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Role of Low Level Laser Therapy in Full Thickness Skingraft Donor Site

Amrutha J.S.[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P.[3]

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ABSTRACT

Low level laser therapy (LLLT) has been used in different fields, including healing of chronic ulcers like diabetic and pressure ulcers. Here we are using this method to look for role in FTSG donor site. Full thickness skin grafts include full thickness of the epidermis and dermis whereas split thickness skin grafts (STSG) include the entire epidermis and only partial dermis. LLLT improves tissue perfusion and fibroblast proliferation, with increases in collagen synthesis accelerating wound healing. The purpose of this case report is introducing LLLT as a therapeutic method for accelerating healing of FTSG donor site.

Keywords: Low level laser therapy; Full thickness skin graft; Donor site.

INTRODUCTION

Full thickness skin grafts are most common procedure done in plastic surgery for the skin defects. Full thickness skin graft sites are closed usually by suturing of the wound. Low level laser therapy helps in accelerating the wound healing process by stimulating microcirculation and collagen deposition in the wound.[1] In this case report we assess the role of low level laser therapy in full thickness skin graft donor site for better and faster healing.

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MATERIALS AND METHODS

The study was conducted in a tertiary care hospital in south India. Informed consent obtained from the patient. This is non-randomized prospective study conducted in department of plastic surgery. The patient was a 21 years male with alleged thermal burns at 2 years of age over left hand. Post burn contracture release followed by full thickness graft taken from left groin. (Fig. 1)

Donor site management with Low level laser therapy (LLLT) done over the donor site for 10 min after the wound closure. (Fig. 2)

Low level laser used was Gallium Arsenide (GaAs) diode red laser of wavelength 650 nm, output power 100 mW, frequency 10 kHz, continuous beam, scanning mode, non-contact delivery (60 cm distance between laser source and scar) with area of delivery adjustable according to the size of scar. Laser therapy was given for duration of 10 minutes. Therapy is given post-operatively immediately after suturing. LLLT was

given to the wound on day one, with all laser safety precautions in dedicated laser room.

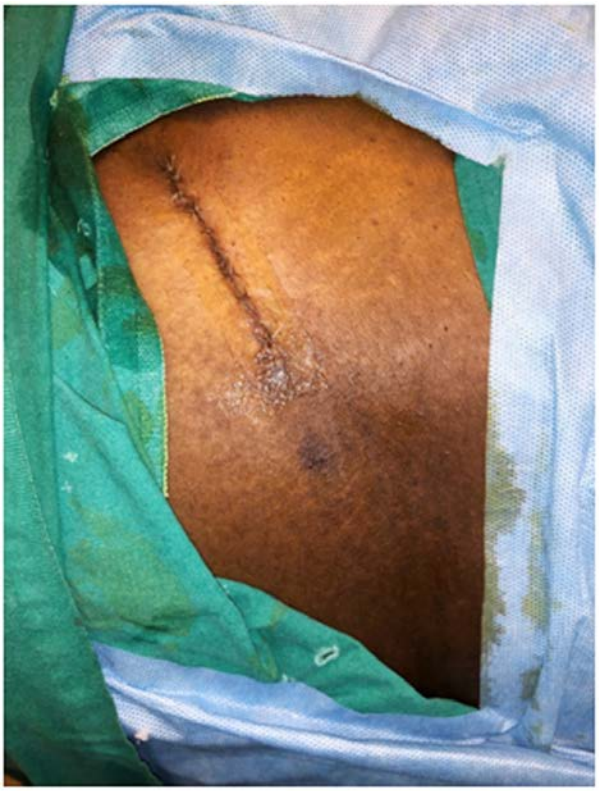

Fig. 1: Donor site wound after primary closure

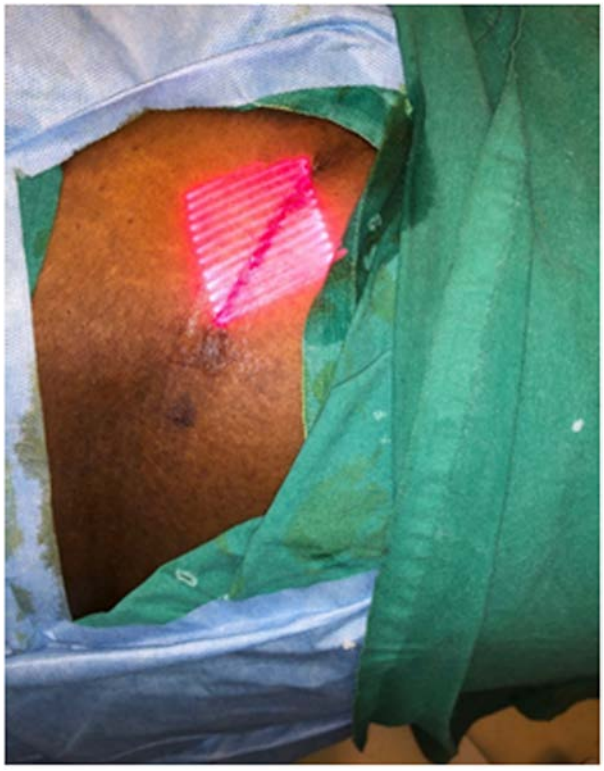

Fig. 2: LLLT application at donor site

Low level laser used was Gallium Arsenide (GaAs) diode red laser of wavelength 650 nm, output power 100 mW, frequency 10 kHz, continuous beam, scanning mode, non-contact delivery (60 cm distance between laser source and scar) with area of delivery adjustable according to the size of scar. Laser therapy was given for duration of 10 minutes. Therapy is given postoperatively immediately after suturing. LLLT was given to the wound on day one, with all laser safety precautions in dedicated laser room.

RESULTS

The application of LLLT over full thickness graft donor site aided in the healing of the wound. (Fig. 3) No complications noted post-operatively. Patient discharged successfully.

Fig. 3: Post-operative day 7 FTSG donor site

DISCUSSIONS

FTSG works well for reconstruction of burns contracture. LLLT helps in healing at FTSG donor site and thus decreases morbidity related to burn contracture. Contracture causes physical and aesthetics consequences and appropriate treatment

is very essential for day-to-day activities of victim post trauma. Proper site selection should be made to decrease donor site morbidity. LLLT has been found to be safe and beneficial in few case reports for uptake of FTSG post burn contracture but randomized controlled trials had yet to be done.

The acronym LASER abbreviated as "light amplification by stimulated emission of radiation", are defined by a power density at <l500 mW/ cm^2.[2,3] Energy used in LLLT is much less than the one used for cutting, and ablation therapy. LLLT is a form of phototherapy that employs electromagnetic radiation, that is capable of generating enough energy for interacting with living tissues. It produces photochemical and photophysical effects without generation of heat, with consideration of re-establishing cell homeostasis. Essentially, light energy is delivered topically in controlled way which is absorbed by photo absorbers (chromophores) that transform it into chemical energy.[4] Positive effects include increased formation of granulation tissue and acceleration of tissue repair, wound contraction, inflammation, modulation, and pain reduction.[4] As per literature, low energy photo emissions given at a wavelength range of 600nm to 900nm accelerate cell proliferation and promote wound healing.[5] Its action is thought to:

- Stimulate respiratory chain components promoting ATP synthesis, 6 and hence increase rate of mitoses and fibroblast numbers.[6]
- Stimulate collagen and elastin production.[7]
- Stimulate micro-circulation with dilatation of the capillaries and neovascularisation.[8]
- Liberate mediator of inflammation-histamine, serotonin and bradykinin and hence activate macrophages.
- Regenerate lymphatic vessels.

CONCLUSION

In our study we found that LLLT was useful in promoting wound healing at FTSG donor site and prevention of complications.

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Role of Cyclical Negative Pressure Wound Therapy in Scald Burns

Venkatesh A[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P[3]

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ABSTRACT

Aim of this case report is to assess the role of cyclical negative pressure wound therapy (CNPWT) in management of scald burns. Clinical examination of the scald burns before and after use of cyclical negative pressure wound therapy was done. Cyclical negative pressure wound therapy is effective in healing of scald burns wound. CNPWT may be used in scald burns wound management.

Keywords: Negative pressure wound therapy; Cyclical NPWT; Burns; Scald burns.

INTRODUCTION

Management of scald burns poses a challenge regarding improving the general condition of the patient and adequate dressing of the wound. Apart from wound cleaning and dressing, one of the available methods of wound care is negative pressure wound dressing which utilises a vacuum device to create negative pressure over the wound, which then improves the wound blood supply, improves wound granulation and removes exudates.[1] The aim of this case report is to assess the role of cyclical negative pressure wound therapy (CNPWT) in management of scald burns.

MATERIALS AND METHODS

The study is done in a tertiary care hospital in South India. The subject is an 8-year-old male child, with no comorbidities, with alleged history of scald burns overback of both thighs with hot water. On examination, the patient's vitals were stable. On local examination, second degree deep burns over back of both thighs (Fig. 1). He was admitted for management of the scald burns and burns care was given in the form of intravenous fluids, antibiotics and dressing. Collagen dressing, APRP, LLLT and CNPWT was also given. CNPWT was given with the negative pressure oscillates between -75 and -125 (Fig. 2).

