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Role of Allograft in Necrotizing Fasciitis

Deepak Sharma[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P[3]

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Abstract

Necrotizing fasciitis is an infection of subcutaneous tissue and fascia which may spread rapidly to deeper tissue and surrounding tissue which may cause damage to the tissue and present as a localized infection and fulminant septic shock with high mortality rate.[1] Necrotizing fasciitis will undergo extensive wound debridement of the necrotic tissue which may create huge raw area with severe morbidity to the patient. Skin Allograft can be used as a biological dressing to cover the wound as a bridge till the wound bed and general condition of the patient get improved has been found to be effective in wound bed preparation. This study highlights our experience in wound bed preparation using Allograft as an adjuvant in a case of necrotizing fasciitis.

Keywords: Allograft; Wound bed preparation; Necrotizing fasciitis; Management.

INTRODUCTION

Necrotizing soft tissue infections (NSTIs) include necrotizing forms of fasciitis, myositis, and cellulitis. These infections are characterized clinically by fulminant tissue destruction, systemic signs of toxicity, and high mortality.[1] Accurate diagnosis and appropriate treatment must include early surgical intervention and antibiotic therapy. Several different names have been used to describe the various forms of necrotizing infections; this is related in part to naming based on clinical features rather than surgical or pathologic findings. The degree of suspicion should be high since the clinical presentation is variable and prompt intervention is critical. The lay press has referred to organisms that cause NSTI as flesh-eating bacteria.[2] There is sufficient evidence to conclude that healing of necrotizing fasciitis is accelerated by Allograft. Though it is well-established therapy in the armamentarium of wound management, its role in wound bed preparation before cover by skin graft or flap has not been studied well. Allograft has been found to be effective in wound bed preparation but has not been reported in literature. This study highlights our experience in wound bed preparation using Allograft in a case of necrotizing fasciitis.

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MATERIALS AND METHODS

This study was conducted in the department of plastic surgery in a tertiary care center after obtaining the departmental ethical committee approval. Informed written consent was taken from the patient. The study is a prospective observational type done on a 60-year-old male with

known co-morbidities including hypertension & coronary artery disease with ejection fraction of 25%. Patient presented with raw area (Fig. 1) over left lower limb & perineum of one month duration. He was apparently well one month back when he developed multiple blebs over left lower limb & perineum which ruptured leaving raw area with rapid progression of wound infection with foul smelling discharge. He was diagnosed with clinically as a case of necrotizing fasciitis. He underwent multiple debridement in referral surgery department after that he was referred to department of plastic surgery for further wound care. There are various modalities of regenerative wound care out of which here we used allograft skin (Fig. 2) as a regenerative modality for wound care. We decided to carry out tangential excision and biological coverage of the raw area of the granulating wound. Option of skin allograft was explained to the parents. Written informed consent was obtained from both the relatives and the patient. The allograft skin was taken from the traumatic amputated upper limb in emergency from another patient and was stored. The graft was kept in tissue culture medium at 4 degrees Celsius and transferred to the recipient operation theatre. Fresh skin allograft was applied over the patient's wounds (Fig. 2). Allograft was minimally meshed (hand meshing) to cover the raw area of the wound. The graft was taken well initially (Fig. 3) and then started showing signs of rejection from 21th postoperative day. It got completely peeled off on 25th and the wound was fully granulated well (Fig. 4) by that time and patient general condition improved for autograft from opposite thigh. The patient responded well to the allografting and did not develop hypovolemia, electrolyte abnormalities, or any wound infection during the course of treatment.

RESULTS

After allograft, patient responded well to the allografting and did not develop hypovolemia and other electrolyte abnormalities, or any wound infection during the course of treatment. The Allograft applied took well on the patient. The allograft was rejected and got peeled off on day 25 and wound granulated well without any slough and patient general condition improves by that timeplanned for autografting from opposite leg. (Fig. 4)

