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Clinicopathological Profile of Salivary Gland Tumors in A Tertiary Care Center: A Long-term Experience

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Abstract

The most common benign neoplasm of the salivary glands is pleomorphic adenoma originating from the parotid gland. Surgical excision is usually all that is required to provide both definitive diagnosis and adequate treatment. Despite this relatively simple algorithm, management of salivary neoplasms is challenging because of their relative infrequency, inconsistent classification, and variable biologic behavior. Although many studies regarding the incidence of salivary gland tumors have been reported, the epidemiology of these neoplasms is not well established because these studies are frequently restricted to a specific population, anatomical location, or a specific tumor type.

There are numerous studies on the incidence and histological types of salivary gland tumors from countries in the western world and African countries. However, there is little available information about the pattern of their presentation from Asian countries. The aim of this study was to analyze the incidence and distribution of all types of salivary gland tumors in an Indian series, and to provide data for comparison with other epidemiological studies from different geographical sites and races. Demographic data from these studies should help us to a better understanding of the biological and clinical characteristics of the disease.

Keywords: Salivary gland; Parotid gland; Pleomorphic adenoma; Warthin's tumor; Submandibular sublingual salivary gland; Minor salivary gland.

Introduction

Salivary glands stand out as the tissue with probably the most diverse pathology in human body. Salivary gland tumors consist of a group of heterogeneous lesions with complex clinicopathological characteristics and distinct biological behavior. The WHO salivary gland tumor classification lists at least 34 subtypes of epithelial tumors alone, as well as several stromal types. Regardless of this, Salivary gland neoplasms are rare and constitute 3% to 4% of head and neck neoplasms. According to the World Health Organization (WHO), the global annual incidence, when all SGTs are considered, varies from 0.4 to 13.5 cases per 1,00,000 inhabitants.

Better understanding of the histogenesis of neoplasms of the salivary glands has allowed a more consistent and rational classification of these tumors. Recent advances in molecular biology and tumor genomics have shed some light on the genetic basis of certain types of tumors of the salivary glands. The role of fine-needle aspiration biopsy and high-resolution imaging in the management of patients with salivary neoplasms continues to evolve. Spiro[1] reviewed the Memorial Sloan-Kettering experience

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with salivary neoplasms over a 35-year period. Out of 2807 patients included in study benign neoplasms constituted 54% (1529 patients) of all tumors. Pleomorphic adenoma (1280 patients) constituted 84% of benign tumors and 45% of all salivary gland neoplasms. Warthin's tumor was the second most benign tumor and comprised 12% (183 patients) of all benign tumors. Among malignant tumors 34% were mucoepidermoid carcinoma, the next most common type was adenoid cystic carcinoma (22%).

Two theories of tumorigenesis have been proposed for salivary gland neoplasms.[2] (e.g. multicellular theory and Bicellular reserve cell theory). In the Multicellular theory, each type of neoplasm is thought to originate from a distinctive cell type within the salivary gland unit. According to this theory, Warthin's and oncocytic tumors are thought to arise from striated ductal cells, acinic cell tumors from acinar cells, and mixed tumors from intercalated duct and myoepithelial cells.[3]

The Bicellular reserve cell theory, assumes that the origin of the various types of salivary neoplasms can be traced to the basal cells of either the excretory or the intercalated duct. Hence despite the seeming heterogeneity of salivary tumors, all of them are thought to arise from one of two pluripotential cell populations. In this model, adenomatoid tumors including pleomorphic adenoma and oncocytic tumors are derived from the reserve cell of the intercalated duct, whereas epidermoid tumors, such as squamous cell carcinoma and mucoepidermoid carcinomas, are derived from the reserve cell of the excretory duct. Malignant neoplasms of the major and minor salivary glands are rare, comprising approximately 3% of all head and neck malignancies.[1] Of all salivary neoplasms (benign and malignant), the vast majority occurs in the parotid gland and the fewest in the sublingual gland. In a review of 2410 cases of salivary gland tumors[4] 73% occurred in the parotid, and of those, only 15% were malignant. On the other hand, minor salivary gland tumors constituted only 14% of the total number of cases but 46% were malignant. Likewise, submandibular gland neoplasms constituted 11% of the cases with 37% being malignant; sublingual gland neoplasms constituted only 0.3% with 86% being malignant.

Tumor grade has been associated with prognosis for certain histologic types. When referring to histologic grade, high-grade malignant tumors are considered to include squamous cell carcinoma, undifferentiated carcinoma, high-grade mucoepidermoid carcinoma, and carcinoma ex-pleomorphic adenoma.[5] Low-grade malignancies include acinic cell carcinoma, low-grade mucoepidermoid carcinoma, low-grade adenocarcinoma (including basal cell and mucinous adenocarcinoma), and papillary cyst-adenocarcinoma. Intermediate grade malignancies include adenoid cystic carcinoma and epithelial-myoepithelial carcinoma.

Materials and Methods

Ours is an observational, prospective and retrospective cohort study conducted at a single center. It is a study of clinicopathological profile of salivary gland tumors, done over a period of 7 years between January 2012 and December 2018 at Kasturba hospital, Manipal, Karnataka, India, a tertiary care teaching hospital. The sample size was 135 cases. Hospital is located in the southern part of India, which is completely ethnically Indian. The study sample is therefore thought to be representative of the Indian population as a whole with a minimal bias. Salivary gland neoplasms which were histopathologically proven by either definitive surgery or biopsy were included in this study. Patients who underwent only FNAC and no further histopathological diagnosis were excluded.

Statistical Analysis

Study was analyzed using SPSS statistics software.[21]

Results

Out of 135 cases 96 were benign and 39 were malignant. The peak age of incidence was in the 5th decade in both males and females and also for both benign and malignant tumors.

Benign tumors were most commonly seen in 3rd, 4th and 5th decades. Malignant tumors were most commonly seen in 5th, 6th and 7th decades.

Youngest was 11-year-old. Oldest was 80 years. Mean age of benign tumors was 44.40 years and malignant tumors was 48.43 years. Males were affected relatively at an older age than females in both benign and malignant disease. Among 135 cases 77 (57.04%) were male patients and 58 (42.96%) were female patients. Among 96 benign cases 55 (57.29%) were males and 41 (42.71%) were females. Among 39 malignant cases 22 (56.41%) were males and 17 (43.59%) were females. Males were more commonly affected in both benign and malignant tumors. Among 31 cases of malignant parotid tumors 6 (19.35%) cases presented with facial

nerve palsy. No case of benign tumor presented with facial nerve palsy. Total 13 cases presented with recurrent disease. 9 (9.4%) cases were benign tumors out of which 8 were pleomorphic adenoma and 1 Warthin's tumor. Remaining 4 (10.2%) were malignant tumors.

Various incidence and distribution of benign and malignant tumors in all salivary glands are shown in Table 1. Among 39 of the malignant cases, 2 cases had synchronous tumors involving parotid and submandibular glands and 1 case had synchronous tumor involving parotid and minor salivary gland. Among 110 cases of parotid involvement, only 3 (2.7%) cases showed tumor confined to deep lobe out of which 2 were benign and 1 malignant neoplasm. 4 (3.7%) cases showed tumor involving both lobes, 2 in each group of benign and malignant tumors. Benign were more common in parotid glands which constituted 71.8% when compared to 28.2% of malignant. 66.7% were benign and 33.3% were malignant in submandibular gland tumors. The incidence of malignant tumors was proportionately higher in submandibular gland than in parotid gland. Only one tumor was found in sublingual gland which was malignant. Among minor salivary glands, palate was the most common site of involvement. Benign tumors constituted 58.3% of minor salivary glands and 41.7% are malignant.

Out of 12 minor salivary gland tumors, 8 were seen in palate, 2 in buccal mucosa, 1 in lateral border of tongue and 1 in nasopharynx.

Table 1: Distribution of benign and malignant tumors among salivary glands

	Benign *n* **(%)**	**Malignant** *n* **(%)**	**Total** *n* **(%)**
Parotid gland	79 (71.8)	31 (28.2)	110 (79.7)
Submandibular gland	10 (66.7)	5 (33.3)	15 (10.9)
Sublingual gland	0	1 (100)	1 (0.7)
Minor salivary gland	7 (58.3)	5 (41.7)	12 (8.7)

Nine out of 39 cases of malignancies presented with lymph node metastasis.

Two (100%) out of 2 cases of salivary duct carcinoma, 4 (57%) out of 7 cases of high-grade mucoepidermoid carcinoma, 1(33%) out of 3 cases of intermediate grade mucoepidermoid carcinoma, 1 (33%) out of 3 cases of carcinoma ex-pleomorphic adenoma and 1 (20%) out of 5 cases of Adenoid cystic carcinoma presented with lymph node metastasis.

Seven out of 39 cases of malignancy presented with distant metastasis (Fig. 1).

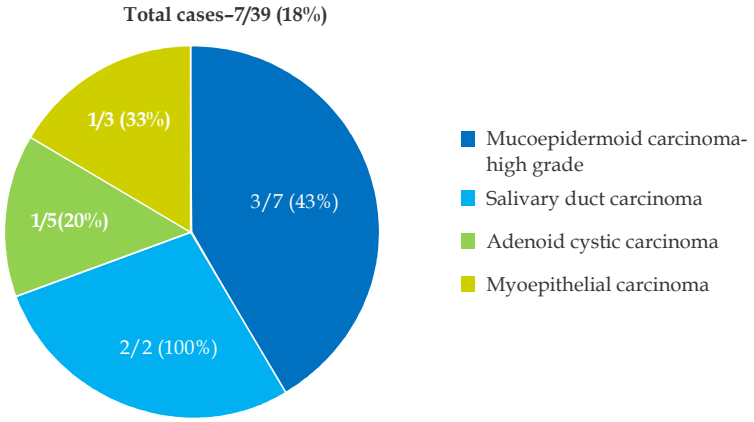

Fig. 1: Showing incidence of distant metastasis.

Two (100%) out of 2 cases of salivary duct carcinoma, 3 (43%) out of 7 cases of high-grade mucoepidermoid carcinoma, 1 (33%) out of 3 cases of myoepithelial carcinoma and 1 (20%) out of 5 cases of Adenoid cystic carcinoma presented with distant metastasis. Most common site for metastasis was skeletal followed by lungs and liver. 3 cases had metastasis to bone, 1 case to lungs, 1 case to pleura, 1 case to liver and 1 case had metastasis to both liver and bone.

FNAC

Out of 135 cases 110 cases underwent FNAC. 7 were inadequate for opinion.

Total 103 cases were taken into account shown in Table 2. Among these FNAC correlated with final histopathology report in 91 patients. Out of 80 cases of benign tumors who underwent FNAC 5 were misdiagnosed and among 23 cases of malignant tumors 7 were misdiagnosed.

Table 2: Percentage of FNAC that correlated with final biopsy

	True positive	False negative	FNAC don
Benign	75 (93.7%)	5 (6.3%)	80
Malignant	16 (70%)	7 (30%)	23
Total	91 (88.3%)	12 (11.7%)	103

Among 5 misdiagnosed cases of benign tumors, 3 cases were Warthin's tumors and 2 cases were basal cell adenomas. Among malignant tumors 7 cases were misdiagnosed as either benign tumors or no evidence of malignancy. All 3 cases of carcinoma ex-pleomorphic adenoma were misdiagnosed as pleomorphic adenoma.

FNAC: malignant tumors

- Sensitivity 69.5%
- Specificity 93.7% in diagnosing malignant tumors
- Positive predictive value – 76.2%
- Negative predictive value – 91.5%

Twenty-five cases didn't undergo FNAC. Of these 6 cases underwent excision biopsy, 2 cases underwent incision biopsy, 1 case underwent trucut biopsy, 1 case underwent lymph node biopsy. 3 cases were recurrent cases and FNAC was not done, all of them were benign neoplasms. 6 cases were operated outside and no FNAC report was available, all of them were malignant. 6 cases were operated without tissue diagnosis, 4 were benign and 2 were malignant neoplasms.

Surgery

Patients with parotid gland tumors underwent 5 types of surgeries

- Superficial parotidectomy
- Partial parotidectomy
- Total parotidectomy
- Radical parotidectomy
- Extended parotidectomy

Patients with benign tumors in tail of parotid underwent partial parotidectomy. Out of 110 cases of parotid tumors, 109 were operated and 1 patient underwent biopsy followed by radiotherapy. Total 6 cases had involvement of facial nerve during surgery of which 4 underwent radical parotidectomy and 2 underwent extended parotidectomy. Patients with benign submandibular tumors underwent excision of the gland and those with malignancy spreading outside the gland underwent wide local excision.

Patient with sublingual adenoid cystic carcinoma underwent hemimandibulectomy because of infiltration in to mandible, along with wide local excision and Supraomohyoid neck dissection (SOHND). Similarly patients with minor salivary gland tumors underwent excision of tumor with a rim of normal tissue in benign cases and wide local excision in malignant cases. Among parotid malignancies 5 underwent SOHND and 7 underwent modified radical neck dissection (MRND). In submandibular malignancy one each underwent SOHND and MRND.

Postoperative Complications

Immediate postop exploration for hematoma clearance was done in 2 (2.4%) cases of superficial parotidectomy. Both were cases of pleomorphic adenoma. Facial paresis was seen in 21 (25.6%) out of 82 superficial parotidectomies and 5 (45.45%) out of 11 total conservative parotidectomies. Permanent postop facial paralysis developed in 1 (9%) patient who underwent total parotidectomy. He underwent gold weigh implantation.

In 6 patients facial nerve was sacrificed intraop because of tumor involvement. Four of them had lateral tarsorrhaphy done followed by physiotherapy. Two patients underwent gold weight implants. Postop seroma collection which required aspiration was seen in 8 (9.75%) cases who underwent superficial parotidectomy. Cutaneous fistula formation was noticed in 3 cases who underwent superficial parotidectomy, 2 of which were done for recurrent pleomorphic adenomas. They were managed with regular pressure dressings and wound care and they finally healed. 5 (6.09%) cases who underwent superficial parotidectomy had Frey syndrome. They were treated with local application of antiperspirants.

Histopathological Type

The incidence of benign tumors was higher than malignant tumors with 71.1% and 28.9% respectively. Pleomorphic adenoma constituted 58.5% of all tumors, Warthin's tumor 8.9% and mucoepidermoid carcinoma 14.8%. Only 1 tumor was identified in sublingual gland which was malignant tumor. Distribution of benign and malignant tumors were shown in Tables 3 and 4 respectively. Mucoepidermoid carcinoma was the most common malignant neoplasm accounting for 51.3% followed by adenoid cystic carcinoma (12.8%). Mucoepidermoid carcinoma was the commonest malignant tumor in both major and minor salivary

Table 3: Distribution of benign tumors in different salivary glands

	Parotid gland (*n*)	Submandibular gland (*n*)	Minor salivary gland (*n*)	Total (*n*)
Pleomorphic adenoma	62 (78.5%)	10 (100%)	7 (100%)	79 (82.3%)
Warthin's tumor	12 (15%)	0	0	12 (12.5%)
Basal cell adenoma	5 (6.5%)	0	0	5 (5.2%)

glands. Adenoid cystic carcinoma is the second most common tumor. In minor salivary glands only mucoepidermoid carcinoma and adenoid cystic carcinoma were encountered. Only one tumor was identified in sublingual gland which was adenoid cystic carcinoma.

Table 4: Distribution of malignancies among different salivary glands

Malignant tumors	Parotid	Submandibular	Sublingual	Minor salivary	Total cases
Mucoepidermoid Ca	16	2	0	4	20 (51.3%)
Adenoid cystic Ca	2	1	1	1	5 (12.8%)
Acinic cell Ca	3	0	0	0	3 (7.7%)
Ca ex-pleomorphic	2	1	0	0	3 (7.7%)
Myoepithelial Ca	3	1	0	0	3 (7.7%)
Salivary duct Ca	2	0	0	0	2 (5.1%)
Basal cell adeno Ca	1	0	0	0	1 (2.6%)
Oncocytic Ca	1	0	0	0	1 (2.6%)
Secondaries	1	0	0	0	1 (2.6%)

Synchronous Malignant Tumors

There were 3 synchronous malignant tumors.

1. Synchronous mucoepidermoid carcinoma of left parotid and submandibular glands.
2. Synchronous mucoepidermoid carcinoma of left parotid and right lateral border of tongue.
3. Synchronous myoepithelial carcinoma of right parotid and submandibular glands.

There was one case of secondaries in parotid with primary from oncocytic meningioma. This patient presented with secondaries after 4 years of surgery to primary site. He underwent superficial parotidectomy, but he did not follow-up later.

Radiotherapy

Out of 39 cases of malignancies, 28 cases received radiotherapy. Radiotherapy was given in a dose of 60Gy in 30 fractions over a period of 6 weeks. 66Gy in 33 fractions was given in salivary duct carcinomas and in high-grade mucoepidermoid carcinomas**.** Postop radiotherapy was indicated for all cases of malignant tumors except low-grade mucoepidermoid carcinomas. Close follow-up was advised for patients with low-grade mucoepidermoid carcinomas, except 2 cases who received radiotherapy in view of extraglandular spread. Two cases of high-grade mucoepidermoid carcinoma and 1 case of acinic cell carcinoma didn't come for follow-up.

Chemotherapy

Cisplatin was given in weekly doses over 6 weeks in 6 out of 39 cases. Three cases who came with distant metastases, 1 case of high-grade mucoepidermoid carcinoma in tongue and 2 cases of salivary ductal carcinoma received chemotherapy.

Follow-up

Out of 96 cases of benign tumors, 57 cases didn't come for follow-up. 39 cases were followed up for a period of 1 or more months. Average period of followup was 5 months. There were no recurrences noted. Out of 39 cases of malignant tumors, 36 cases returned for follow-up for 1 or more months. Average period of follow-up was 14 months. 4 cases had local recurrence. Six cases presented with distant metastases. One case presented with both local recurrence and distant metastases. Two patients died during hospital stay because of pulmonary complications following secondaries of lung.

Discussion

Salivary gland tumors are a large and diverse group of lesions, characterized by morphologic heterogeneity. There are numerous epidemiologic studies of salivary gland tumors in different countries, with varied results likely representing differences in the origin of study, divergences in

the histologic classification, restriction to a specific population, anatomical location, or tumor type. Most commonly involved salivary gland was parotid for both benign and malignant tumors. Parotid glands accounted for 79.7% of all cases which was similar with study published by Patrick J Bradley[6] in UK in 2012. Submandibular gland tumors accounted for 15% which was similar to study by Subhashraj K in India. Sublingual glands were involved in 0.7% of cases similar to other studies.[6–8] Minor salivary gland tumors were involved in 8.7% of cases similar to other studies.[6,9] Among minor salivary glands palate was the most common site of involvement for both benign and malignant tumors which was similar to other studies.[1,4] In parotid glands 71.8% were benign tumors and 28.2% were malignant, in submandibular glands 66.7% were benign and 33.3% were malignant, in sublingual glands only one tumor was identified which was malignant and in minor salivary glands 58.3% were benign and 41.7% were malignant.

Among parotid gland tumors, superficial lobe was most commonly affected and tumors involving only deep lobe were rare. Among 110 cases of parotid involvement, only 3 cases showed tumor confined to deep lobe, 4 cases showed tumor involving both lobes. Out of 12 minor salivary gland tumors, 8 were seen in palate, 2 in buccal mucosa, 1 in lateral border of tongue and 1 in nasopharynx. Lymph node metastasis was most commonly seen in salivary duct carcinoma (100%), followed by high-grade mucoepidermoid carcinoma (57%). Lymph node metastasis was not seen in low-grade mucoepidermoid carcinoma, acinic cell carcinoma, myoepithelial carcinoma.

High-grade nature of salivary duct carcinoma was shown in one study[10] which stated, salivary duct carcinoma is the most aggressive salivary gland carcinoma with 30% to 40% of patients developing local recurrence and between 50% and 75% developing distant metastases and dying of their disease, most within 4 years of diagnosis. Less incidence of lymph node metastasis in low-grade mucoepidermoid carcinoma and acinic cell carcinoma was shown in other studies.[11,12] Distant metastasis also showed the same trend of lymph node metastasis which was most commonly seen in salivary duct carcinoma (100%), followed by high-grade mucoepidermoid carcinoma (43%). Distant metastasis was not seen in low and intermediate grades of mucoepidermoid carcinoma and acinic cell carcinoma. This was similar to other studies.[10,12] The most common site for metastasis in this study was skeletal followed by lungs and liver.

In our study the accuracy of FNAC in detecting benign tumors was 93.7% and that of malignant tumors was 70%. The overall accuracy was 88.34%. The accuracy of detecting salivary gland tumors was high in benign tumors when compared to malignant tumors.

Positive predictive value and negative predictive value of detecting malignant tumors were 76.2% and 91.5% respectively. This was comparable with study by Singh Nanda and collegues.[13] All 3 (100%) cases of carcinoma ex-pleomorphic adenoma were misdiagnosed as benign on FNAC. 3 (20%) cases of Warthin's tumors were misdiagnosed as chronic sialadenitis. Total 7 (6.36%) samples were reported as inadequate for opinion.

Pleomorphic adenoma constituted 58.5% of all tumors and 82.3% of all benign tumors. Pleomorphic adenoma was the most common benign tumor among both major and minor salivary glands.[1] Warthin's tumor was the second most common benign salivary gland tumor[4,6,8] accounting for 8.9% of all tumors and 12.5% of benign tumors.