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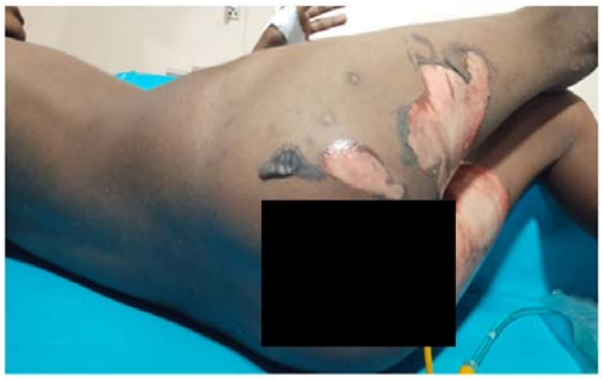

Fig. 1: Burn wound at presentation

Fig. 2: Cyclical negative pressure wound therapy (CNPWT)

RESULTS

CNPWT is useful in reducing the size of the scald burns wound and fasten the wound healingin our patient. (Fig. 3)

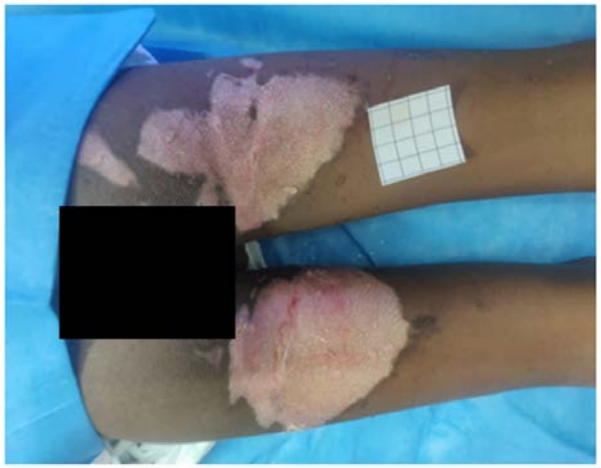

Fig. 3: Healed burn wound after CNPWT

DISCUSSION

Since the introduction of the negative pressure wound therapy (NPWT) system by Morykwas and Argenta, it has been applied to a number of wounds and has become an influential and effective technique for healing simple and complex wounds. The conventional NPWT system adopts either 'intermittent' or 'continuous' mode.

While the continuous mode constantly applies a sub-atmospheric pressure of −125 mmHg, the intermittent mode creates a sub-atmospheric pressure of −125 mmHg for 5 minutes and a 2 minutes resting phase of 0 mmHg.

In experiments performed on animal models, the intermittent mode showed increased perfusion level and formation of granulation tissue in the wound area compared with the continuous mode.[1,2] Despite the effectiveness of intermittent mode in wound healing, it has been avoided in clinical application because of the pain occurring every few minutes during the initiation phase of the system to reach −125 mmHg. Thus, 'cyclic' mode would minimize the pain while maintaining the superior efficacy of the intermittent mode.

The cyclic NPWT system is similar to the intermittent mode in terms of using the same maximal sub atmospheric pressure, but the pressure never reaches zero in the cyclic mode. So, it continuously creates certain pressure gradient that oscillates between −125 mmHg and the preset sub atmospheric pressure. The cycle runs based on the changes in sub atmospheric pressure, not time, and thus its frequency reflects the wound volume.[3]

Types of NPWT

1. Continuous NPWT the continuous mode constantly applies a sub-atmospheric pressure of −125 mmHg.
2. Intermittent NPWT the intermittent mode creates a sub-atmospheric pressure of −125 mmHg for 5 minutes and a 2-minute resting phase of 0 mmHg.
3. Cyclic NPWT the cyclic NPWT system is similar to the intermittent mode in terms of using the same maximal sub-atmospheric pressure, but the pressure never reaches zero in the cyclic mode. So, it continuously creates certain pressure gradient that oscillates between −125 mmHg and the preset sub atmospheric pressure.

Variables affected by NPWT

Cutaneous capillary network can be investigated with regards to blood flow (BF), velocity (VELO), postcapillary oxygen saturation (StO_2), and relative hemoglobin content (rHb).[4]

Blood Flow (BF)

Regardless of the application of different pressure levels, intervals of suction and cutaneous blood flow below the foam dressing was significantly enhanced in all three types.

Post-capillary Tissue Oxygen Saturation (StO_2)

Corresponding to enhancements in cutaneous BF, StO2 values steadily increased when suction was active.

Relative Hemoglobin Content (rHb) and Red Blood Cell Velocity (VELO)

Both parameters were significantly altered due to the NPWT stimulus.

Pain / Discomfort

As expected, reported levels of discomfort were nominal. No statistic difference was found in comparison of maximum values between groups ($p > 0.05$).

Surface Pressure

Applied suction caused significant changes in the surface pressure (sp) of the underlying skin.

Remote Effects

Cutaneous microcirculation of the contralateral thigh was also affected by NPWT treatment. It shows virtually a linear increase in BF 90 min in all three types.

Advantage of cyclic NPWT

1. Less painful when compared to intermittent NPWT.
2. Superior effects on local and remote cutaneous perfusion in the cyclic type compared to others.

CONCLUSION

Cyclic negative pressure wound therapy is found to be effective in improving wound healing in scald burns, by enhancing the blood supply and tissue oxygenation.

Conflicts of Interest

This study does not require any institutional approval.

Declarations

Authors' contributions: All authors made contributions to the article

Availability of data and materials: Not applicable

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Consent for publication: Not applicable

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Application of Cost Effective Indigenous Dermal Matrix Assisted Split Skin Grafting for Post Traumatic Raw Area

Amrutha J.S.[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P.[3]

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ABSTRACT

Dermal substitutes improve the quality of wound healing and quality of the scars. It acts as a scaffold in which cell migration and repair of wound takes place. Many multimodality treatment methods available to augment wound healing at various levels. Adermal substitute should be affordable, long lasting, ready-to-use, analgesic, durable, flexible, non-antigenic, stops water loss, conforms to uneven wounds, anti-microbial, and may be applied in one sitting. Skin grafting may usually result in poor skin quality and scar contracture. In this study, we attempted to use our own cost-effective dermal matrix assisted split skin grafting in a patient with post traumatic raw area.

Keywords: Cost effective; Dermal matrix; Split skin grafting; Post traumatic raw area.

INTRODUCTION

The quality of skin wound healing can be improved by the application of collagen scaffolds as biological dermal substitutes. Dermal extract helps to improves wound healing and quality of the scars. They serve as a scaffold into which cells can migrate and repair the injury. Now many biological and cellular engineering skin substitutes are available, wound management is a multimodality treatment with use of multiple available methods to improve wound healing at various levels. Dermal substitute is defined as biomatrices which fulfil function of cutaneous dermal layer and provides matrices and scaffold for new tissue growth and thus increases rate of wound healing. The collagen scaffold helps in supporting the in growth of connective tissue cell, thus causing regeneration of tissue providing the critical physiological functions of dermis. In this article we have described dermal matrix assisted split skin grafting. The gold standard coverage for post traumatic wounds is bioengineering substitute, free flaps and autologous skin grafting.[1] However, poor skin quality and scar contracture occur frequently and are well known problems in split grafted areas. Dermal substitute is an appropriate way to minimise scar contraction and to optimise the quality of the grafted area in strained regions with loss of function and with high requirements of elasticity, pliability and stability.[2] In this article we highlight the role of cost effective indigenous

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dermal matrix assisted split skin grafting for post traumatic raw area.

MATERIALS AND METHODS

This study was conducted in the Department of Plastic surgery in a Tertiary care centre in South India. Departmental ethical clearance and consent from the subject were obtained. This is a non-randomised case study. The details of the patient in study are as follows: 22-year-old male with alleged history of crush injury right upper limb while working with cement mixer and underwent guillotine amputation at the level of mid arm followed by he developed post traumatic raw area in the upper limb stump. The wound bed preparation was done with autologous platelet rich plasma, low level laser therapy and scaffold dressing. Once wound bed prepared well, we planned for split skin grafting (Fig. 1).

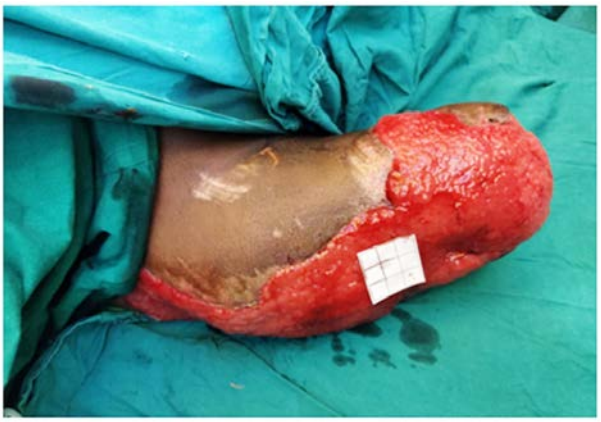

Fig. 1: Post traumatic raw area right upper limb amputated stump wound bed

In our case we did a split skin grafting by combining dry collagen sheet with the split skin graft harvested from his right thigh (Fig. 2 & 3).