Fig. 1: At admission with extensive necrotizing fasciitis of left lower limb

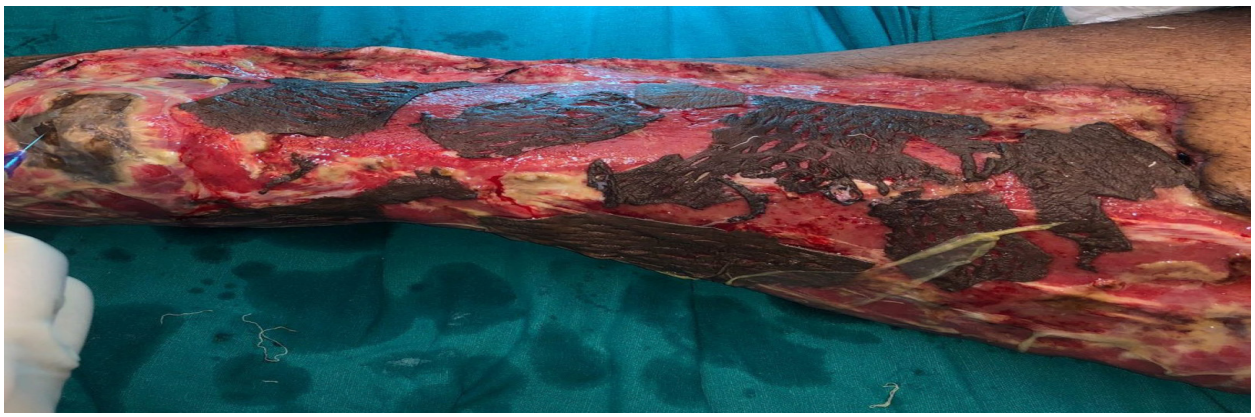

Fig. 2: Allograft applied over the thigh wound

Fig. 3: Allograft take well post-operative day 14

Fig. 4: Day 25 post allografting wound granulated well with rejection of allograft

DISCUSSION

Necrotizing fasciitis is a rare but life-threatening condition, with a high mortality rate (median mortality 32.2%) that approaches 100% without treatment. Numerous conditions are associated with this pathology, such as diabetes mellitus, immunosuppression, chronic alcohol disease, chronic renal failure, and liver cirrhosis, which can be conductive to the rapid spread of necrosis, and increase in the mortality rate. The diagnosis of NF is difficult and the differential diagnosis between NF and other necrotizing soft tissue infections more so. However, the clinician should do their utmost to secure the diagnosis of NF, as a delay in diagnosis can be fatal, and septic shock is inevitable if the disease remains untreated. The characteristic of NF is the clinical status change over time.[1] The early clinical picture includes erythema, swelling, tenderness to palpation, and local warmth; once the infection develops, the infection site presents skin ischemia with blisters and bullae. The diagnosis of NF can be secured faster with the use of laboratory-based scoring systems, such as the LRINEC score or the FGSI score, especially in cases of Fournier's gangrene. However, the diagnosis is definitely established by performing explorative surgery at the infected site. Management of the infection begins with antibiotic treatment. In the majority of cases with NF (70–90%) the reasonable pathogens are two or more, suggesting the use of broad-spectrum antibiotics. The value of antibiotic treatment in NF is relatively low, and early and aggressive drainage and debridement is required. In NF of the extremities, the clinician should consider amputating the infected limb, although this will not reduce the risk of mortality. Finally, postoperative management of the surgical wound is important, along with proper nutrition of the patient.[1]

The term 'allograft' refers to a graft taken from the same species, from a source that is notgenetically identical. George Pollock first described the concept when he donated his own skin alongwith the patient's skin to treat burns wounds. Though both grafts initially took, the allograft eventually disappeared from the wound.[2] Ten years following this, it was Girdner who first

described the use of cadaveric skin to cover burns wounds. Following this many studies have been published about the use of allograft skin for the cover of burnswounds and other non-healing ulcers. The allograft limits wound infection and prevents protein, fluid and electrolyte loss from the wound decreasing theenergy spent by the patient.[3] It also reduces pain,improving the general welfare and psychological status of the patient and conserves auto graft. The allograft skin has been used only for the cover of extensive burns woundsfor wound bed preparation. Snyder *et al.* reported the use of allograft for the treatment of diabetic, venous, arterial, posttraumatic, post scleroderma ulcers etc. The benefits noted by him include a substantial decrease in wound infection, desiccation and patient symptoms such as pain.[4,5] In our study, the skin was transplantedon patient for temporary wound cover and forwound bed preparation. In our patient, we applied allograft as a wound cover to reduce the wound area to reduce the morbidity of the patient which was harvested from the traumatic amputated upper limb in road traffic accident. The patient improves rapidly following application of the allograft. The use of Allograft skin in wound management has greatly improved the results of post operative management. Human skin allograft effectively reduces water, electrolyte, and protein loss from the wound and reduces energy requirements of the body and thus decreases morbidity related to necrotizing fasciitis. Clinical indication of skin allograft[6] use in Necrotizing fasciitis are the following:

- Coverage of extensive full-thickness wounds.
- Coverage of widely meshed skin autografts.
- Healing of partial-thickness wounds.
- Wound bed preparation and testing for later acceptance of autograft.