Among malignancies mucoepidermoid carcinoma was the most common tumor[1] constituting 14.8% of all tumors and 51% of malignancies. Mucoepidermoid carcinoma was graded in to low, intermediate and high-grades. 50% of cases were low-grade and remaining were intermediate and high-grade. 57% of high-grade mucoepidermoid carcinomas were associated with lymph node metastasis and 43% with distant metastasis.

Second common malignancy was adenoid cystic carcinoma[6,7,9] with 12.8% followed by carcinoma ex-pleomorphic adenoma (7.7%), acinic cell carcinoma (7.7%), myoepithelial carcinoma (7.7%), salivary duct carcinoma (5.1%), basal cell adenocarcinoma (2.6%), oncocytic carcinoma (2.6%), secondaries to parotid (2.6%). In minor salivary glands only mucoepidermoid carcinoma and adenoid cystic carcinoma were encountered. Only one tumor was identified in sublingual gland which was adenoid cystic carcinoma. Two cases of salivary duct carcinoma were identified both of which had lymph nodal and distant metastasis. Both the cases had local recurrence following surgery and radiotherapy. One patient died during hospital stay because of lung metastasis. It is the most aggressive salivary gland carcinoma with high chances of developing local recurrence and distant metastases and dying of their disease, mostly within 4 years of diagnosis.[14]

Facial paresis was seen in 25.6% cases of superficial parotidectomies and 45.45% of total conservative parotidectomies. Permanent postop facial paralysis developed in 1 (9%) patient who underwent total parotidectomy. In a study of 256 consecutive patients who underwent parotid surgery at the Cleveland Clinic over a period of 15 years, immediate postoperative facial nerve dysfunction was frequently encountered (46%), but permanent dysfunction was uncommon (4%).[15] These statistics were similar to our study.

All cases of salivary duct carcinoma, adenoid cystic carcinoma, myoepithelial carcinoma, carcinoma ex-pleomorphic adenoma, high and intermediate grade carcinoma received radiotherapy. In a recent multivariate analysis of 140 patients with Adenoid cystic carcinoma, Chen and colleagues[16] observed that the omission of postoperative radiation therapy was an independent predictor of local recurrence with a hazard ratio of 5.82. A retrospective multivariate analysis of 103 parotid gland carcinoma patients by Renehan and colleagues[17] found that the addition of postoperative radiation significantly reduced locoregional recurrence (15%) compared with surgery alone (43%) at 10 years and that this improved survival was seen mainly in patients with high-grade tumors. Chemotherapy was given to cases who came with recurrent local or distant disease and in cases who had salivary duct carcinoma.

Conclusion

The peak age of incidence of both benign and malignant salivary gland tumors was 5th decade of life. Males were more frequently affected than females in both benign and malignant tumors. Twenty percent of cases with malignancy presented with facial nerve palsy. Pleomorphic adenoma was the most common benign tumor followed by Warthin's tumor. Warthin's tumor was confined to parotid glands and showed bilateral disease and multicentricity. Mucoepidermoid carcinoma was the most common malignant tumor followed by adenoid cystic carcinoma in both major and minor salivary gland tumors. Among minor salivary glands, palate was the most common site of involvement for both benign and malignant tumors. A correct diagnosis was obtained using FNAC in 93.7% benign tumors and in 70% malignant tumors. Facial nerve paresis was the most common complication following parotid surgery followed by salivary fistula and Frey's syndrome. Patients who underwent partial parotidectomy had least incidence of complications. Radiotherapy was indicated in all cases of malignancy except low-grade mucoepidermoid carcinomas which were closely followed up.

Ethical Clearence

Ethical clearance taken from the Institutional ethics committee.

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Original Research Article

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To Compare Absorbable Versus Non-absorbable Tacker for Laparoscopy Ventral Hernia Repair: A Prospective, Randomized Study

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Abstract

Context: Laparoscopic incisional ventral hernia repair (LIVHR) has been associated with a high incidence acute and chronic pain due to use of non-absorbable tackers. Several absorbable tackers have been introduced to overcome these complications.

Aims: To compare postoperative effectiveness, comfort, complications of mesh fixation using absorbable and non-absorbable tacks in laparoscopic ventral hernia repair.

Settings and design: A Prospective randomized clinical trial. Randomization was done by computer generated randomization number method for a period of 2-year study duration.

Material and methods: A total of 60 patients were randomized in two groups. Patients of Group A were subjected to mesh fixation with absorbable tacks and group B were subjected to mesh fixation with no-absorbable tacks. All were evaluated for visual analogue scale (VAS) postoperative, length of hospital stay, time to resume normal activity.

Statistical analysis used: Results were compared by student *t* test or Mann Whitney *U* test for continuous variables, and chi-square or Fisher's exact tests were used for categorical variables.

Results: Patients in both the groups were comparable in terms of demographic profile and hernia characteristics. No significant difference found in VAS score at day 0, 1 week, 3 months and 6 months. No significant difference found in hospital stay, time to return to normal activity, postoperative complications.

Conclusions: As per our opinion, the choice of either of these fixation methods during surgery should not be based on the concerns of pain or recurrence. AT may be the preferable option in LIVHR due to the lower cost.

Keywords: Laparoscopic incisional ventral hernia repair; Non-absorbable tackers; Mesh fixation; Pain; Visual analogue scale.

Introduction

The ventral hernia repair surgery has evolved from direct suture repair to the use of synthetic mesh to obtain a tension-free repair during last 50 years. Open ventral hernia surgeries were commonly practiced in past but laparoscopic repair of ventral hernia has gained popularity since many studies have reported encouraging results in term of outcome and recurrence rate.[1,2] Laparoscopic technique offers a variety of advantages over conventional open surgery in the repairing of ventral hernia, such as shorter recovery time and lower recurrence rates and lower wound complication rates.[3]

The ventral hernia repair surgery has evolved from direct suture repair to use of synthetic mesh,

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mesh fixation with suture to fixation by non-absorbable tacks, absorbable tacks and fibrin glue to obtain tension-free repair.[4] In laparoscopic ventral hernia repairs both non-absorbable and absorbable tacks are used for fixation of mesh. Non-absorbable tacks (NAT) have several complications such as adhesion formation and bowel perforations, post-operative pain.[5,6] Recently absorbable tacks (AT) have been introduced for use in combination with light weight meshes, under the assumption that permanent fixation is no longer needed after mesh has integrated with the host tissue, nevertheless, there is no evidence that absorbable tacks may guarantee the same results as non-absorbable tacks in terms of strength of fixation and recurrence rates.[7,8]

The direct comparison of non-absorbable with absorbable tacks seems to be the best way to assess their efficacy and safety for short and long term. The aim of our study is to compare absorbable tacks with non-absorbable tacks for fixation of mesh in laparoscopic ventral hernia repair in term of postoperative pain, length of hospital stay, complications and recurrence rates.

Materials and Methods

This prospective study was conducted from August 2017 to August 2019 after getting clearance from Institutional Review Board. All the patients diagnosed with ventral hernia attending surgery OPD was taken as study population. Informed and written consent for Anesthesia and Surgery was taken from each patient in their local language. Patient of both sexes with age group 18–65 years with uncomplicated ventral hernia including incisional hernia. Patients with recurrent hernias, significant comorbidities such as diabetes mellitus, coronary artery disease and requiring any additional intra abdominal procedure, defect size >5 cm, unfit for general anesthesia, converted to open hernia repair due to any reason and requiring component separation were excluded from the trial.

Total 60 patients were randomized into 2 groups using computer generated random numbers in sealed envelopes numbered serially to ensure concealed allocation with block randomization. Informed consent was obtained from each patient before randomization. Patients of group A were subjected to mesh fixation with absorbable tacks (Absorba Tack, COVIDEN, U.S.A.) and patients of Group B were subjected to mesh fixation with non-absorbable tacks (ProTack, COVIDEN, U.S.A.).

Patients were operated under general anesthesia with endotracheal intubation. Three ports were used, first 12 mm camera port for a 30° 10 mm telescope and 2 additional 5 mm working ports. Additional ports were used if required. Adhesions were taken down and the size of the defect was measured. A mesh of appropriate size to have a 5 cm overlap on all sides was taken in through 12 mm port and mesh was fixed with tackers in a double-crown fashion and placing the tackers at a distance of 1.5 to 2 cm and at least 4 corner transfacial suture placement was used. The method of mesh fixation for each patient was determined by means of computerized random generation of a number just before the operation. The number was given to the surgeon, and the mesh fixation technique previously assigned to that number was used. Patients were randomly assigned to the NAT and AT mesh-fixation groups. In the AT group, the mesh fixation was provided by absorbable tack and in the NAT group, titanium helical tacks were placed approximately 5 mm inside the edge of the mesh along its entire perimeter, about 1.0 – 2.0 cm apart. After fixation of the mesh, the trocars were removed, and the 10 mm fascial defects were closed. All patients provided standard postoperative care, including mobilization. A patient-controlled analgesia was provided for the first 24 hours after surgery.

Patients were followed up to 9 months after the surgery. Follow-up was done in the surgery outpatient department at day 1, day 7, 1 month, 3 months and 6 months from the date of surgery. Those who not reported back in OPD were be contacted on phone. Following parameters were evaluated: early postoperative pain and chronic pain, pain score was evaluated on VAS ranging from no pain (0) to worst possible pain (10). Postoperative hospital stay, time to resume normal activity, any wound seromas or hematomas, recurrence of the hernia.

Statistical Analysis

Numerical data were presented as mean ± SD and range. Categorical variables were presented as number and percentages. Student's *t*-test will be used to compare numerical variables and the chi-square test or Fischer's exact test will be used for categorical variables. Data were processed using statistical package for social sciences (SPSS version 20.0 for Windows, SPSS Inc., IBM, and Armonk, NY) statistical software. For all statistical tests, a p value of less than 0.05 was taken to indicate significant difference.

Results

Total 60 patients were enrolled in the study. The mean ages were 48.23 ± 7.82 and 48.4 ± 7.57 years for AT and NAT groups respectively. Both groups were comparable in terms of demographic profile like age and gender (Tables 1 and 2).

Table 1: Distribution of the study group according to the age group

Age group	Group A *N* (%)	Group B *N* (%)
21–30 years	0	1 (3.3)
31–40 years	6 (20.0)	4 (13.3)
41–50 years	11 (36.7)	13 (43.3)
51–60 years	12 (40.0)	11 (36.7)
More than 60 years	1 (3.3)	1 (3.3)
Total	30 (100)	30 (100)
Mean ± SD	48.23 ± 7.82	48.4± 7.578
t-value	0.084	
p-value, Sig	0.933, NS	

Data were expressed as Number (Percentage). NS = Not Statistical significant

Table 2: Distribution of the study group according to gender

Sex	Group A *N* (%)	Group B *N* (%)
Male	8 (26.7)	7 (23.3)
Female	22 (73.3)	23 (76.7)
Total	30 (100)	30 (100)

χ^2 value = 0.089, df = 1, *p*-value = 0.766, NS

Data were expressed as number (Percentage). Data were compared using chi-square test and *p*-value is not significant. NS = Not statistical significant. df = degree of freedom.

There was no statistically significant difference in the mean VAS pain scores between the 2 groups at day 0, day 1 and day 2, 1 week, 1 month, 3 months, 6 months postoperatively (Table 3). Two patients in AT group and 3 patients in NAT group have moderate pain at 6 months. One patient was lost to follow-up 6 months in both the groups.

The time to return to normal activity in Group A was 11.2 ± 2.53 days and Group B was 11.57 ± 2.14 days which were also not statistically significant (Table 4). On 6 months follow-up, no recurrence was noted in the patient in any of the group.

Table 3: VAS score of the study group on postoperative days

Pain score post -operative day 0 (visual analogue scale)	Group A	Group B	*t*-value	*p*-value, Sig
Day 0	6.47 ± 1.57	6.6 ± 1.19	0.71	0.13, NS
Day 1	3.47 ± 0.94	3.33 ± 0.76	0.60	0.54, NS
Day 2	1.8 ± 0.66	1.7 ± 0.79	0.52	0.59, NS
1 week	1.46 ± 0.81	1.43 ± 0.72	0.16	0.86, NS
1 months	1.13 ± 1.16	0.86 ± 0.93	0.97	0.33, NS
3 months	0.5 ± 0.83	0.46 ± 0.68	0.14	0.88, NS
6 months	0.4 ± 0.21	0.6 ± 0.27	0.65	0.51, NS

Data were expressed as Mean ± SD. Both groups were compared using unpaired *t*-test and showed no statistical significance. NS = Not Statistical significant

Table 4: Time to return normal activity for study groups

Time to return to normal activity	Group A	Group B	*t*-value	*p*-value, Sig
Mean ± SD	11.2 ± 2.53	11.57 ± 2.41	0.573	0.569, NS

Data were expressed as Mean ± SD. Both groups were compared using unpaired *t*-test and showed no statistical significance. NS = Not Statistical significant

Discussion

Laparoscopic repair has been described as the "Standard of Care" according to the recent guidelines of International Endohernia Society for patients undergoing incisional and ventral hernia repair.[9] Over the open repair, laparoscopic repair have advantages of low recurrence rate, shorter hospital stay, good cosmetic outcome, and low complication rate.[10]

Few case series and retrospective studies have shown that absorbable tackers cause less pain as compare to other approaches. A study by Colak et al. observed no significant difference between the absorbable and non-absorbable groups with respect pain scores at 0, 1 and 2 days.[11] In a study by

Bangash et al., the pain scores were higher in suture groups compared to the tacks group.[12] Nguyen et al. showed no significant difference at PO 1 week, 1 month, and 2 months regarding pain assessment in suture (n = 29) and tack (n = 21) groups.[13] Bansal et al. randomized 68 patients into non-absorbable suture (n = 32) and tack (n = 36) groups. Tack fixation resulted in significantly higher pain scores than suture fixation at 1, 6, and 24 hours and also at 1 week and 3 months postoperatively. They reported no significant difference in the incidence of chronic pain and seroma, development in the follow-up of 32.2 months.[14] In a randomized controlled trial that compared methods for securing the mesh during LIVHR, the absorbable sutures with tacks (n = 56), double crown (n = 60), and non-absorbable sutures with tacks (n = 56) techniques were associated with similar PO pain and quality-of-life findings.[15] In our study, there was no significant difference found in PO VAS score in both the groups. The higher VAS pain scores with tackers are hypothesized to be due to the screwing action of the sharp tips by which the tacks penetrate tissues that causing compression and twisting of nerve fibers.[16]

Present study had shown that, the mean days of hospitalization in A group was 1.5 days ± 0.572 and 1.43 ± 0.679 days in B group which was not statistically significant. In a study by Colak et al., the mean postoperative stay in Absorbable group was 2.1 days and 2.5 days in non-absorbable groups.[11] In a study by Bangash et al., the mean days of hospitalization was 4.3 days and 4.7 days in suture group.[12]

There was no statistical significant difference found in time to return to normal activity on comparing between the 2 groups. Our findings were consistent with the previous study by Bansal et al., that also showed no statistical difference in time to return to normal activity in both AT and NAT groups.[14]

The incidence of chronic pain was however similar in both AT and NAT groups. Only 5 (16.7%) patients, 3 with NAT and 2 with AT had chronic pain by 3 months follow-up, among them only 1 required local analgesic infiltration at 6-month follow-up. Lepere et al. reported no recurrence during a follow-up period of 1 year using absorbable tacker.[17] Cavallaro et al. showed similar results on comparing non-absorbable and absorbable tackers in a non-randomized study.[18] In our study, we notice only 1 recurrence in AT group which was not statistically significant. Although the follow-up duration was for 6 months. It has been reported in literature that true incidence of recurrence in incisional and ventral hernia repair can be found, only if the patients are followed up for >5 to 10 years.[14]

Although this is a randomized trial, the study has some limitations. Few patients were given injectable analgesics during the induction of anesthesia which may have impacted the early pain VAS scores. Our follow-up period is around 6 months. A longer follow-up of minimum 3 to 5 years would have been better to comment upon the recurrence rates. Finally, the most obvious advantage of ATs is to have lower cost than NATs[11,14] but we didn't compare the price in this study as secondary objective.

Conclusion

In conclusion, we have found no significant differences between the AT and NAT fixation techniques regarding recurrence, complications, and PO pain for 6 months duration. ATs may be a preferable option due to lower cost in LIVHR. Based on this study results, the choice of either of these fixation methods during surgery should not be based on the concerns of pain or recurrence.

Key Message

Both fixation method, absorbable and non-absorbable tackers have same outcome for long duration in laparoscopic incisional ventral hernia repair. So, choice of mesh fixation will not be depend on outcome and complication of these methods.

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Original Research Article

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Comparative Study Between BISAP Scoring System and C-Reactive Protein Analysis in Predicting Severity of Acute Pancreatitis

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Abstract

Introduction: Acute pancreatitis is one of the commonest conditions that presents as a surgical emergency worldwide.

Aim: The aim of the study was to compare BISAP scorings and serum levels of C-reactive protein in predicting severity of acute pancreatitis.

Materials and methods: Thirty patients got admitted from November 2012 to April 2014 in our hospital with acute pancreatitis were included in the study. C-reactive protein evaluated along with BISAP score at the time of admission. Patients assessed for severity by comparing both. Statistical analysis done by using Fischer's exact test, chi-square test and student *t*-test.

Results: 23.3% of patients had a BISAP score of 3, rest had a score of 1 or 2. 66.7% of patients had an elevated CRP. An elevated CRP level and an increased BISAP score was found to have a statistically significant relation ($p = 0.009$ and $p = 0.0002$ respectively) to length of patient's stay in hospital and hence the severity. BISAP and CRP levels had a positive correlation with a *p*-value of 0.064. Here, we found that BISAP scores had a statistically significant relationship with ICU stay (*p*-value: 0.014)

Conclusion: In conclusion, we found that BISAP is a better predictor of severity of acute pancreatitis compared to CRP levels. It is a useful means of predicting severity in acute pancreatitis. Larger studies will be needed to further consolidate our findings, but it is safe to say that BISAP has the advantage of simplicity and speed over more traditional scoring systems.

Keywords: Acute pancreatitis; Bisap scoring; C-reactive protein; Hospital stay.

Introduction

Acute pancreatitis (AP) is a sudden inflammation of the pancreas characterized by activation of pancreatic enzymes to cause self-digestion of the pancreas. According to the revision of Atlanta definition and classifications that was brought about by International consensus in 2012,[1] the diagnosis of acute pancreatitis requires two of the following three features.[1] Abdominal pain consistent with acute pancreatitis (acute onset of a persistent, severe, epigastric pain often radiating to the back);[2] serum lipase activity (or amylase activity) at least three times greater than the upper limit of normal; and[3] characteristic findings of acute pancreatitis on contrast-enhanced computed tomography (CECT) and less commonly magnetic resonance imaging (MRI) or transabdominal ultrasonography.

Acute pancreatitis is one of the commonest conditions that presents as a surgical emergency. Worldwide, the incidence ranges between 5 and 80 per 100,000 population. The pathophysiology of acute pancreatitis is characterized by a loss of

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intracellular and extracellular compartmentation, by an obstruction of pancreatic secretory transport and by an activation of pancreatic enzymes. In biliary acute pancreatitis, outflow obstruction with pancreatic duct hypertension and a toxic effect of bile salts contribute to disruption of pancreatic ductules, with subsequent loss of extracellular compartmentation. Alcohol induces functional alterations of plasma membranes and alters the balance between proteolytic enzymes and protease inhibitors, thus triggering enzyme activation, autodigestion and cell destruction. Once the disease has been initiated, the appearance of interstitial edema and inflammatory infiltration are the basic features of acute pancreatitis. The accumulation of polymorphonuclear granulocytes in pancreatic and extrapancreatic tissue, and the release of leukocyte enzymes play an essential role in the further progression of the disease and in the development of systemic complications. Activation of different cascade systems by proteolytic activity, and consumption of alpha 2-macroglobulin further characterize the severe clinical course of acute pancreatitis.

Previously, acute pancreatitis was categorized as mild or severe with mild acute pancreatitis characterized by interstitial edema of the gland and minimal organ dysfunction whereas severe acute pancreatitis was characterized by pancreatic necrosis, severe systemic inflammatory response and often multiorgan failure.[2] The recent modifications[1] classify it into two broad categories of interstitial edematous pancreatitis and necrotising pancreatitis. Furthermore, acute pancreatitis has been graded as mild, moderately severe and severe types. Mild acute pancreatitis is characterized by the absence of organ failure and the absence of local or systemic complications. Moderately severe acute pancreatitis is characterized by the presence of transient organ failure or local or systemic complications in the absence of persistent organ failure. Severe acute pancreatitis is characterized by persistent organ failure.

While it is true that a majority of the patients have mild and self-limiting disease, 20% to 30% of patients develop a severe disease that can progress to systemic inflammation and cause pancreatic necrosis, multiorgan failure, and potentially death. Mortality varies from 1% in mild cases to 20% to 50% in severe disease. About one-third of deaths occur in the early phase of attack, from multiple organ failure, while deaths occurring after first week of onset are due to septic complications. Most patients of acute pancreatitis recover without complications, the overall mortality rate of this illness is between 2 and 5%.

Hence, early, quick, and accurate risk assessment of acute pancreatitis patients would permit evidence-based early initiation of intensive care therapy for patients with severe acute pancreatitis to prevent adverse outcomes and allow treatment of mild acute pancreatitis in the wards. Therefore, a reliable risk stratification tool to predict the severity and prognosis of acute pancreatitis is of great clinical importance for the management of this disease in view of reducing both morbidity and mortality.

