



SKIN GRAFTING AFTER POST-BURN CONTRACTURE RELEASE AND ITS OUTCOME

Gaurav Saxena	Index Medical College, Hospital and Research Centre, Indore
Unnati Singh Baghel*	Index Medical College, Hospital and Research Centre, Indore*Corresponding Author
Harshita Thakur	Index Medical College, Hospital and Research Centre, Indore
Rakhi Arjariya	Index Medical College, Hospital and Research Centre, Indore
Megina Jain	Index Medical College, Hospital and Research Centre, Indore
Aayush Rai	Index Medical College, Hospital and Research Centre, Indore

ABSTRACT **Introduction:** Most common cause of development of post burn contracture of upper extremity is flame burn (81%), followed by scald burn (9.5%) and electric burn (9.5%). Females (57.1%) were more likely to get burnt and developed contracture as a result more than males (42.9%). Most common causes include accidental burns from fire. Hand and neck are the most frequently involved area with post burn contracture followed by axillary region. **Aim:** To study the outcome of skin grafting after post burn contracture release over upper extremities. **Methods:** The study was conducted in IMCHRC among the patients admitted in the department of general surgery where grafting was done over post burn contracture after its release. **Results:** The patients who came to us with contracture mainly had second or third-degree burn involving flexor surfaces. Post-burn contractures were released followed by either full-thickness grafts or split-thickness grafts with or without z-plasty or flap cover with or without k-wire fixation. Full thickness graft for smaller burn area for post-burn contracture release. Patients were followed up after discharge and followed for 1 year, the range of motion of the affected joints was assessed. In this study, out of 34 cases, 14 cases developed re-contracture. **Outcome:** Post burn contracture usually occurs after 3-4 months of deep burns. Pre and post operative assessment after one year showed significant improvement in range of motion and satisfactory outcome.

KEYWORDS :

INTRODUCTION:

Most common cause of development of post burn contracture is flame burn (81%), followed by scald burn (9.5%) and electric burn (9.5%). Females (57.1%) were more likely to get burnt and developed contracture as a result more than males (42.9%). Most common causes include accidental burns from fire. Hand and neck are the most frequently involved area with post burn contracture followed by axillary region.

Burn injuries are amongst one of the most devastating of all injuries, resulting in an estimated 195000 deaths annually. Unfortunately, a vast majority of burns occur in low- and middle-income countries (LMICs), regions that generally lack the necessary infrastructure to reduce the incidence and severity of burns. Immediately Dressings? silver sulfadiazine, and other antimicrobials have been used for treatment purposes and controlling secondary infection.

The earliest record of skin grafting goes back to the 5th century AD, where an Indian surgeon, Sushruta, repaired noses, that were amputated as punishment for crimes, using strips of skin from the forehead which were flapped downwards and grafted over the wound. Sushruta has also been documented to transplant skin from the buttock to the nose. The first documentation of a modern skin graft in humans was by Carl Bunker in 1823. Contracture from burn injuries were first documented in Eber's Papyrus in 1500 BC, describing the use of copper splints to treat burns.

The majority of burns occur in people from low- and middle-income countries, with almost half occurring in southeast Asia region accounting for about 27% of global burn deaths. Contraction is a normal process of wound healing. Contraction is the active biologic component of wound healing that decreases the dimension of the involved connective tissue. Two types of skin grafts are used to cover the burn wound: split-thickness skin grafts (STSGs) and full-thickness skin grafts (FTSGs). These grafts are frequently required because the release of a post-burn contracture often leaves exposed subcutaneous connective tissue. To become successfully integrated, both types of skin grafts require a vascular wound bed, immobilization of the joint, and the prevention of infection. Common graft complications include wound/graft dehiscence, granulation tissue formation, infection, and

the need for revisional surgery. Physiotherapy, through active and passive mobilization, is a key component of successful contracture release and should be started soon after the healing is achieved. The main goal of physiotherapy should be to maintain the length gained by surgery. For contractures of the upper extremity, the secondary goal is to improve the patient's ability to perform actions of daily living. Postburn contractures are perhaps the most dreaded and distressing morbidity in patients surviving major burns. Repair and amelioration of these is essential to make the patient productive and socially acceptable and more importantly to functionally rehabilitate the burn victim. Demographic factors are personal characteristics are used to collect and evaluate data on people in a given population. Typical factors include age, gender, marital status, race, education, income and occupation. Socio-economic status has been defined as position that an individuals or family occupies with reference to the prevailing average standard of cultural and material possessions, income and participation in group activity of the community.