Human skin allograft effectively reduces water, electrolyte, protein loss from the wound and reduces energy requirements of the body.[7] In our patient, we have used allograft for the same reason. Allograft relieves pain and controls infection more effectively than collagen dressing. Skin allograft can be harvested from the torso, hips, thighs, and upper calves of the diseased donor.

CONCLUSION

In our study we found that allograft was useful in promoting granulation and Woundbed preparation avoiding pain and risk of infection from frequent dressing changes. The limitation of the study includes that it is a case report with a single center study with no statistical analysis. Further randomized controlled studies are required to validate the efficacy of the allograft in theWound bed preparation of necrotizing fasciitis wound.

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Role of Pedicled Transverse Rectus Abdominis Myocutaneous Flap in Breast Reconstruction

Jacob Antony Chakiath[1], Ravi Kumar Chittoria[2]

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Abstract

Traditional breast conservative therapy (BCT) is lumpectomy, sentinel lymph node biopsy and possible axillary dissection, and radiation therapy. BCT is, as known and considered all over the world, is oncologically equivalent to mastectomy with regard to overall long-term survival rates. BCT is the recommended treatment of choice for women with early stages breast cancer. The main philosophy of BCT is optimizing cosmetic goals and minimizing the psychological morbidity of a mastectomy while ensuring low rates of local recurrence. Achieving an oncologically safe resection is maintained by tumor margin clearance. Ensuring an oncologic clearance with increasing tumor size requires extensive breast parenchyma resection. And this results in large volume resection and this requires volume replacement techniques. Depending on the amount of breast volume resected, an autologous tissue transfer may be required to achieve requirement of breast restoration. Latissimusdorsi flap and TRAM flap are two autologous tissues mostly used to fulfill this restoration. This chapter focuses on the TRAM flap, one of the most commonly used autologous tissue in volume replacement reconstruction of the mastectomy defect.

Keywords: TRAM; Flap; Breast; reconstruction; Mastectomy.

INTRODUCTION

Breast reconstruction with transverse rectus abdominismyocutaneous (TRAM) flap has its own unique features and requirements. Not all cases require TRAM flap, and TRAM flap is not the best option for every case. That can be analyzed by comparing available treatment options of breast cancer (or breast deformities) and reconstruction.

Traditional breast conservative therapy (BCT) is lumpectomy, sentinel lymph node biopsy, possible axillary dissection, and radiation therapy. BCT, as known and considered all over the world, is oncologically equivalent to mastectomy with regard to overall long-term survival rates. BCT is the recommended treatment of choice for women with early stages of breast cancer.[1,2] The main philosophy of BCT is optimizing cosmetic goals and minimizing the psychological morbidity of a mastectomy while ensuring low rates of local recurrence.

Achieving an oncologically safe resection is maintained by tumor margin clearance.[2] Ensuring an oncologic clearance with increasing tumor size requires extensive breast parenchyma resection.

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And this results in large volume resection, and this requires volume replacement techniques. Depending on the amount ofbreast volume resected, an autologous tissue transfer may be required to achieve requirement of breast restoration. Latissimusdorsi flap and TRAM flap are two autologous tissues mostly used to fulfill this restoration. Perforator flaps are also available within the last two decades, and some centers and surgeons began to use them as the procedure of choice. This chapter focuses on the TRAM flap, one of the most commonly used autologous tissue in volume replacement reconstruction of the mastectomy defect.