An ideal scoring system should promise an early, quick, simple, accurate, and reproducible description of disease severity. At present, a variety of scoring systems are available to evaluate the severity of AP, including Ranson criteria,[3] acute physiology and chronic health evaluation (APACHE II),[4] and several others. It is safe to say that their advantages withstanding, all the scoring systems have limitations. For instance, the main limitation of the Ranson criteria is that the evaluation cannot be completed until 48 hours following admission, which may lead to missing an early therapeutic window and increased mortality.

In 2008, Wu et al.[5] retrospectively developed a new scoring system, the bedside index for severity in acute pancreatitis (BISAP), to estimate the risk of in-hospital mortality in patients with acute pancreatitis.

The BISAP incorporates 5 variables:

1. Blood urea nitrogen >25 mg/dL (BUN)
2. Impaired mental status (Glasgow Coma Scale Score <15)
3. Systemic inflammatory response syndrome (Presence of more than 2 of following criteria)
   - Pulse > 90 beats per minute
   - Respiration > 20/min or $PaCO_2$ <32 mmHg
   - Temperature < 36 °C (96.8 °F) or >38 °C (100.4 °F)
   - WBC count > 12000 or <4000 cells/cubic mm or >10% immature neutrophil/band
4. Age > 60 years
5. Pleural effusion (chest X- ray or USG)

Each point on BISAP score is worth 1-point. There is steady increase in risk for mortality with the increasing number of points.

BISAP score is an uncomplicated, quick and reasonably reliable for assessment of disease severity on admission. Also, data for BISAP score is collected within the first 24 hr of hospitalization. The ability to stratify patients early in their course is a major step to improving future management strategies in acute pancreatitis.

The present study was designed to assess acute pancreatitis using both BISAP and CRP levels and to compare the two in order to ascertain which is a more effective predictor of severity of the disease. We aim to find a reliable, simple and accurate means of stratifying patients with acute pancreatitis.

Objectives of Study

It was an observational prospective study including cases that came to Vydehi Institute of Medical Sciences and Research Centre from 2012 to 2014

1. The primary objective of this study is to compare the ability of BISAP score with C-reactive protein analysis to predict the severity of acute pancreatitis and prognosis of the disease.
2. To assess the severity of acute pancreatitis and to take decision for further management (ICU admission or conservative)

Materials and Methods

Period of Study

This was a prospective study conducted in Vydehi Institute of Medical Sciences and Research Centre from November 2012 to April 2014.

Source of Data

The study included all patients who presented to the Department of General Surgery, VIMS & RC (during the above-mentioned time period) with features suggestive of acute pancreatitis as well as patients referred from other departments.

Inclusion Criteria

All patients admitted to VIMS & RC with clinical features or ultrasound findings suggestive of acute pancreatitis

Exclusion Criteria

i. All patients admitted with acute pancreatitis but also diagnosed with other conditions

ii. All patients diagnosed to have complications of acute pancreatitis

Thirty patients were selected for the study based on these inclusion and exclusion criteria.

Methods

- Written informed consent was taken from each of the selected patients.
- Relevant demographic data and complete history was collected from each patient.
- Each patient underwent the following investigations:
  - Complete blood picture
  - Blood urea nitrogen
  - C-reactive protein
  - Chest X-ray
  - USG abdomen
  - Serum amylase and lipase
  - Serum electrolytes
  - Renal function tests
  - Liver function tests

BISAP score was calculated for each patient within 24 hours of admission, based on individual variables as follows:

- BUN >25 mg/dL
- Impaired mental status (Glasgow Coma Scale Score <15)
- SIRS is defined as two or more of the following:
  - Temperature of <36°C (96.8°F) or >38°C (100.4°F)
  - Respiratory rate >20 breaths/min or $PaCO_2$ <32 mm Hg
  - Pulse > 90 beats/min
  - WBC < 4,000 or >12,000 cells/mm^3 or >10% immature bands
- Age >60 years
- Pleural effusion detected on imaging

One point was attributed to each component and total BISAP score was computed and documented.

- CT scan was performed in 9 out of 30 patients due to inadequate information after ultrasound imaging.
- Each patient was monitored during hospital stay, and the duration of hospital stay as well as ICU stay was documented.

Statistical Analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. The following assumptions on data is made,

Assumptions:

1. Dependent variables should be normally distributed,
2. Samples drawn from the population should be random, cases of the samples should be independent.

Student *t*-test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

Chi-square/Fisher's exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Significant figures

+ Suggestive significance (p-value: $0.05 < p < 0.10$)

* Moderately significant (p-value: $0.01 < p \leq 0.05$)

** Strongly significant (p-value: $p \leq 0.01$)

Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables, etc**.**

Results

Age Distribution

Half of our patients (50%) were between 31 and 40

Table 1: Age distribution

Age in years	Number	Percentage (%)
<20	1	3.3
21–30	5	16.7
31–40	15	50.0
41–50	7	23.3
>50	2	6.7
Total	30	100.0

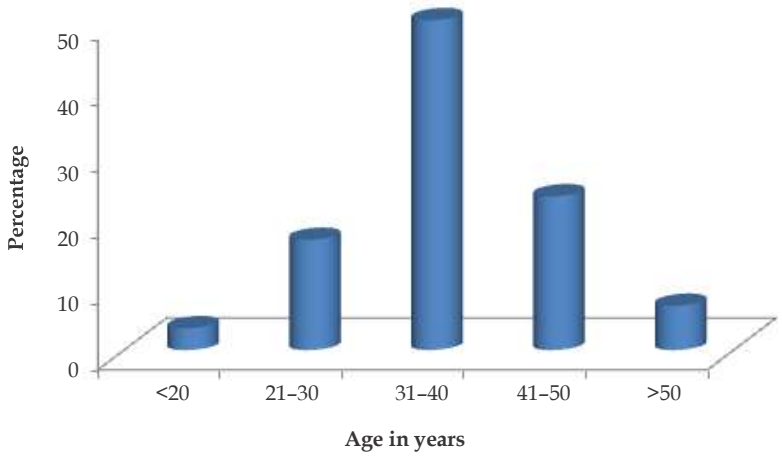

Fig. 1: Age distribution.

Table 2: Gender distribution

Gender	Number	Percentage (%)
Female	4	13.3
Male	26	86.7
Total	30	100.0

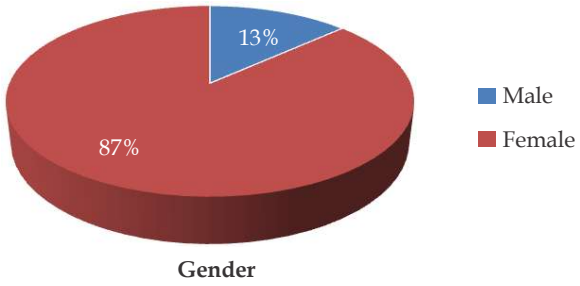

Fig. 2: Gender distribution.

years of age and only 3.35 were below 20. The mean age was 36.33 (SD ± 8.68) (Table 1 and Fig. 1).

Gender Distribution

We had 86.7% males and only 13.3% females in our study population (Table 2 and Fig. 2).

Symptomology of Patients

Out of the patients we studied, all (100%) presented with abdominal pain however only 60% complained of vomiting (Table 3).

Components of BISAP

As already mentioned, BISAP Score is calculated on the basis of following parameters (Table 4)

- Age above 60
- Blood urea nitrogen >25 mg/dL

Table 3: Symptomology of patients

Symptom	Present	Number	Absent	Number	Total
Pain	100%	30	0	0	100%
Vomiting	60%	18	40%	12	100%

Table 4: BISAP parameters

	Components	Number	Percentage (%)
AGE > 60 years	> 60 years	0	0.0
	< 60 years	30	100.0
BUN	>25 mg/dL	7	23.3
	<25 mg/dL	23	76.7
GCS	15/15	24	80.0
	<15/15	6	20.0
SIRS	Present	30	100.0
	Absent	0	0.0
Pleural effusion	Present	11	36.7
	Absent	19	63.3

- Altered mental status (GCS <15)
- Presence of pleural effusion
- Presence of SIRS having two criteria at least

BISAP Scores

BISAP scores computed were as follows (Table 5 and Fig. 3):

Table 5: BISAP scores

BISAP	Number	Percentage (%)
1–2	23	76.7
3	7	23.3
Total	30	100.0

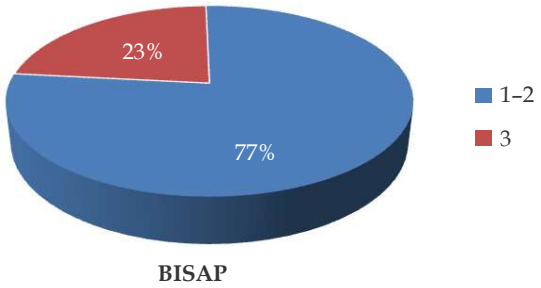

Fig. 3: BISAP scores.

Table 6: Amylase levels

Amylase (IN IU/L)	Number	Percentage (%)
<100	9	30.0
101–200	5	20.0
201–300	4	13.3
301–400	2	6.7
401–500	3	10.0
>500	6	20.0
Total	30	100.0

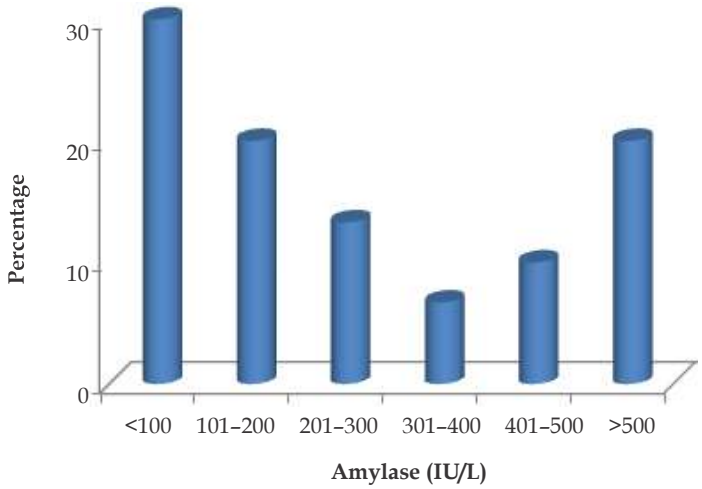

Fig. 4: Amylase levels.

Amylase Levels

The amylase levels had a Mean ± SD: of 391.33 ± 580.68. Thirty percent patients had serum amylase levels less than 100 IU/L (Table 6 and Fig. 4).

Lipase Levels

The lipase levels had a Mean ± SD: of 91.33 ± 580.68. About 43.3% patients had a low lipase level of below 100 IU/L (Table 7 and Fig. 5).

Table 7: Lipase levels

Lipase (IU/L)	Number	Percentage (%)
<100	13	43.3
101–500	9	30.0
>500	8	26.7
Total	30	100.0

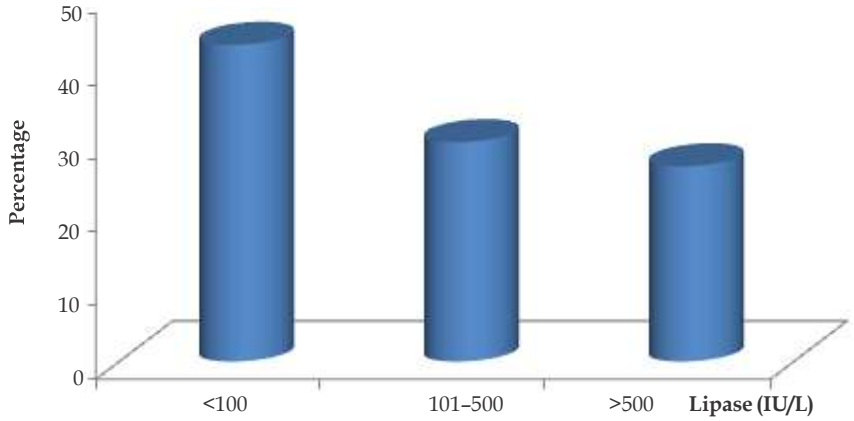

Fig. 5: Lipase levels.

Table 8: CRP Levels

CRP Levels (in mg/L)	Number	Percentage (%)
<150	10	33.3
>150	20	66.7
Total	30	100.0

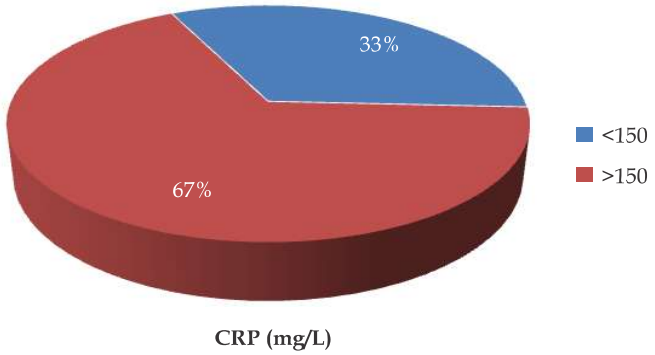

Fig 6: CRP levels.

CRP Levels

A CRP level of above 150 mg/L was considered significant. 66.7% of our patients had an elevated CRP (Table 8 and Fig. 6).

ICU Stay

Thirty percent of patients had severe disease which required stay in the intensive care unit (Fig. 7).

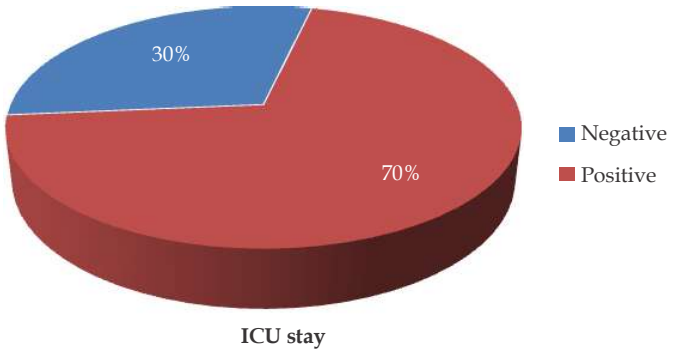

Fig. 7: ICU stay.

Table 9: Length of hospital stay

Hospital stay	Number	%
1–2	3	10.0
3–7	11	36.7
8–14	8	26.7
15–21	5	16.7
22–28	3	10.0
Total	30	100.0

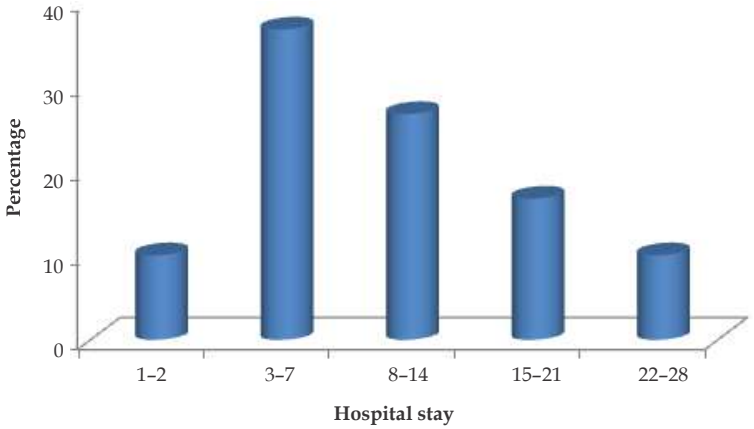

Fig. 8: Length of hospital stay.

Hospital Stay

The length of hospital stay among our patients varied from 1 day to 28 days. Mean duration of hospital stay was 10.10 days (with SD of 7.21) (Table 9 and Fig. 8).

Correlation of BISAP and CRP

While applying Fisher's exact test on BISAP scores and CRP levels, *p*-value was 0.064 which was significant. That is, a higher BISAP score was seen with elevated levels of CRP (Table 10).

Table 10: BISAP and CRP correlation

BISAP	(mg/L)		Total
	<150	>150	
1–2	100	65	76.7
3	0	35	23.3
	1–2	3	100.0
<150	100	0	*p* = 0.064 +, significant, Fisher's exact test
>150	65	35	

Table 11: Correlation of CRP levels with hospital stay

Hospital stay (days)	(mg/L)		Total
	<150	>150	
1–2	30	0	10.0
3–7	50	30	36.7
8–14	0	40	26.7
15–21	20	15	16.7
22–28	0	15	10.0
Total	100	100	100.0

p = 0.009**, significant, Fisher's exact test

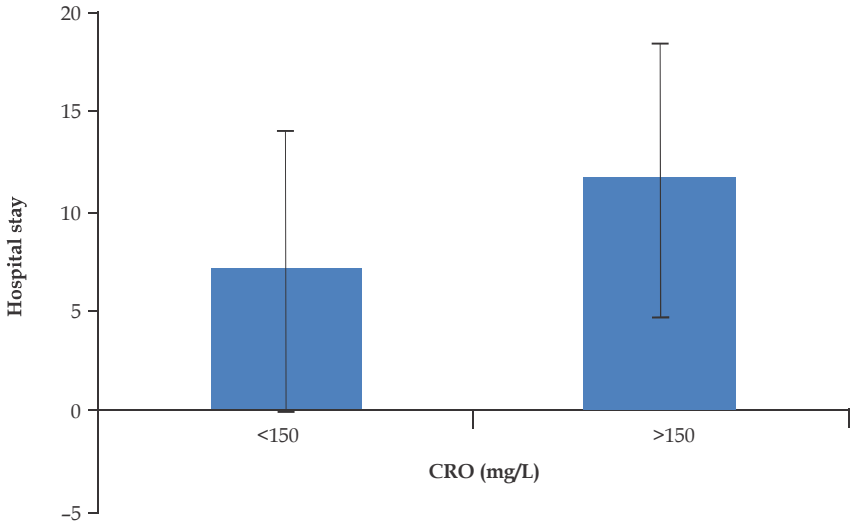

Fig. 9: Correlation of CRP levels with hospital stay.

CRP Levels and HospitaL Stay

An elevated CRP level was found to have a statistically significant relation (p = 0.009) to length of patient's stay in hospital. That is, a patient with elevated CRP was more likely to stay longer in the hospital than one with a normal CRP (Table 11 and Fig. 9).

CRP Levels and ICU Stay

The relationship between elevated CRP levels and ICU stay was not statistically significant (Table 12 and Fig.10).

Table 12: Correlation of CRP levels with ICU Stay

ICU stay	(mg/L)		Total		
	<150	>150		Negative	Positive
Negative	80	65	<150	80	20
Positive	20	35	>150	65	35
Total	100	100	100		

p = 0.675, Not significant, Fisher's exact test

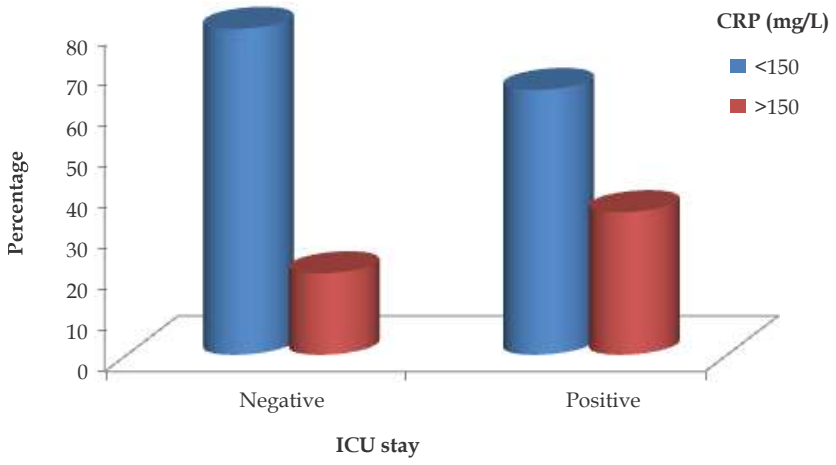

Fig. 10: Correlation of CRP levels with ICU stay.

Table 13: Correlation of BISAP scores with ICU stay

ICU stay	BISAP		Total
	Low BISAP	High BISAP	
Negative	82.6	28.6	70
Positive	17.4	71.4	30
	Negative	Positive	100
Low BISAP	82.6	17.4	
High BISAP	28.6	71.4	

p = 0.014*, significant, chi-square test

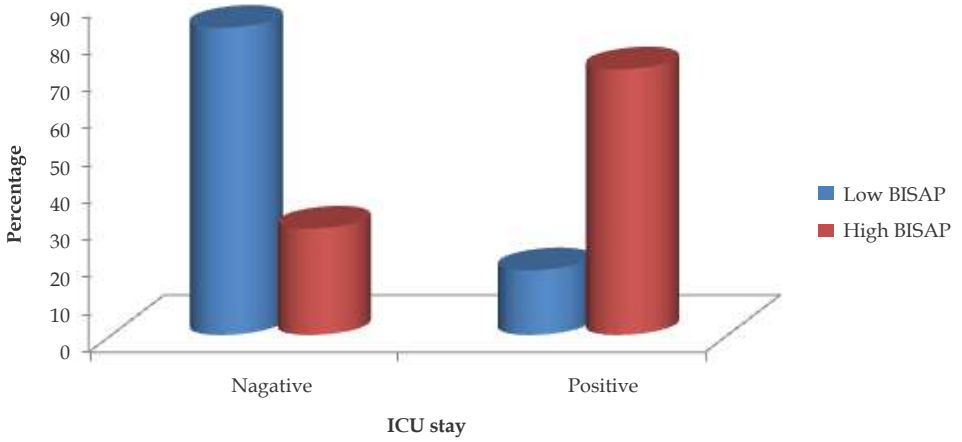

Fig. 11: Correlation of BISAP scores with ICU stay.

