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Contents

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Role of Feracrylum in Burn Wound Management

Deepak Ranjan Patro[1], Ravi Kumar Chittoria[2], Amrutha J S[3]

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Abstract

Thermal burns are skin injuries caused by excessive heat, typically from contact with hot surfaces, hot liquids, steam, or flame. Most burns are minor and can be treated as outpatients or at local hospitals. Approximately 6.5% of all burned patients receive treatment in specialized burn centers. Thermal burns are the most common type of burn injuries, making up about 86% of the burned patients requiring burn center admission. In this case we will assess the role of feracrylumin the management of burn wound. Feracrylum solution is a novel topical hemostatic agent, for use in control of oozing in various surgical procedures. It also possesses antimicrobial properties and decreases the wound infection.[1]

Keywords: Thermal burns, Feracrylum.

INTRODUCTION

About 86% of burns are thermal burns (43% from fire/flame, 34% from scalds, 9% from hot objects), 4% electrical burns, 3% chemical burns and 7% are other types of burns. Thermal burns cause both local injuries and if severe (> 20% of body surface area) a systemic response. The local injuries can be roughly separated into three zones of injury analogous to a circular target pattern. The innermost injury is the zone of coagulation or necrosis, representing the area of irreversible cell death. Surrounding this is the zone of ischemia or stasis, representing an area of decreased circulation and an area at increased risk of progression to necrosis due to hypoperfusion or infection. The outermost area is the zone of hyperemia, representing an area of reversible vasodilation and an area that usually returns to normal. In clinical practice, burns are dynamic injuries that may progress over hours to days, making it difficult to accurately determine the various zones during the early course of the injury. Large burns (>20% body surface area) also cause a systemic response from the release of inflammatory and vasoactive mediators. Fluid loss locally at the burn site, from oozing, blister occurs. Apart from fluid loss, continuous oozing can retard healing and can be a source of infection.The

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ultimate goals of burn restoration techniques are to conceal injuries, reestablish function, and maintain appearance. The three main surgical procedures for managing a wound are excision, grafting, and reconstruction.[3] Early excision and skin grafting minimize necrotic and diseased tissue while simultaneously enabling the first acute covering of burns. To prevent oozing from wound and promote wound healing, Feracrylum can be used. Feracrylum is a watersoluble mixture of incomplete ferrous salt of polyacrylic acid containing 0.05 to .5% of iron which acts as effective, safe and reliable topical haemostatic agent. It also possesses antimicrobial properties thereby decrease the risk of wound infection. Feracrylum is biocompatible, biodegradable and hygroscopic in nature.[2]

MATERIALS AND METHODS

This study was conducted in tertiary care centre in department of plastic surgery after getting the department ethical committee approval. Informed consent was obtained. The subject was a 58 year old female who sustained accidental fire injury leading tosecond degree scald (superficial+deep) burns involving buttocks, anterior abdomen and chest, right upper limb, right lower limb 25% TBSA (Fig. 1). After initial resuscitation and stabilization, serial

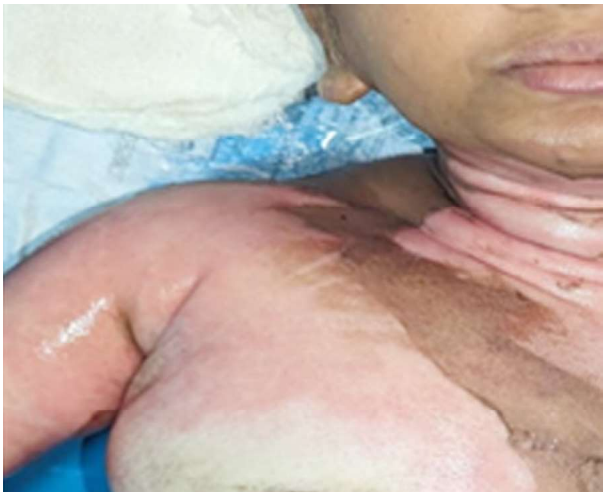

Fig. 1: Use of Fevacrylum during first debridement

wound debridement, APRP, LLLT, Feracrylum application and regenerative scaffold dressing was done. Wound covered with SSG, dressing with Feracrylum (Fig. 2) and regenerative scaffold and NPWT continued. Graft uptake was good, no wound complications observed.

Fig. 2: Application of feracrylum solution

RESULTS

Intra-operative and post-operative periods were uneventful for the patient. Graft taken well. No signs of wound discharge/infection noted throughout the hospital course.