The results of breast reconstruction have improved dramatically over the past 30 years. The main reason for this improvement is the experience that has grown from various techniques of flap surgery. Breast reconstruction entered the modern era with the introduction of the TRAM flap in 1982 by Hartrampf *et al*.[3] This ingenious procedure reliably transfers autogenous tissue from the lower abdomen for breast reconstruction. This surgery has also the added benefit of abdominal rejuvenation.[4]

Anatomy of TRAM

Rectus abdominis muscle: The rectus abdominis muscles are pairs of long, straight muscles that flex the spine and tighten the intra-abdominal wall. This muscle has its origin from the symphysis pubis and the pubic crest and inserts on the lineaalba and the fifth, sixth, and seventh costal cartilages. Each muscle has two to five tendinous inscriptions. The most caudal inscription is at the level of umbilicus.[5] Thesetendinous inscriptions are not adherent to the posterior sheath but to overlying anterior rectus sheath. Rectus sheath is thick and encloses the rectus abdominis muscle except for the posterior part below the arcuate line. The arcuate line is mostly located halfway between the umbilicus and symphysis pubis. The arcuate line is the transition point where the internal oblique aponeurosis stops to split and the aponeurosis of all three muscles pass ventral to the rectus abdominis muscle. Below the arcuate line, there is only the transversalis fascia where this is the region of weakness and it is the place potential herniation after flap dissection. The lineaalba is the decussation of the fused aponeurosis in the midline. The lineaalba is wider close to the xiphoid process and narrows to a fine a line below the umbilicus. The lateral border of the rectus muscle with its sheath is referred to as the linea semilunaris.[6]

Blood supply: The blood supply to the rectus muscle and TRAM flap comes from the deep superior epigastric artery (DSEA), which arises from the internal thoracic (mammary) artery, and the deep inferior epigastric artery (DIEA), a branch of the external iliac artery. Both the deep superior and inferior epigastric arteries communicate within the rectus abdominis muscle and the overlying muscular and cutaneous tissue of the anterior abdominal wall. The DSEA and DIEA systems connect above the umbilicus through a system of small-caliber vessels that Taylor and Palmer refer to as "choke" vessels.[7] The DIEA originates approximately 1 cm above the inguinal ligament and then pierces the transversalis fascia and enters the rectus sheath just below the arcuate line. The DIEA then ascends obliquely and medially between the rectus abdominis muscle and the posterior wall of the rectus sheath. The DIEA divides into two or three large branches below the level of the umbilicus. It shows certain type of arborization, extensive studies reported by Moon and Taylor. Based on their outcomes, there are three types of anastomosis between DIEA and DSEA. Most patients have two networks (57%), while there are three networks in 14% of the people and only one major anastomosis in 29% of the people.[8]

Perforators are key for the vascular supply of TRAM flap. These vessels are terminal branches of the DIEA and deep inferior epigastric veins. Perforators extend from the vertical epigastric system and pass through the anterior rectus sheath, supplying the skin and subcutaneous tissue. Taylor and Palmer studies demonstrated a rich connection between the DIEA system and the abdominal wall skin. The majority of perforators are between the umbilicus and the arcuate line, but the highest concentration of perforators is in the periumbilical area. Usually there are two parallel rows of perforators, a medial one and a lateral one. Incorporation of theperiumbilical perforators permits the harvesting of a skin flap with virtually any orientation from the midline.[9,10]

TRAM flap can be planned either unipedicled or bipedicled. The decision about pedicle depends on the requirement of the tissue pad to be transferred. If a surgeon needs almost up to 60% of the lower abdominal tissue, then unipedicle might be the right choice. If the requirement is more than that, then it would be better to go with bipedicled flap.

Indications of TRAM flap

1. Breast Reconstruction

2. Chest Reconstruction
3. Soft Tissue Sarcoma Reconstruction
4. Head and Neck Reconstruction

TRAM Flap

Breast reconstruction with TRAM flap can be accomplished with a variety of lower abdomen flap and techniques such as pedicled TRAM flap (uni- or bipedicled), free TRAM flap, or DIEP flap. Here we discuss pedicled TRAM flap.

Patient selection: The very first part of this procedure should be patient selection. The candidate should be evaluated as to the status of her disease and overall health. She should be emotionally stable. She should have a good motivation. All details regarding surgery, hospitalization, and recuperation need to be discussed in detail.

Who are candidates for TRAM flap breast reconstruction?

In general speaking, mastectomy defect needs to be evaluated before planning.