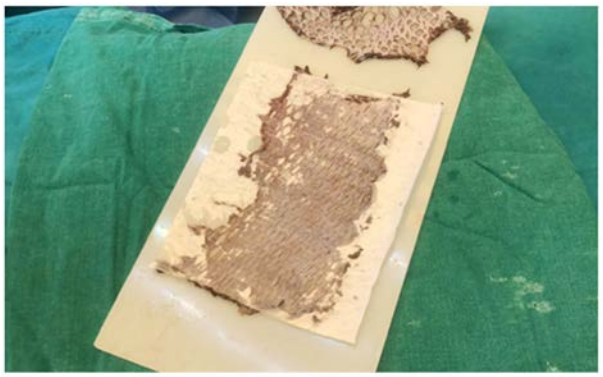

Fig. 2: Collagen sheet placed over SSG

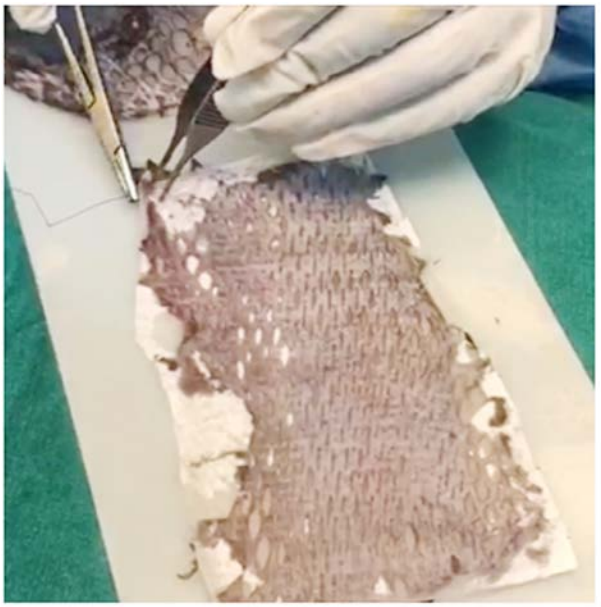

Fig. 3: Fixing collagen sheet to split skin graft to make the dermal matrix

The cost of dry collagen sheet is 1700 Indian rupees of size 10x20 cm which was used in our case. The skin graft is meshed with the help of Mesher before adding to collagen sheet. The collagen sheet also meshed. The collagen sheet is sutured to the ends of skin graft. This meshing helps prevents the exudate collecting beneath the template. This template was then applied over raw area and conventional dressing with gauze and cotton pad was done over it (Fig. 4).

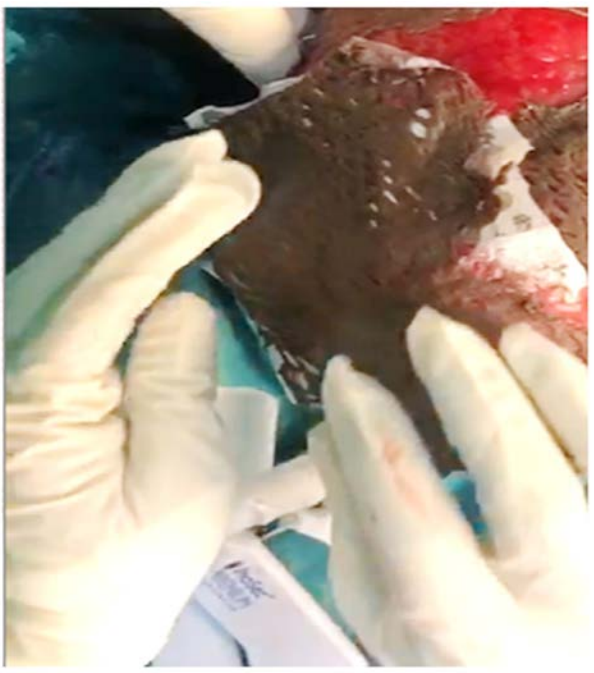

Fig. 4: Application of dermal matrix assisted split skin grafting

RESULTS

Dermal matrix assisted skin graft was well taken on day 10 (Fig. 5). No graft loss noted with this procedure. No complication observed in the patient. Patient discharged successfully.

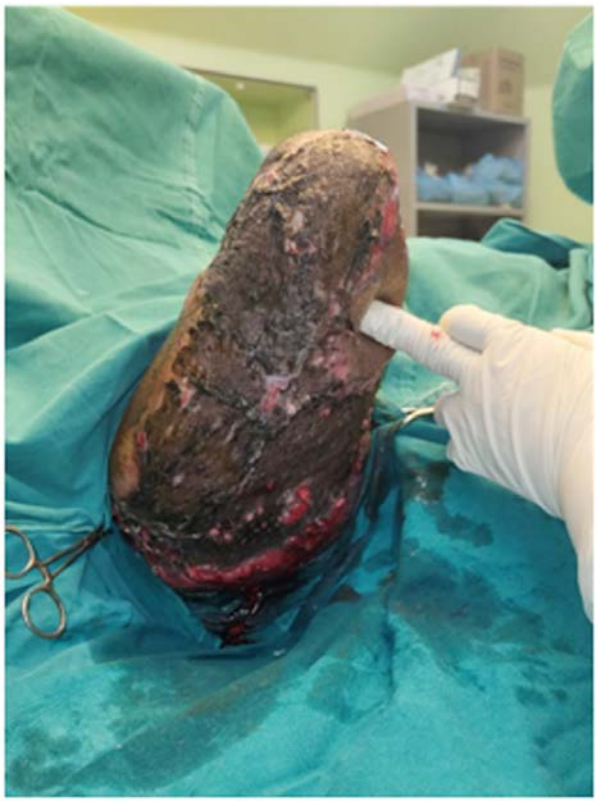

Fig. 5: Post-operative day 10

DISCUSSIONS

Collagen scaffolds, synthetic polymers, and cadaveric skin are some of the dermal substitutes available.[2] They provide temporary wound coverage until donor sites are ready to be collected for autograft, or may provide permanent wound closure if they contain autologous cells. There are now just a few permanent skins substitutes accessible, but advances in human skin tissue engineering are likely to soon produce improved models for expanded availability and wound healing.[3]

Collagen is well known for its benefits, which include simplicity of removal, low cost, painless application, hypoallergenic properties, a wide range of sizes, the ability to store for three years, and the ability to combine medications and growth factors that are delivered in a regulated manner.[5] An ideal dermal substitute should be affordable, long-lasting, ready-to-use, analgesic, durable, flexible, non-antigenic, stops water loss, conforms to uneven wounds, anti-microbial, and may be applied in one sitting.[6]

MatriDerm is a single use three dimensional matrix composed of native, structurally intact collagen fibrils and elastin for supporting dermal regeneration. The collagen is obtained from bovine dermis and contains the dermal collagen types I, III and V. The elastin is obtained from bovine nuchal ligament by hydrolysis. MatriDerm serves as a scaffold in the skin reconstitution and modulates scar tissue formation. MatriDerm, applied using a single stage, is immediately covered with split skin through the 1mm thick matrix by diffusion. MatriDerm is supplied in sterile double bagged packs, and these may only be opened under sterile conditions. Before the use, MatriDerm must be rehydrated in ample physiological saline solution, and to avoid trapped pockets of air (air pockets can hinder the diffusion and thus jeopardise the attached graft), MatriDerm should be laid on the surface of the water and not immersed. The matrix is ready for use as soon as the appearance of the entire surface has changed from white to translucent.[7,8]

Classic skin grafting was performed with a dermatome using a thin split thickness depth, meshing all grafts (1:2 ratio) and fixing to the wounds by 3/0 nylon sutures. A compressive dressing is used to cover the surgical wound.

We attempted to mimic the same technique in our dermal matrix assisted SSG, which is created locally and is cost-effective. The indigenous dermal regeneration template, which is made of dried collagen sheets, is inexpensive and simple to make.

CONCLUSION

The adoption of an indigenous, cost-effective dermal matrix assisted SSG showed better take of graft in case of post traumatic raw area. Large randomised control trials are required to assess the advantages and disadvantages of this procedure.

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Role of Autologous Platelet Rich Plasma in Adult Burns

Chundru Krishna Venkata Rajesh Varma[1], Ravi Kumar Chittoria[2], Amrutha J.S.[3]

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ABSTRACT

Autologous platelet rich plasma (APRP) has gained its importance in medical field since its first use in sports medicine and open heart surgeries. It is widely used in plastic surgery and in cosmetic medicine because of its wound healing properties.

The autologous platelet rich plasma, rich in growth factor can be used for the management of adult burns.

Keywords: Autologous; Platelet; Plasma; Burns.

INTRODUCTION

The autologous platelet rich plasma as the name suggest is the patient own platelet rich plasma. Platelets contain growth factor and cytokines, which are thought to play a role in reducing inflammation and also aid the healing process. Autologous platelet rich plasma (APRP) has gained its importance in medical field since its first use in sports medicine and open heart surgeries. It is widely used in plastic surgery and in cosmetic medicine because of its wound healing properties.

The autologous platelet rich plasma, rich in growth factor can be used for the management of adult burns.

METHODS AND MATERIALS

This study was carried out in the department of Plastic Surgery in a tertiary care centre in South India after getting written informed consent from the patient and approval from the department. A 55 years old male presented to the casualty with 2nd degree flame burns in 15% of his total body surface area. (Fig. 1) Burn area was infiltrated with APRP. On further observation the burn wound healed without any complications.

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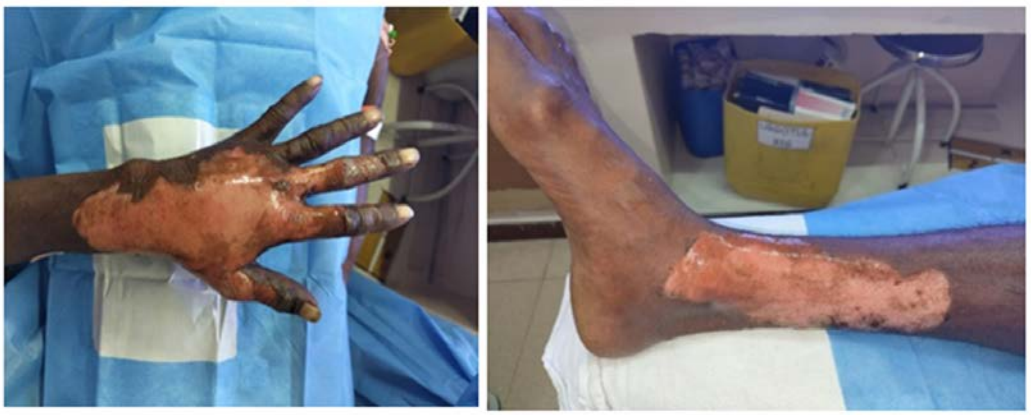

Fig. 1: Intial burn wounds

Technique of Autologous platelet rich plasma preparation followed was the standard technique as described by Franco *et al.* and Li *et al.*" The steps of Autologous platelet rich plasma preparation are as follows:

Step 1: A 10 ml of the patient's venous blood was taken and heparinized.