Table 14: Hospital stay with the grades of BISAP

Hospital stay	BISAP		Total
	Low BISAP	High BISAP	
1–2	3 (13%)	0 (0%)	3 (10%)
3–7	11 (47.8%)	0 (0%)	11 (36.7%)
8–14	5 (21.7%)	3 (42.9%)	8 (26.7%)
15–21	4 (17.4%)	1 (14.3%)	5 (16.7%)
22–28	0 (0%)	3 (42.9%)	3 (10%)
Total	23 (100%)	7 (100%)	30 (100%)

p = 0.003**, significant, Fisher's exact test

BISAP Scores and ICU Stay

When chi-square test was applied on collected data, we found that BISAP scores had a statistically significant relationship with ICU stay (p-value: 0.014). That is, patients with higher BISAP score were more likely to need ICU (Table 13 and Fig. 11).

On applying Student t test, it was found that BISAP score had a positive correlation with length of hospital stay (p = 0.003). That is, higher the BISAP score, longer was the stay in hospital (Table 14).

Discussion

We studied a total of 30 patients who presented with acute pancreatitis to our hospital during the period of study. In our study, 50% of the patients were between 31 and 40 years of age. The mean age was 36.33 (SD ± 8.68). Like other previous studies, it was seen that acute pancreatitis can affect people of all ages. Our study had 86.7% males and 13.3% females. This is in accordance to worldwide epidemiology in that pancreatitis is more common in males than in females.[6,7]

The main symptoms among our study population was pain abdomen (100%) which is a prerequisite for diagnosis of acute pancreatitis[1] and vomiting (in 60%).

All patients underwent tests to measure serum levels of pancreatic amylase and pancreatic lipase enzymes. The amylase levels had a Mean ± SD: of 391.33 ± 580.68. This mean was elevated but 30% patients had serum amylase levels less than 100 IU/L. This illustrates the fact that serum amylase can be normal in cases of pancreatitis and hence is not a reliable predictor of the disease. Similarly, the lipase levels had a Mean ± SD: of 91.33 ± 580.68. About 43.3% patients had a low lipase level of below 100 IU/L. Serum lipase is considered a more reliable diagnostic marker of acute pancreatitis than serum amylase. In patients with delayed presentation, its activity remains increased for longer periods (up to 8–14 days), and it has an increased sensitivity in acute alcoholic pancreatitis.

As there is no single laboratory test that can be used to diagnose acute pancreatitis, multiple scoring systems have been used to assess its severity. Commonest among these are Ranson's score, Glasgow Coma Scale and APACHE II score. As discussed earlier in detail earlier, these tests have their own disadvantages like delaying diagnosis to 48 hours beyond admission and complexity of the scoring itself.

BISAP score was chosen by us as it's a relatively new test and only limited data is available regarding its efficacy. It's easy to apply and can be used at the time of admission itself. Different cut-offs have been used with BISAP score with varying results. Vikesh Singh and colleagues[8] used a cut-off value at 3 that yielded a comparable sensitivity (38.6%), specificity (93.2%), PPV (59.1%), and NPV (85.6%). A study by Papachristou et al.[9] reported that with the cut-off value set at 3, BISAP score had a sensitivity of 37.5%, a specificity of 92.4%, a PPV of 57.7%, and an NPV of 84.3% in predicting SAP. However, the best cut-off value calculated using Youden index for BISAP was 2, and using this cut-off value yielded a sensitivity of 61.4%, a specificity of 83.1%, a PPV of 48.1%, and an NPV of 89.4%. We used a cut-off of 3 in our study. 23.3% of our patients had a score of 3. The rest had a score of 1 or 2. Wu et al.[5] who designed the scoring system predict a mortality of less than 3.6%, 1.6% and 0.4% for BISAP scores of 3, 2 and 1 respectively. The low scores of our patients and the absence of mortality in our study are thus in accordance with the previous study.

We also used C-reactive protein or CRP as a comparative index for assessing acute pancreatitis. A CRP level of above 150 mg/L was considered significant and 66.7% of our patients had an elevated CRP. Imamura et al.[10] studied levels of CRP in 20 patients and concluded that it is a useful indicator of severity of disease in early phase of acute pancreatitis.

On statistical analysis, we found a positive correlation between BISAP scores and CRP values (p-value 0.064). A patient with higher BISAP score had a higher value of CRP. Since in our search of literature, we found no similar study comparing these two indices, we cannot corroborate this finding.

All our patients had mild to moderate disease. There was no incidence of complications and no mortality during our study. We assessed severity of disease hence based on length of stay in hospital and the need for stay in the intensive care unit. The lengths of hospital stay among our patients varied from 1 day to 28 days. Mean duration of hospital stay was 10.10 days (with SD of 7.21). Bradley et al.[2] reported average length of hospital stay for uncomplicated pancreatitis to be 5–14 days.

We found that both an elevated CRP level and an increased BISAP score were found to have a statistically significant relation (p = 0.009 and p = 0.0002 respectively) to length of patient's stay in hospital. That is, a patient with elevated CRP or higher BISAP score was more likely to stay longer in the hospital.

We also studied correlation of the predictors to ICU stay. Thirty percent of our patients had disease severe enough to validate an ICU stay. Here, we found that BISAP scores had a statistically significant relationship with ICU stay (p-value: 0.014). However, CRP levels had no relationship with ICU stay. Again due to the novelty of our study, we have no previous reports to compare.

To conclude, BISAP score is a positive predictor of increased length of hospital stay as well as need for ICU care. However, CRP cannot be used to predict need of intensive care in acute pancreatitis. Hence, BISAP is a better predictor of severity of pancreatitis compared to CRP.

Limitations of our Study

- Due to paucity of time during this dissertation, we studied only a small sample size. Further studies with larger sample sizes need to be conducted in this area.
- We studied only uncomplicated cases of acute pancreatitis, studies including complications may yield varying results.

Summary and Conclusion

This was a prospective observational study of 30 cases of acute pancreatitis in Vydehi institute of medical college and research centre from November 2012 to April 2014. We aimed to compare BISAP score and CRP levels as indicators of severity of acute pancreatitis.

Among the 30 cases we studied, 4 (13.3%) were females and 26 (86.7%) were males. The ages ranged from 17 to 60 with a mean age of 36.33 (SD: 8.68). 23 patients (76.7%) had a BISAP score of 1 or 2 and the remaining 7 (13.3%) had a score of 3. Mean CRP level was 484.24 mg/L with 10 patients having normal and 20 (66.7%) having elevated CRP levels. Thirty percent patients required ICU stay and mean duration of hospital stay was 10.10 days (with SD of 7.21). BISAP and CRP levels had a positive correlation (p-value 0.064). Both BISAP and CRP levels had a positive correlation with length of hospital stay (p-0.001 and p–0.009 respectively). Only BISAP had a positive correlation with ICU stay (p–0.014).

In conclusion, the demographic data of age, sex and symptomatology in our study was comparable to other studies. We found that BISAP is a better predictor of severity of acute pancreatitis compared to CRP levels. Larger studies will be needed to further consolidate our findings, but it is safe to say that BISAP has the advantage of simplicity and speed over more traditional scoring systems. It is a useful means of predicting severity in acute pancreatitis in comparison to individual laboratory parameters like amylase, lipase and CRP levels. We confirm BISAP score to be an accurate means for risk stratification and prognostic prediction in our patients.

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Original Research Article

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Coal Tar Burns: Our Experience

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Abstract

Burns due to contact with hot coal tar are challenging as it is very difficult to remove and there is no specified appropriate agent for the removal of tar. Hot tar burns usually occur as occupational hazard. This is a case series of our experience in treating 6 patients who sustained hot tar burns. Patients were treated with diesel, butter and Vaseline.

Keywords: Tar; Diesel; Butter; Vaseline.

Introduction

Tar which is obtained using dry distillation from coal, stones, and various kinds of wood, is commonly used in areas such as paving roads.[1,2] The boiling point of paving tar is 140°C, thus when it comes in contact with skin leads to severe and deep burns.[3] Thus in the treatment of hot tar burns it is important to restrict tissue damage and prevent the further contact with tar.[4] In the literature many substances like diesel, sunflower oil and butter have been mentioned being used to remove tar from the affected area.[1] This study highlights the details of six cases of a hot coal tar burns treated with diesel, butter and Vaseline.

Materials and Methods

The study was conducted in a tertiary care burn center in India. All the cases of coal tar burns who reported on the same day are included in the study. The study highlights the role of various methods of removal of coal tar, treatment and outcome. The details of cases include history of sustaining coal tar burns when the bus they were traveling hit a crusher with molten tar and patients accidentally came in contact with the molten tar. Following are the details of cases:

Case 1: A 65-year-old man came with coal tar on his both feet. On presentation, his vital signs were normal. Physical examination showed that his both feet with distal third of legs were covered with tar. After starting IV resuscitative fluids Vaseline was applied on the coal tar covered areas.

Case 2: A 25-year-lady came with coal tar on her both feet, both hands and left thigh. On admission, her vital signs were normal and after starting IV resuscitative fluids butter was applied on the coal tar covered areas including her left thigh.

Case 3: A 32-year-old man sustained coal tar burns on his both feet and both hands. After starting IV resuscitative fluids diesel was applied on the coal tar covered areas.

Case 4: A 30-old-man year man came with coal tar on his both feet over which butter was applied.

Case 5: A 35-year man, who was injured by hot tar in this incident, came with coal tar on his both feet. He also gave history of jumping from 18 feet height after burns. On admission, his vital signs were normal. His physical examination showed that his both feet were covered with tar with pelvic

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compression test positive. He was also found to have pubic rami fracture and L1 vertebra fracture. After starting IV resuscitative fluids diesel was applied on the coal tar covered areas.

Case 6: A 60-year-old man, sustained coal tar burns on his both feet and both hands over which Vaseline were applied. He was a known case of pulmonary tuberculosis and incidentally found to be HBsAg positive.

Results

Patient details are summarized in Table 1.

Burns on which Vaseline and butter was applied took more time for removal of layer of tar, about 15 minutes more, compared to diesel. Patients, in whom diesel was used, complained of more burning sensation in comparison to patients treated with butter or Vaseline. Overall healing time was same irrespective of substance used for removal of tar.

Table 1: Summary of patient details

S. No.	Name	Age (years) / Sex	% of Burns	Depth of burns	Time lag	Operative procedure	Duration of hospital stay	Outcome
1	Magaboop Basha	85/M	10% Vaseline applied	II degree deep	5 hr	Nil	1 day	Lost to follow-up
2	Ranjini (Fig. 1–3)	25/ F	20% Butter applied	II degree deep	5 hr 30 min	Nil	20 days	Discharged with remaining raw area of 3%
3	Thennarasan	32/M	15% Diesel applied	II & III degree deep	4 hr	Yes Debridement + SSG of foot	30 days	Discharged with remaining raw area of 2% on dorsum of feet
4	Murugan (Fig. 4–6)	30/M	4% Butter applied	II degree deep	6 hrs	Nil	20 days	Discharged with completely healed burns
5	Karmegam	35/ M	7% Diesel applied	II degree deep	6 hr	Nil	1 day	Not known
6	Annamalai	60/ M	13% Vaseline applied	II & III degree deep	7 hr	Nil	25 days	Discharged with remaining raw area of 5%

Fig. 1: Case 2: Butter applied on coal tar burns.

Fig. 2: Case 2: Immediately after removal of tar.

Fig. 3: Case 2: After 20 days.

Fig. 4: Case 4: After cleaning with diesel.

Fig. 5: Case 4: After skin grafting.

Fig. 6: Case 4: Hand burns healed completely with conservative management.

Discussion

Tar is composed of paraffinic and aromatic hydrocarbons and heterocyclic compounds containing sulfur, nitrogen and oxygen, and becomes a liquid when heated to 93°C. However, for occupational use it is heated to more than 232°C.[5] The tar adheres to the skin and continues to transfer heat to cause a progressive thermal burn which may lead to II and III degree deep burns. Tar solidifies and forms an occlusive barrier over the skin, favoring bacterial proliferation underneath leading to infection. Primary management of a tar burn involves early removal of the tar but manual debridement of solidified tar causes removal of underlying viable skin.[6,7] In literature many methods are mentioned for removal of tar, including the use of household butter, sunflower oil, olive oil, baby oil, and mayonnaise. Liquid solvents such as kerosene, gasoline, acetone and alcohol have been mentioned but can damage the tissues and produce systemic toxic effects if they get absorbed.[6]

At present polysorbate appears to be the method of choice as it is less painful and less destructive to the viable tissue, more water soluble and easily washable and can emulsify the tar in a shorter time. But it is not readily available in emergencies. In this case series polysorbate was not available in emergency, so readily available Vaseline, butter and diesel were used.

Conclusion

Vaseline, butter and diesel can be used for removing tar. With diesel it is possible to remove tar faster, compared to Vaseline and butter. If Vaseline and butter are insufficient for removing a thick layer of tar, then the use of diesel is suggested.

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Original Research Article

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Transhiatal Esophagectomy: Short and Long-term Outcomes

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Abstract

Background: Esophageal cancer is relatively common gastrointestinal tract malignancy with poor prognosis. The aim of the study is to conduct retrospective review of esophageal cancer patients managed by Transhiatal esophagectomy (THE).

Methodology: The study was retrospective analysis of prospective collected data of esophageal cancer patients from June 2010 to June 2019.

Inclusion criteria: Histologically proven carcinoma, medically fit lower third esophageal cancer.

Exclusion criteria: Middle third esophageal carcinoma requiring transthoracic route, metastatic cancer, medically unfit patient, patient refusing consent for surgery.

Results: 575 cases of esophageal cancer were managed in a single unit of surgery. Of these 575 cases, Transhiatal esophagectomy was done in 69 patients. Mean age of the patients was 58 years. Male to female ratio was 15:54. THE alone was done in 18 (25.7%), THE + adjuvant chemotherapy in 24 (34.3%), THE + adjuvant radiotherapy in 12 (17.1%), THE + neoadjuvant chemotherapy 6 (8.6%), THE + neoadjuvant chemoradiotherapy 9 (12.9%). The overall morbidity was 40.5% (14/69). Perioperative mortality was in 5 patients (7.24%). Follow up was done for mean 26.4 months. The mean survival was 19.3 months.

Conclusion: Esophagectomy is complex operation with high morbidity and potential mortality. Multimodality approach appears to be reasonable safe in managing esophageal carcinoma patients.

Keywords: Esophageal cancer; Transhiatal esophagectomy; Morbidity; Multimodality therapy.

Introduction

Esophageal cancer is the seventh most common cancer, worldwide. In India it is the sixth most common cancer and sixth most common cause of cancer related death.[1] Squamous cell carcinoma is the most common type of esophageal carcinoma in India and is most commonly located in distal one-third of esophagus. The overall survival in esophageal cancer remains poor despite advances in multidisciplinary care. Esophagectomy remains the only curative approach to esophageal carcinoma. Depending upon the location of tumor surgery is performed via thoracic, abdominal or combined approach. We present our experience with transhiatal esophagectomy (THE) in patients of carcinoma esophagus. The patient characteristics, surgical approach and outcome are presented and discussed.

Materials and Methods

A retrospective analysis of prospectively maintained data of esophageal cancer from June 2010 to June 2019 was done. The preoperative work up of esophageal cancer included upper GI endoscopy and biopsy, computerized tomography of chest and abdomen, echocardiography and pulmonary

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function test. PET CT scan was used selectively. Staging was performed using 8th American joint committee on cancer/International union against cancer TNM classification. Esophagectomy was considered for medically fit patients with localized resectable lesion at middle and distal one-third esophagus. Locally advanced carcinoma (T3 and or N1) were subjected to neoadjuvant therapy (chemo and/or radiotherapy) with the intention of esophagectomy after regression of lesion. In general carcinoma of lower one-third esophagus were selected for transhiatal route.

Inclusion Criteria

Histologically proven carcinoma, medically fit lower third esophageal cancer.

Exclusion Criteria

Middle third esophageal carcinoma requiring transthoracic route, metastatic cancer, medically unfit patient, patient refusing consent for surgery. Midline incision was given, after excluding metastases gastric mobilization done using harmonic scalpel. The lymph nodes removed included perigastric, hepatic artery and accessible mediastinal. Gastric conduit through the posterior mediastinum was the preferred replacement. Hiatus was widened by dividing diaphragmatic crus. Chest tube was inserted only after obvious pleural rupture. The esophagogastric anastomosis was performed in neck using single layer interrupted 3-0 mersilk suture after excising gastric crescent either from anterior or posterior wall of stomach. Our policy is not to perform pyloric drainage procedure and to do feeding jejunostomy in all the patients. Postoperatively patients were managed in ICU for 1 or 2 days. Enteral nutrition was started on postoperative day 2. Perioperative mortality was defined as in hospital mortality or within 30 days mortality. After discharge patients were followed up every 6 month with clinical examination and X-ray chest. Adjuvant chemotherapy and/or radiotherapy were given for Stage II onwards at the discretion of medical and radiation oncologist. Statistical analysis was done using SPSS software version 24. Survival analysis was performed using Kaplan-Meier method.

Results

Over a period of nine years, from June 2010 to June 2019, 575 cases of esophageal cancer were managed in a single unit of surgery. Of these 575 cases, Transhiatal esophagectomy was done in 69 patients. Rest of the patients were managed with chemoradiotherapy alone, esophageal stenting and Transthoracic esophagectomy.

Demography profile of these 69 patients summarized in Table 1. Mean age of the patients was 58 years. Male to female ratio was 15:54. Alcohol abuse was found in 12 (17.4%) patients and tobacco abuse in 9 (13.4%) patients. Majority of patients presented with dysphagia to solids with median duration of symptoms of 60 days before the start of definitive treatment.

Table 1: Demographic characteristics

Mean age (years)	**58**
Male: Female	15:54
Alcohol abuse	12 (17.4%)
Tobacco abuse	9 (13.4%)
Median duration of symptoms (days)	60
Mean duration of surgery (hours)	4.5
Average hospital stay	12

Mean operative time was 4.5 hours. Average hospital stay was 10 days. THE alone was done in 18 (25.7%), THE + adjuvant chemotherapy in 24 (34.3%), THE + adjuvant radiotherapy in 12 (17.1%), THE + neoadjuvant chemotherapy 6 (8.6%), THE + neoadjuvant chemoradiotherapy 9 (12.9%) (Table 2).

Table 2: Treatment detail

Treatment	**No. of patients**
THE only	18
THE + Adjuvant radiotherapy	12
THE + Adjuvant chemotherapy	24
THE + Neoadjuvant chemoradiotherapy	9
THE + Neoadjuvant chemotherapy	6

The overall morbidity was 40.5% (14/69). Morbidity is being detailed in Table 3. Majority of the complications were respiratory (pneumonia, atelectasis) in 8 (11.6%) cases, anastomotic leak in 6 patients (8.6%) and anastomotic stenosis in 3 cases. Anastomotic stenosis was managed with repeated esophageal dilatation. Unilateral recurrent laryngeal nerve paralysis occurred in 1 patient. This patient presented with hoarseness in the immediate postoperative period. Conservative management was successful in managing this patient. Delayed gastric emptying occurred in 2 patients. One patient settled with the use of prokinetic agents (metoclopramide, domperidone and erythromycin) whereas in another patient delayed gastric emptying persisted despite use of prokinetic agents.

Table 3: Complications

Complication	No. of patients
Pneumonia, Basal atelectasis	8
Recurrent laryngeal nerve palsy	1
Anastomotic leakage	6
Anastomotic stenosis	3
Delayed gastric emptying	2

This patient was successfully managed with endoscopic balloon dilatation. Perioperative mortality was in 5 patients (7.24%). All of these patients had respiratory failure secondary to pneumonia. Stagewise distribution as per AJCC 8th classification was as follow (Table 4). Most common was Stage IIA 27 (39.1%) followed by Stage IIIA in 15 (21.7%), ypI 6 (8.7%), IIB 6 (8.7%), IVA 6 (8.7%), IIB 6 (8.7%), IA 3 (4.3%), ypIIIA with 3 (4.3%) cases in each group. Stagewise survival shown in Fig. 1. R0 resection was achieved in all patients. Mean number of lymph nodes harvested from specimen were 9.74. Follow up was done for mean 24.3 months. Till date 37 patients are surviving. Mean survival of patients was 19.3 months (Table 4).

