Pseudomonas aeruginosa* infected diabetic ulcers. Totally 80 patients including

In-patients and out patients from departments of General Surgery, General Medicine, Cardiology, Nephrology and Neurology from November 2016 to November 2018, were selected. All patients with diabetic foot ulcers with culture proven *Pseudomonas aeruginosa* positive status were included in the study, and those with Ischaemic ulcer, venous ulcer, ulcer with vasculitis, ulcers with osteomyelitic changes, ulcers with bones or tendons exposed and Immunocompromised patients were excluded from the study. Written informed consents were obtained from the patients and detailed clinical history of the patient were collected from the patients who participated in this study. The following details were collected. Name, age, sex, diabetic status, onset and duration of ulcer and culture sensitivity reports on day 0 and day 10. Each patient was followed up for 10 days and their culture reports were analysed. The patients were divided into two groups based on simple randomization into test and control groups each containing 40 patients. 3% acetic acid was prepared by titrating 100% Glacial acetic acid with distilled water. The test group received 3% acetic acid dressing. 3% acetic acid was taken in a sterile container and sterile gauze was soaked in it. After thorough cleansing of the wound with saline, 3% acetic acid is placed over the wound and gamgee pad was placed over it following which the wound was closed in roller bandage. This was done twice daily for 10 days and culture sensitivity was sent on 10th day. The control group received traditional saline dressings. Under aseptic precautions, patient's wound was thoroughly cleansed with saline and sterile gauze was placed over the raw area following which gamgee pad was placed and wound dressed. This was done twice daily for 10 days and culture sensitivity was sent on 10th day.The data was collected and tabulated in an EXCEL spreadsheet. The test variables and the control variables were tabulated and compared using Chi square test. Percentages, mean values and statistical significance values were derived. A type I error of 0.05 was taken into consideration in all analysis. The efficacy of 3% Acetic acid in eradication of *Pseudomonas aeruginosa* infected diabetic ulcers was assessed by reviewing the culture reports on day 10 amongst all patients in both groups using the above statistical tools. $p < 0.01$ was seen and was considered to bestatistically significant in the above study, thereby demonstrating a better outcome in eradication of P. aeruginosa in P. aeruginosa infected diabetic ulcers using 3% acetic acid.

Results and Discussion

It is well known that diabetic ulcers increase the morbidity of the affected individual and delayed wound healing in the presence of infected wounds. It should therefore be mandatory to prevent the development of diabetic foot ulcers at the earliest by identifying diabetic peripheral neuropathic changes. In case of a formed ulcer, in diabetic individuals, adequate care must be initiated to prevent the ulcer from causing irreparable damage. Care involved is multifactorial from the choice of dressings, frequency of dressings, glycaemic control, infection control to debridements. In patients with *Pseudomonas aeruginosa* infected diabetic foot ulcers, due to the prevalence of multiple strains with resistance to betalactams and carbapenems and the ability to produce biofilms, care administered gets difficult due to poor loco-regional control. Acetic acid provides a cheaper alternative in eliminating *Pseudomonas aeruginosa* in *P. aeruginosa* infected diabetic wounds by reducing the pH of the wound and its ability to denature proteins. Literatures reviewed on the use of acetic acid on elimination of *Pseudomonas aeruginosa* in diabetic ulcers and chronic ulcers have shown promising results.Thomas *et al*., have studied the effect of biofilm formation and antibiotic resistance by *Pseudomonas aeruginosa* and its effect in delayed wound healing. It was seen that biofilms resist and or tolerate all antibiotics and promote pathogen growth. Nagoba *et al.* in 2008 studied the effect of 3–5% acetic acid's topical application two to twelve times over the P. aeruginosa infected diabetic wound successfully eradicated the organism. Ryssel H *et al.* in 2010 studied the effect of acetic acid matrix dressing in burn wounds and found them to be effective in eradication of the organism. In this study, we compared the eradication of *Pseudomonas aeruginosa* in infected diabetic ulcers by using 3% acetic acid to that of conventional saline dressings at the end of 10 days (Fig. 1).