The best candidates are as follows:

1. Patients with large and ptotic breasts where the contralateral breast needs to be altered for symmetry purpose.
2. Patients with big mastectomy defect and/or poor skin quality due to excessive dissection, skin slough, radiation effect, etc. The best candidates for TRAM flap harvesting are the patients with well-padded lower abdominal soft tissue and loose upper abdominal soft tissue. Patient with excessive abdominal fat might not be a good candidate.[11]

Who are not candidates for TRAM flap breast reconstruction?

The scar on the abdomen is also a key to analyze patient eligibility for TRAM flap. A subcostal or transverse incision that divides the rectus abdominis muscle and its superior epigastric blood supply might be a contraindication for the use of a pedicled TRAM flap. Lower abdominal incision such as Pfannenstiel incision is not a contraindication for a TRAM flap, and contrary to fact, such an incision might play a "delay phenomena" effect. Patients ideally should be nonsmoker, or if they are smoker,they need to stop smoking almost 1–2 months before surgery. If the patient is on chemotherapy, it would be better to wait at least 6 months more after the last cure of chemotherapy. If there is a history of radiation therapy, it would be better to postpone surgery for another 6 months to year after the last cure of radiation therapy. The last condition can be totally excluded based on the recipient area requirement such as radiation induced soft tissue defect in the mastectomy area or other soft tissue defects due to the mastectomy.

Pre-operative Marking and Patient Positioning

All markings are made with the patient in an upright standing position.

Recipient area: The inframammary, parasternal, anterior axillary line of the contralateral breast is marked. The template of these lines is reflected to the recipient side on a mirror image. The footprint of the recipient side is also copied from the contralateral breast. The marking are also made for the future inframammary fold and the tunnel that the flap would pass through (Fig. 1).

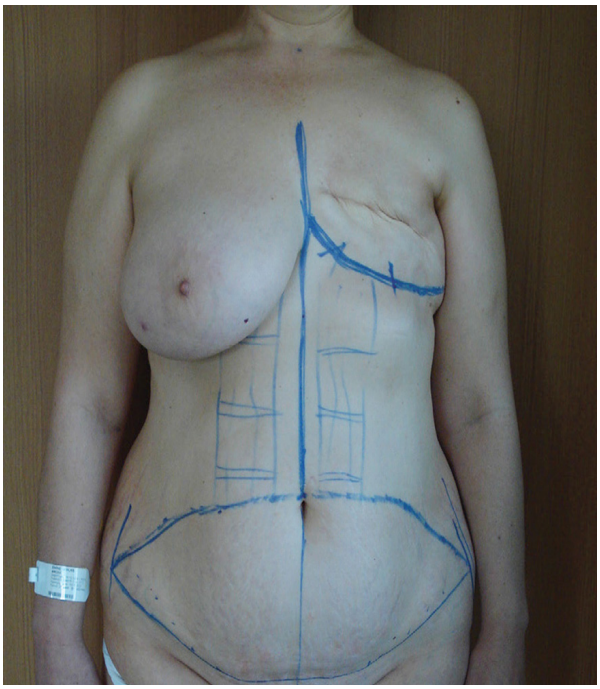

Fig. 1: Markings for TRAM flap
(*source:* @ *google search engine*)

Donor area: The TRAM flap is marked as a horizontal ellipse on the lower abdomen. Perforators around the umbilicus and below it are marked with the aid of a handheld Doppler US. The whole ellipse is tried to fit with these perforators as much as possible. The inferior incision is placed in the low bikini area. The best inferior incision location would be suprapubic crease, but this might not be possible in each case.