Step 2: Centrifugation at 3000 RPM continued for 10 minutes. Three layers formed in the tube at the end of 10 minutes.

Step 3: The upper layer of the three layers was aspirated using sterile needle and syringe.

Step 4: Re-centrifugation at 4000 RPM for 10 minutes. At the end of 10 minutes, the content separated into two layers.

The bottom layer is the plasma rich in platelets and was aspirated using sterile needle and syringe. The Autologous platelet rich plasma is infiltrated under all aseptic precautions to the burn wound site. (Fig. 2) The donor site was given compression dressing in the form of an elastocrepe bandage and the limb was kept elevated at the foot end with pillow for three weeks. The donor site was evaluated with Vancouver scar scale score at the beginning of each session.

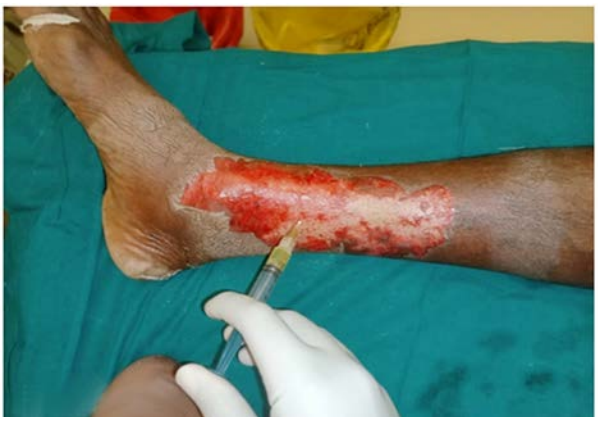

Fig. 2: Showing APRP in burn wound site

RESULT

Following 2 session of Autologous platelet rich plasma, the burn site healed without scarring (Fig. 3). The use of Autologous platelet rich plasma also decreased the hospital stay.

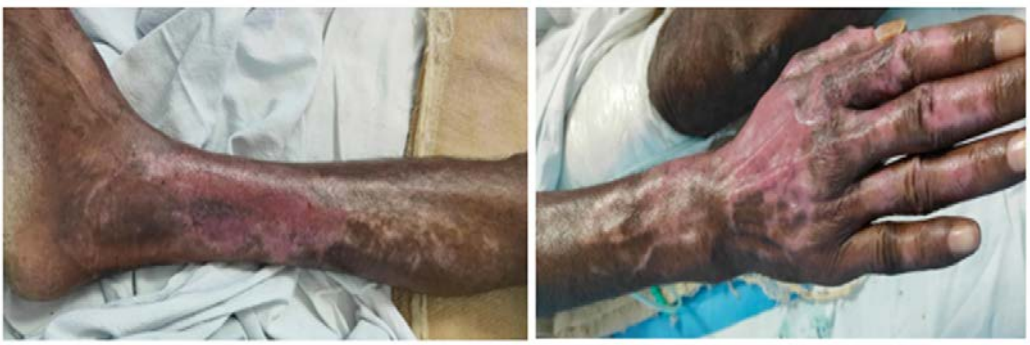

Fig. 3: At the time of discharge

DISCUSSION

Autologous platelet rich plasma (APRP) as the name implies refers to the plasma derived from the patient's own blood with a platelet count higher than the platelet count in the peripheral blood of the patient. Historically having been used to treat thrombocytopenia, the use in other specialities became wide spread with its use in sports medicine to treat musculoskeletal injuries. Its use in wound management results from the observation that wounds have a proinflammatory environment that impairs healing. In addition, wounds have a high protease activity that impairs functioning of growth factors. Autologous platelet rich plasma used in a chronic wound serves as a source of growth factors and thence has mitogenic, angiogenic and chemotactic properties. Autologous platelet rich plasma has also been shown to stimulate human dermal fibroblast proliferation and thus increasing the deposition of type I collagen, the above mechanism being proposed to its use in scar management.[1,3] Application of activated Autologous platelet rich plasma also provides 5 to 10 times the normal concentration of growth factors that include PDGF, VEGF, TGF-β locally also accelerating wound healing. Addition of calcium salts also helps in activation of platelets.[7,8,9]

Usually, around 1 to 1.5 ml of Autologous platelet rich plasma can be obtained from 10 ml of patient's blood. Hence, the disadvantage of the use of Autologous platelet rich plasma lies in its use in wounds of a large surface area that would require a large volume of blood which in a patient with a chronic non healing wound or a traumatic wound requires consideration.

CONCLUSION

Autologous platelet rich plasma is an effective measure in improving scar remodelling and is a good choice for treating burn wounds.

Conflicts of interest: None

DECLARATIONS

Authors' contributions: All authors made contributions to the article

Availability of data and materials: Not applicable

Financial support and sponsorship: None

Consent for publication: Not applicable

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Role of Onion Extract in Preventing Abnormal Scarring in Scald Injury

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ABSTRACT

Use of silicone derivative and onion extract had been reported in the prevention of abnormal scarring. Our study showed the preventive use of silicone derivative plus onion extract gel on abnormal scars after scald burns. Next to silicone based products, onion extract or cepalin has been highlighted as one potential anti-scarring agent over recent years. Based on several studies, onion extract alone or in combination with allantoin and heparin seems to alleviate the wound healing process and appears beneficial for preventional application in fresh scars. During each visit, pain and itching scores were graded by the patients and scar characteristics were observed by surgeons using the Vancouver scar scale (Table 1). Pain and itch score values from patients' who applied silicone derivative plus onion extract gel. No adverse events were reported by any of the patients. A silicone derivative plus onion extract gel is safe and effective for the preventing the abnormal scarring after scald burn injury.

Keywords: Onion extract; Scarring; Scald injury.

INTRODUCTION

Abnormal scarring like keloid and hypertropic scar treatment remains a challenging problem for clinicians. When scars are formed, physical conditions and emotions are affected. They may also cause significant functional and cosmetic impairment. Hypertrophic scars tend to cause itch and pain symptoms, which are responsible for a reduction in quality of life. Cost of treatment for these scars may also be expensive depending on individual factors such as genetic, type of wound and infection. The normal duration for treatment of scars is approximately 6 months and it may extend to 1-2 years so scar prevention therapy is an interesting alternative in the management of scars.

Onion extract is reported to have anti-inflammatory, anti-microbial, anti-proliferative, and regenerative activities. Several clinical trials have confirmed that this gel is well tolerated and helps prevent pathological scarring and improves preexisting scars. Quercetin from onion extract is found in various scar treatment products. It has anti inflammatory, bacteriostatic and collagen down regulatory properties. Topical agents, with a composition of silicone derivative plus onion extract in semi liquid gel form, may improve hypertrophic scarring. In this article, we present

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our experience in the preventive use onion extract gel for abnormal scars after scald injury.

MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery in a tertiary care institute. Informed consent was obtained. The patient under study was 37 year old male with no comorbidites presented with 2nd degree 5% TBSA involving head and neck (Fig. 1) due to accidental spillage of hot water over head under the influence of alcohol. He was unaware of the incident at that time. No one was with him at that time. He slept off and in the morning one episode of involuntary movement of both upper limb and lower limb. Patient admitted in Burns ICU, managed with antibiotics, IV Fluids, analgesics. Dressings done, regenerative therapies done and scar management (like onion extract and silicone sheet) done (Fig. 2). VSS score at the time of admission was 6/13. ENT, Ophthalmology, Neurology, Psychiatry consultations done. At discharge wound healed well and Video-dermoscopy done and scar VSS score at the time of discharge is 3/13.

Fig. 1: 2nd degree 5% TBSA involving head and neck

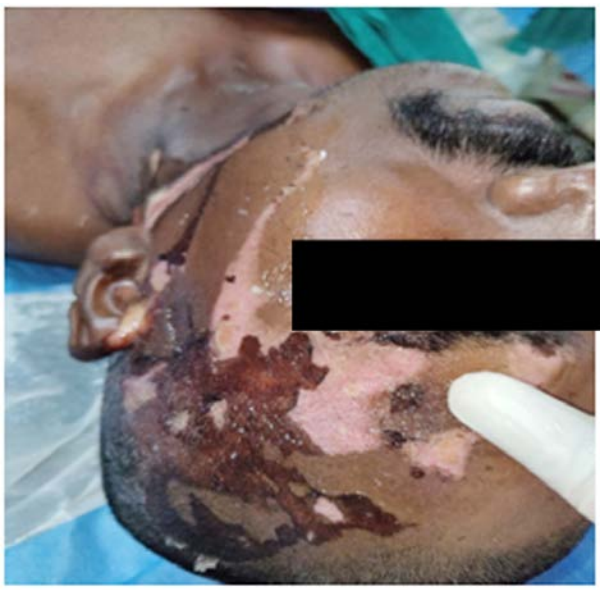

Fig. 2: Onion extract application

RESULT

It was found that onion extract gel has plausible efficacy in the prevention and treatment of scar formation. It could improve subjective symptomatic pain, itching symptoms and hyperpigmentation of scar.