DISCUSSION

During phases of burn wound healing, there is inflammation which lead to vasodilation, increases capillary permeability, and persistent oozing from the wound. The secretions can cause significant fluid and protein loss, retard wound healing, and promote microbial growth. Feracrylum has three ways Action for wound care

1. ***Haemostatic Action 3:*** It causes activation of thrombin (Factor IIa) which is a serine protease that converts soluble fibrinogen into insoluble strands of fibrin thus forming clot as well ascatalyzing many other coagulation related reactions in blood coagulation. Also, feracrylum on coming in contact with blood proteins especially albumin, it forms a biodegradable water insoluble synthetic complex creating a large rubbery clot which forms a physical barrier on wound surface and stops capillary bleeding and oozing in 2-3 minutes. Itis non allergic with no systemic absorption.
2. ***Antimicrobial Action:*** Feracrylum is not only haemostatic but also anti-infective against anumber of Gram-positive and Gram-negative pathogenic, bacterial and fungal strains like Staphylococcus aureus, Streptococcus pyogenes, Corynebacterium

dipth eriae, Salmonellatyphi, Shigella dysentriae, Pseudomonas aeruginosa, Proteus vulgaris, Escherichia coli, Trichoderma viridae and Candida albicans. It ruptures microbial cell wall causing cell lysis. Feracrylum is superior to povidone iodinefor its antimicrobial properties and its efficacy is comparable to that of povidone iodine. Feracrylum decreases risk of wound infection which delays wound healing.[4,5]

CONCLUSION

Feracrylumplays a role in burn wound healing in burns. It helps in promoting the wound healing process. It helps in better healing of second degree superficial burns and wound bed preparation for deep burn wounds for further intervention.

Conflict of Interest: None declared.

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Skin Pigmentation Disorders

Pranjal Soni[1], Ravi Kumar Chittoria[2], Barath Kumar Singh P[3]

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Abstract

Many pigmentary skin illnesses influence appearance, mental health, and social functioning. The main skin pigmentations include hyperpigmentation and hypopigmentation. Clinically, albinism, melasma, vitiligo, Addison's disease, and post-inflammatory hyperpigmentation from eczema, acne vulgaris, and drug interactions are the most common skin pigmentation problems Anti-inflammatory, antioxidant, and tyrosinase-inhibiting medications cure pigmentation. Oral and topical medications, natural therapies, and cosmetic products can help. This review covers pigmentation types, causes, and treatments.

Keywords: Skin, Pigmentation disorders, Hypopigmentation, Hyperpigmentation.

INTRODUCTION

Human skin pigmentation and melanin synthesis vary greatly due to genetics, UV exposure, and medicines. Many pigmentary skin diseases affect patients' appearance, mental health, and social functioning. The two main skin pigmentation types are hyperpigmentation and hypopigmentation.[1] Albinism, melasma, vitiligo, Addison's disease, and post-inflammatory hyperpigmentation from eczema, acne vulgaris, and drug interactions are the most frequent skin pigmentation disorders in clinical practice. Pigmentation can be treated using anti-inflammatory, antioxidant, and tyrosinase-inhibiting drugs. Oral and topical drugs, natural therapies, and cosmetic products can treat skin pigmentation, but a doctor should be consulted before starting any new treatment. This review covers pigmentation varieties, causes, and treatments.

MATERIALS AND METHODS

This investigation was done in a tertiary care plastic surgery department. This review article examines 30 papers on disorders related with skin pigmentation disorders from Scopus, PubMed, Google scholar, and the internet.

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RESULTS

Based on the inclusion criteria 30 articles were studied to discuss Skin pigmentation disorders under following headings:

1. Background
2. Pathophysiology
3. Management
4. Conclusion

DISCUSSION

Background

Melanin production determines skin colour. Melanocytes in the epidermis produce eumelanin and pheomelanin. Pheomelanin lightens skin, while eumelanin darkens it. The dark brown pigment eumelanin absorbs UV rays, protecting the skin from sunburn. Lighter skin tones have lower eumelanin levels than darker ones. Another benefit of eumelanin is skin cancer prevention.[1,2] Pheomelanin is lighter yellow-red. Higher levels of pheomelanin cause lighter skin tones and sunburn because it absorbs UV rays less effectively than eumelanin. Melanoma and other skin cancers can be prevented by pheomelanin. Melanin synthesis for the melanocortin G-protein-coupled receptor 1 (MC1R) is controlled by gene locus q24.3 on chromosome 16. The MC1R gene controls tanning, skin and hair colour, and melanoma risk. Genetics, sun exposure, and melanocyte-stimulating hormones such ACTH, lipotropin, and MSH produce this variance (MSH). More melatonin causes greyish-brown skin. The MC1R gene controls tanning, skin and hair colour, and melanoma risk.