Table 4: Stagewise distribution

Stage	No. of patients *n* (%)
IA	3 (4.3)
IIA	27 (39.1)
IIB	6 (8.7)
IIIA	15 (21.7)
IIIB	3 (4.3)
IVA	6 (8.7)
ypI	6 (8.7)
ypIIIA	3 (4.3)

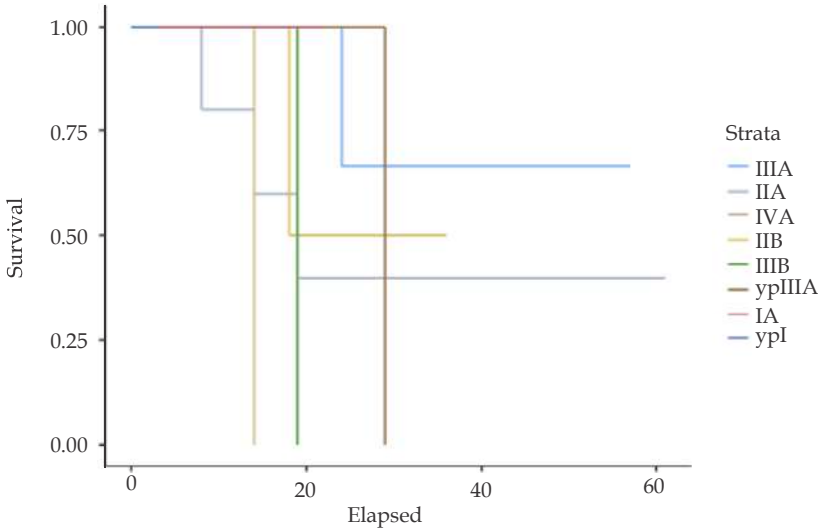

Fig 1: Stage wise survival curve.

Discussion

Carcinoma of esophagus is an aggressive malignancy and usually presents at an advanced stage at the time of diagnosis. Only 20% patients have localized disease, whereas 30% have locally advanced and more than 50% are metastatic at the time of presentation.[2,3] In our series too only 69 patients were suitable for definitive resection out of 575 diagnosed esophageal cancer cases managed in our unit. In view of absence of proper referral system in our region majority of patients had delayed referral. Median duration of symptoms 60 days at the time of admission. History of alcohol intake and tobacco abuse was found only in minority of patients 12 (17.4%) and 9 (13.4%). This could be attributed to more female than male patients in our series (15:54). Intake of hot beverages could have been the factor responsible for the esophageal cancer in female gender. Das et al.[4] in their study on analysis of risk factor for squamous cell carcinoma have incriminated poor nourishment and consumption of hot beverages as cause of squamous cell carcinoma in esophagus. Surgery remains the important component of the management of this disease, however only minority of the patients are suitable for the same. Presently multimodality treatment is advocated for majority of the cases. The use of multimodality approach has shown improvement in survival of locally advanced carcinoma.[5] In our own series surgical approach alone was done in 18 (25.7%) patients.

Majority of the esophageal cancer cases received multimodality treatment in the form of adjuvant or neoadjuvant chemotherapy and radiotherapy (Table 2).

Esophagectomy is a major surgery that carries high morbidity and mortality. The Transhiatal approach was rediscovered by Orringer in 1976.[6] The Transhiatal approach is based on the rationale that avoidance of Transthoracic route reduces the risk of pulmonary complications and intrathoracic anastomosis leak. However the points against Transhiatal approach is that it violates basic principles of oncological surgeries. There is poor exposure to esophagus in absence of thoracotomy, lack of adequate mediastinal lymphadenopathy resulting in higher rate of locoregional recurrence and poor overall survival.[7,8] The overall morbidity of Transhiatal esophagectomy in our study was 40.5%. Respiratory complications were the most common. This is consistent with the incidence of morbidity reported in literature.[9–11] In a meta-analysis Zhou et al.[12] have shown that minimally invasive esophagectomy has lesser pulmonary complications than open esophagectomy without any difference in anastomotic leak rate. The anastomotic leak rate in our series was 8.6%. The leak rate after cervical esophagogastric anastomosis has been reported between 9 and 11% in the literature. Technical factors and ischemia of transpositioned gastric tip are considered to be important causative factors.[13,14] In our series almost all of our patients were managed conservatively with opening of cervical wound and drainage of anastomotic dehiscence area with encouragement of semisolid diet intake. Orringer et al. have shown that use of side-to-side stapled esophagogastric anastomosis has reduced the leak rate to 2.7%.[15] Sokuti et al.[16] in their study on anastomotic technique has concluded that use of wide cross-sectional hand sewn esophagogastric anastomosis decreases rate of stricture formation. Anastomotic stenosis occurred in 3 patients, all these patients had anastomotic leaks. These patients were successfully managed with repeated esophageal dilatation. Left recurrent laryngeal nerve paresis happened in one patient, paresis got resolved with conservative method.

The mortality in our study was 7.24%. Neagoe et al.[17] in their series on Transhiatal esophagectomy have reported mortality of 9.09%. Similar results have been reported by Birkmeyer et al.[18]

Limitation of our study is that it is a single center and retrospective in nature. Follow-up period was short, i.e. 19.3 months.

Conclusion

Esophagectomy is a complex procedure with high morbidity and potential mortality. Transhiatal esophagectomy is a relatively safe approach with adequate oncological results. Multimodality approach has the potential to improve the survival of the esophageal cancer patients.

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Correlation of the Size of Liver Abscess and Liver Function Test: An Experience at our Institution

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Abstract

Introduction: Liver abscess is the collection of pus within the liver parenchyma. It is the most common cause of intra-abdominal visceral abscess. Though ultrasonography has been used for diagnosing liver abscesses, other hematological investigations, such as total counts, and liver function tests have often been useful aids in diagnosis and planning the management. These may also provide a basis for early detection of the condition and serve as a tool for prediction of the prognosis of the condition. This study aims at identifying the correlation between the size of the liver abscess and liver function tests.

Methodology: This was a prospective observational study conducted at Victoria hospital between April and June 2019. Fifty patients between the ages of 18–60 presenting to emergency and diagnosed as having liver abscess were included in the study and were subjected to ultrasonography and routine investigations. Details such as etiology, leukocyte counts, liver function tests including albumin levels, levels of enzymes such as ALT, AST and ALP were noted and tabulated and analyzed. The correlation between the variables was calculated by using the Pearson's coefficient. A *p*-value of <0.01 was considered statistically significant.

Results: 34 (68%) of the 50 patients were male while 16 (32%) of the 50 patients were females. 36 (72%) of the patients had amoebic liver abscess while 14 (28%) had pyogenic liver abscess. The greatest dimension of the liver abscess was in the range of 4–10 cm with a mean of 6.9 ± 1.38 cm. The total leukocyte counts of the 50 patients included in the study ranged from 10,300–32,100 cells/mm^3 (mean 21627 ± 4994). Serum albumin levels ranged between 1.8–3.2 mg/dL, with a mean of 2.57 ± 0.3 mg/dL. AST ranged from 33–99 (mean of 70.4 ± 15.76), ALT from 29–110 (mean 70.96 ± 16.15) and ALP between 45–190 (mean 110.1 ± 41.68).

Conclusion: Total leukocyte counts, AST, ALT and ALP showed a positive correlation with the size of liver abscess whereas serum albumin showed a negative correlation with the size of liver abscess.

Keywords: Liver abscess; Correlation with LFT; Hypoalbuminemia; Leukocytosis.

Introduction

Liver abscess is the collection of pus within the liver parenchyma. It is of two types: pyogenic and amoebic liver abscess. The pyogenic liver abscess was first described in 4000 BC[1] and the amoebic liver abscess in 5000 BC by Hippocrates. Since then it has been extensively studied, and has been described as the most common cause of intra-abdominal visceral abscess.[2] The annual incidence of liver abscess has been estimated at 2.3 cases per 100,000 people and is higher among men than women.[3] A case fatality rate of 9.1 percent was reported among patients with pyogenic liver abscess by SC Chen et al. in their study.[4] A case fatality rate of 6% was reported by H Dimopoulou et al., who also noted that hyperbilirubunemia, use of antibiotics

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alone and bilobar involvement were associated with increased mortality.[5] Low social economic status and alcohol consumption are implicated as predictors of amoebic liver abscess.[6]

Traditionally, though ultrasonography has been used for diagnosing liver abscesses, other hematological investigations, such as total counts, and liver function tests have often been useful aids in diagnosis and planning the management. Leukocytosis is present in 70% to 90%, an elevated alkaline phosphatase in 80%, and an elevated bilirubin and transaminases in 50% to 67% of patients. Anemia, hypoalbuminemia, and prolonged prothrombin time are seen in 60% to 75% of patients.[1] These may also provide a basis for early detection of the condition and serve as a tool for prediction of the prognosis of the condition. This study aims at identifying the correlation between the size of the liver abscess and liver function tests.

Materials and Methods

- *Study design:* This was a prospective observational study
- *Study period:* The study was conducted between the months of April and June 2019
- *Place of study:* The study was conducted at Victoria hospital, Bangalore.
- *Patient selection:* Adult patients presenting to emergency at Victoria hospital, fulfilling the following criteria were included in the study

Inclusion Criteria

- Patients between the ages of 18–60
- Patients with sonologically proven liver abscess

Exclusion Criteria

- Patients not consenting for participation in the study
- Patients with evidence of rupture of liver abscess

Methodology

After obtaining formal consent, 50 patients satisfying the inclusion criteria were included in the study. Their details were collected, such as name, age, sex. They were subjected to routine investigations and the details such as etiology, leukocyte counts, liver function tests including albumin levels, levels of enzymes such as ALT, AST and ALP were noted and tabulated in Microsoft's Excel. These details were then analyzed with SPSS 25 software. The results were described using descriptive statistics such as mean and standard deviation. The correlation between the variables was calculated by using the Pearson's coefficient. A p-value of <0.01 was considered statistically significant.

Results

The 50 patients enrolled in the study had ages in the range of 31–60 years, with a mean of 45.64 ± 8.24 years. Most of the patients had ages between 41–50 years. 34 (68%) of the 50 patients were male while 16 (32%) of the 50 patients were females (Fig. 1).

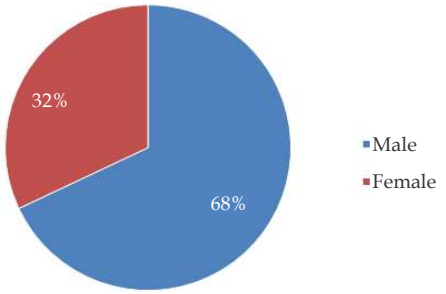

Fig 1: Sex distribution of patients.

On analysis of the type of the liver abscess, it was found that 36 (72%) of the patients had amoebic liver abscess while 14 (28%) had pyogenic liver abscess (Fig. 2).

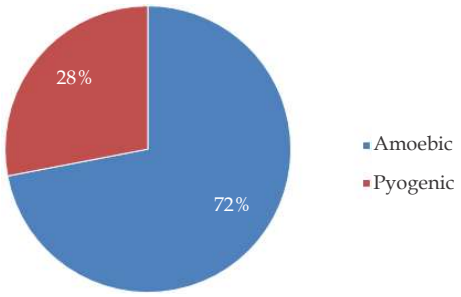

Fig. 2: Analysis of type of liver abscess.

Analysis of the greatest dimension of the liver abscess revealed that it was in the range of 4–10 cm with a mean of 6.9 ± 1.38 cm. 8 (16%) of the 50 patients had the greatest dimension of the abscess less than 5 cm while majority (42, i.e., 84% patients) had the greatest dimension of liver abscess between 6 and 10 cm (Table 1).

Table 1: Analysis of the size of liver abscess

Largest dimension (cm)	Number of patients	Percentage	Range	Mean ± SD
1–5	8	16	4–10 cm	6.9 ± 1.38
6–10	42	84		

The total leukocyte counts of the 50 patients included in the study ranged from 10,300–32,100 cells/mm^3. The mean total leukocyte count was 21627, with a standard deviation of 4994. The total leukocyte count showed a statistically significant positive correlation to the size of the liver abscess (Pearson's coefficient = 0.943). The liver function test was also analyzed for each component and the variation was compared with the size of the liver abscess. It was found that the serum albumin levels of the patients ranged between 1.8–3.2 mg/dL, with a mean of 2.57 ± 0.3 mg/dL. This showed a negative correlation to the size of the liver abscess, with a Pearson's coefficient of –0.323 (Table 2).

Table 2: Statistical analysis of correlation between abscess size and LFT

Parameter	Pearson's coefficient
Total leukocyte counts	0.943
Albumin	–0.323
AST	0.723
ALT	0.825
ALP	0.723

Analysis of the liver enzymes revealed that AST ranged from 33–99 (mean of 70.4 ± 15.76), ALT from 29–110 (mean 70.96 ± 16.15) and ALP between 45–190 (mean 110.1 ± 41.68).

These showed positive correlation to the size of liver abscess (Pearson's coefficient values being 0.877, 0.825 and 0.723 respectively).

Discussion

Traditionally, though ultrasonography has been used for diagnosis of liver abscesses, the measurement of other hematological parameters such as total leukocyte counts, and liver function tests aids in the diagnosis of liver abscess. These can also have prognostic implications.

In this study, we found a male predisposition, with 68% of patients being males. This is consistent with the findings by other authors. Ershad et al.[7] in their study 'Management of Liver Abscess: An institutional experience' noted a male to female ratio of 48:6. Vineet Jain[8] et al., in their study 'Correlation between Abscess size and Liver function tests in case of Liver abscesses' had 80% of their patients as males. The male predisposition could be due to the higher prevalence of alcoholism among males. In our study, middle aged patients (41–50 years) were affected more. The study by Ershad et al.[7] had maximum number of patients in the age group between 35–45 years.

Analysis of the type of liver abscess revealed that 72% patients had amoebic liver abscess while 28% had pyogenic liver abscess. This is consistent with the findings of Soumik Ghosh et al.[9] who reported 71% patients having amoebic liver abscess. Amitesh Kumar Jha et al.[10] reported 88% patients as having amoebic liver abscess in their study. This could be due to the high prevalence of amoebiasis in developing countries like India.

The mean size of liver abscess was found to be 6.9 ± 1.38 cm (range 4–10 cm). The mean total count 21627 ± 4994, mean serum albumin levels 2.57 ± 0.3, mean AST 70.4 ± 15.76, mean ALT 70.96 ± 16.15 and mean ALP 110.1 ± 41.68. Of these, total counts, AST, ALT and ALP showed a positive correlation with the size of liver abscess, while serum albumin showed a negative correlation with the size of the abscess. This is consistent with the findings of Vineeth et al.[8] who also reported a positive correlation between the size of the liver abscess and AST, ALT and ALP and a negative correlation with serum albumin. Soumik Ghosh et al.[9] also reported raised leukocyte levels and low serum albumin levels among patients with liver abscess.

Martin Sánchez Aguilar et al.[11] reported that a serum albumin level <3 mg/dL, diameter >10 cm and ALP >300 had a sensitivity of 0.75 and specificity of 1 in predicting failure of treatment of liver abscess.

Conclusion

Total leukocyte counts, AST, ALT and ALP have a positive correlation with the size of liver abscess while serum albumin has a negative correlation with the size of liver abscess.

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Original Research Article

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A Retrospective Analysis of Blunt Trauma Abdomen in Patients Attending the Emergency Department in a Tertiary Care Hospital

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Abstract

Trauma is the leading cause of death and disability in developing countries and also the most common cause of death under 45 years of age. Injury is the 7th cause of mortality worldwide and abdomen is the third most common injured organ. The spleen and liver are the most commonly injured abdominal organs as a result of blunt trauma. In the civilian population, blunt injury to the abdomen is commonly caused due to road traffic accidents. *Material and Methods:* A retrospective study of 157 cases of blunt abdominal trauma patients presenting to department of emergency surgery in medical college of Central India from January to June 2019 was done.

Results: Amongst the studied cases most common age group involved was 21–30 years (46 cases) and 31-40 years (32 cases) followed by 41–50 years (28 cases). Liver was found to be the most commonly injured organ 60 cases followed by spleen 39 cases and bowel and kidney (21 and 17 cases respectively).

Conclusion: Blunt Abdominal Trauma is one of the important causes of morbidity and mortality in relatively young individuals. Most common mode of injury was road traffic accidents and men were affected predominantly. Hospitals and trauma care centers must adopt a multi-pronged approach to diagnose and promptly treat patients with blunt injury abdomen so that the prognosis can be better in these patients.

Keywords: Abdominal trauma; Road traffic accident.

Introduction

Trauma has been always a neglected disease of modern society, despite its close companionship with man. Trauma is the leading cause of death and disability in developing countries and also the most common cause of death under 45 years of age.[1] Injury is the 7th cause of mortality worldwide and abdomen is the third most common injured organ. Around 25% of cases of abdominal injuries requires surgeries. Eighty-five percent of abdominal traumas are of blunt character.[2] the spleen and liver are the most commonly injured abdominal organs as a result of blunt trauma. Clinical examination alone is inadequate because patients may have altered mental status and some other distracting injuries. Initial resuscitation along with focused assessment with sonography in trauma (FAST) and computed tomography (CT) abdomen are very important to detect patients with minimal and clinically untraceable signs of abdominal injury and are the part of recent management guidelines. Approach to trauma should be systemic and prioritized. About 10% of patients have persistent hypovolemic shock as a result of continuous blood loss in spite of aggressive fluid resuscitation and require an urgent surgical intervention. Damage

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control laparotomy is a life-saving procedure for such patients with life-threatening injuries and to control hemorrhage and sepsis. On the other spectrum, there has been increasing trend towards non operative management (NOM) of blunt trauma amounting to 80% of the cases with failure rates of 2–3%.[3]

For hemodynamically stable solid organ injuries NOM is considered as standard protocol.

Pre-hospital transportation, initial assessment, thorough resuscitative measures and correct diagnosis are of utmost importance in trauma management.

In the civilian population, blunt injury to the abdomen is commonly caused due to road traffic accidents. Patients brought to the emergency department require immediate attention and thorough evaluation. Blunt injury to the abdomen can also occur as a result of fall from height, assault with blunt objects, sports injuries, and blasts injuries.[4] Focused assessment with sonography for trauma (FAST) has emerged as a useful tool in the evaluation of blunt injury abdomen.[5–7] The majority of blunt injury abdomen cases are related to motor vehicle collision or automobile versus pedestrian accidents.[8] The spleen and liver are the most commonly injured solid organs in blunt injury abdomen. However, injuries to the pancreas, bowel and mesentery, bladder, and diaphragm, as well as retroperitoneal structures like kidneys, abdominal aorta, are less common but still need to be considered. Injuries to the kidney and urinary bladder may be associated with pelvic fractures and retroperitoneal hemorrhage.[9] in a patient who has been in a road traffic accident, injuries to the head, chest, and fractures of any bones must also be ruled out.

Materials and Methods

A retrospective study of 157 cases of blunt abdominal trauma patients presenting to Department of emergency surgery in medical college of Central India from January to June 2019 was done. After initial resuscitation, clinical details, physical examination, laboratory tests and X-rays, ultrasonography was done to confirm the diagnosis.

CT scan was usually done in all of the cases. Patients were categorized to stable verses unstable. The progress of patients was closely monitored, decision was taken for conservative management or to undertake laparotomy. Patients who were unresponsive to conservative management, were unstable hemodynamically and continued deterioratingin spite of sufficient resuscitation or who had signs of bowel involvement were shifted for immediate laparotomy. Inferences were made for various variables like age, sex, cause of blunt abdominal trauma, time of presentation of patient, signs and symptoms, operative findings, various procedures employed, associated extra-abdominal injuries, postoperative complications and mortality.

This study was based on 157 patients. A thorough history was obtained directly either from the patient or from the patient's relatives. Then, only clinical examination and the relevant diagnostic investigations was performed.

After hemodynamic stability and resuscitation, all patients were subjected to careful examination. However, depending on the clinical findings; a decision was taken for further investigations like X-ray abdomen, FAST and CECT abdomen.

The decision for operative or non-operative management depended on the outcome of the clinical examination, hemodynamic stability of the patient and the results of the investigations done.

Patients selected for conservative management were placed on strict bed rest. They were also subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate and repeated examination of the abdomen and other systems. Appropriate investigations, such as the hemoglobin value, and ultrasound of the abdomen were repeated as and when necessary.

Results

In this retrospective study of 157 patients with blunt abdominal trauma there were 93 males and 64 females with an M:F ratio of 1.4:1 (Fig. 1). Amongst the studied cases most common age group involved was 21–30 years (46 cases) and 31–40 years (32 cases) followed by 41–50 years (28 cases). Only 5 cases were more than 70 years (Fig. 2). In 92 cases road traffic accident was the mode of injury followed by fall from height in 19 patients. Forty three patients had the history of assault (Fig. 3). Most of the patients presents with history of abdominal pain followed by abdominal guarding and rigidity. Only few patients presented with hematuria. Liver was found to be the most commonly injured organ 60 cases followed by spleen 39 cases and bowel and kidney 21 and 17 cases respectively (Fig. 4).

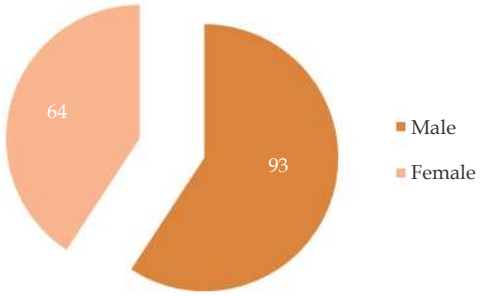

Fig. 1: Sexwise distribution of blunt injury abdomen.

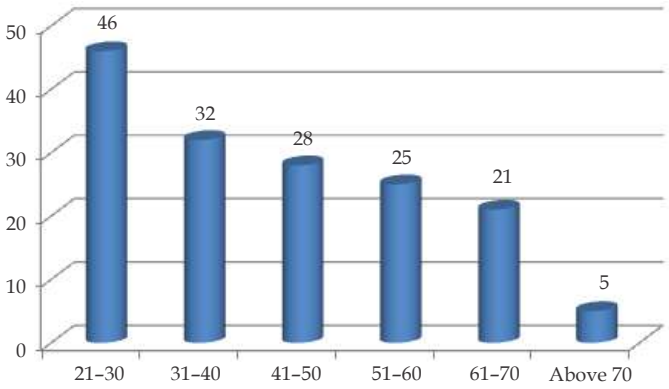

Fig. 2: Agewise distribution of blunt injury abdomen.