DISCUSSION

Extractumcepae acts in an anti-inflammatory manner and is bactericidal.[1] It is currently believed that the flavonoids (quercetin and kaempferol) in onion extract play the main role in reducing scar formation through inhibition of fibroblast proliferation and collagen production.[2] Fibronectin expression was suppressed by quercetin suggesting a strong inhibitory effect of this compound on production of fibronectin.[3] Transmission electron microscopy was performed on keloid fibroblasts with and without quercetin.[4] Keloid fibroblasts without quercetin showed markedly higher density of ECM fibers in a homogenous ECM, but no ECM deposition was seen in the fibroblasts treated with quercetin, indicating a strong effect of quercetin in the suppression of ECM production and deposition by keloid fibroblasts.[5] It has been further demonstrated that several flavonoids

inhibit the antigen induced histamine release from human basophils, which may be of certain importance since there is evidence to the effect that histamine may accelerate collagen formation.[6] In the treatment of open wounds, scar prophylaxis using an onion extract gel should be delayed until complete epithelialization of the wound.[7] Treatment usually continues over several weeks to months.[8] While side effects are generally very low, treatment containing onion extract might be slightly irritating in facial areas, particularly in younger children.[9] Till to date, preventing pathologic scarring remains undoubtedly more effective than treating it. Next to specific surgical techniques and appropriate general after care of fresh wounds, a multitude of scar gels, creams, patches, and ointments are available and are being promoted for scarless wound healing. Next to silicone based products, onion extract or cepalin has been highlighted as one potential anti-scarring agent over recent years. Based on the recently published German guidelines on scarring, onion extract containing scar creams may be considered as additional therapy for active hypertrophic scars and for post surgical prophylaxis of excessive scarring.

CONCLUSION

Scarring following surgery or trauma is difficult to predict, and both physicians and their patients are highly concerned with minimizing scar appearance and value even small improvements in scarring as clinically meaningful. Although its underlying study data remains in part contradicting regarding its efficacy, onion extract containing scar creams appear to positively influence scar texture, height, and associated symptoms compared to placebo or untreated control.

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Review Article

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Innovative Skin Graft Harvesting Board

Furqan Mohammed Ahmed[1], Padmalakshmi Bharathi Mohan[2], Ravi Kumar Chittoria[3]

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ABSTRACT

Skin boards are a pair of wooden boards used during skin harvesting to flatten the surface and ease the passage of the oncoming skin knife. The skin board is used to tense the skin by pressing the board against the skin and then pulling the two boards apart therefore creating a tension on the skin and flattening the surface. For the easy passage of the knife a lubricant is used on the skin (example Vaseline). The conventional skin boards scrape away most of this lubricant while stretching the skin. A modification has been made to the conventional skin boards by adding small channels on the surface of the board which lets lubricant slide through it and thus the lubricant remains on the skin to be harvested. This modification does not reduce the capacity of the skin board to tense the skin and provides a flat well lubricated surface for the skin knife to pass.

Keywords: Innovative; Skin; Graft; Harvesting; Board.

INTRODUCTION

Skin graft is the cornerstone of plastic surgery. It was first performed by Reverdin and later modified by Brown *et al*. who described in detail full thickness, intermediate thickness and epidermal (Thiersch) grafts and pointed out the advantages and disadvantages of each. The basic principles of skin grafting remain the same till date.[1-6]

Skin grafts are used in a variety of clinical situations such as traumatic wounds, defects after oncological resections, burn reconstruction, scar contracture release, congenital skin deficiencies, hair restoration, vitiligo, and nipple areola reconstruction. Being such a versatile procedure, it is impervious that the technique for performing the skin graft should be refined till it reaches perfection. One such advancement is going to be discussed in the current article.[7-10]

Entional skin grafting uses two wooden boards to flatten the skin to ease the usage of the skin knife by proving a flat and smooth surface. However, the usage of skin board leads to lubricant being scrapped away from the surface of the skin. A modification has been made to the conventional skin board to include a number of small channels to the angled edge which comes in contact with the skin, so as to allow small streams of lubricant to pass through the channels and assist the oncoming

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skin knife.[11-15]

MATERIALS AND METHODS

A modification was made to the conventional skin board by including a number of small channels to the angled edge which comes in contact with the skin. The channels are spaced 1 cm apart and are 1 mm in depth. The result is to pass a small stream of lubricant through the channels and assist the easy passage of oncoming knife.

The skin board is usually made up of medical grade teak wood. The conventional skin board was taken to a wood worker and the channels were drilled in the board. Naturally only the board that is preceding the knife needs to have the channels. The board was subjected to the autoclaving and was ready for use in the operation theatre.

Fig. 1: The modified skin board with channels for the lubricant being shown in use

The patient was a 35-year-old male with no known comorbidities with a raw area over the left leg following electrical burn injury. The wound was initially treated with serial minimal debridement and negative pressure wound therapy. Clinically the wound had health granulation tissue with no active exudation and no signs of infection. The patient was posted for split skin grafting and the modified skin board was used for the same. It was noted that the ability of the board to tense the skin was in no way reduced. The lubrication was retained on the skin even after passing the skin board due to the channels.

DISCUSSION

Skin graft is one of the most indispensable techniques in plastic surgery. It is used in a variety of clinical situations, such as, traumatic wounds, defects after oncological resection, burn reconstruction, scar contracture, release, congenital skin deficiency, hair restoration, vitiligo and nipple areolar reconstruction.[16-18]

Split thickness skin grafts can be harvested by a free hand dermatome. A free hand dermatome offers a quick method of harvesting a skin graft that does not depend on electricity or pneumatic power; thus, it is useful in harvesting small and thin grafts. Infiltration of the subcutaneous tissue with tumnescent prior to using a motorized dermatome can facilitate skin graft harvest, especially when harvesting skin over a bony prominence. Also, lubrication with a small amount of lubricant, example vaseline ointment, makes it easier to harvest the skin by decreasing the friction between the skin and the dermatome.[19-20]

Skin boards are used to maintain tension and get a smooth flat surface for the skin knife to harvest a skin graft. However, in the usage of the skin board to create tension the boards are run over the donor site, removing the lubricant in the process.[21] The current modification helps in preserving the lubricant on the skin surface due to the presence of small channels on the board. The ability of the boards to create tension is in no way reduced. The skin knife was noted to pass easily due to the lubrication. The number of times the lubricant needed to be reapplied was also reduced.

CONCLUSION

The current modification helps in preserving the lubricant on the skin surface and helps in easier passage of the skin knife. We used this skin board in one patient and have found that it greatly improves the performance of the skin graft knife.

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Role of Autologous Platelet Rich Plasma in application of Full Thickness Skin Graft

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ABSTRACT

Autologous platelet rich plasma is the component of plasma containing concentrated platelets after graded centrifugation. It has various applications. Since time immemorial, skin grafting has been used for wound coverage. However, the healing process is longer and may be difficult, depending on the site, defect size, and patients' general condition, and is difficult to be carried out in patients who have limited donor sites & is associated with poor outcomes. Platelet rich plasma can be used in the management, to assist in the graft uptake, thus decreasing patient morbidity and improving the surgical outcome.

Keywords: Autologous platelet rich plasma; Full thickness skin graft; Management; Wound healing.

INTRODUCTION

A Full thickness skin graft (FTSG) is defined as a graft that contains the epidermis and dermis. Full thickness skin graft is the gold standard when it comes to management of a healthy raw area in face and regions where required small grafts. Unlike flaps, skin grafts do not have their own blood supply & must hence depend on a well vascularized wound bed for graft uptake. Full thickness skin graft survival depends on the blood supply of the edges of the wound. APRP is said to contain several growth factors such as platelet derived growth factor (PDGF), vascular endothelial growth factor (EGF) that have the ability to stimulate angiogenesis and stimulate fibroblast cell differentiation, enhance soft tissue healing.[1,2] In this case report, we highlight the role of Autologous platelet rich plasma (APRP) in the application of Full thickness skin graft.

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MATERIALS AND METHODS

The study was conducted in the department of plastic surgery in a tertiary care center in South India after obtaining the departmental ethical committee approval. Informed written consent was taken from the patient. 21-year-old male presented to the hospital with post burn contracture to the

left little finger with Metacarpo phalangeal joint subluxation. Patient had fire flame injury wherein, he inserted his hand in the hot firewood at 2 years of age, now presented with chief complaints of left-hand little finger functional deficit & painless deformity (Fig. 1).