Pathophysiology

Genetics, UV exposure, and drugs cause most skin pigmentation. The formation mechanism has these phases. UV creates free radicals. Both free radicals and UV radiation activate biological molecules that affect melanocytes, which produce pigment.[2,3] Tyrosinase converts tyrosine into red or brown melanin pigments. Tyrosinase, which produces colour, is activated by biological molecules. Melanin is lost when skin cells reach the surface and are shed during exfoliation. Skin colour comes from melanin granules from adjacent keratinocytes. Multiple drugs can lighten skin pigment. Antibiotics increase melanin production and skin colour. Skin pigmentation may increase with birth control tablets.

Causes of Hypopigmentation

Most cases of low melanin concentration are caused by skin trauma like blisters, infections, burns (Figure 1), chemical exposure, and other lesions. After healing, injured skin is paler than surrounding skin. Genetic disorders can cause skin hypopigmentation in other areas. Albinism, melasma, fungal infections, pityriasis versicolor, alba, and vitiligo can cause hypopigmentation. Albinism is caused by low melanin content at birth. Albinos have white skin, dark blue eyes, and white hair. The hereditary melasma disorder can generate brown or blue-gray patches on the arms or face. Hormones, sun, and contraceptives can cause hypopigmentation. Although the Malassezia genus causes tinea versicolor, commonly known as pityriasis versicolor, fungi can infect humans and change their skin color. Malassezia alters skin melanin pigmentation, causing little discolorations. Pityriasis alba, a skin ailment affecting adolescents and teens, causes oval or circular hypopigmented lesions with soft scales. Darker skin makes face, upper body, and arm lesions more visible, which may be slightly erythematous before becoming hypopigmented. A common hypopigmented skin disorder is depigmentation, when the skin gets completely white. Vitiligo, an auto-immune disorder, causes depigmentation by causing melanocyte loss and white chalky macules on the skin. Vitiligo develops smooth, white skin areas. Vitiligo is often overlooked. Pityriasis alba, a skin ailment affecting adolescents and teens, causes oval or circular hypopigmented lesions with soft

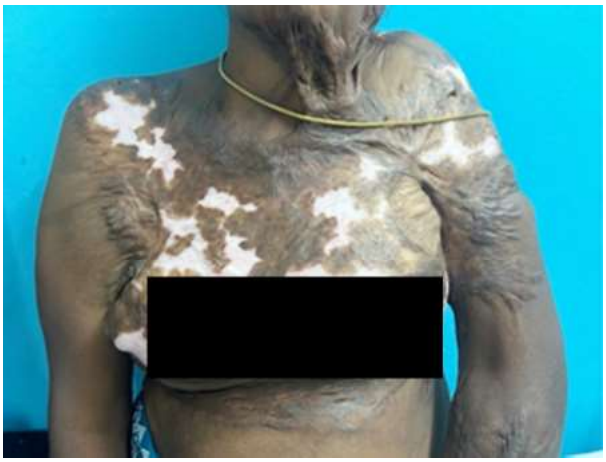

Fig. 1: Hypopigmentation patches in the burns scar

scales. Darker skin makes face, upper body, and arm lesions more visible, which may be slightly erythematous before becoming hypopigmented. Vitiligo, an autoimmune disease that causes depigmentation, is characterized by white chalky macules on the skin and melanocyte loss.

Causes of Hyperpigmentation

Chloasma and melasma are hormonal hyperpigmentation (Figure 2). Oestrogen and progesterone, which increase melanin synthesis under sunlight, are responsible for this condition, which is common in women. Hyperpigmentation results from hormone replacement therapy. Melanocyte counts diminish with aging, while remaining cells proliferate and specialize. These physiological changes show how aging becomes more apparent after 40. Post-inflammatory hyperpigmentation occurs after chemical exposure, burns, wounds, psoriasis or atopic dermatitis, and acne. After healing, the skin is blacker and discoloured. Papules, pustules, and acne can infect the dermis. Skin illnesses that increase melanin synthesis cause dark patches. Similarly, fatty gland and hair follicle infections produce hyperpigmentation. Hyperpigmentation rarely occurs with mild acne. Squeezed, squashed, or pierced acne lesions deepen and colour. Pregnancy-related birthmarks, age spots, acne scars, and antibiotics, birth control medications, antimalarials, and tricyclic antidepressants can induce hyperpigmentation.[2,3] The rare disorder Addison's disease causes black skin patches and diminished adrenal gland activity. Laser or light treatment may cause hyperpigmentation.