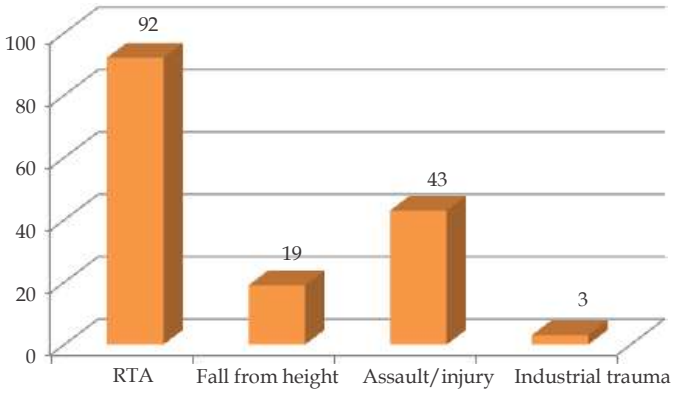

Fig. 3: Mode of injury in patients who sustained blunt injury abdomen.

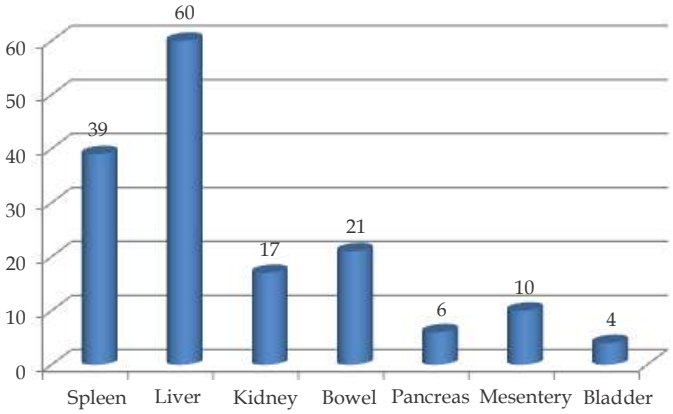

Fig. 4: Organs involved in patients who sustained blunt injury abdomen.

The analysis of the pattern of injuries showed that there were 43 patients with multiple organ injuries. Three patients had hepatic and renal injuries, splenic and renal injuries 6, splenic, kidney and bladder 4 and hepatic injuries were seen in 21 each. In 9 patient liver and bowel and mesentery were injured (Fig. 5).

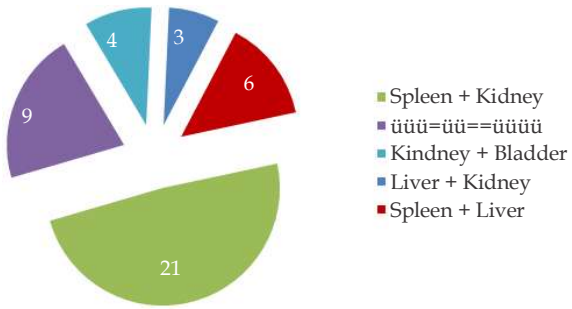

Fig. 5: Multiorgan injuries in study cases.

One hundred eighteen patients were managed non-operatively because they had no signs of peritonitis and they were hemodynamically stable. Whole 39 patients had undergone surgical intervention. During laparotomy the most common operative procedure which was done was resection and anastomosis (17/39) followed by splenectomy (12/39), by primary closure of perforation, intraperitoneal repair of urinary bladder and nephrectomy was done in 4, 4 and 2 cases respectively (Table 1). Majority of the patients were discharged within 10 days of admission. There was no patient who had to remain in hospital beyond a period of 20 days.

Table 1: Specific operative procedures done in patients who sustained blunt injury abdomen

Procedure done	No. of patients operated
Splenectomy	12
Primary suturing of liver laceration/Hemostatic gel foam	0
Nephrectomy	2
Resection-anastomosis of bowel	17
Perforation closure of bowel	4
Intraperitoneal repair of urinary bladder	4

Discussion

Blunt abdominal trauma is the challenging work even to the best of grammatologists. Injuries which are ranging from single to multiorgan trauma may be produced by blunt abdominal trauma. Abdominal findings may be absent in 40% of patients with hemoperitoneum. Sometimes, clinical evaluation of blunt abdominal injuries may be masked by other more obvious external injuries.[10] Non therapeutic laparotomies have significantly reduced with proper and timely applications of imaging methods in BAT patients along with physical examination. Unrecognized abdominal injury is a frequent cause of preventable death after trauma.[11]

The patients who had undergone blunt abdominal trauma may have suffered injury simultaneously to other systems and it is mandatory to examine for injuries of head, thorax and extremities. Attention and care of injuries in any of the systems may take priority over the abdominal trauma.

Commonest intra-abdominal injury was liver injury in 60 cases followed by spleen injury. Small bowel perforation was the commonest hollow organ injury.

In blunt trauma surgeon's main concern is control of hemorrhage and/or bleeding, but how it can be best done with safety and less morbidity, depending on grade, sites and severity of injury. Procedures done for splenic trauma in our study were splenectomy in 12. Splenectomy

was done for most of grade 4 and 5 trauma and hemodynamically unstable patients of lesser grades only. Hemodynamically stable patients were followed with series physical examinations; ultrasonography or CT scans thus avoiding unnecessary laparotomy.

Kidney and urinary bladder injuries were frequently associated with pelvic fractures. Nephrectomy through Tran's peritoneal approach was done in 2 cases of extensive renal lacerated Grade 5 injury and the patient recovered uneventfully, otherwise renal injury were treated conservatively.

CT scan was done in each and every patient of renal trauma who were conservatively managed.

In patients with intraperitoneal urinary bladder injury, laparotomy followed by repair of the bladder was carried out in 2 layers and the patients recovered uneventfully.

Perforation closure was done in 4 cases of bowel injury. Resection and anastomosis was done in 17 cases. Bowel injuries is one of the major chunk for failure of non-operative or conservative management

Surgeon should cautiously look for other sites of trauma to rule out extra-abdominal injuries. Abdominal injuries were associated with various extra-abdominal injuries amongst which most common were rib fractures 64 cases and hemothorax 36 cases. The higher incidence of fractures of ribs were probably due to more number of upper abdominal trauma.

Anonymous extra-abdominal injuries can contribute to patient death when a relatively simple procedure might otherwise have saved the patient's life.

The major cause of mortality was delayed presentation of patients and poor general condition of patient.

Commonest postoperative complication in our study was surgical site infection which in most cases were minor infections and were managed conservatively. This was consistent with studies conducted by Beall et al.[12] The cause of sepsis/ infection in these patients were necrotic tissue, mutilating injuries and late presentation in some patients.

Conclusion

Blunt Abdominal Trauma is one of the important causes of morbidity and mortality in relatively young individuals. Most common mode of injury was road traffic accidents and men were affected predominantly. Early diagnosis of extent of injury by appropriate imaging (X-ray, Ultrasound or CT abdomen) and appropriate interventions (Aggressive fluid resuscitation, blood transfusion and operative interventions) are crucial in management. Associated injuries like head injury, abdominothoracic injuries and fractures influence the outcome.

From our study it is seen that, blunt injury abdomen mainly affected men and the younger population between the age group of 21 and 30. When the patient is received in the emergency department immediate attention must be provided and a thorough evaluation must be done. The patient must be stabilized quickly and investigations must be done without much delay. FAST and CECT abdomen are very useful tools in diagnosing the severity and extent of blunt injury to the abdomen. Heyn et al. suggested that in patients with multiple injuries, abdominal ultrasound and CT scan of the abdomen have complementary value. Non-operative management can be tried when the patient is hemodynamically stable. Injuries to the liver can sometimes be treated conservatively, due to the firm architecture of the liver. However, careful monitoring is required in such cases. When laparotomy is decided, then a thorough examination of the abdominal organs must be done. In our study the spleen was found to be the most common organ injured in blunt injury abdomen. Thus, hospitals and trauma care centers must adopt a multi-pronged approach to diagnose and promptly treat patients with blunt injury abdomen so that the prognosis can be better in these patients.

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Original Research Article

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Immediate Intraoperative Tissue Expansion in Cranioplasty

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Abstract

Craniectomy following head injury is a common surgery with a high rate of complications. Postoperative infection following cranioplasty leads to shortening of the scalp flap and leads to problems in closure. Various techniques have been described like local flaps, wide tissue mobilization and tissue expansion. Another technique, not so well described in literature, is Intraoperative expansion.

We present a case of similar calvarial defect managed by intraoperative expansion to enable tension-free closure of the scalp.

Keyword: Cranioplasty; Calvarial defect.

Introduction

Craniectomy usually includes preservation of the resected bone flap in the subcutaneous plane typically in the abdomen.[1] Calvarial defects are related with issues like headache, irritability, and epilepsy because of direct pressure on the defect.[2–4]

The cranioplasty procedure secures the underlying brain, gives the correct cranial esthetic which are fundamental for the quality of life of the patient.[2]

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Both autologous bone and prosthesis have been used as a reconstructive measure.

Cranioplasty is one of the oldest neurosurgical procedures being practiced, several materials have been used as the bioprosthetic including coconut shells, resins, ceramics.[5] The literature reports complication rates in cranioplasty of up to 20%, with infection, skin atrophy and implant exposure cited as the most common.

Most authors describe lack of planning or problems obtaining soft tissue cover over the alloplastic material as the most frequent causes for postoperative complications.

Expansion of the native skin is a simple technique to avoid these complications. Controlled tissue expansion provides a valuable means to provide local tissues to cover surgical defects. Classically this technique requires two stages. The first stage involves placement of the tissue expander(s) followed by slow filling of the device during the ensuing weeks. In the second stage the expander(s) are removed and the defect is closed with the stretched skin for coverage ding to increased survival of flaps. Controlled tissue expansion also has disadvantages. Two operations are required: the first to place the tissue expander and the second to remove the expander and complete the reconstructive effort. Immediate intraoperative tissue expansion takes advantage of the skin's ability to stretch and increase in surface area immediately

We would like to share our experience of using intraoperative tissue expansion to recruit the native

scalp and ensure a tension-free closure of the scalp for cranioplasty.

Materials and Methods

Thirty-four-year-old male presented to the Plastic surgery OPD with a complaint of right side calvarial defect of four months duration (Fig. 1) following decompressive craniotomy for post-traumatic right subdural hematoma. The patient had the bone flap presented in the abdominal wall in the subcutaneous plane.

Patient was a known diabetic since 4 months on oral hypoglycemic drugs. Patient had history of 2 seizure episodes 4 months back after the decompressive craniectomy and was on oral anti-epileptic drugs. Patient had no other neurological weaknesses and was freely ambulant. He had history wound infection following the initial decompressive craniotomy wound. Due to predicted difficulty in closure of the scalp flap, pt was planned for intra-operative tissue expansion using expander (Fig. 2). On the surrounding scalp around the calvarial defect, 50 ml saline was infiltrated in the subgaleal plane for hydrodissection and minimal expansion.

Fig. 1: Preoperative.

Fig 2: Expander used.

Subsequently 5 cm incision was given on the previous surgical scar and a pocket was made on the surrounding uninvolved scalp. A pocket was created and a 240 ml rectangular expander was inserted. The port was taken out through the incision wound (Fig. 3). The wound was closed with skin stapler (Fig. 4). The expander was filled with 200 ml saline till blanching of the skin flap and left for 20 minutes. During this time the bone flap was harvested from the abdomen. The bone flap was subsequently fixed to the calvarial defect using plates and screws and tension-free closure of the scalp flap was achieved (Fig. 5). Drain was inserted. The drain was removed on 7th postoperative day and clips were removed on postoperative day 10.

Fig. 3: Expander being inserted.

Fig 4: Intraop expansion.

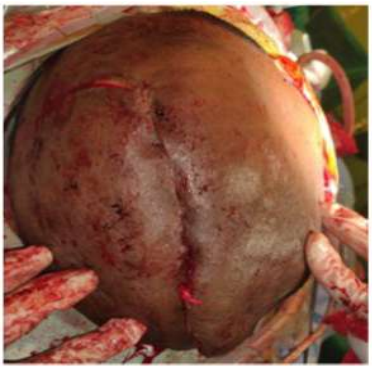

Fig. 5: Flaps opposing following expansion.

Results

Well approximation of scalp flaps was achieved with expansion. Postoperatively, patient had no complications. The postoperative result was satisfactory (Fig. 6).

Fig. 6: Postoperative.

Discussion

Cranioplasty, though a simple procedure, requires immaculate preoperative planning to attain the desired result. The rate of complications after cranioplasty has varied from 12 to 45% in various studies.[6,7] The accurate assessment of surface tissue needed before cranioplasty is as essential as the choice of the material used for bone reconstruction. Most of the time, the native scalp tissue allows a reconstruction under good conditions. However, when a tissue retraction occurs, in particular after an infected cranioplasty or a delayed reconstruction of large defects, scalp tissue expansion should be proposed to the patient.[8] Tissue expansion allows scalp wounds to be closed with minimum tension, damaged scalp to be removed, reduces additional scars and eliminates flap failure. The scalp is an excellent hair-bearing site for tissue expansion–generally well vascularized, with a clear plane and a hard, underlying base. Immediate intraoperative tissue expansion is in an early stage of development, and further research is needed to understand and define this technique better.[9] Sasaki[10] noted that blood flow in immediate intraoperative expanded tissue decreased rapidly during expansion but recovered to near-normal levels within a minute after deflation. Complications resulting from immediate intraoperative tissue expansion, reported in 120 cases by Sasaki,[10] are lowest in the head and neck region (2%) and highest in the lower extremity (26%).

Conclusion

We found that intraoperative expansion of the cranioplasty scalp flaps is useful in tension-free closure. However much randomized control trials are required to know the true efficacy of intra-operative expansion in such patients.

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Percutaneous Aspiration vs Pigtail Catheter Drainage for Liver Abscess: A Single Institutional Study

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Abstract

Introduction: Liver abscess is the accumulation of pus in the liver parenchyma. It is the most common cause of intraabdominal abscess. It is of two types: pyogenic liver abscess and amoebic liver abscess. Treatment of larger abscesses involves drainage, either by percutaneous aspiration or percutaneous drainage. This study was an attempt to compare the efficacy between the two methods.

Methods: The study included 50 patients with liver abscess of size more than 5 cm. Two compared modalities of percutaneous treatment of liver abscess were needle aspiration and pigtail catheter aspiration, performed under ultrasonographic guidance. Results were compared on the basis of clinical improvement, duration of hospital stay and time for reduction of abscess.

Results: Amoebic liver abscess (72%) was more common than pyogenic liver abscess (28%). Clinical recovery was faster in catheter group (average 2.56 days) than in aspiration group (average 5.2 days) (p-value <0.05). The mean reduction in total counts in the catheter group was 8193 while that in the aspiration group was 6208. The mean duration for the abscess size to reduce to 50% was 4.3 days in the aspiration group while that was 2.76 in the catheter group (p = 0.018). Patients who underwent aspiration needed repeated interventions as compared to the other group. The mean duration of hospital stay was 10.32 among the aspiration group while that was 5.72 among the catheter group (p < 0.05).

Conclusions: Our study concluded that catheter drainage of liver abscess had earlier improvement of symptoms, better control of infection, faster duration of resolution of the abscess and shorter hospital stay as compared to percutaneous aspiration.

Keywords: Liver abscess; Pigtail catheter; Aspiration; Faster recovery.

Introduction

Liver abscess is the accumulation of pus in the liver parenchyma. It is the most common cause of intraabdominal abscess.[1] Traditionally, it has been described to be of two types: pyogenic liver abscess and amoebic liver abscess. Pyogenic liver abscess has been known to have been caused by a number of Gram negative and Gram positive aerobes and anaerobes, and currently accounts for 15 of 1,00,000 admissions;[2] whereas amoebic liver abscess is caused by the parasitic protozoan *Entamoeba histolytica* and has an overall prevalence of 4% per year.[2] The symptoms typically include right upper quadrant discomfort along with fever, malaise, anorexia in predisposed individuals such as elderly, diabetics and immunosuppressed.[3] These conditions are diagnosed by the presence

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of multiloculated cystic mass as evidenced on ultrasonography or CT, and amoebic liver abscess by the demonstration of Ova/Cyst. Treatment of the condition has varied and been debated over time. Traditionally, the treatment consisted of antibiotics and metronidazole for pyogenic and amoebic liver abscesses respectively, with the drainage of the abscess by laparotomy.[1] However, with the advances like ultrasonography and CT, it is possible to localize the lesion and thus developed the era of minimally invasive techniques such as percutaneous aspiration and percutaneous catheter drainage. The efficacy of one of these techniques over the other has been debated. This study is an attempt to compare the outcomes of liver abscess after management with percutaneous drainage and percutaneous catheter placement.

Materials and Methods

This was a prospective randomized comparative study in which 50 patients presenting to Victoria hospital emergency diagnosed as having liver abscess were included in the study.

Place of Study: Victoria Hospital

Study Duration: April-June 2019

Sample Size: 50

Inclusion criteria: Patients diagnosed as having liver abscess with the following criteria were included in the study:

- Age between 18 and 60
- Patients with single liver abscess
- Patients with greatest dimension of abscess >5 cm
- Uncomplicated liver abscess
- Patients consenting for participation in the study and for percutaneous procedures

Exclusion criteria: The patients with the following characteristics were excluded from the study:

- Patients below the age of 18 and above the age of 60
- Patients with multiple liver abscesses
- Patients with ruptured liver abscess
- Patients not consenting for participation in the study or for percutaneous procedures
- Patients with greatest dimension of abscess <5 cm

Methodology

Patients presenting to Victoria hospital emergency department with clinical signs and symptoms suggestive of liver abscess were subjected to an ultrasonological evaluation to confirm the diagnosis of liver abscess and to determine the location, size and number of liver abscesses and to rule out the possibility of ruptured liver abscess. Once the diagnosis was made, the patients fulfilling the inclusion criteria were included in the study.

After obtaining valid consent, the patients included in the study were subjected to investigations such as complete blood counts, liver function test, renal function test, prothrombin time and calculation of international normalized ratio (INR). This data was noted down and tabulated. The patients were then randomly divided into two groups of 25 patients each, to be subjected to either percutaneous aspiration or percutaneous catheter drainage.

All the patients were treated with quinolone antibiotics along with metronidazole. They were given intramuscular injections of vitamin K to promote the synthesis of coagulation factors. After confirming the liquid nature of the abscess, the patients were subjected to either percutaneous aspiration or percutaneous catheter drainage. This division was random.

Percutaneous Aspiration

This was done under sonological guidance under local anesthesia. With the patient in supine position, an 18G lumbar puncture needle was used to enter into the abscess cavity and aspiration of the contents was done until the cavity was collapsed or until the aspiration was negative.

Pigtail Catheter Insertion

This was done under local anesthesia. An 18F pigtail catheter was used to enter into the abscess cavity under sonological guidance by Seldinger's technique. The tip of the pigtail catheter was placed deep into the abscess cavity and was allowed for dependant drainage (Fig. 1).

Post the procedure, the patients were observed for resolution or decrease in the symptoms. Two days after the procedure, complete blood count

Fig. 1: Insertion of percutaneous pigtail insertion.

was repeated to evaluate the changes in the blood picture. Repeat ultrasonological scans were done to monitor the size of the liver abscess. The duration for resolution of symptoms, and the duration for reduction in size of the abscess cavity to half of the intial size, and the duration of stay in the hospital were noted. Follow up of the patient was done until discharge.

Statistical Analysis

The data obtained was tabulated in Microsoft Excel and was analyzed in SPSS software. The variables were expressed in terms of descriptive statistics such as mean and standard deviation. The two groups were compared using unpaired *t*-test.

Results

Age distribution of patients in the study ranged from 31 to 60 years (45.64 ± 8.24 years). The patients who underwent aspiration had age ranging from 31 to 60 years (44.68 ± 1.8 years) while those who underwent percutaneous catheter drainage had age ranging from 35 to 60 years (46.6 ± 8.79 years).

Of the 50 patients, 34 (68%) were males and 16 (32%) were females. Among the patients who underwent aspiration, 19 (76%) were males and 6 (24%) were females; while among the patients who underwent percutaneous catheter drainage, 15 (60%) were males and 10 (40%) were females (Fig. 2).

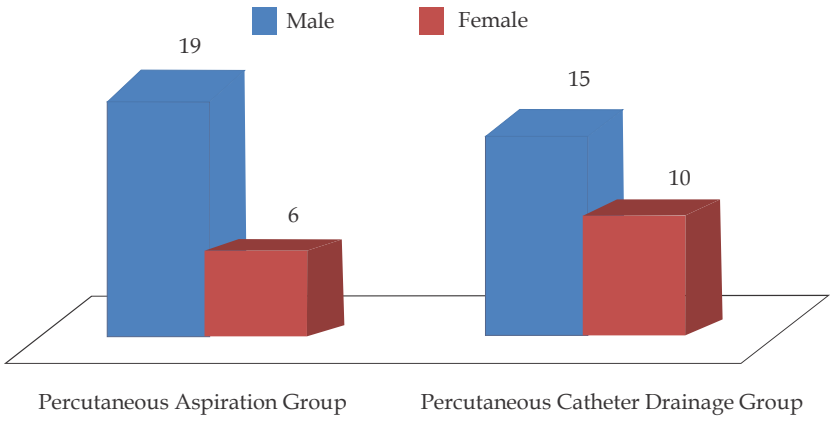

Fig. 2: Sex distribution of patients.