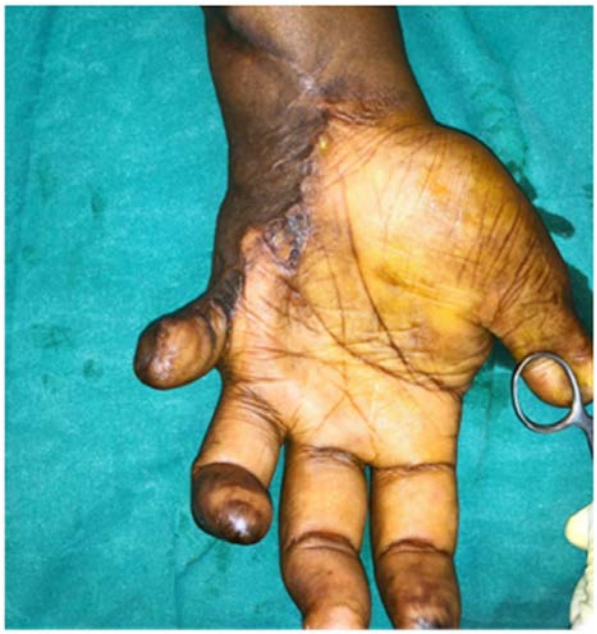

Fig. 1: Post burn contracture left little finger

Patient was admitted with the above symptoms & evaluated. He underwent Contracture release followed by full thickness graft from left groin. Pre-op X-ray shows Metacarpo-phalangeal joint subluxation. K-wire fixation of left little finger under fluoroscopic guidance. Once joint is fixed and raw area is created, it was grafted with full thickness graft taken from the right groin. Autologous platelet rich plasma was sprayed over the dermal side of the graft and also over the wound bed before fixing the full thickness skin graft over the raw area. (Fig. 2 and 3)

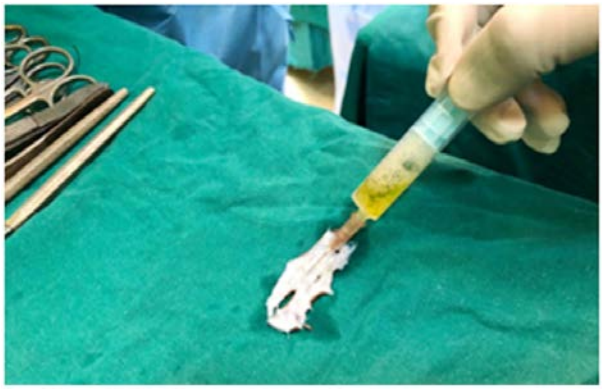

Fig. 2: APRP sprayed over the dermal side of skin graft

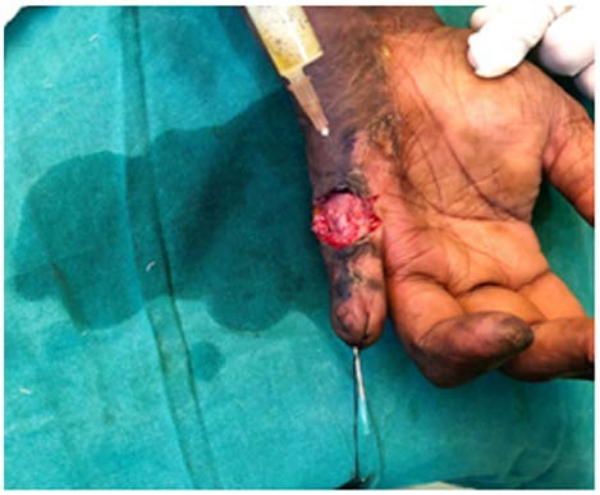

Fig. 3: APRP sprayed over the raw area before placing the skin graft

Full thickness skin graft was fixed with absorbable sutures at the edges of the raw area. (Fig. 4) Autologous platelet rich plasma was prepared by the following methods as described.

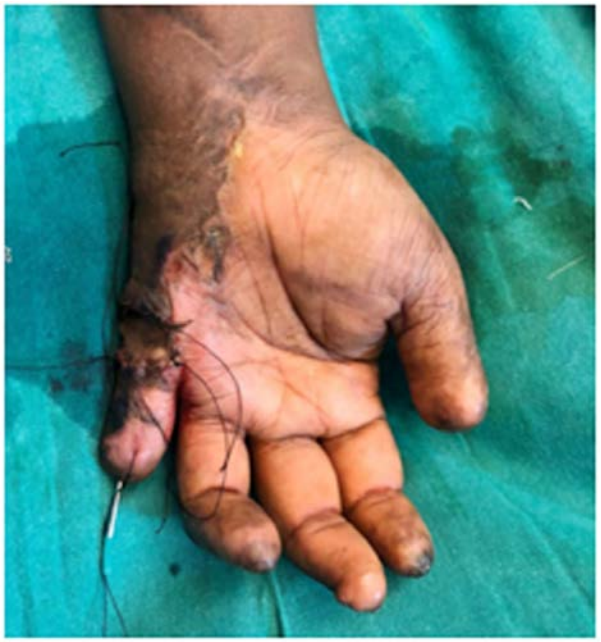

Fig. 4: Skin graft applied over the raw area

Steps of Autologous platelet rich plasma preparation were as follows: 10 ml of heparinized venous blood of the patient is taken and centrifuged at 3000 rpm for 10 minutes. The three layers are formed. The upper layer of the three layers, was taken and recentrifuged at 4000 rpm for 10 minutes. The content is separated into 2 layers. The bottom layer of the plasma is rich in platelets and is aspirated using 18 G needle.[3,4] Autologous platelet rich plasma was taken and used in our case.

RESULTS

Patient post-operative period was uneventful and showed unremarkable recovery. Graft uptake was good and wound site healed well. Patient discharged successfully.

DISCUSSION

Action of platelet is release of bioactive proteins responsible for attracting macrophages, mesenchymal stem cells, and osteoblasts. These cells are known to promote removal of necrotic tissue and enhances tissue regeneration and healing. It is also helpful in acceleration of wound healing.[5] Platelet Rich Plasma (PRP) is defined as a portion of the plasma having a higher concentration of platelet. It consists of platelets with clotting and growth factors. The APRP preparation method is simpler, requires little handling, and is not dependent on an anticoagulant or thrombin activator. The necessary items are conveniently available in a hospital. A special architecture that aids in the healing process is provided by the activity of autologous growth factors and the biomechanical stiffness of plasmatic proteins after fibrin formation.[6] In addition to fibrin, fibronectin, and vitronectin, growth factors from activated platelet alpha-granules also play a significant role in tissue repair. These growth factors are hepatocyte growth factor (HGF), fibroblast growth factor-b (FGFb), PDGF, vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), and angiopoietin-I.[7] Among these, PDGF and EGF are found to be the key growth factors that are involved in fibroblast migration, proliferation, and synthesis of collagen. Increased concentrations of PDGF & EGFis the probable reason for the accelerated wound healing, which is estimated to be at least 2–3 times faster than that of normal.[8,9] Similar mechanism of action is hypothesized to be seen in the case is APRP use in Full thickness skin graft. As grafts are tissues that are transferred without their own blood supply, they have to revascularize in the new site. This is clearly promoted by APRP. A major advantage of using of APRP is that it is extracted from the same patient, thus having almost nil chances of hypersensitivity, immunological reactions and transmission of blood borne diseases. Also, it is observed to be cost effective, and by improving the take of Full thickness skin graft, it reduces hospital stay for the patient, and thus decreases the patient morbidity & health care costs.

CONCLUSION

A PRP application for Full thickness skin graft has shown promising results and we propose that it can be used to improve outcomes on graft uptake. A larger, multicentric randomized control trial may be required to validate the same.

Conflicts of interest: None

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Availability of data and materials: Not applicable.

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Consent for publication: Not applicable

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Case of Lichen Planus Pigmentosus with Atypical Presentation: A Case Report

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ABSTRACT

Lichen planus pigmentosus (LPP) is a chronic pigmentary disorder that shows diffuse or reticulated hyperpigmented, dark brown macules and patches on the sun-exposed areas such as the face, neck and other flexural folds. Clinically, it is different from classical lichen planus because LPP has a longer clinical course and it manifests with dark brown macules. In case of LPP, involvement of the scalp, nail or mucosal area is rare. The histopathological findings of the lesions show an atrophic epidermis, the presence of melanophages and a vacuolar alteration of the basal cell layer with a sparse lymphohistiocytic lichenoid infiltration. Here we report a case of lichen planus pigmentosus over sun protected areas.

Keywords: Lichen Planus Pigmentosus; Pigment Incontinence; Sun protected areas.

INTRODUCTION

Lichen planus pigmentosus (LPP) was first described by Bhutani *et al.*[1] The lesions are small, brown, oval macules with diffuse borders. Later, they merge to form pigmented areas which are grey or brown. The pigmentation may be diffuse, reticulate, blotchy, or perifollicular. The patches are usually symmetrical in distribution but may be found in a segmental, zosteriform, or blaschkoid pattern.[2]

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CASE REPORT

A 21 year old male, waiter by occupation, hailing from Assam presented to the dermatology OPD with complaints of a symptomatic black discoloration mainly over back, neck, arms, thighs since 4 months.

Patient first noticed brown to black a symptomatic lesion over upper left scapular region which gradually spread to involve the entire back, abdomen, bilateral shoulders, lateral aspect of upper arm, buttocks, thighs and lower legs. There was no history of preceding erythema or erythematous borders over the lesions which is generally seen in Erythema Dyschronicum Perstans.

There was history of application of mustard oil all over body everyday in the night since 3 years

of age. Patient denies any history of long duration of sun exposure or outdoor activities as the lesions were mainly present over the sun protected areas sparing the sun exposed areas and flexural folds.

On examination multiple ill defined diffuse hyper pigmentation tending towards symmetry over back, bilateral shoulders, arms, buttocks, thighs and knees was seen. (Fig. a-f)

Fig. A: Absence of lesions over face, neck and hands.

Fig. B: Absence of lesions over face, neck and hands.