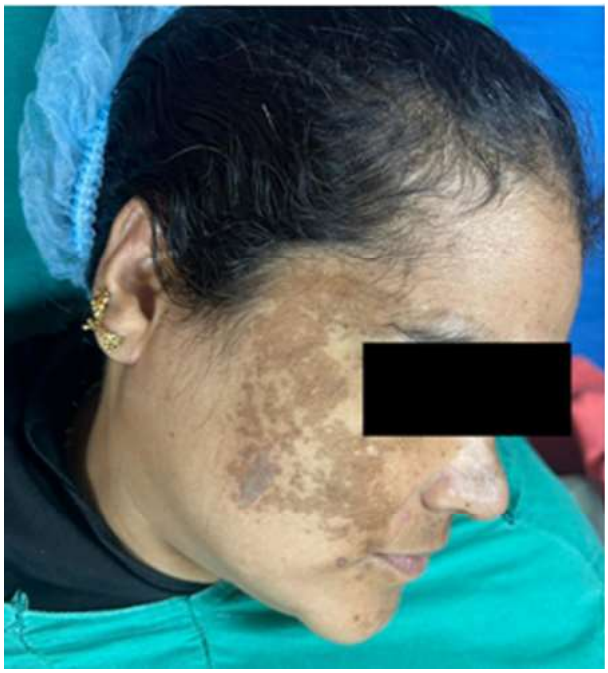

Fig. 2: Hyperpigmentation patches over the cheek

MANAGEMENT

Measurement of Pigmentation

A Mexameter MX16 narrow band reflectance spectrophotometer measured pigmentation on damaged and unaffected skin on each face. The Melasma Area and Severity Index (MASI) measured melasma severity.

Drugs for Treatment of Skin Pigmentation

Tranexamic Acid

Tranexamic acid reversibly shuts off plasminogen lysine binding sites, preventing the plasminogen activator from converting it to plasmin. This lowers abnormal fibrinolysis and blood loss. Tranexamic acid aids tyrosinase in untangling, according to recent studies. Hyperpigmentation may be prevented by lowering melanin synthesis.[4,5] This frequently utilized pharmacological method is effective against pigment spots and easy to access. Histological examination confirmed significant decreases in mast cell counts, vessels, and epidermal pigmentation. Oral tranexamic acid is a safe and effective melasma treatment.[6,7]

Isotretinoin

Isotretinoin is the 13-cis-retinoic acid derivative of vitamin A, in treating acne vulgaris, oral isotretinoin exerts its effects by reducing sebaceous gland activity, the development of Propionibacterium acnes, and inflammation. This facilitates pore cleaning, and inhibits the growth of new lesions. The administration of 20 mg of Accutane (isotretinoin) orally. They are applied directly to the affected area, and can lighten or darken the skin. The main advantage of topical creams is that they can be used at home, and do not require a trip to the doctor. Additionally, they are typically less expensive than oral medications.[8,9,10]

Salicylic Acid

Salicylic acid, podophyllum resin and podofilox are a few examples of topical keratolytics that are administered topically to the skin, to soften keratin.

This facilitates the peeling of skin cells, supports the skin's capacity to retain moisture, and aids in the treatment of dry skin conditions, and is generally used to treat skin diseases, such as psoriasis, warts, keratoses, and acne. Because of its keratolytic qualities, salicylic acid, a lipophilic B-hydroxy acid, is frequently used in cosmetic product formulations as a skin scaler for lightening. Arachidonic acid is reduced from converted prostaglandins and thromboxanes by COX1 and COX-2 inhibitors. Salicylic acid also has anti-inflammatory and antibacterial effects.[11] Twenty Latin American women over the age of 18 with moderate to severe bilateral melasma participated in a small, potential randomized controlled trial to compare the efficacy of salicylic acid 20–30% scaler every two weeks, followed by up to eight weeks, in combination with hydroquinone 4% twice daily for 14 weeks, versus hydroquinone 4% alone.

Topical Steroids

Topical steroids are the most often recommended drug in dermatology. The dosage varies from one to three times per day. Betamethasone 0.05% and clobetasol 0.05% are examples of topical steroids. The NF-Kappa B inhibitors betamethasone and clobetasol are glucocorticoids that prevent neutrophil apoptosis and demarginating. Betamethasone and clobetasol are phospholipase A2 inhibitors, which also reduce the production of arachidonic acid derivatives.[12]

Tri-Luma Combination cream

Tri-Luma, a triple combination cream is sold that includes the active components tretinoin, hydroquinone, and fluocinolone in concentrations of 0.01%, 4%, and 0.05%. Hydroquinone is the most frequently used skin-lightening or depigmenting substance. It treats dyschromic skin diseases such as melasma, chloasma, freckles, and post-inflammatory hyperpigmentation, by suppressing melanin production. It stops tyrosinase from converting L-3, 4-dihydroxyphenylalanine into melanin, due to its structural similarity to a specific analogue of melanin. Retinol cures skin aging. It has been shown that it might be beneficial for concerns related to skin aging.[13-15] Antimicrobial creams and ointments like silver sulphadiazine were also used in preventing the pigmentation disorders in burn injuries.