The excursion of the lower bikini area should be tested by pinching. The superior incision line is marked 1 cm above or below the umbilicus. A superior incision that is above the umbilicus is preferable as this has a higher chance to include as much periumbilical perforators as possible. But the ease of donor area closure is the key factor to place the superior incision line. A TRAM flap is divided into four zones based on the reliability of perfusion. There are four zones for a unipedicled TRAM flap scenario. Zone 1 refers to the skin overlying each lateral rectus abdominis muscle. Zone 2 refers to the skin overlying contralateral rectus abdominis muscle. The skin territory on each side of theabdomen lateral to the lineasemilunaris is referred to as zone 3, and the skin lateral to the opposite lineasemilunaris is zone 4. The perfusion of zones 4 and 3 is less than zones 1 and 2 where zone 4 is the most tenuous. Surgical technique: The mastectomy skin flap is elevated off the pectoralis major muscle inferiorly and superiorly based on the preoperative marking. Previous mastectomy scar is excised and sent for pathologic evaluation. The superior TRAM flap incision is placed till anterior rectus fascia. The upper abdominal skin flap is elevated close to both inframammary folds (IMF). A tunnel is made to the mastectomy area. The inferior incision is placed deep to the rectus muscle, and both superficial epigastric vessels are identified and preserved. Zones 3 and 4 are dissected off the external oblique fascia, and dissection continues medially with precaution while approaching the lateral border of the rectus abdominis fascia. At this point, preoperative markings for perforators are followed, and this dissection continues medially, stopping approximately 4–5 mm lateral to these perforators. The largest perforator is mostly found just lateral and inferior to the umbilicus. An incision is made on the rectus fascia just 1 cm lateral to the perforators. The inferior epigastrics are identified easily along the lateral edge of the rectus muscle. The vessels are identified close to the external iliac artery, and the DIEA is ligated. The rectus fascia is divided vertically, and the rectus muscle with TRAM flap attached elevated off the posterior rectus fascia. The umbilicus is circumferentially incised and isolated on its stalk medially. The eight intercostal nerves are identified and transected to help for the atrophy of the muscle pedicle while approaching close to the arcuscostarum. TRAM flap is delivered through the tunnel to the mastectomy site. Anterior rectus fascia is closed with 0 or 1\0 Prolene (or nylon suture). Inferior cuff of rectus muscle is integrated to the weak area below arcuate line. Closure is reinforced with an overlay Prolene mesh that lies from epigastric area to symphysis pubis. Care must be taken not to constrict the pedicle. Abdominal skin flap is closed in layers, and the umbilicus is delivered to its new location in the midline. The TRAM flap is provisionally placed into the mastectomy defect, and the mastectomy flap is draped over the TRAM flap. The patient is placed in a sitting position, and the TRAM flap is shaped into a breast mound. Care should be taken to shift breast mound superior and medial area to ensure adequate cleavage volume. Surely, volume distribution is important for each quadrant of breast mound.

Post-operative care

Wound care is essential, and routine wound care is needed. The flap is kept warm, and a fenestrated dressing might be a better option to observe flap perfusion. A support bra is used to maintain the position of the flap. The patient is placed in a flexed position by keeping head elevated 30° and legs elevated 20°. An abdominal girdle needs to be on at all time for 2 months. Patients are mostly hospitalized for 3 days. Patients are advised for resting for 15 days to a month after surgery.

Complications

*Fat necrosis***:** Fat necrosis can be seen, and the reason is inadequate perfusion or limited perfusion to a certain part of the flap. Planning and surgical technique needs to be verified before and during surgery to minimize the possibility of inadequate perfusion. Planning and technique should be optimal perforator areas with limited perfusion, or question might be discarded during surgery. Zone 4 is always an area of question and must be discarded before transposing the flap.

*Partial flap loss***:** Partial flap loss is also can be seen due to inadequate perfusion. Likewise, areas with question need to be discarded; planning and technique should be optimal to include as much perforators as possible.

*Abdominal hernia***:** Hernia or bulging can be seen as one of the major complication. Fascial closure needs to be dome tension free, and mesh needs to be used if indicated. Patients should be placed in abdominal girdle and told to avoid strenuous exercise till the sixth month after surgery.[12] The incidence of abdominal bulgeswas reported 3.8%, while hernia was reported 2.6%.[13] It is also reported that abdominal strength, as measured by the ability do sit-ups, is influenced significantly by TRAM flap.

Revisional surgeries for TRAM flap: All

complications need to be revised as needed. Partial flap loss should be addressed within the first 2 weeks after surgery. Meticulous wound care is essential meanwhile.

Breast reconstruction with TRAM flap is a two-stage procedure. The goal of the first step is to reconstruct the breast mound as close as to the contralateral breast mound. The goal of the second stage is to get symmetry as much as possible and reconstruction of nipple areola complex (NAC). Surgical intervention might be needed for the contralateral breast (i.e., lifting and reduction) during the second stage. The following procedures might be done during the second stage: removal of fat necrosis, breast mound revision, IMF revision, medial cleavage revision (with flap transposition or fat grafting), donor site liposuction for feathering touch, and NAC reconstruction.