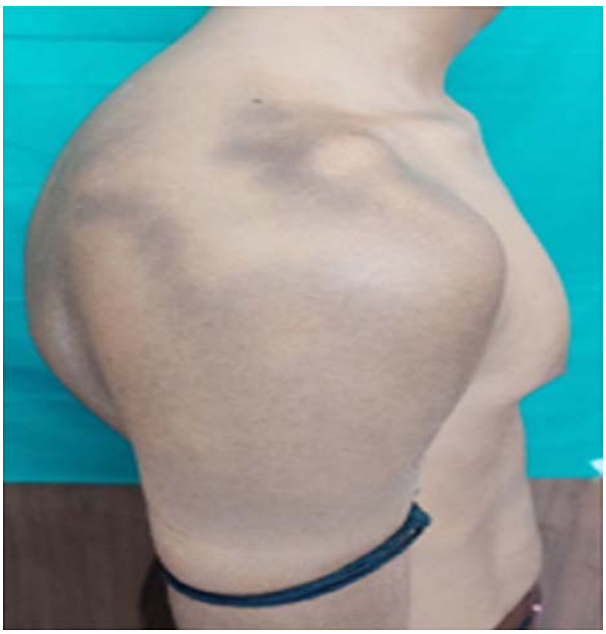


Fig. C: Depicts the presence of diffuse hyperpigmentation over arms, abdomen and back

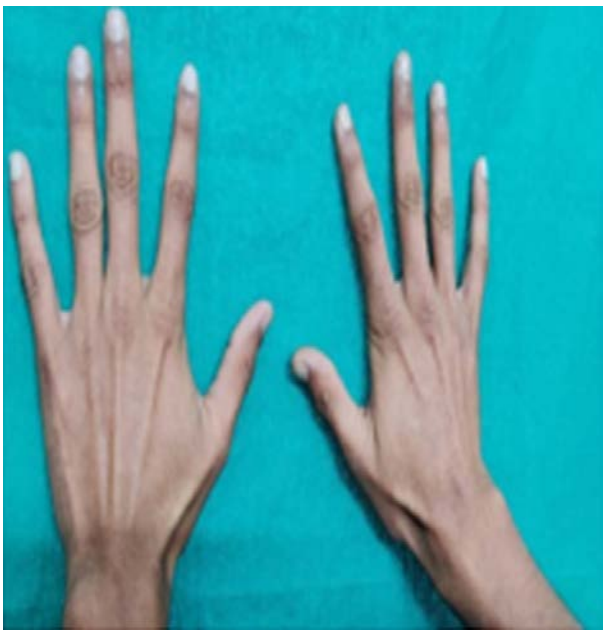


Fig. D: Absence of lesions over face, neck and hands.

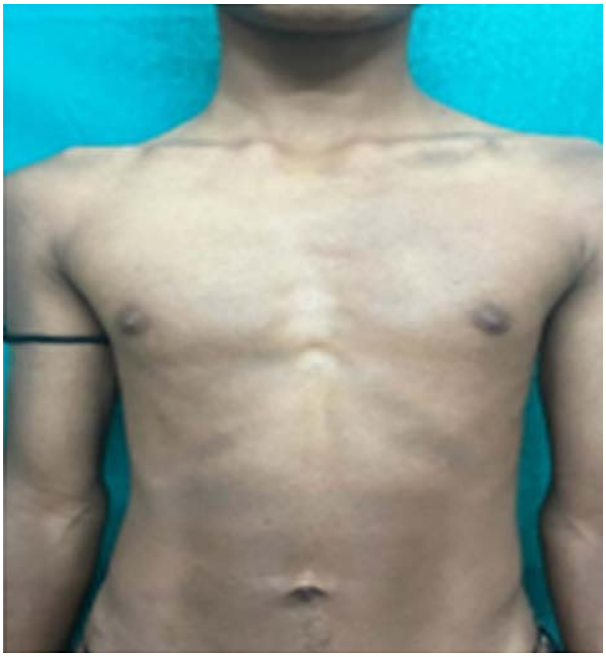


Fig. E: Depicts the presence of diffuse hyperpigmentation over arms, abdomen and back

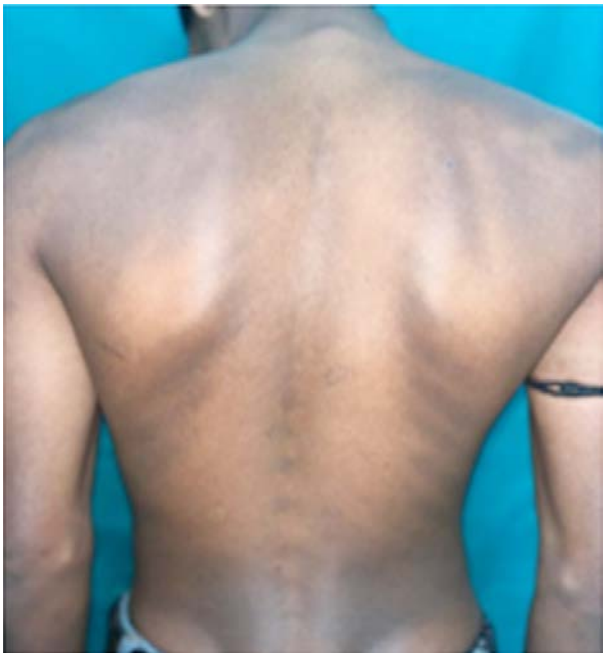
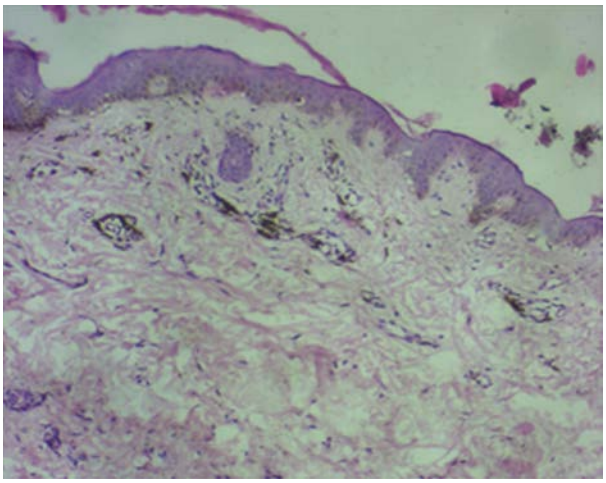


Fig. F: Depicts the presence of diffuse hyperpigmentation over arms, abdomen and back



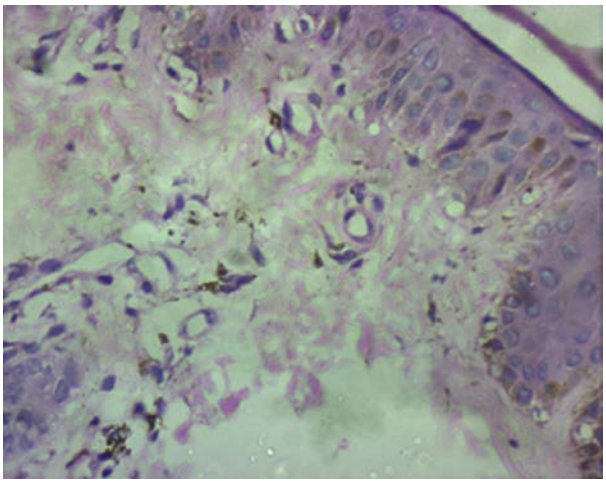


Fig. G & H: Histopathology of the skin lesions showed thinning of the epidermis, a superficial band like lymphocytic infiltrate with basal layer vacuolization and pigmentation incontinence in superficial dermis. Fig (g) HE 40x, Fig (h) HE 100x

There was complete sparing of face, intertriginous areas, forearm, legs, hands, feet, nails, oral and genital mucosa.

Histopathological examination shows sparse superficial perivascular lymphocytic infiltrate with numerous melanophages within the papillary dermis. The papillary dermis is slightly thickened and shows delicate fibroplasia and mucin. Overlying epidermis shows focal vacuolar change in the basal layer and infiltration of interface by lymphocytes. The epidermis is flattened at places. The findings were suggestive of Lichen Planus Pigmentosus.

DISCUSSION

Lichen planus pigmentosus is a chronic inflammatory pigmentary disorder.[1] LPP is essentially a disease of the adult, starting insidiously after the age of 30. It occurs in both sexes but shows a female preponderance. It has been reported to occur predominantly in people with darker skin. Although the etiology is essentially unknown, a number of agents have been reported to act as predisposing factors. The occurrence in exposed areas in many patients has led to the proposition

that sunlight may be a principal etiological agent mustard oil which contains the potential photosensitizer allyl thiocyanate, amla oil where photosensitivity may be caused by fragrances, cosmetic agents such as kumkum, hair dyes, etc. Abnormalities in T lymphocyte functions have also been implicated.[2-6]

Morphological variants described in order of frequency from highest to lowest are diffuse, reticular, blotchy, perifollicular, segmental, zosteriform and linear.[8-11] Another variant is LPP inversus which was described in 2001 by Pock et al., defining it as a variant of LPP limited to intertriginous and flexural regions, sparing sun exposed areas.[12, 13]

Dermoscopy shows with discrete brownish to bluish grey dots, globules, blotches, rods and white lines against a diffuse brownish background. Brown indicates epidermal pigmentation while the grey and blue dots indicate melanin incontinence in papillary and reticular dermis, respectively.[14,15]

The histologic findings of LPP show hyperkeratosis and atrophy of the epidermis with vacuolar degeneration of the basal layer. A perivascular lymphohistiocytic infiltration and pigmentary incontinence in the dermis are also noted.[3,9]

The most common differential diagnosis of LPP include Idiopathic eruptive macular pigmentation, Erythema Dyschromicum Perstans, Riehl's melanosis, Ochronosis, Hori nevus, Fixed drug reaction and Post-inflammatory Hyper pigmentation.[16,17]

Table 1: Depicts few differentiating features of the mentioned differential diagnosis.