36 (72%) of the 50 patients had amoebic liver abscess and 14 (28%) had pyogenic liver abscess. Among the patients who underwent aspiration, 8 (32%) had pyogenic liver abscess and 17 (68%) had amoebic liver abscess as compared to 19 (78%) amoebic liver abscess and 6 (24%) pyogenic liver abscess among the patients undergoing pigtail catheter drainage (Fig. 3).

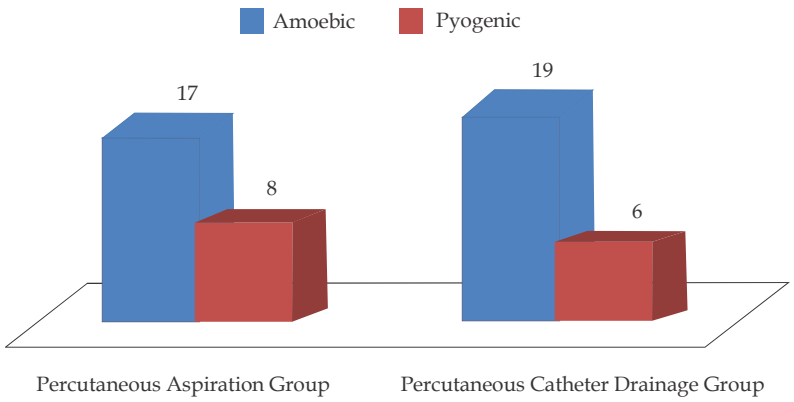

Fig. 3: Etiology of liver abscess.

The overall size of the liver abscess ranged from 5 to 10 cm with a mean of 6.9 ± 1.38 cm. The patients who underwent percutaneous aspiration had abscesses in the range of 5–9 cm (6.68 ± 1.19 cm) while those who underwent percutaneous catheter drainage had abscess size ranging from 5 to 10 cm (7.36 ± 1.16 cm).

The total counts at presentation of patients who underwent aspiration ranged from 13,800 to 28,700 cells/mm^3 (21,268 ± 4,485 cells/mm^3) while that of patients undergoing percutaneous catheter drainage ranged from 10,300 to 32,100 cells/mm^3 (21,985 ± 5,433 cells/mm^3).

The total counts were estimated 2 days after the intervention. This was in the range of 8,000–24,000 cells/mm^3 (15,060 ± 4,085 cells/mm^3) for patients who underwent aspiration and in the range of 6,500 cells/mm^3 (13,792 ± 4,501 cells/mm^3) for patients who underwent percutaneous catheter drainage. The mean reduction in total counts was 6,208 cells/mm^3 for patients who underwent aspiration while it was 8,193 cells/mm^3 for patients who underwent percutaneous catheter drainage (Table 1).

Table 1: Comparison of outcomes between the two groups

Parameter studied	Percutaneous aspiration group	Percutaneous pigtail insertion group
Mean reduction in total counts (cells/mm^3)	6,208	8,193
Clinical improvement (days)	5.2 ± 2.4	2.56 ± 1.2
Duration for 50% reduction in size (days)	4.32 ± 2.83	2.76 ± 1.3
Need for second procedure	68% of patients	16% of patients
Duration of hospital stay (days)	10.32 ± 4.8	5.72 ± 1.8

Patients who underwent aspiration showed clinical improvement in 1–11 days (5.2 ± 2.4 days) while those who underwent percutaneous catheter drainage showed clinical improvement in 1–5 days (2.56 ± 1.2 days). The mean difference in the number of days taken to show clinical improvement among the two groups was 2.64 days. This was found to be statistically significant ($p < 0.05$) (Table 1).

In patients who underwent aspiration, the duration taken for the abscess to reduce by 50% ranged from 1 to 11 days (4.32 ± 2.83 days) while the same in patients who underwent percutaneous catheter drainage ranged from 1 to 5 days (2.76 ± 1.3 days). The mean difference between the two groups in the number of days taken for the abscess size to reduce to half was 1.56 days. This was found to be statistically significant ($p = 0.018$) (Table 1).

Among the 25 patients who underwent aspiration, 17 (68%) needed further aspiration while only 4 (16%) of the patients who underwent percutaneous catheter drainage needed further intervention. 3 of these 4 needed repositioning of the catheter while one needed reinsertion. 21 (84%) of the patients who underwent percutaneous catheter drainage did not need any further intervention (Table 1).

The mean duration of hospital stay among patients who underwent aspiration ranged from 5 to 21 days (10.32 ± 4.8 days) while that among patients who underwent percutaneous catheter drainage ranged from 3 to 9 days (5.72 ± 1.8 days). The mean difference in duration of hospital stay among the two groups was 4.60. This was found to be statistically significant ($p < 0.05$) (Table 1).

Discussion

This study was an attempt to compare the efficacy of percutaneous needle aspiration vs percutaneous catheter drainage in the treatment of liver abscess, in terms of reduction in the total counts, time taken for clinical improvement, time taken for the abscess cavity to reduce to half its original size, need for second intervention and the duration of hospital stay.

In our study we included patients with abscess cavity size of more than 5 cm, and found that patients undergoing percutaneous catheter drainage showed rapid recovery, faster decrease in total counts and reduction in cavity size, and had lesser need for second intervention as compared to patients undergoing percutaneous needle aspiration.

In the study by Ershad et al.[4], they concluded that patients with abscess cavity less than 5 cm did not need any invasive intervention and could be managed on antibiotics alone; whereas the patients with abscess cavity more than 5 cm needed intervention and patients undergoing percutaneous needle aspiration had a faster recovery as compared to patients undergoing percutaneous catheter drainage, although patients undergoing percutaneous needle aspiration frequently needed further intervention. This difference in observation could be due to the continuous drainage, and thus, a faster clearance of the cavity in percutaneous catheter drainage as compared to percutaneous needle aspiration.

Sreeramulu et al.[5] concluded that small abscesses can be treated with antibiotics alone while medium abscesses can be treated with aspiration and follow up while large abscesses required percutaneous catheter drainage.

The findings of our study is consistent with the findings of Arshad Khan[6] et al. who reported faster recovery and shorter duration of hospital stay in patients in whom larger quantity of pus was drained in the first sitting; they concluded that continuous catheter drainage is a more effective percutaneous treatment modality than intermittent needle aspiration.

Sukhjeet Singh[7] et al. also reported earlier clinical improvement and reduction in size of abscess cavity among patients undergoing percutaneous catheter drainage as compared to patients undergoing percutaneous needle aspiration, with no significant change in the time needed for near total resolution or duration of hospital stay. They also concluded that percutaneous catheter drainage is a better modality than percutaneous needle aspiration in the treatment of liver abscess.

However, studies have to be conducted on a larger scale for better validation of results.

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Correlation of Clinical Findings with Doppler Study in Lower Limb Ischemia

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Abstract

Aims and objectives: Color Doppler Ultrasound Scan is a non-invasive and cheap tool than other Radiological Investigations for Screening, Diagnosis and follow-up of Vascular Diseases. In this study performed at Basaveshwara Teaching and General Hospital, Kalaburagi, Karnataka, we correlated the Clinical data with the findings of Color Doppler Ultrasound of the Lower Limb Arteries in Chronic Lower Limb Ischemic cases with Claudication.

Patients and methods: Fifty Patients admitted under Department of General Surgery at Basaveshwara Teaching and General Hospital, Kalaburagi, between November 2017 and May 2019, with Claudication Pain of Lower Limb and associated symptom were studied. All examinations were done clinically and then compared with the Color Doppler Ultrasound using 7.5 MHz linear transducer connected to Digital Ultrasound Imaging System.

Results: Fifty Patients were studied out of which 43 were male and 7 were female with a ratio of 6.14:1. The minimum age was 48 years and maximum age was 92 years. Number of patients were highest in the group of 51–65 years, i.e. 58%, with a mean age of 59.3 years. Thirty-nine patients were Smokers, which were statistically significant. Most common clinical presentation of the patients was gangrene with claudication pain (42%), Gangrene alone in 76% of the patients. The most common cause of lower limb ischaemia in our study was Atherosclerosis constituting 84% of all the etiology for the provided above age groups, followed by Thromboangiitis Obliterans. Femoro-Popliteal and below the knee arteries were commonly involved by these abnormalities while diabetes and hypertension were frequently associated clinical problems of these Patients.

Conclusion: Doppler ultrasound has a high diagnostic yield in depicting abnormalities in Patients with clinical features of peripheral arterial disease.

Keywords: Doppler ultrasound; Peripheral arteries; Diabetes.

Introduction

Lower limb ischemia is a common presenting problem in the surgical practice, of which, Atherosclerosis and TAO are two important causes. Peripheral arterial disease (PAD) of lower limbs, refers to the obstruction or deterioration of Arteries (other than those supplying the heart and the brain) which results in limb ischemia and may manifest as Claudication, rest pain, local tissue loss (ulceration) in select cases.[1,2] Patients diagnosed as having PAD, including those who are asymptomatic, have an increased risk of mortality.[1] The incidence of symptomatic PAD increases with age, approximately 0.3% per year for men aged 40–55 and it goes up to 1% per year, above 75 years.

Risk factors being smoking, the single most important modifiable cause of PVD internationally, which increases the risk by 10 times, dyslipidemia,

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sedentary lifestyle and hypertension, associated with increased risk of developing PVD and DM.[3,4]

The common denominator among these processes is the impairment of circulation and resultant ischemia to the tissue involved. Highly prevalent in our society, arterial occlusive disease, in its myriad iterations, constitutes the leading cause of death.[1,4] In addition to death from MI or stroke, significant disability and loss of function from PAD results in an enormous cost in impaired quality of life for our aging population and a direct financial concern to our health care systems.

Techniques available for the diagnosis of peripheral arterial disease includes invasive procedure like CT angiography, which is considered the standard of reference[5] and other non-invasive methods like Doppler study, segmental pressures, pressure volume tests (Plethysmography) and duplex sonography. Doppler imaging is accepted as a valuable diagnostic technique.[6] It is the only noninvasive test which does not require contrast enhancement, preparation of patient before study or any radiation exposure. It allows the evaluation, the quantification and the follow-up of the arterial diseases by carrying out a precise vascular mapping and can guide the radiological or surgical intervention if necessary.[7] Thus, color Doppler imaging is proving to be a safe, popular, repeatable, noninvasive procedure for investigating lower limb ischemia, especially relevant to developing countries like ours in providing cost-effective solution to the general population. With this in mind, this study is done to correlate the clinical findings with the color Doppler in lower limb ischemia.

Materials and Methods

This study was done under Department of General Surgery, at Basaveshwara Teaching and General Hospital, Kalaburagi, between November 2017 and May 2019, with claudication pain of lower limb and associated symptom following ethical clearance. A thorough history of development of disease with risk factors and clinical examination was done in both lower limbs arterial systems mainly by palpation of doralis pedis artery, popliteal artery and femoral artery. Thereafter, radiological examination of the relevant limb was done with the patient lying supine or prone (depending on the specific artery) using 7.5 MHz linear transducer connected to digital ultrasound imaging system. Occasionally, 3.5 MHz convex transducer of the same machine was used (to optimise the depth) in obese patients and those with severe subcutaneous oedema. Color with or without power Doppler scans were done on the arteries to document the presence and direction of blood flow. The san was considered normal if the artery showed normal consistent typical triphasic appearance of the waveform. The artery was considered to be totally occluded if there was no demonstrable blood flow with Color Doppler ultrasound. The examination was also extended to the external iliac arteries. In addition, complimentary corresponding venous examinations were conducted on each limb to detect asymptomatic incidental abnormalities such as deep venous thrombosis. All examinations were performed (by, at least, a consultant radiologist) with patients lying calmly on the examination table. Data analysis was conducted using statistical package for social sciences version 20.0.

Results

Total number of patients in the present study was fifty. (n = 50). In this study the minimum age was 48 and maximum age was 92. Number of patients were highest in the group of 51–65 years, i.e. 58%. Mean age of presentation was 59.3 years. Median age was 65 years (Fig. 1).

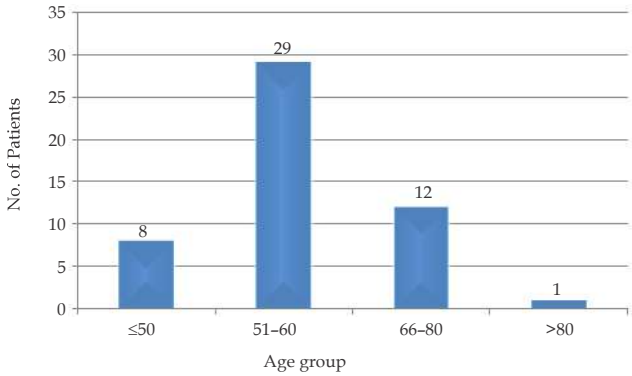

Fig. 1: Distribution of patients according to age.

Out of 50 Patients 39 were smokers and 11 were non-smokers, which showed that Lower Limb ischemia is more common in smokers than in non-smokers. This relation was found to be statistically significant (Fig. 2).

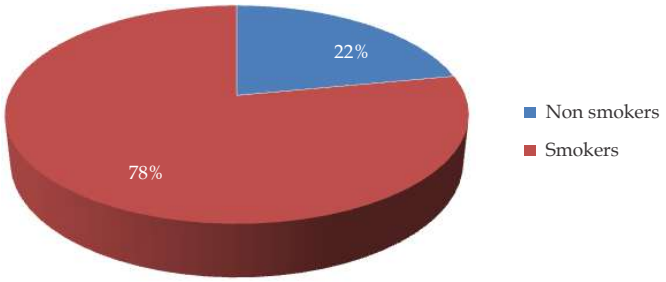

Fig. 2: Distribution of patients according to history of smoking.

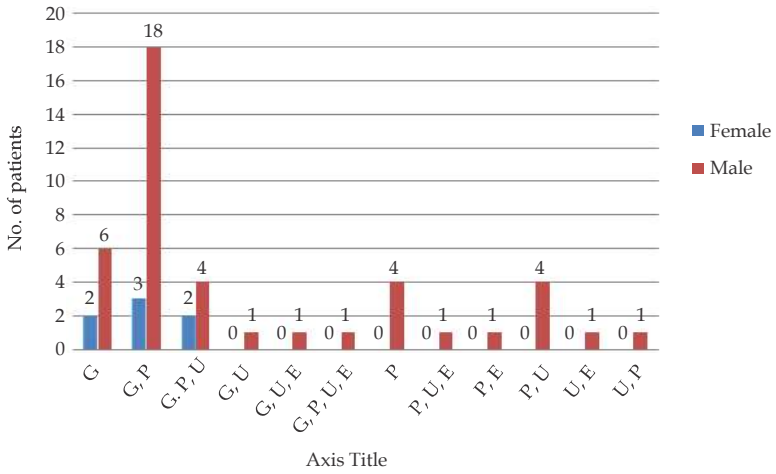

Fig. 3: Distribution of patients according to chief complaints and sex.

Most common clinical presentation of the patients was gangrene with claudication pain (42%). The single most common presenting complaint was gangrene of the limb which was seen in 76% of the patients, of which 68% came with gangrene associated with pain, ulceration and/or edema (Fig. 3).

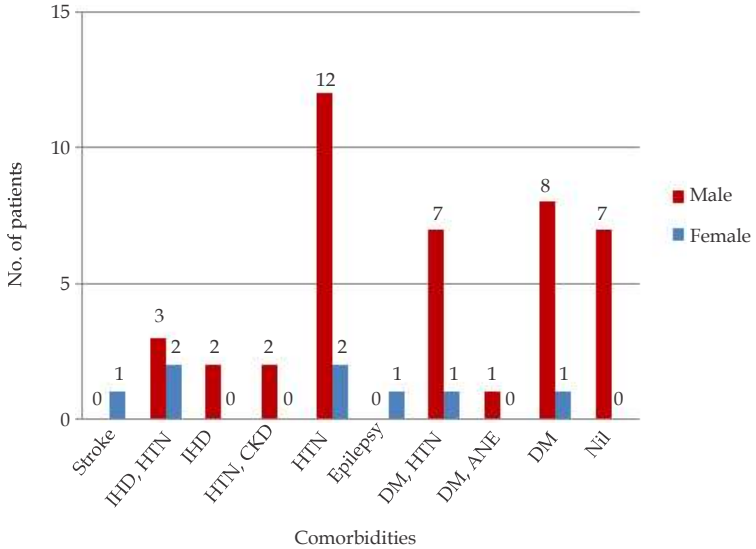

Fig. 4: Distribution of patients according to Comorbidities.

Out of 50 patients, most common comorbidity was hypertension, found in 28% of the patient. The next common presentation was diabetes mellitus, found in 18% of the patients. A further 16% had both diabetes mellitus and hypertension (Fig. 4).

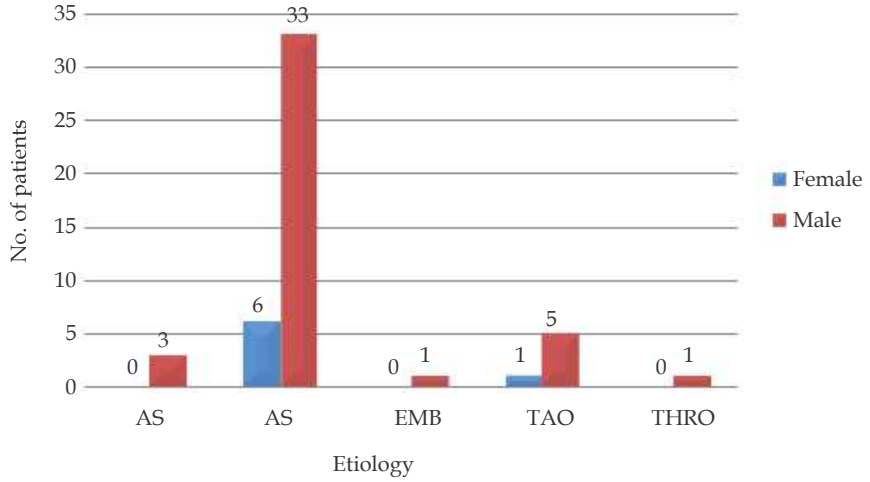

Fig. 5: Distribution of patients according to etiology.

The most common cause of lower limb ischaemia in our study was atherosclerosis constituting 84% of all the etiology for the provided above age groups and then the thromboangiitis obliterans (Fig. 5).

In the case of dorsalis pedis artery, out of the 50 patients, clinical examination showed absent pulse in 40 patients, of which 18 patients showed monophasic flow, 4 patients showed biphasic flow and the rest 18 patients showed absent flow even on Doppler study of dorsalis pedis. Doppler study picked up flow in 50% of the patients which had absent pulse on clinical examination. This result was statistically significant (Fig. 6).

Clinical examination showed feeble pulse in the rest of the 10 patients which was duly reinforced by the Doppler study as all 10 patients having a monophasic flow (Fig. 7).

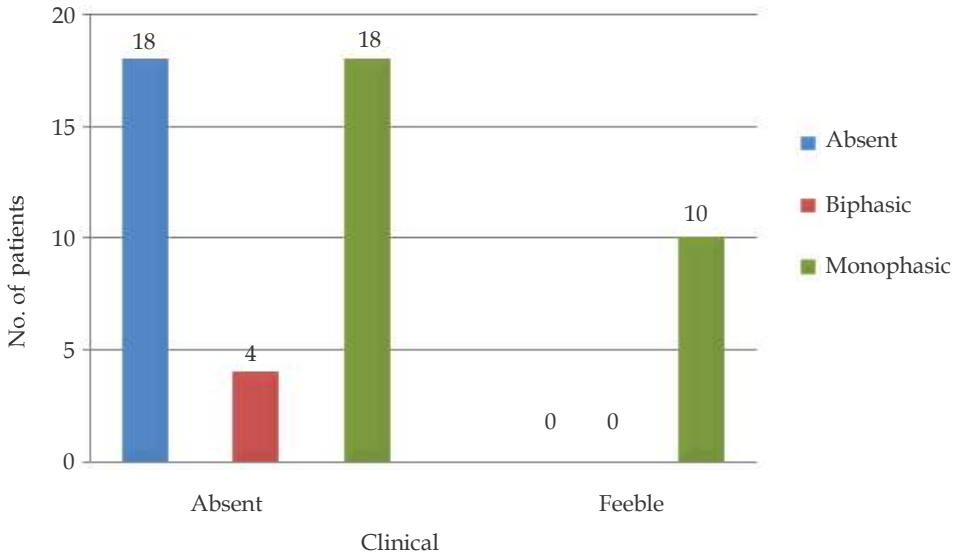

Fig. 6: Comparison of clinical diagnosis and Doppler of dorsalis pedis artery.

In the case of popliteal artery, 21 patients had a feeble pulse on clinical examination, of which the Doppler study showed that 11 patients had a monophasic flow and 7 patients had biphasic flow.