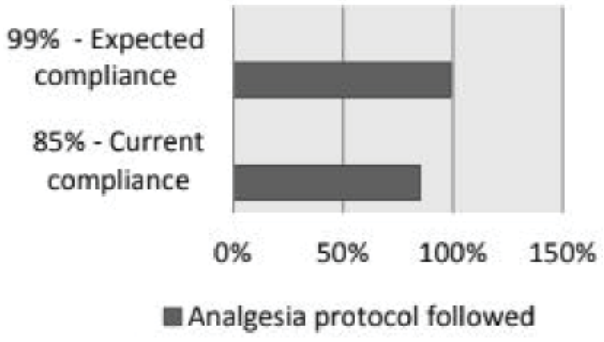

Fig. 1:

All patients received conventional antibiotics via oral and/or parenteral based on culture sensitivity. At the end of the study, both groups of 40 individuals each were compared. It was seen that there was complete eradication of *Pseudomonas aeruginosa* in 35 individuals in those treated with 3% acetic acid to that of 25 individuals in the control group (treated with traditional saline dressings). 70% of the individuals were males in the test group to that of 65% in control group, with the maximum affected individuals in 51–70 age group. 87.5% of the individuals in the test group had complete eradication of the organism with acetic acid dressings and 62.5% of the individuals in the control group had complete eradication of the organism with traditional saline dressings. The percentage elimination of *Pseudomonas aeruginosa* showed a statistical significance ($p = 0.009$), with independent t analysis having ($p = -0.596$) suggesting no bias. It was thus concluded that Acetic acid dressings help in maintaining locoregional control of *Pseudomonas aeruginosa* and eradication of the organism. It is also to be noted that acetic acid proves to be a considerable economic advantage due to its easy availability and better efficacy in eradicating the organism. The limitations of this study to note is its small sample size.

Conclusion

Thus, in conclusion, Acetic-acid based dressings are effective for management of diabetic foot. Acetic acid dressings, in 3% concentrations, help in complete eradication of *P. aeruginosa* in diabetic ulcers. The main advantage being, Acetic acid is easily available and is an economic alternative in providing loco regional control for multidrug resistant Pseudomonas infected diabetic foot ulcers.

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Original Research Article

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Comparison of Limberg Flap Versus Secondary Wound Healing after Excision of Sacrococcygeal Pilonidal Sinus: A Retrospective Study

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Abstract

Introduction: Pilonidal Sinus disease is considered to be a male dominate disease which affects near about 0.7% of world young adult population. Although many treatment options are available but surgical intervention is still remained a gold standard treatment option for this disease. This study is aimed to find out better surgical procedure in terms of less complication and recurrence rate.

Methods: This was a retrospective study which was carried out at Department of General Surgery, Dr M K Shah Medical College and Research Centre, Ahmedabad. Total 100 patients of which 50 patients who underwent Limberg flap procedure whereas 50 patients who underwent Secondary wound healing procedure are nalyzed.

Results: In present study we have found that operative time in secondary healing procedure was significantly shorter in duration but Limberg flap procedure cures with less pain, lower rate of wound infection, less hospital stay, early returning to normal activity and low rate of recurrence of the disease.

Conclusion: As a results obtained from this study we are concluding that Limberg Flap Method has shown optimal post operative outcomes as compared to Secondary healing procedure in terms of less post operative pain, low rate of wound infection, lesser days of hospitalization and low reoccurrence rate and early returning to normal daily activities. Open procedure is required lesser operative time as compared to Limberg Flap Procedure.

Keywords: Pilonidal Sinus; Limberg Flap Procedure; Secondary wound healing procedure.

Introduction

Pilonidal Sinus disease is considered to be a male dominate disease which affects near about 0.7% of world young adult population. In 1833, Herbert Mayo introduced this disorder whereas Hodges termed as Pilonidal in 1880[1]. The incidence rate of pilonidal sinus disorder is 26 per 100,000 individuals[2]. Some of the research studies indicate that male gender, obesity, individuals with excessive hair, poor hygiene, prolonged sitting related occupation like drivers and positive family history are most common cause of the pilonidal sinus[3].

Although many treatment options are available but surgical intervention is still remained a gold standard treatment option for this disease and is aimed at a simplified procedure with minimal post-operative pain, minimal wound care, rapid wound healing, shorter hospital stay, early return to daily activities and low recurrence rate.[1,2]Several surgical methods were outlined like Primary closure Procedure, Secondary healing Procedure, Limberg Flap Procedure and Karydakis Flap Procedure.