Differential Diagnosis	Comment
Idiopathic eruptive macular pigmentation	Occurs in younger patients. Brown to grey macules start in the middle area of the trunk and then spread to proximal areas of the limbs. Histopathology reveals pigmentation of the basal layer with mild perivascular inflammatory infiltrate. It is an epidermal hypermelanosis and does not show significant melanophages in the papillary dermis. [16,17,18]
Ashy dermatosis/erythema dyschromicum perstans	EDP presents with blue-grey, regularly shaped, hyperpigmented macules compared with dark brown, irregularly shaped, and ill-defined hyperpigmented macules in LPP with erythematous raised active borders. Histopathological evaluation reveals superficial dermal melanin and melanophages in LPP, whereas EDP usually has deep dermal melanophages, giving rise to the characteristic brown–grey color in LPP and the bluish-grey hue in EDP.[16, 19,20]
Riehl's melanosis/pigmented contact dermatitis	Characterized by facial hyperpigmentation, most pronounced on the forehead and in the zygomatic and/or temporal region. A correlation with clinical history of contactants and positive patch testing is necessary.[16,17]
Ochronosis	History of hydroquinone use at high concentration for a prolonged period, most commonly on the face. Usually does not affect neck and flexural areas.[16]
Hori nevus	Bluish-grey or dark brown 2–5 mm macules caused by dermal melanocytes affecting the cheeks, temples, or forehead. Biopsy confirms diagnosis.[16]
Fixed drug reaction	Round, initially erythematous macules with history of medication intake prior to onset.[16]
Post inflammatory pigmentation	Previous history of dermatosis which leaves pigmentation as it subsides.[16]

CONCLUSION

This case exhibited an atypical clinical variety of LPP, including a wide region of grey brown patches occurring on the photo protected sites sparing the sun exposed and intertriginous areas showing characteristic histologic features of Lichen Planus Pigmentosus.

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Role of Topical Sucralfate in Wound Management

Pradossh[1], Ravi Kumar Chittoria[2], Bharat Prakash Reddy J[3]

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ABSTRACT

A wound is a typical issue after a burn, injury, or infection. There are numerous ways to stop the infection and cover the exposed skin. However, there is no proven technique to quicken the rate of wound healing. The treatment of duodenal and stomach ulcers using sucralfate. Recent studies have demonstrated the efficacy of sucralfate as a topical medication for the healing of a variety of epithelial wounds, including burn wounds, ulcers, inflammatory dermatitis, and mucositis. This article emphasises the function of sucralfate in treating wounds.

Keywords: Topical; Sucralfate; Wound; Management.

INTRODUCTION

The wound is a regular issue that doctors run with. There are many approaches with varied degrees of success. The T.I.M.E. concept, which stands for Tissue management, Infection control, Moisture regulation, and wound edge management[1], is used to manage wounds. It comprises managing tissues, preventing infections, controlling moisture, and managing wound edges. Duodenal and stomach ulcers have traditionally been treated with sucralfate. Studies have revealed a positive impact on skin lesions.[2] In this paper, we discuss our experience using sucralfate to treat a case of post road traffic accident (RTA) raw skin over the right lower limb.

MATERIALS AND METHODS

After receiving approval from the departmental ethical committee, this study was carried out in the Department of Plastic Surgery at the Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER). The patient provided written informed consent. This case report describes the application of sucralfate to a right lower leg with a raw area reaching from the knee to the ankle following RTA.[3] The patient, a 57-year-old man, had a case of raw skin over his right lower limb following an RTA.

No prior history of co-morbidity existed. On the wound, sucralfate cream was evenly administered. The non-adherent dressing was applied over it. The dressing was removed every third or fourth day, and the wound was evaluated.

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RESULTS

After the application of sucralfate, the wound started granulating, the amount of slough and pus discharge also reduced. No adverse local or systemic effect was noted with the use of sucralfate therapy.

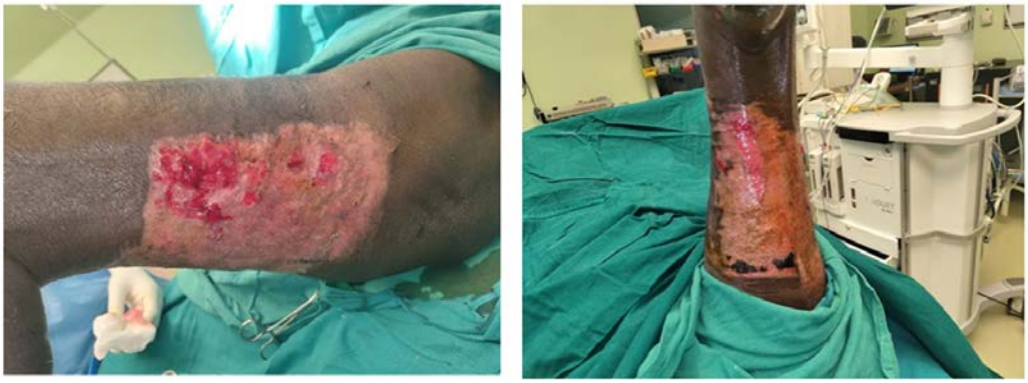

Fig. 1: Raw area which ishealed after application of sucralfate

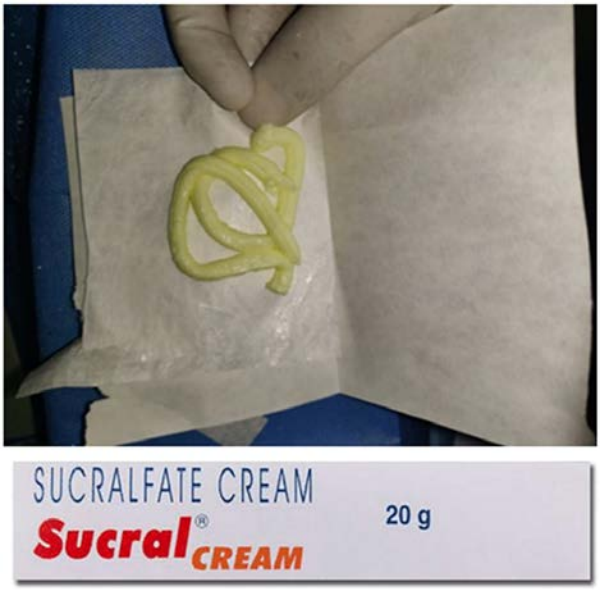

Fig. 2: Sucralfate application

DISCUSSION

Conventionally, wound healing is broken down into four phases: the hemostasis period, the inflammatory phase, the proliferative phase, and the maturation phase. These stages cross over one another. The haemostasis phase, which results in the creation of the platelet block, starts quickly after the injury. Several growth factors are released as a result of platelet and complement system activation, which starts the inflammatory phase. This phase is characterised by the recruitment of leucocytes, initially neutrophils, then lymphocytes, and finally macrophages. Platelet derived growth factor (PDGF), transforming growth factor (TGF-beta and TGF-alpha), basic fibroblast growth factor (bFGF), vascular endothelial growth factor (VEGF), etc. are only a few of the growth factors that macrophages release. These growth factors drive maturation, angiogenesis, collagen and extracellular matrix (ECM) synthesis, and proliferation. An imbalance of growth factors results in a wound that does not heal, preventing these stages from developing or stopping them at a different stage. It is generally known that sucralfate plays a role in gastric and duodenal ulcers. It adheres to the bile acids, coats the ulcer, and creates a mucus gel. The role of sucralfate in various ulcerative lesions has been investigated. According to certain research, it aids in the recovery of chronic venous ulcers. In second and third degree burns, sucralfate has been found to speed up epithelialization and encourage the growth of healthy granulation tissue. Additionally, it shields against radiation induced ulcers and aids in their recovery. The component of activity by which sucralfate helps in injury mending is complex. Sucralfate boosts angiogenesis, granulation tissue, and re-epithelialization by increasing the bioavailability of growth factors and prostaglandins and decreasing the synthesis of oxygen free radicals. In our case, we applied sucralfate cream locally and noticed a reduction in necrotic tissue and an acceleration in the appearance of granulation tissue, both of which indicate rapid healing. The economically accessible sucralfate cream like wise contains xylocaine that aides in help with discomfort too. Its application had no negative effects. An imbalance in growth factors is what stops these phases from happening on time or at a different level in a wound that is

not healing. It is well known that sucralfate can cause gastric and duodenal ulcers. It adheres to the bile acids, forms a mucus gel, and covers the ulcer. Sucralfate job in a few other ulcerative sores has been examined. According to some studies, it aids in the healing of chronic venous ulcers. In burns of the second and third degree, sucralfate has been shown to speed up the process of epithelialization and encourage the growth of healthy granulation tissue. It also helps heal ulcers caused by radiation and prevents them. There are many different ways that sucralfate aids in wound healing. Sucralfate boosts angiogenesis, granulation tissue, and re-epithelialization by increasing the bioavailability of growth factors and prostaglandins and decreasing the synthesis of oxygen free radicals. In our case, we applied sucralfate cream locally and noticed a reduction in necrotic tissue and an acceleration in the appearance of granulation tissue, both of which indicate rapid healing. Xylocaine, which also aids in pain relief, can be found in the sucralfate cream that is available for purchase. No unfavorable impact was noted with its application.

CONCLUSION

In this study, we found that sucralfate has a role in the healing of the wound and the wound heals at a faster rate. But since it is a single case study, a definite conclusion cannot be made. Large randomized control trials are required to confirm the efficacy of sucralfate in wound healing.

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All authors made contributions to the article

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Not applicable

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None

Consent for publication:

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