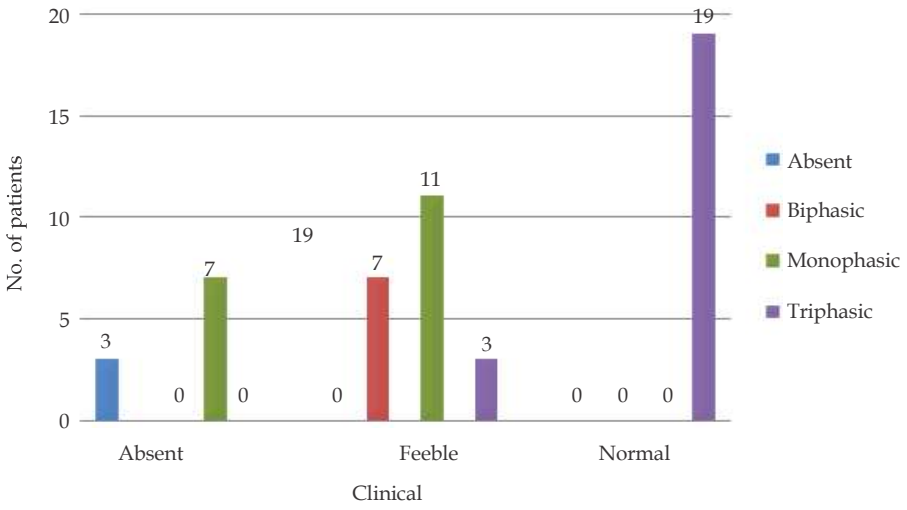

Fig. 7: Comparison of clinical diagnosis and Doppler of popliteal artery.

In the case of femoral artery, 13 patients had a feeble pulse on clinical examination, of which the Doppler study showed that 4 patients had a monophasic flow, 6 patients had biphasic flow and 3 had triphasic flow with a significant *p*-value (Fig. 8).

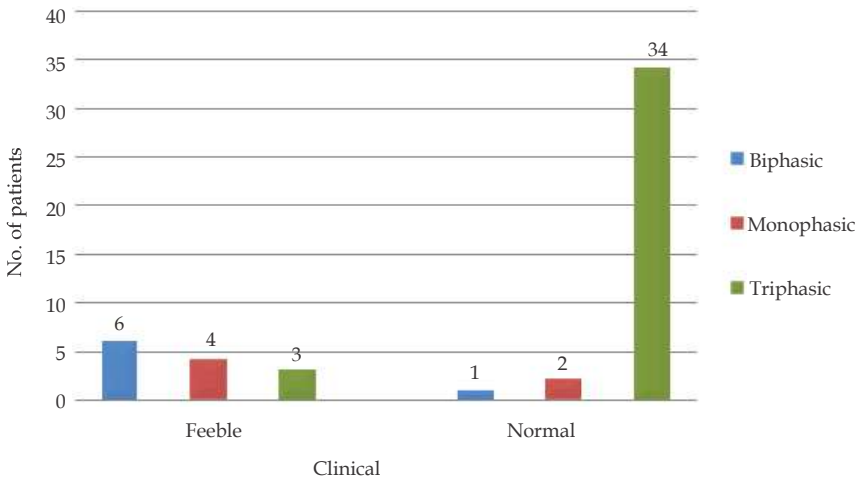

Fig. 8: Comparison of clinical diagnosis and Doppler of femoral artery.

Discussion

The mean age of 59.3 years in this study corresponds to the typical patients with peripheral arterial Disease. This is as demonstrated by Shaheen and Sohail[8] in their review of 100 diabetics with peripheral arterial disease. Ascher et al.[9] also documented the mean age of 55 years in their review of 68 patients with acute lower limb arterial ischemia in pakistan.

As per the study conducted by Ismail et al.,[10] diabetic foot disease, intermittent claudication, gangrene and limb swellings were the most common comorbidities in patients who presented lower limb ischemia, constituting 32.1%, 20.5%, 16.7% and 15.4%, respectively as compared to our study showing gangrene of the limb which was seen in 76% of the patients, of which 68% came with gangrene associated with pain, ulceration and/or edema.

In our study, atherosclerosis accounted for 84% of the patients. This finding is similar to the study by Hong FF et al.,[13] in 2019, where atherosclerosis was found to be a causative factor in 90% of the

patients. Next most common cause was TAO in 12% of the total patients.

Smoking and tobacco consumption are frequently present in patients with lower limb ischemia and act as an additional risk factor. In our study, 78% patients were smokers and the rest 22% were non smokers. This was similar to the findings in the study by Willigendael et al.,[11] where the prevalence of symptomatic PAD was increased 2.3-fold in current smokers as opposed to non smokers.

As shown in our results, the frequency of disease involvement of femoral artery was 12%, popliteal was 42%, and below-knee artery, i.e. dorsalis pedis artery 36%. This pattern is similar to the report of Guo et al.[12] on 162 diabetics with arterial lesions. They found frequencies of below knee arteries (92/127, 67.2%) was higher than that in iliac artery (8/33, 24.2%), popliteal artery (53/157, 33.8%) and femoral artery (11/78, 14.1%).

This study compared the findings of clinical examination and Doppler study of the patients with chronic lower limb ischemia, whereas most of the previous studies were done to compare the Doppler study with other imaging modalities such as impedance plethysmography, DSA and CT angiography, etc.

Conclusion

This preliminary review of 50 patients showed high frequency of femoro-popliteal and Tibial arterial system involvement in chronic lower limb ischemia. In addition to atherosclerosis, history of smoking with diabetes and hypertension in older age groups were more prone for the ischemia of the lower limb. Though subjective, our study showed high diagnostic yield of color Doppler ultrasound in depicting flow pattern in patients when compared to the clinical feeble and/or absent arterial pulses of involved lower limb of the patients with features of peripheral arterial disease.

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Case Report

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Role of Phenytoin in Fournier's Gangrene

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Abstract

Fournier's gangrene or idiopathic gangrene of the scrotum has a fulminant course if not identified and managed at the earliest possible. The main stay of treatment is intensive care along with thorough surgical debridement and culture sensitive antibiotics. Multimodality treatment is advised as it hastens the wound healing, thereby shortening the patient stay in the hospital and thereby decreasing the patient mortality and morbidity. We hereby share our experience in managing a case of Fournier's gangrene using topical phenytoin as an adjunct for wound-bed preparation.

Keywords: Phenytoin; Fournier's gangrene; Wound-bed

Introduction

Fournier's gangrene (FG) is a synergistic polymicrobial necrotizing fasciitis of the perineum, scrotum and penis which is portrayed by obliterative endarteritis of the subcutaneous arteries, bringing about gangrene of the subcutaneous tissue and the overlying skin.[1] Despite the fact that the reason is believed to be idiopathic, it is mostly observed in alcoholic patients, or patients with diabetes or those with idiopathic immunocompromised patients.[2] It was first portrayed by Jean Alfred Fournier, a French dermatologist in 1883 as a "fulminant gangrene" of the penis and scrotum.[3] Different terms that were utilized to depict the infection were 'idiopathic gangrene of the scrotum', 'peri-urethral phlegmon', 'streptococcal scrotal gangrene'and 'phagedena'.

The origin of the disease might be either through the anorectal skin or genitourinary tract. Numerous patients present with a spontaneous necrotic patch which quickly advances to Fournier's gangrene which can expand up to the abdominal wall. The mainstay in the management of Fournier's gangrene remains extensive debridement and wound bed preparation, trailed by tissue cover. Early diagnosis is basic to maintain a strategic distance from mortality and morbidity of this condition. Different strategies have been depicted as an adjunct to the management of Fournier's gangrene. In our investigation, we are depicting topical phenytoin as a supplement for debridement in wound-bed preparation.

Case Report

Sixty-six year-old gentleman hailing from Tamilnadu, driver by occupation, a known case of diabetes and hyperthyroidism, presented to us with history of necrotic patch over the right hemiscrotum following surgery for hydrocele, which was done 6 days ago. On admission, the patient's general condition was fair, he had toxic features, febrile. Necrotic patch with swelling over the right hemiscrotum was noted, which was tender. Fournier's gangrene severity index was 10, which showed a morbidity and mortality index was 75%.

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Clinical diagnosis of Fournier's gangrene was made and emergency debridement of the patch was done, which exposed sloughed out skin of the hemi-scrotum, and slough and pale granulation tissue over the testis (Fig. 1). The initial Bate-Jensen score of the wound was assessed to be 38. Following surgical debridement, topical phenytoin was used (Fig. 2). Injection phenytoin (50 mg/ml) solution was diluted using normal saline (0.9% NaCl) to prepare a phenytoin solution (5 mg/ml). Serum phenytoin concentration was monitored regularly in the department of clinical pharmacology, JIPMER, and it was always below 0.4 Mg/ml, indicating only minimal absorption of phenytoin systemically. No local or systemic adverse effects of phenytoin were observed during the course of the treatment.

Fig. 1: Fournier's gangrene at initial presentation.

Fig. 2: Topical phenytoin being sprayed over the wound post-surgical debridement.

Fig. 3: Scrotal wound after 20 days (7 applications) of topical phenytoin.

Over 20 days, after 7 applications, the wound improved drastically and the scrotal wound was closed primarily (Fig. 3).

Discussion

The cornerstone in the treatment of Fournier's gangrene is intensive care alongside proper surgical debridement pursued by broad spectrum anti-microbial. In any case, this takes a more extended span, prompting expanding costs for the patient's relatives. Consequently innovative techniques which can be utilized as a subordinate to fasten the healing process have been introduced. Those constitute low level laser therapy, autologous platelet rich plasma infusion, insulin therapy and Phenytoin application.

Though commonly described in diabetic foot ulcer management, the literature on use of phenytoin in fournier's gangrene is sparse. In 1939, Kimball and Horan watched for the first time that gingival hyperplasia cropped up in certain patients who are treated with phenytoin. The earliest preliminary trail which was done in 1958 recommended that the periodontal patients with surgical wounds who were pre-treated with oral phenytoin had less inflammation, less pain, and accelerated healing when compared with control.[4]

Topical phenytoin sodium has wound healing effects credited to the accompanying components: increase in fibroblast multiplication, restraint of collagenase action, promoting granulation tissue formation, diminishes bacterial contamination, decreases wound exudate development, up-regulates growth factor receptors.

In 1991 Muthukumaraswamy et al. in their research on the effect of topical phenytoin in diabetic foot ulcers, a prospective controlled clinical trial, have utilized phenytoin powder on the ulcer base.[5] Where they presumed that utilization of phenytoin to advance healing of diabetic ulcers is both viable and safe.

Dacosta et al. in 1998 in their investigation inferred that phenytoin alters the normal course of wound healing and might be of advantage in clinical circumstances where deficient collagen deposition may prompt poor wound healing and resulting morbidity and mortality.[6] There was fibroblast expansion and neovascularization in the wounds treated with phenytoin compared with controls at day 3. By day 6, the inflammatory infiltrate had completely subsided in the treated wounds.

A randomized controlled trial in 65 patients by Shaw et al. in 2011 reasoned that there were no distinctions in diabetic foot ulcer closure rates or in diabetic foot ulcer area after some time between the two groups when phenytoin is utilized.[7] The examination by Shaw et al. was constrained by sample size.

Dutta et al.[8] were the exclusive article which portrayed the utilization of phenytoin in Fournier's gangrene, however as an aid to various techniques, and consequently resulting in wound healing.

Each study that is referenced acknowledges that phenytoin causes increased fibroblast expansion, improves granulation tissue, diminishes bacterial contamination. But Shaw et al. state that there were no distinctions in diabetic foot ulcer closure rates or in diabetic foot ulcer area over time between the two groups when phenytoin is utilized

To conclude, Our case report focuses on the upsides of phenytoin, for example, simple accessibility, cost-effectiveness, decreased side effects of treatment. Furthermore cases are required to be enlisted to evaluate and approve the viability of phenytoin in Fournier's gangrene, as only sparse literature is available on this topic.

Conclusion

To conclude, our case report focuses on the upsides of phenytoin, for example, simple accessibility, cost-effectiveness, decreased side effects of treatment. Furthermore cases are required to be enlisted to evaluate and approve the viability of phenytoin in Fournier's gangrene, as only sparse literature is available on this topic

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Case Report

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Endoscopic Retrieval of Impacted Meat Bone Causing Chronic Dysphagia

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Abstract

Impacted foreign body in esophagus is a clinical emergency as such most often seen in children, but sometimes in adults foreign bodies are usually accidentally ingested admixed with food. Food foreign body require emergent treatment within 2 hours and definitive treatment within 6 hours. In adults, fish bone is the most common food associated foreign body in Asia, while meat bone is the most common cause in Europe. Male gender is more commonly involved gender than female.[1] In 80% of cases, the ingested material pass uneventfully through the gastro/intestinal tract (GIT).[2] Endoscopy is performed in 20% cases[3] and surgical intervention is required in less than 1% cases.[4] Emergency esophagogastroduodenoscopy is indicated when occlusion is complete, impacted object is sharp and if impacted foreign body is a battery. Poor prognosis is associated with time lapse after impaction, type of foreign body and size of foreign body (>3 cm). We are reporting a case of chronic dysphagia of more than one year duration in a male caused by impacted meat bone of size more than 3 cm in esophagus.

Keywords: Eesophagus; Endoscopy; Chronic dysphagia; Gastro intestinal tract (GIT).

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Introduction

Aero-esophageal foreign body disease can be divided according to part involved like tracheobronchial, oropharyngeal, eesophageal. Except tracheobronchial, all others are considered as foreign body of digestive tract. In children, coins are the most common foreign body, while in adult food associated foreign bodies are more common. In 80% of cases, the ingested material passes uneventfully through the GIT. Endoscopy is performed in 20% cases and surgical intervention is required in less than 1% cases. Intentionally ingested foreign bodies require endoscopic intervention in (73–76%) and surgical intervention in (13–16%) cases. Esophageal foreign bodies in adults are more common in patients with age >40 years because of decreased swallowing movements and physiological changes that occurs with age.[5] There are four sites where a foreign body can be lodged–upper esophageal sphincter, aortic arch eminence, left bronchus crossing oesophagus and lower esophageal sphincter. Upper esophageal sphincter is the most common site as it is the narrowest part of oesophagus. Linear bones tends to obstruct the pharynx, while polygonal or flat bones tends to get lodged in oesophagus. Emergent treatment should be sorted within 2 hours and definitive management should be sorted out within 6 hours, and if foreign body is sharp and impacted at site of aortic eminence in oesophagus a cardiovascular surgeon should always there in back up.

Case Report

A 60-year-old gentleman presented in out-patient department of our institute with complaint of; on and off pain in retrosternum while swallowing, sticking of food in the chest since last one year. Initially he developed dysphagia towards solid food which gradually proceeded towards liquids and then he suffered recurrent episodes of vomiting every time he took anything orally. Vomitus always contained undigested food particles. Recurrent episodes of vomiting brought the patient to us. Because of all these group of symptoms, patient was frightened of taking anything orally and he started losing weight rapidly. Patient was admitted and put on parenteral nutrition, IV fluids, antiemetics. A barium swallow was performed which showed irregular narrowing at lower esophagus. A preliminary chest X-ray was done to rule out any lung mass compressing on esophagus. Finally he was posted for esophagogastroduodenoscopy. Eesophagogastroduodenoscopy was carried with 4% lignocaine topical anesthetic spray, with patient in left lateral position and mouth gag in place. During endoscopy, a meat bone of size 3 cm × 1.5 cm was found impacted at 32 cm from incisors (Fig. 1).

Fig. 1: During endoscopy, a meat bone of size 3 cm × 1.5 cm was found impacted at 32 cm from incisors.

Along with it some undigested food particles were also found occluding more than two-thirds of the esophageal lumen. Esophagitis at the surrounding site of impaction was also noted. With the help of alligator forceps the meat bone was removed successfully (Fig. 2). Rest of the endoscopic view of esophagus, stomach and duodenum was unremarkable.

Fig. 2: Meat bone was removed successfully.

Discussion

A number of cases of foreign body retrieval from GIT, tracheobronchial tree are reported. The major causes for foreign body disease differ among children and adults. Coins are the most common foreign body in children and it is almost always accidental. In adults foreign body disease is common among psychiatric, developmentally disabled patients.

Sometimes it can be intentional too, like in cases of prisoners for seeking secondary gains. Esophageal food foreign body is more common in males. Fish bone is more common culprit in Asian population, while meat bone is more common cause in western world. Every esophageal foreign body should be treated emergently within 2 hours and definitive management should be given within 6 hours. In 80% of cases, the ingested material passes uneventfully through the GIT.

Endoscopy is performed in 20% cases and surgical intervention is required in less than 1% cases. Intentionally ingested foreign bodies require endoscopic intervention in (73–76%) and surgical intervention in (13–16%) cases.

Size, shape, site of impaction and time lapse after impaction are also important in deciding the outcome of intervention. Esophagogastro-duodenoscopy is both diagnostic and therapeutic, so it is the first modality used. Since meat bones have sharp edges, it can penetrate the mucosa so a prophylactic antibiotic can be started. If there is perforation, laceration, abscess formation, it should be managed like mediastinitis.[6,7] Protective devices are needed for safe retrieval of sharp bones.

Endotracheal intubation should be considered in high-risk patients. In food bolus impaction, push technique into stomach is the primary treatment. Risks of complications are high with sharp bones and sharp foreign bodies, so endoscopic retrieval in sheath covered instrument is the treatment of choice.

Conclusion

The fish bone foreign body is most common in Asia and meat bone is most common food foreign body in west. A foreign body should be removed within 24 hours. A long-time lapse is associated with high risk of complications. Computerized Tomography is considered if there is any suspicion of complication. For safe removal of sharp-edged meat bone, use of an over tube is recommended. If sharp foreign body like meat bone is impacted in esophagus near aortic eminence, then it is mandatory to have a standby cardiothoracic surgeon during removal of foreign body.

Conflict of interest

There is no conflict of interest.

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Case Report

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Neonatal Breast Abscess: A Preventable Condition

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Abstract

Neonatal mastitis is an uncommon condition which can be complicated with local abscess formation. Here is a case reporting of unilateral breast abscess in a 16-day old term female neonate caused by *methicillin -resistant Staphylococcus aureus* [MRSA], treated with antibiotics and surgical drainage. This report was to emphasis the health education to readers regarding the prevention of breast abscess formation.

Keywords: Neonatal breast enlargement; Neonatal mastitis; MRSA.

Introduction

Neonatal mastitis is a preventable and curable uncommon condition, affects full-term neonates, commonly females than males, complicating the normal physiological neonatal breast enlargement, diagnosed by history, examination and by echography in early stages and later formation of pus is almost diagnostic. Most commonly caused by Staph aureus bacteria, usually methicillin resistant. Adequate antibiotic coarse and surgical drainage if needed can prevent complications.

Case Report

A 16-day old full-term female neonate presented with complaints of swelling over left breast increasing in size associated with pus discharge with no history of refusal to feeds. On examination neonate was afebrile, with good activity, with 4 × 4 cm swelling in left breast involving nipple areola complex with local inflammatory signs with active pus discharge (Fig. 1). Under general anesthesia circumareolar incision taken (Fig. 2), and pus drained with antibiotic coverage of amoxicillin and clavulanic acid empirically for 2 days and then same combination syrup for next 5 days. Pus culture sensitivity report s/o *methicillin resistant Staph aureus* (MRSA). Discharge from the wound decreased gradually. On postoperative day 7 neonate had a healed wound (Fig. 3).

Fig. 1: Left breast abscess.

Fig. 2: Circumareolar incision.

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Fig. 3: Healed wound on postoperative day 7.

Discussion

Neonatal breast enlargement is a self-limited common physiological finding (70%),[3,8] due to fall in the level of maternal estrogen at the end of pregnancy which triggers the release of prolactin from the pituitary gland of the newborn[7,8] which is independent of sex.[5] Neonatal mastitis is an infection of breast tissue, common in full-term neonates as preterm have underdeveloped breasts,[2] common during second week of life.[1] with sex ratio female: male = 2:1.[3,8] Large study of Talat Masoodi et al. stated that neonatal mastitis is usually local and unilateral, caused by squeezing breast to remove the milk (witch's milk) with spread of bacteria from skin to the breast parenchyma through the nipple. Local inflammatory signs with or without pus discharge with rarely systemic signs will be the presentation.[4,8] It also showed that Gram staining of the discharge was positive in 60% of cases with *Staphylococcus aureus* as the most common causative organism (83–86%),[1,3-5,7,8] as shown in most of the studies. If left untreated, rarely lead to cellulitis, osteomyelitis, brain abscess and sepsis.[2,8] The local echography can be used to differentiate local mastitis and abscess formation.[2,3] Spontaneous drainage of pus may or may not cure, and can affect developing breast bud and distorted.[1,8] Most of the studies reported that mastitis usually resolves with antibiotics, but abscess needs needle aspiration or incision and drainage.[6,7] Educating the parents and caretakers regarding the condition will decrease the habit of squeezing neonate breast for witch's milk, which prevents the formation of breast abscess and distortion of future breast tissue.

Conclusion

Neonatal mastitis is a preventable and curable uncommon condition, but with possible breast deformity. Local echography can be helpful in early stages with only mastitis, which will resolve with antibiotics alone, but abscess needs surgical intervention for effective cure. Proper health education to caretakers will prevent the abscess formation and distorted future breast.

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Abstract Page

The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

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State the background of the study and purpose of the study and summarize the rationale for the study or observation.

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The methods section should include only information that was available at the time the plan or protocol for the study was written such as study approach, design, type of sample, sample size, sampling technique, setting of the study, description of data collection tools and methods; all information obtained during the conduct of the study belongs in the Results section.

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Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540–7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347–55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone-iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3–9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792–801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. pp 7–27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979–2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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