Curcumin

The antioxidants in turmeric extract can help prevent skin aging and pigmentation diseases like melasma by neutralizing free radicals. Curcumin also lightens skin. It reduces hyperpigmentation and lightens skin by reducing tyrosinase production. Turmeric contains curcuminoids, which gently exfoliate dead skin cells and promote skin regeneration, reducing hyperpigmentation and black spots. The study indicated that turmeric extract reduced skin inflammation and improved skin health in psoriasis, eczema, and acne patients.[16]

Ruxolitinib

Ruxolitinib has a low affinity for JAK3, but is a solid and selective inhibitor of JAK2 and JAK1. Ruxolitinib reduces the plasma levels of pro-inflammatory cytokines, and inhibits myeloproliferative neoplasms by downregulating the JAK-STAT pathway. Randomized controlled trials recommended using ruxolitinib 1.5% cream for treating vitiligo twice daily in various patients.[17] This was shown to demonstrate clinically excellent re-pigmentation of all body areas, including the acral region, after 24 weeks, with continued improvement through week 52.[18]

Plant-based and Natural Remedies

Vitamin A, B, C, and E are essential for healthy skin and can treat pigmentation. Each vitamin, found in foods or supplements, offers benefits. The most common vitamins in cosmetics are niacin, pantothenic acid, and biotin.[19] Vitamin niacinamide, used in facial creams and masks, reduces enlarged pores, fine wrinkles, and dullness. Pantothenic acid moisturizes dry, flaking skin. Biotin is in many hair, nail, and skincare products. Vitamin C, an antioxidant, inhibits tyrosinase by binding to copper and reducing the oxidative polymerization of melanin precursors, preventing melanin formation in the melanogenesis pathway. Turmeric extract has been used therapeutically since ancient times. Due to curcumin, it has health benefits for pigmentation and skin issues and a yellow colour. Curcumin reduces skin inflammation caused by psoriasis and eczema due to its anti-inflammatory properties.[20,21]

Natural Oils

Natural oils protect skin from environmental factors, reducing discolouration. Antioxidants and fatty acids in rosehip, jojoba, and argan oils reduce inflammation and brighten skin. Aloe vera lightens skin and treats hyperpigmentation without

side effects.[22,23] In single segment and emulsion structures, jojoba oil provides excellent lubricity without being oily or greasy. It can also help the skin regulate water during transpiration, lowering evaporation without blocking gases or water vapor. The study found that skin surface elasticity increased within 5 min and lasted for hours, suggesting a use in dry skin remedies. Jojoba liquid wax treated diaper rash as well as triamcinolone acetonide, nystatin, neomycin, and gramicidin. Additionally, jojoba oil reduces inflammation. It also possesses anti-acne and anti-psoriasis properties that dissolve sebum deposits in hair follicles by infiltrating them, removing comedones, and clearing the skin.[24,25]

Green tea extract

Green tea extractis anti-inflammatory, skin-protective, and rich in polyphenols and antioxidants. Green tea extract treats pigmentation and skin disorders in several ways. Green tea antioxidants catechins and epigallocatechin gallate (EGCG) fight free radicals that damage skin and accelerate aging. Green tea extract contains powerful anti-inflammatory properties that can reduce acne, eczema, and rosacea skin irritation. EGCG in green tea extract inhibits tyrosinase, lowering melanin synthesis and lightening skin. In addition, green tea extract may protect against UV radiation, which can damage skin and create pigmentation issues.[26]

Kojic Acid

Kojic acid beneficial in treating skin diseases and pigmentation concerns. It Inhibits tyrosinase lowers melanin formation, reducing dark patches and hyperpigmentation.[27] Kojic acid contains antioxidant and anti-inflammatory qualities in addition to blocking tyrosinase. This can help acne, rosacea, and other inflammatory skin problems. Other creams for melasma contain 2% kojic acid, 10% glycolic acid, and 2% hydroquinone.

Laser Therapy

Laser therapy has traditionally been the recommended treatment for skin discoloration. Lasering the affected area reduces melanin and evens out skin tone. Lasers can target pigmentation deeper and more covertly. Lasers may now target pigment under the skin without discomfort or injury. Thus, age spots and sun damage can be treated without pain. Modern lasers use optical energy and strong pulsed light to eliminate stubborn pigmentation. This breakthrough development allows faster and more effective patient treatment than ever before.[28]

Newer Topical creams and serums

Niacinamide, Kojic acid, Licorice extract, and mulberry extract designed to counteract pigmentation. These advanced compounds can eliminate dark spots, lighten skin tone, and improve skin clarity and texture. Niacinamide and kojic acid diminish skin discolouration by suppressing melanin production and tyrosinase activity. The treatment should also be paraben- and preservative-free to avoid skin sensitivities.[28]

Micro-needling

Skin collagen and elastin production is increased by micro-needling. Pricking the skin with little needles creates minute channels that can only be seen under a microscope.[29] This simple treatment boosts collagen synthesis and skin self-healing. Micro-needling is becoming the most common way to lighten skin molecules.