NAC reconstruction: NAC reconstruction can be done with various techniques. Some of the mostly used techniques are CV flap, skate flap, star flap, etc. Areola mostly reconstructed with pigmented full-thickness grafting from inguinal area or tattooing.

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Role of Low-level Laser Therapy in Pediatric Scald Burn

Dhira Shobith Munipati[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P[3]

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Abstract

Burns and related injuries are common causes of deaths and disability. The highest incidences of burn cases occur in children and adults. In children less than 2 years of age, contact with hot surfaces and scald burns are the most common presentation to the hospital. The practice of cooking at ground level or sleeping with a burning lamp are some of the causes. Early management of this type of burns results in better outcomes. In this case we describe the role of low-level laser therapy (LLLT) as an adjuvant in the management of paediatric thermal burns.

Keywords: LLLT; Burn; Injuries; Graft; Scald burn.

INTRODUCTION

Burns are one of the leading causes of morbidity and mortality in children. Basic knowledge about thermal injury is important in the management of children presenting with burns. A study by Davis in 1990 quoted 2 million incidences of burns per year in the Indian Subcontinent. Forty percent of burn victims are under 15 years of age.[1,2] Scalds and hot liquids make up 90% of burn injuries to children. Common sites are at home around the kitchen and open fire places.There are various literatures suggesting the role of low-level laser therapy (LLLT) in the management of wounds. In this case report, we assess the role of low-level laser therapy in the management of pediatric scald burns.

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MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery in a tertiary care institute. Informed consent was obtained from the patient under study. Department scientific committee approval was obtained. It is a single center, non-randomized, non-controlled study. The patient under study was a 4-years-old male, with no other known comorbidities presented with mixed second degree scald burns to the left chest, abdomen and neckconstituting 15% of total burn surface area (Fig. 1). The patient was treated according to WHO protocol. The burn wound was debrided with hydro-jet and regenerative therapies like Low-level laser therapy (Fig. 2) was done. Low level laser therapy was applied once in five days for 10 min for four sessions. Gallium Arsenide (GaAs) diode red laser (wave length 650 nm, frequency 10 kHz and output power 100 mW) was used as a

source of LLLT. It is a continuous beam laser with an energy densityof 4 J/cm.[2] Machine delivers laser in scanning mode (non-contact delivery) with 60 cm distance between laser source and wound.[3] In each session, the wound was given laser therapy for duration of 10 minutes (Fig. 3) followed by non-adherent absorbent dressing.

RESULTS

Burn wounds healed well with low level laser therapy session at 2 weeks (Fig. 4). Post therapy period was uneventful.

Fig. 1: At admission with mixed second degree superficial and deep burns

Fig. 3: Application of Low-Level Laser Therapy

Fig. 4: Healed Burn wounds

Fig. 2: Low-Level Laser machine

DISCUSSION

Low level Laser uses energy much less than that is used for cutting, ablation therapy. By definition Low-level lasers are one with power density less than 500 mW/cm.[3,4] LLLT is used as an adjuvant to conventional therapy with promising results, in patients with ulcers.[5] LLLT is a form of photo therapy that use electromagnetic radiation. LLLT does not generate heat but produces photo chemical and photo physical effects, with the intention of re-establishing cell homeostasis. Essentially, light energy is delivered topically in a controlled, safe manner and it is absorbed by photo-absorbers (chromophores) that transform it into chemical energy.[6] Positive effects of LLLT are: It accelerates tissue repair, increases the formation of granulation tissue, helps in wound contraction, decreases inflammation, modulation, and it also helps in pain reduction.[6,7,8] According to the literature, low-energy photo emissions given at a wave length range of 600nm to 900nm accelerates cell proliferation and wound healing processes.[9] Its action is thought to: Stimulate respiratory chain components such as flavin and cytochromes which increase adenosine triphosphate (ATP) synthesis, thus enhancing the rate of mitoses and increasing fibroblast numbers, stimulate collagen and elastin production, leading to better reepithelialisation, stimulate microcirculation and dilatation of the capillaries and neovascularisation to increase tissue oxygenation, liberate mediator substances such as histamine, serotonin and bradykin in to influence macrophages, regenerate lymphatic vessels.