In our study we have compared outcome of Limberg flap versus Secondary wound healing

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method after excision of sacrococcygeal pilonidal sinus surgery. This study is aimed to find out better surgical procedure in terms of less complication and recurrence rate.

Materials and Methods

This was a retrospective study which was carried out at Department of General Surgery, Dr MK Shah Medical College and Research Centre, Ahmedabad. In this study we have analyzed data of the patients who were admitted with sacrococcygeal pilonidal sinus from June 2016 to June 2018. Total 100 patients of which 50 patients who underwent Limberg flap procedure whereas 50 patients who underwent Secondary wound healing procedure are analyzed.

We have included only those patient's data that has age between 18 years to 45 years and fulfilling the diagnostic criteria of Chronic discharging sinus/ sinuses in natal cleft with or without surrounding tissue inflammation and associated with pain and bleeding on clinical evaluation. Patients' data were followed up at post operative 1st week, 1 months, 2 months and 1 year.

Following data were recorded;

- Age, Gender and BMI of the patient.
- Operation duration.
- Hospital stay time.
- post operative infection.
- Duration of inability to work in days.
- Recurrence.

Statistical Methods

Student's *t*-test (independent sample *t*-test) as a parametrical test was used to find significant mean difference between both the study group. In comparing categorical variables, cross-table statistics were used (χ^2-Fisher's exact test). Significance limit of statistics was set at $p < 0.05$.

Results

Table 1: Demography

Variable	Limberg Flap Procedure	Secondary healing procedure	*p* - value
Age (Years) mean ± SD	29.14 ± 6.74	28.47 ± 8.88	>0.05
Gender (Male/Female)	47/3	45/5	>0.05
BMI (Kg/m^2) mean ± SD	26.63 ± 7.54	26.78 ± 6.98	>0.05

In both groups it was found that male were significantly higher as compared to female patients. We did not find any significant demographic difference between both the groups (Table 1).

Table 2: Procedure Outcome

Variable	Limberg Flap Procedure	Secondary healing Procedure	*p* value
Operation Time (min)	78.43 ± 10.74	60.23 ± 7.19	0.0001
Post Operative Infection	1	7	0.0269
Hospital Stay	1.89 ± 0.38	4.69 ± 2.59	0.0001
Days required Return to work	10.83 ± 3.61	22.17 ± 3.58	0.0001
Reoccurrence	1	4	0.1686

From our data it was found that operating time was significantly higher in Limberg Flap procedure group as compared to Secondary Healing Procedure (78.43 ± 10.74 min vs. 60.23 ± 7.19) with p value 0.0001. In Secondary healing Procedure post operative infection was found in 14.00% of the patients as compared to 2.00% in Limberg Flap Procedure. The mean duration of hospital stay was longer in Secondary Healing procedure group as compare to Limberg Flap Procedure Group ($p < 0.001$). Similarly mean days required return to work was significantly less in Limberg Flap Procedure Group as compared to Secondary Healing procedure group (*p* value 0.0001). Reoccurrence was observed in 4 patients who underwent Secondary Healing Procedure whereas in Limberg Flap Procedure reoccurrence was observed in only 1 patient (Table 2).

Discussion

The best surgical technique for sacrococcygeal pilonidal disease is still controversial. The treatment for sacrococcygeal pilonidal disease aims to provide cure but with a low rate of complications and recurrence and further to avoid prolonged hospitalization and ensure early return to work.[4]

In present study we have found that operative time in secondary healing procedure was significantly shorter in duration but Limberg flap procedure cures with less pain, lower rate of wound infection, less hospital stay, early returning to normal activity and low rate of recurrence of the disease. Limberg Flap procedure fulfilled all our study objectives with significant difference over secondary healing procedure.

In Parvez Khan *et al.*[4] study they have found that operation time was longer in Limberg flap group

whereas the hospital stay, days required return to work, post operative infection, and reoccurrence rate were significantly less which is consistent with our study.

In Siddhartha Priyadarshini *et al*.[5] study reoccurrence rate was found 5.88% whereas in present study it was found that 8.00% which is consistent with our study.