Chemical Peels

Chemical peels are used to remove the top layers of skin, which lessens the visibility of dark patches.

Combination Treatments

Combination therapies are proving to be even more effective at minimizing dark spots. These combination treatments include several acids, such as glycolic acid and lactic acid, which, when used together, can be much more potent than when used separately. These combined therapies, which neither lasers nor light-based devices can currently offer, can help with both facial discoloration, and uneven pigmentation on other parts of the body, with only one treatment.

Recent Advances

New technology makes skin pigmentation remedies more promising. Plasma pen therapy for skin pigmentation problems seems promising. A tailored plasma energy beam removes pigment

from the skin to cure freckles, age spots, sunspots, and melasma. Radiofrequency therapy for skin pigmentation problems is becoming more prominent. This method employs radio waves to break down melanin deposits in the skin, improving dark spots and skin tone and texture. Radiofrequency therapies are fast, safe, non-invasive, and require little rehabilitation.[30]

CONCLUSION

Skin pigmentations disorders are common problem in both developing and developed countries. In failed cases of medical management, Laser therapy is used. Plasma pen therapy and radiofrequency treatments are recent techniques. The cause of pigmentation disorders should be validated before treating the individual. Newer techniques are evolving over years in the era of cosmetic surgery.

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Review Article on Management of Postburn Digital Web Space Contracture

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Abstract

Burn web space contracture refers to the abnormal tightening and narrowing of the skin and underlying tissues that occurs after a burn injury. This condition results from the healing process where scar tissue forms and contracts, leading to limited mobility and functionality in the affected area. In connection with burns, especially in the area between the fingers or other joints, contractures can significantly impair movement and cause functional deficits. Treatment may include surgery, such as skin grafts or releases, coupled with rehabilitation to restore range of motion. This review article covers the different ways to manage digital web contracture.

Keywords: Digital webspace; Contracture; Z plasty; Flaps.

INTRODUCTION

The web space helps with hand movements such as finger abduction, adduction, as well as finger flexion and extension at the metacarpophalangeal joint. Normal web spaces are rectangular in shape with an angle of 45˚ in the distal direction to the palmar direction. The arc of the second to fourth web forms a circle.

Blood supply to the web space is from branches of the dorsal and volar digital arteries.[1-3] Sensation is via the dorsal radial sensory and ulnar sensory branches. The volar innervation of the nets is branches from the common digital nerves, which are the terminations of the median and ulnar nerves. The first web space mainly by the median nerve and also contributions from the dorsal radial sensory nerve.

The palmar aponeurosis consists of the longitudinal fibers of Legue and Juvar (Fig. 1) in the distal direction, which bifurcate in the proximal extent of the fingers and merge with the tendon sheaths and tissues around the metacarpophalangeal joints volarly and dorsally. They are the endings of the deep fibers of the palmar fascia. Abduction of the finger is limited

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by the transverse subcutaneous band of Bourgery, which is part of the natatory ligament. This forms the distal extent of the fabric, and its arcuatefibers form the arches between the fingers. These fibers form the volar digital septum of Grayson and the dorsal digital septum of Cleland.