Numerous case reports and clinical trials with humans have shown impressive wound healing outcomes using LLLT. Further work with animals has also supported the use of LLLT to facilitate wound healing.[10,11] The exact mechanism by which LLLT facilitates wound healing is largely unknown. However, several theories may help explain the enhanced wound contraction observed here. In vitro studies have shown an increase in fibroblast proliferation after therapy[11,12] suggesting that LLLT therapy may facilitate fibroplasia during the repair phase of tissue healing. Pourreau-Schneider et al, who reported that laser irradiation transforms fibroblasts into myofibroblasts. Myofibroblasts are directly involved in granulation tissue contraction, and increased numbers could lead to facilitated wound contraction. A myofibroblast is a modified fibroblast with ultrastructural and functional properties of fibroblasts and muscle cells. Cytoplasmic fibrils of actomyosin allow for contraction of myofibroblasts, pulling on the borders of the wound and reducing the size during the repair phase of soft tissue healing.[12] LLLT may have caused release of tissue growth factors into circulation, which may have affected surrounding tissues or entire systems. Indirect healing could be a very beneficial effect of this modality in treating tissue damage of large size or at multiple locations. It might also suggest that deeper tissues could be affected by light therapy.

CONCLUSION

The LLLT is an effective treatment for enhancing wound healing of second-degree burns. In this study we showed that LLLT can be used to facilitate wound healing in burn wounds.

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Role of Collagen Patches in Facial Rejuvenation

Ravi Kumar Chittoria

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Abstract

The skin laxity is a feature which appears early over the face with age. The skin laxity associated with old age can be corrected by various surgeries. Non-surgical treatment may be another option. Hereby we are sharing our experience of using a non-surgical technique for skin tightening using gel eye patches which contains collagen.

Keywords: Facial Rejuvenation; Collagen Gel Patches; Collagen; Anti-aging.

INTRODUCTION

Skin laxity and the appearance of fine lines and wrinkles are inevitable results of aging and chronic sun exposure. Non-surgical techniques are now becoming more popular especially for mild to moderate skin laxity with lower risks of complications. The main component of skin is fibroblast and extracellular matrix (ECM).

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MATERIALS AND METHODS

Current study was performed in the Department of Plastic Surgery at a tertiary care center. The departmental ethical committee approval as well as informed written consent was obtained. A 50 year old gentleman was with bilateral saggy eyes (Fig. 1). He was provided with gel eye patches containing acqua, glycerine, paraffinumliquidum, dimethicone, cetearyl alcohol isopropyl palmitate, sorbitan stearate, propylene glycol butylene glycol, phenoxyethanolhydrolzed collagen. Total 6 pairs were applied, 1 pair every week for 6 weeks. After washing and cleaning the face with water, face was dried, and the gel patched were applied over the saggy eyes (Fig. 2). The patches were left in place for 20 minutes and then carefully removed followed by massage of the area with fingertip. The assessment was done using visual assessment using two independent evaluators who both were kept blind about the treatment.

RESULT

Collagen patches containing the collagen are effective in managing the skin laxity causing saggy eyes with any adverse effects (Fig. 3).

Fig. 1: Before The Application of Gel eye patches

Fig. 2: Gel eye patches applied

Fig. 3: After the application

DISCUSSION

The aging process of skin starts early even in mid 20s due to excessive damage of the skin due to sunlight exposure or various chemical pollutants, all these are ultimately associated with decreased collagen production and excessive collagen damage which will slow down the skin repair mechanism. The aged look on the face on the individual will influence the psychological wellbeing of the patient as well as his confidence there are various methods in practice to prevent or manage the aging process. Reason why collagen is required due to the fact of reduction in production of collagen with age. The another reason for effect of ageing is elastosis. Skin tightening techniques target collagen and elastic fiber remodeling and synthesis to rejuvenate the skin. Laser therapy is one of the non-surgical procedure.

CONCLUSION

Surgical intervention remains main treatment for skin laxity. While non-surgical skin tightening technologies have gained popularity, they historically have not achieved the same levels of treatment durability and efficacy.

Conflict of interest: *None*

Declarations

Author's contributions

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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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