Pathophysiology Of Scar And Contracture:- Superficial partial thickness burns rarely lead to scarring. Conversely, deep dermal or full thickness burns extend to the dermal reticular, which destroys the epidermal appendages and their extensions into the dermis. The wound is less able to spontaneously epithelize, and wound closure occurs from just the wound edge rather than from the central portion of the wound. This leads to a delay in wound healing which increases the risk of scarring. Deep dermal burns may lead to hypertrophic scarring. Peacock defines hypertrophic scarring as: 'a scar raised above the skin level that stays within the confines of the original lesion'. There is an over-proliferative response of wound healing leading to excessive deposition of collagen and ground substances. Collagen type III is the predominant connective tissue type and is structurally disorganized and nodular. Myofibroblasts proliferate at a wound site which causes the wound edges to contract towards one another. Delayed healing and scar formation leads to an over-proliferation of myofibroblasts causing pathological contracture.

Hypertrophic scars usually occur within the first three months of a burn injury. Dietch et al. concluded that one third of anatomical sites became hypertrophic if the healing time occurred between 14-21 days. After 21 days, 78% of scars became hypertrophic. Recognized factors

which may delay wound healing include infection, smoking, suppressed immune system, age, poor circulation and nutrition. Such factors may delay wound healing causing breakdown of the wound.

Local Surgical Procedures: - The Z-plasty is a commonly used local procedure for contracture release and is mainly used for bowstring contractures (11,12). The Z-plasty borrows skin from adjacent tissue sites to divide and lengthens the contracture band. As there is shortening within the transverse axis, there may be little room for further shortening with a z-plasty. A multiple Z-plasty may be preferred as theoretically this reduces transverse shortening. The Z-plasty should only really be used when there is ample laxity of the surrounding tissue and not in diffuse contractures. The Y-V plasty (figure 5) is relatively simple to perform and is recommended for linear bands. In comparison to the Z-plasty, the Y-V plasty does not require undermining, which reduces the risk of distal tip necrosis. Contractures can be lengthened by 100%, whereas with a 60-degree Z-plasty, length is increased by 75%. The Y-V plasty can also be repeated adjacently which is used when there is a broad sheet of contracture. Patients are able to mobilize earlier post-operatively than if the Z-plasty was chosen. Other techniques include the double reverse V-Y plasty and the W-plasty.

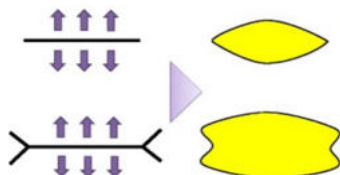


Fig:-1 Bilateral fish tailed incision should be made for adequate contracture release

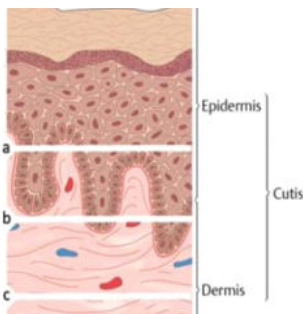


Fig:2 The classification of split thickness skin grafts (a–c) and full thickness skin graft (d) according to the thickness of the layer. a = 0.15–0.3 mm; b = 0.3–0.45 mm; c = 0.5–0.6 mm; d > 0.6 mm.

Skin graft: - When using grafts, sheet grafts are to be preferred and no attempts should be made to expand the graft by meshing. The more graft than the size of the defect should be used to prevent secondary contraction. The junction line of the sheets of the grafts should be parallel to the axis of joint motion.

Two types of skin grafts are used to cover the burn wound: split thickness skin grafts (STSGs) and full thickness skin grafts (FTSGs). To become successfully integrated, both types of skin grafts require a vascular wound bed, immobilization of the joint, and the prevention of infection.



METHODS:

The study is conducted in IMCHRC among the patients admitted in the department of general surgery where grafting is done over post burn contracture after its release.

INCLUSION AND EXCLUSION CRITERIA: All patients who came to us with post-burn contracture over upper extremities and were

operated with contracture release with skin grafting were included. Patients who do not want to be part of study were excluded.

The study was performed in accordance with Good Clinical Practice guidelines. The study protocol was approved by the local ethics committee at each participating center. Patients or guardians gave written informed consent.