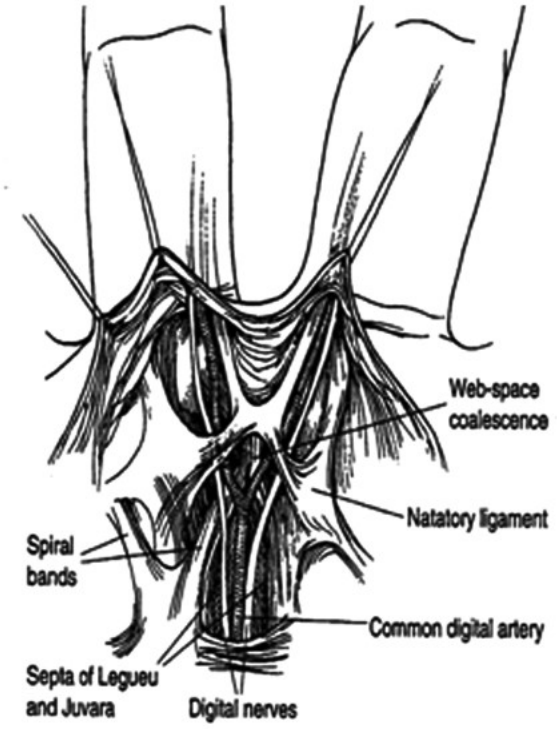

Fig. 1: Webspace anatomy

Postburn contractures affect the arachnoid spaces and lead to major functional and aesthetic deformities. Web contractures are classified according to whether they involve the dorsal web, palmar web, or interdigital space, called burn syndactyly.[4] Depending on the maturity of the scar tissues, they can again be classified as dynamic or static contractures. Subsequently, burn contractures of the arachnoid spaces limit abduction and independent flexion and extension of the fingers. They can also lead to an inversion of the web space with a bad aesthetic appearance. These contractures affect the normal 45° back slope and palm-to-finger ratio. Contractures of the web of index and thumb may involve only the skin, and in chronic conditions may involve fibrosis and shortening of the adductor pollicis muscle.[5] In severe and chronic cases, along with soft tissue contractures underlying bony abnormalities, they also occur.

SURGICAL TECHNIQUE

The palmar edge of the web space normally extends to the level of the middle of the proximal phalanx. If the distal edge of the tissue lies between this normal position and 75% of the length of the proximal phalanx, tissue reconstruction can be performed using local tissue rearrangement. If the interdigital contracture exceeds 75% of the length of the proximal phalanx, a dorsal hourglass flap can be performed to reconstruct the web space.[6] After mesh reconstruction, splinting is necessary to minimize mesh creep and recurrence.

Skin Grafts

Split-thickness skin grafts are not ideal for web space contracture release because they tend to contract during healing. Full-thickness skin grafts contract less and are generally more useful.

Full-thickness skin grafts are widely used in syndactyly release to resurface the adjacent sides of the fingers. The ulnar and thenar eminences can be used. Other sites are the ulnar border of the distal forearm and the medial upper arm. If the male male has not yet been circumcised, but if circumcision is planned, the foreskin can also be used as donor skin. The foreskin can provide up to 25 cm^2 of tissue. If a large amount of skin is needed, the lower abdomen is a good source. Incorporation of Integra as a primary or secondary reconstruction template over which a thin skin graft can be placed has also been described.[7,8] Using Integra under a skin graft can inhibit contracture and promote improved range of motion.

Local flaps

Local flaps for the reconstruction of webspace contractures are mainly Z-plasties and combinations of Z-plasties with advancement flaps. Various modifications include

- Jumping man flap - Mustarde´,
- Five-flap - Hirshowitz and coworkers (Fig. 2).
- V-M flaps - Alexander and coworkers, Lewis and coworkers, and Onishi and coworkers.
- Three-flap web-plasties-Ostrowski and coworkers and Housinger and coworkers (Fig. 3).
- ‘‘Goalpost’’ flap-by Housinger-advancement of a rectangular tissue flap with rotation of small flaps from its distal end along its sides.

- V-Y advancements - used for syndactyly correction by Savaci and coworkers and Sherif. Savaci and coworkers described dorsal and volar V-Y flaps to meet in the center of the web (Fig. 4A).
- Island flap advanced in a V-Y fashion by Sherif to resurface the web (Fig 4B)

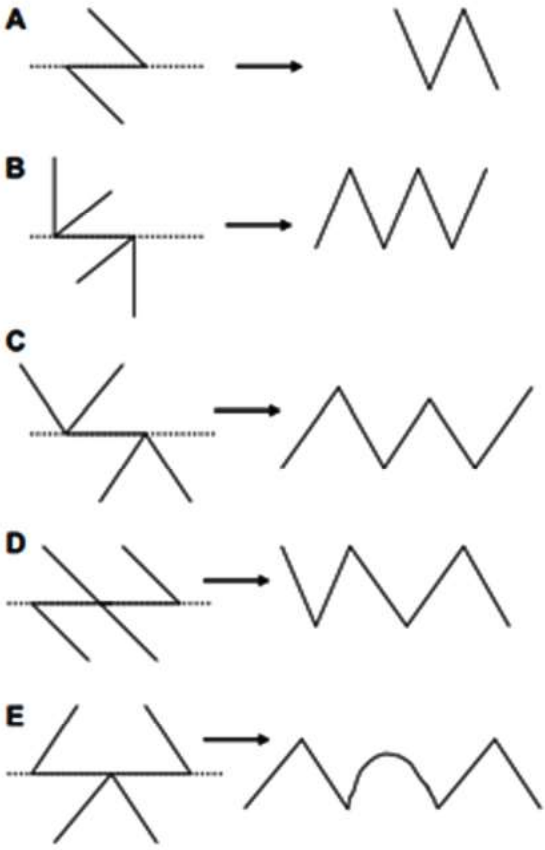

Fig. 2: Variants of Z-plasties. (A) The classic 60-degree angle Z-plasty. (B) The 90-90 degree four-flap Z-plasty. (C) The 120-120 degree four-flap Z-plasty. (D) The Z-plasty in series (E) Double-opposing Z-plasties (butterfly flap). The dotted line refers to the axis of contracture. The figures on the right reflect the appearance after flap rotation.