Akin *et al.* studied the records of 411 patients with pilonidal sinus disease concluded that the Limberg flap procedure is effective and has a low complication rate, short time for returning to normal activity, and short hospitalization[6].

Conclusion

As a results obtained from this study we are concluding that Limberg Flap Method has shown optimal post operative outcomes as compared to Secondary healing procedure in terms of less post operative pain, low rate of wound infection, lesser days of hospitalization and low reoccurrence rate and early returning to normal daily activities. Open procedure is required lesser operative time as compared to Limberg Flap Procedure.

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Innovative Application of Selfie Sticks with Tripod in Plastic Surgery

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Abstract

Aim: To assess the efficacy of use of Selfie stick with tripod in intraoperative photography and videography.

Methods: The study was done by the Department of Plastic surgery in JIPMER, Pondicherry, India from May 2018 to July 2019. Surgeons from the department and plastic surgeons around the area were included into the study after due consent. The selfie stick with tripod for 15 different users for a period of 15 days each. The feedback was collected in a questionnaire which included video quality, audio quality and would they recommend it to their peers.

Results: All 15 users found the audio and video quality satisfactory. All 15 users would recommend the use to theor collegues.

Conclusion: Taking intraoperative pictures in a sterile medium is a challenge and selfie stick with tripod offers a good alternative to capture good close up images. The tripod modifications make it useful for video conferencing, demonstration and video consultation too.

Keywords: Selfie stick; Intraoperative photography; Tripod.

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Introduction

Photography is an essential part of medicine now and an integral part of the plastic surgeons armamentarium as a part of record keeping, teaching and for medicolegal purposes[1]. The Advent of digital photography has made this cost effective, easier and universal. Smart phone cameras have revolutionized photography and very high quality pictures can be captured with substatial ease.

Smart phones have practically replaced conventional camera for digital imaging and record keeping.

Medical photographers are professionals who photograph patients in clinics and operative rooms and are aware of the sterile precautions. Unfortunately, medical photographers are not available in all medical facilities.

Therefore capturing an intra operative image can be a challenge with no one but untrained staff available.

The surgeon may put on extra sterile gloves and take the picture himself but its not always possible when repeated pictures are needed or when his both hands are busy.

When a staff takes a picture, the sterility of the procedure is endangered by his approach to the surgical site and tremor in the outstretched hand causes poor quality photographs.

We offer a cheap and easy solution to the problem in the form of a selfie stick with tripod.

Selfie stick is a monopod what positions the smart phone beyond the range of the normal human arm[2]. The modification is that the monopod can be easily converted to a tripod which gives it an added advantage and use.

Tripod modification of the selfie stick have been used for video recording of the surgery and for video conferencing and intra operative consultation in our study with great results.

Materials and Methods

The study was done by the Department of Plastic surgery in JIPMER, Pondicherry, India from May 2018 to July 2019.

The device was used by 15 different subjects which included residents and attending surgeons. It was used for a period of 15 days each.

Following the 15 days, the data was collected in a feedback profoma:

- A selfie stick with a detachable tripod stand with a slot for the smart phone [android/ iOS] (Fig. 1, Fig. 2).

Fig. 1: Selfie stick with Remote

- Bluetooth remote (Fig. 3)

Fig. 2: Selfie stick with tripod Stand

- Android or IOS based smart phone with Bluetooth connectivity and atleast 3G internet connectivity.

A commercially available selfie stick with tripod and Bluetooth remote was obtained. We connected this with an android based smart phone [version 9].

This was used for intraoperative photography and intra operative video conferencing (Figs 4-6).

Feedback was obtained from users based on a questionnaire.

Fig. 3: Selfie Stick Remote

Fig. 4: Intraoperative video conferencing using selfie stick with tripod

Fig. 5: Surgery Demonstration using Selfie stick with tripod

Fig. 6: Intraoperative Photography using selfie stick

Results

The device was used by 15 different users for intraoperative photography and intra operative video conferencing for a period of 15 days. The selfie stick and camera was used for various indications like intraoperative photography, video conferencing, intraoperative consultation.

On an average it was used to 8.4 (Range 4 to 14) surgeries per user.

All the users found it as useful tool, and would recommend it to their peers.

All of them found the audiovisual quality satisfactory and easy to use.