INVESTIGATIONS: Initial review by general/plastic surgeon Blood count; Prothrombin time, and partial thromboplastin time Blood urea nitrogen, creatinine; Liver function tests; Electrolytes Colour Doppler arterial & venous study

FOLLOW-UP: Physiotherapy, through active and passive mobilization, is a key component for the prevention of contracture after grafting.

STATISTICAL ANALYSIS:

Table no1: - Occupation of Patients

OCCUPATION	FREQUENCY	PERCENTAGE
Skilled Labour	1	3.1
Unskilled labour	12	34.37
Housewives	15	43.75
Students	2	6.25
Kids	4	12.5

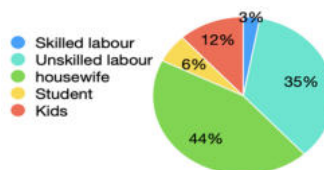


Table no 2: - area of burn and anti-contracture position

AREA OF BURN	ANTI-CONTRACTURE POSITION
Front of neck	Neck in extension. Roll pillow and put behind neck while lying. Head tilted back while sitting
Behind the neck	Keep neck in flexion position
Axilla	Lying and sitting - arms abducted to 90 degrees supported by pillows or foam blocks between chest and arms. Figure of eight bandaging or strapping to provide stretch across chest.
Front of elbow	Elbow extension
Palm of hand	Wrist extended, minimal MCP flexion, fingers extended and abducted
Face	Regular change of facial expression.

Table no 3: - site of burn in studied subjects

SITE OF BURN	FREQUENCY	PERCENTAGE
Hand	24	75%
neck	17	53.12%
Axilla	12	37.5%
Elbow	7	21.8%

Table no 4: - history regarding burn

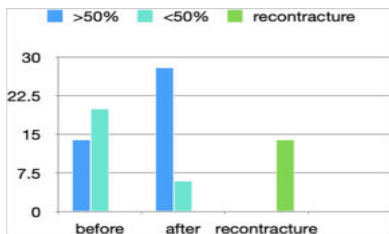
CHARACTERISTICS	NO.OF SUBJECTS	PERCENTAGE	
Degree of burn	2° superficial	2	5.8%
	2° Deep	32	94.11%
Development of contracture (Month)	< 1.5 months	15	44.11%
	< 1.5 -2 months	14	41.7%
	> Months	5	14.7%

Table no 5: - range of motion before after surgery

RANGE OF MOTION	BEFORE	AFTER
More than 50%	22	28
Less than 50%	12	6

COMPLICATIONS: Complications of skin grafting used for treatment of contractures included graft infection, graft rejection,

hematoma formation wound/graft dehiscence, granulation tissue formation and the need for revisional surgery., etc., were seen in 14 of cases even after adequate care.



RESULTS:

The patients who came to us with contracture generally had history of second and third-degree and mainly involving flexor surfaces. Post burn contracture were released followed by either full-thickness grafts or split-tthickness grafts with or without z-plasty or flap cover. Full thickness graft for smaller burn area for post-burn contractures release. Patients were followed up after discharge for 1 year, range of motion of the affected joints was assessed on each visit. In this study, out of 34 cases, 14 cases developed re-contracture.

CONCLUSION:

Post burn contracture usually occurs after 3-4 months of deep burns. Pre and post operative assessment after one year showed significant improvement in range of motion and satisfactory outcome. Despite advances in the overall management of burn injuries, severe post-burn contractures continue to be a formidable foe for reconstructive surgeons in developing countries. Not only do we have a higher incidence of burn injuries, we also lack top class facilities for managing acutely burn patients. These factors are further compounded by ignorance, poverty, and adequate utilization of available health care facilities.

The tendency to undergo cosmetic surgery has been shown to be affected by factors such as gender, age, marital status and education level. Further, the tendency to undergo cosmetic surgery is observed to be more prevalent in women population than men. In our study, maximum patients belonged to daily wages group irrespective of the sex. Housewives were 43.75%. Most of our patients (73.8%) belonged to lower socioeconomic group.

Post operative physiotherapy and splinting has important role in preventing re-contracture in post operative period. In this study, out of 34 cases, 14 cases developed re-contracture, it is because of not following proper physiotherapy and splinting protocol.

Complications of skin grafting used for treatment of contractures included graft infection, graft rejection, hematoma formation, etc., were seen in 24% of cases even after adequate care.