Regional and free flaps

Regional or free fasciocutaneous flaps are bulky. The most commonly used regional flaps are inguinal flaps. This is flexible and particularly useful if soft tissue wrap is required and if tendon transfers or free-functioning muscle transfers are needed later.

A flap with a transverse arm is also a reconstructive option for first webspace defects. May be more comfortable than groin and abdominal flaps. A defect shaped flap is drawn on the upper arm and the lower half is elevated and sutured to the dorsal part of the web defect. After 2 to 3 weeks, the flap is divided and the upper part is rotated into the defect of the volar structure. The flap needs to be divided of soft tissue for better digital motion and appearance.

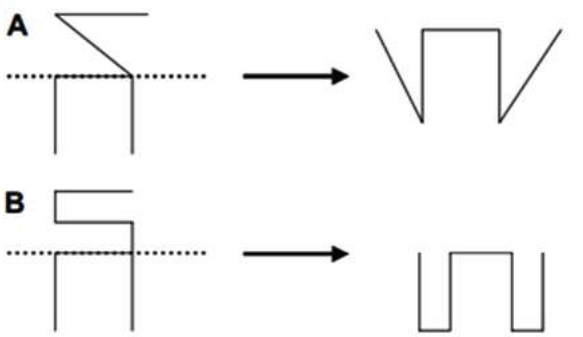

Fig. 3: Three-flap rotation-advancement web-plasties. (A) Triangular flaps of tissue are rotated around the advanced rectangular flap. (B) Rectangular flaps of tissue are rotated around the rectangular flap. The flaps in (B) may be more tenuous and care should be taken in elevating these flaps in tissue that has previously been injured. The dotted line refers to the axis of contracture. The figures on the right reflect the appearance after flap rotation.

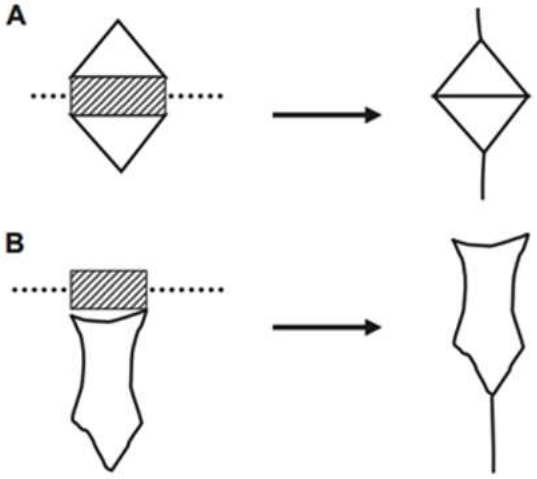

Fig. 4: T V-Y advancement flaps. (A) Opposing V-Y islands as described by Savaci and coworkers.

(B) V-Y island advancement as described by Sherif. The dotted line refers to the axis of contracture. The shaded area represents excised scar tissue. The figures on the right reflect the appearance after flap advancement.

The webspace most accessible to free tissue transfer reconstruction or regional flap is the thumb index webspace. The best options for first web reconstruction are reverse radial forearm flap, posterior interosseous artery flap, free dorsalispedis or free temporalis flap, lateral arm flap, scapular or parascapular flap, and various muscle flaps.

CONCLUSION

Basic principles must be followed in the management of web space contractures early non-operative methods are often effective in preventing or limiting the degree of web space contracture, which include early splinting and passive and active range of motion exercises. If operative intervention is necessary for established contractures or for conditions where the occurrence of contractures is likely, the options aremany variations and combinations of Z-plasties, V-Y, and V-M advancements.

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Subject Index

Author Index

Guidelines for Authors

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journal" developed by international committee of medical Journal Editors

Types of Manuscripts and Limits

Original articles: Up to 3000 words excluding references and abstract and up to 10 references.

Review articles: Up to 2500 words excluding references and abstract and up to 10 references.

Case reports: Up to 1000 words excluding references and abstract and up to 10 references.

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

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

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

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Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical details can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

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

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

Standard journal article

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

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

Article in supplement or special issue

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

Corporate (collective) author

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

Unpublished article

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

(Personal author(s

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

Chapter in book

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

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 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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