Discussion

Digital photography is an extensively used tool for documentation of the clinical pictures in medicine.

Various methods have been tried to take pictures easily in a sterile medium. Gas sterlized underwater camera cases have been used by various surgeon with great success.[3,4,5] But due to the great improvements in smartphone camera quality, smartphone cameras are more commonly used for intraoperative photography than digital cameras. Waterproof covers for various smartphones that can be sterlized are difficult to find and expensive.

Selfie stick is a reasonable solution. It is cheap, easily available and can be universally used for all smartphones. It comes with a remote control to take pictures or video.

The smartphone can be connected to the device vie bluetooth/cable and the stick can be adjusted to the desired length. The staff can thus hold the stick with both hands to lessen the tremor and take great close up pictures.

Another use of the tripod modification is that it can be used for operative workshops and demonstrations. The usual operative workshops require a formal setup and most of the videoconferencing equipment are expensive. This innovative cost effective use of selfie stick with tripod may help, especially in small areas where formal setup may not be possible and also it caters to a large audience if need be.

In Summary This innovative cost effective selfie stick with tripod is highly useful tool for intraoperative photography.

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Case Report

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Role of External Tissue Expansion for Wound Closure (ETEWC) in Fournier's Gangrene: A Case Report

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Abstract

Necrotising Fasciitis of the perineum is a challenging problem to tackle with issues like rampant infections, repeated debridements and comorbidities. It is characterised by a long clinical course with majority of that time needed in wound bed preparation. External Tissue expansion for wound closure (ETEWC) is an indigenous and simple modality that involves stretching of the wound margins and helps in early wound closure while not interfering with the wound bed preparation.

It involved application of hooks on the wound margin and using rubber bands to pull the opposite ends together with a dressing in situ. It acts like a dressing holder and prevents skin margin retraction while not interfering with the time taken for the wound infection to settle. ETEWC for aiding wound closure in fournier's gangrene wound has not been reported in available literature. We wanted to report our experience with the same.

Keyword: ETEWC; Fournier's Gangrene; Skin Stretching devices; Wound closure.

Introduction

Necrotising fasciitis of the perineum also known as Fournier's gangrene, is a challenging disease to treat. It is a life threatening disease with a documented mortality ranging from 20 to 80%.[1]

Throughout history it has been known by various terms like idiopathic gangrene of the scrotum, periurethral phelgmon, streptococcal scrotal gangrene, phagedema and synergistic necrotising cellulitis. Wound management of fournier's gangrene includes a long and tedious clinical course with frequent debridements, dressings, IV antibiotics and similar modalities.[2]

Various modalities of wound cover are used in Fournier's gangrene including split skin grafts, groin flaps and musculocutaneous flaps.[2]

Another novel modality for closure of such wounds is the use of external tissue expansions devices or skin stretch devices. These techniques exploit the visco elastic properties of the skin. The mechanism of action of this phenomenon includes both mechanical and biological creep. Mechanical creep is the predominant among the two. Mechanical creep is the phenomenon of parallel alignment of collagen dermal fibres, together with theprogressive displacement from the dermal network of mucopolysaccharide ground substance during stretch. Biological Creep includes incorporation of new cells to increase the surface area.[3]

Although many skin stretch techniques are available today but they are not used commonly due to high cost and difficult availability.

We have devised a simple, indigenous, cost effective technique using skin hooks and rubber bands. This technique leads to simple, tension free

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primary closure over time and progressive decrease in wound size.

Moreover, it also acts like a dressing holder in difficult areas like the scrotum where dressing getting slipped is a common problem. The aim of this study was to study the role of ETEWC in achieving wound closure in a case of Fournier gangrene status post debridement, whose general condition did not permit other interventions.

Case Report

A 65-year-old gentleman, resident of Tamil Nadu, India, a known diabetic with uncontrolled sugar levels, presented to our hospital with complaints of gradually progressive scrotal swelling for 3 days associated with redness, severe pain, and high-grade fever with chills. He had been operated for hydrocele in a local government hospital 7 days ago and developed wound infection following surgery.

On examination, he was anxious, irritable, dehydrated, with a temperature of 101.6 F and tachycardia. There was significant scrotal wall edema, erythema and blackish necrotic patches over the right hemi-scrotum (Fig. 1). Right testis was enlarged and covered with slough. The perineal region was edematous. The clinical findings were supplemented with an urgent ultrasonography of the perineal region and a diagnosis of fournier's gangrene was made and was planned for urgent debridement. Fournier's gangrene severity index (FGSI) score was 9 at presentation.[4]

He was admitted on emergency basis and resuscitated. Insulin dose was titrated to control the blood sugars. Intravenous (IV) antibiotics were started and immediate debridement was done.

Regular dressings were changed on need basis (whenever wound soakage was noted). After 2 dressing changes, wound started improving. One Sitting of negative pressure wound therapy (NPWT) dressing was applied, it led to drastic decrease in local edema. Healthy granulation tissue was noted at the base. Wound size was documented using planimetry software. Patient was not compliant for subsequent sitting of NPWT and the decision to switch over to ETEWC was done. Easily available blouse hooks and rubber bands were procured and sterilised using Ethylene oxide.

The hooks were sutured to the wound margin under local anesthesia to healthy skin using non absorbable sutures. They were fixed circumferentially around the wound. Rubber bands were applied to the opposite hooks with a gentle traction. The tension was maintained just enough to avoid cut through of the sutures holding the hooks. The required dressing was placed on the wound and held in place by the hooks.

Three sittings of ETEWC were applied subsequently over intervals of 3–5 days depending on the wound soakage and new rubber bands were applied over the previous ones to maintain the tension and continuous tension of the edges.

After 2 weeks, the wound size decreased drastically in comparison to 6*3 cm initially to 4*2 cm and prompt primary closure of the wound was done.It may be noted that ETEWC was used in parallel to other modalities of wound bed preparation and wound infection control.

Fig. 1: Wound at presentation

Fig. 2: Wound after primary Debridement

Fig. 3: Wound after 1 sitting of NPWT

Fig. 4: ETEWC applied to the wound

Fig. 5: Wound after 1 sitting of ETEWC

Discussion

Biomechanical properties of the skin include creep, stress relaxation, extensibility and visco-elasticity. Visco-elasticity include viscosity and elasticity where elasticity describe characteristics that deformation due to stress can be temporary where as viscosity describe the permanent deformation that is maintained when stress is relived.[5]

Stress relaxation indicates that if the skin is stretch over a constant distance, the amount of tension required to keep the skin stretch will decrease with time.[5]

All skin stretching system relies on the above biomechanics properties of the skin.[5]

First attempt to make a similar device was made by Bashir in 1987, Hirshowitz in 1992 deviced a skin stretching equipment which became hugely popular. Since then various devices like EASApprox™, Topclosure™, SureClosure™, WiseBands, etc have been in practice but their use is limited due to high cost and non availability in our country.[5,6,7,8]

Our Technique of using blouse hooks and rubber bands is simple and based on the same principles. The tension on the rubber bands is variable and operator dependent. The average cost for applying the ETEWC was USD 7 to 10 $ in each sitting in our setting.

Fournier's gangrene is named after Jean Alfred Fournier, a parisian dermatologist, who described a fulminant gangrene of the scrotum occurring in young men and progressing rapidly in 1883.[9] The understanding of the disease has since evolved to the present day. Wound closure rate of fournier's gangrene is documented to be 82.8% at 6 months post disease.[10]

Classically, FG is characterised by associated co-morbid conditions and poor wound healing due to rampant suppurative end arteritis and gangrene associated with systemic causes like uncontrolled diabetes, old age and poor self care, moreover scrotal wounds are difficult to manage because of repeated contamination, retraction of scrotal skin which increases the size of defect and difficulty in maintenance and position of dressing. In such a scenario, newer innovative modalities which accelerate wound healing and closure lead to an enormous reduction in the morbidity and cost of health.

ETEWC is a novel technique which has been proven over time and in its indigenous form, is inexpensive and lead to astounding results.

Although this case report suggests quick healing and positive aspects of the modality, a planned case control study to validate the same will be planned in the future.

Conclusion

ETEWC is a cost effective method with excellent results for achieving primary wound closure in a case of fournier's gangrene. It is especially relevant in the perineum because generous amount of lax skin is present which gives quick and excellent results. A larger case control study may be planned to objectively validate the above findings.

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