

# Role of Mesh Grafting in Burn Patients

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This paper presents a study conducted on forty patients divided into two equal groups. Each group contained twenty patients. Comparison was made between Group I patients who underwent mesh grafting and Group II patients who underwent skin grafting applied in the form of sheets. The study concludes that the degree of graft rejection take and wound infection is less in patients who underwent mesh grafting, however, the degree of long term complications and disabilities was higher in Group I patients.

**Key words:** Mesh grafting in burns, skin grafting in burns

This old technique, which has been available in rather crude fashion for over 50 years, has regained enormous popularity through the development of a more sophisticated mechanised means by which the mesh can be predictably produced. This technique was introduced in West Surgical Ward and it resulted in markedly decreased period of hospitalization, wound infection and mortality/morbidity rates. The split thickness graft obtained is passed through the tanner mesh dermatome and, in the process, small slits are cut in the full thickness of the graft, thus allowing it to be expanded in a 1½ :1 or 3:1 or 6:1 ratio in an accordian fashion. Spread of epidermal cells from the margins of the fenestrated graft is rapid and the wound is closed promptly by this technique. It is particularly valuable in patients where donor skin is limited and can be placed over the recipient sites that are in a marginal state of readiness for grafting.

It is important to realize that with the mesh grafting technique, even more than with others, the newly applied skin must be jealously protected against drying and from curling of the cut margins. Both circumstances lead to graft failure and are to be obviated by the application of firm dressings over the graft.

## Study design

This prospective study was carried out in West Surgical Ward, Mayo Hospital, Lahore. It was conducted from 16<sup>th</sup> August 1996 to 20<sup>th</sup> September 1997.

## Material and Methods

Forty patients were selected for this study. The criteria for selection was that only those patients who had 50% or less than 50% body surface burnt were selected for trial.

1. Any patient having more than 50% burns were excluded
  2. Patients with severe sepsis were excluded
  3. Patients were divided into two equal groups of 20 patients each at random and this was a comparative study between these two groups.
- In group I patients; mesh grafts were applied

- In group II patients, splits thickness skin graft was applied

The study contained questions regarding biodata, mode of injury, nature of injury, duration of injury, respiratory difficulty, cough or stridor etc. Clinical examination included recording of burn sheet which included age of the patient, extent of burns, degree of burns, location of burns, any inhalation injury and comorbid factors. Detailed systemic examination was carried out. Investigations included. Hemoglobin levels, TLC, DLC, Serum electrolytes, urine C/E, x-ray chest, ECG, surface swab cultures and biopsy specimens were taken according to their indications.

Stabilization during the initial 48 hours (the burn shock) phase was achieved with attentive monitoring and volume resuscitation. Inhalation injury and respiratory insufficiency required mechanical ventilatory support. Banked blood components were arranged in a sufficient quantity to replace potential intraoperative losses. 25-50ml of whole blood was arranged for each percentage of body surface area to be excised.

General anaesthesia with inhalation agents, intravenous narcotics and a dissociative drugs were chosen according to the clinical status of the patient. To avoid hyperkalemia and sudden arrest, deploring muscle relaxants were avoided.

Specialized instruments were used for mesh grafting. These included:

- a) The Humby's knife
  - b) Air driven Zimmer dermatome
  - c) The Tonner mesher
- Mechanical meshes allowed the expansion of split thickness graft upto the required expansion. An expanded 3:1, 6:1 or 9:1 grafts were chosen to cover the recipient areas. In majority of cases, mesh grafts were not anchored with suture material but were secured with the help of multilayer occlusive dressing<sup>1</sup>.
  - Before applying mesh grafts haemostasis of the recipient areas was carried out thoroughly with the

help of hot sponging, suture ligation or by electrocautery.

- For areas of full thickness skin loss, the face and hands are best covered with sheets of skin graft but the major areas of axilla, elbow, and knees can be quite readily covered with mesh graft.
- Whether the split thickness graft is placed dermal side up or down on Derma carrier depends upon the surgeons preference in this method for transferring mesh graft from carrier to the recipient area. Care was taken to place the graft on the ridged side of the carrier. When skin was passed through the mesher, care was taken, that it could not be caught in the cutting teeth of mesher.
- It was remembered that expanding the skin to the widest dimension also results in considerable degree of shortening in the length of the graft.
- Care was taken to be sure that individual pieces of mesh grafts closely appropriated or overlapped slightly to minimize scarring.
- Skeletal traction was used to immobilize the extremities, on which mesh grafting was applied.
- Post operative bandages were removed on the 3<sup>rd</sup> day. Light dressings subsequently applied. Newly healed epithelial surfaces are kept moist and pliable by massage with mineral oil. Elastic garments applied to all the healed grafted areas to prevent contracture formation. These were removed every 6-8 weeks and worn until wound maturation is complete.

## Results

Results of the study were assessed in terms of

- Degree of graft take
- Wound infection
- Long term implications such as cosmesis/contracture

### i. Degree of graft take

Group I:

n=	Burns %age	Graft take %age
5	25	95
5	25	90
10	50	85

Mean: 90

Group II

n=	Burns %age	Graft take %age
5	25	8
5	25	80
10	50	75

Mean: 80

### ii) Degree of wound infection after grafting

Group I

n=	%age	Graft take %age
5	25	15
5	25	10
10	50	05

Mean: 10

Group II

n=	%age	Graft take %age
5	25	15%
5	25	10%
10	50	10%

Mean: 13%

iii. Degree of long term implications especially cosmesis/contractures etc.

Group I

Long term complications	n=	%age
20% of all patients presented with one or the other following complication	5	25
• Excessive scarring	5	25
• Neck/joint contracture		
• Ectropian etc.	10	50

Group II

Long term complications	n=	%age
10% of all patients presented with one or the other following complication	5	25
• Excessive scarring	5	25
• Neck/joint contracture		
• Ectropian etc.	10	50

## Discussion

The role of mesh grafting in bur patients has definitely changed the outcome of the treatment plan. In our study it was noted that the uptake of mesh graft in identical conditions has been better (90%) than split thickness (80%) with an added benefit that the amount of the donor area is far less than that of the donor area of split thickness graft patient, which definitely reduced the pain and morbidity in this group. The factor responsible for the better uptake is due to a minimal degree of sub-graft.

Similarly degree of wound infection in group-I patient is 3% less than the group-II patient. This is a significant factor as it has been well documented that the major factor responsible for graft destruction is infection, which perpetuates in sub-graft haematoma or seroma.

However the percentage of long term complication has been 10% higher in those patients in whom mesh grafting was applied (Group I).

The follow up was carried out for six month, with the patients visiting our outpatient department on two week interval, and complications regarding, scarring, neck and joint contractures and ectropian were noted and it was documented that about 20% of the patients presented with the above mentioned complications in group I patients and in group II patients and 10% had long term complications.

Mesh grafting is indicated in the following conditions.

1. When there is a shortage of skin.
2. When cosmesis is not important.
3. In exudate areas such as varicose ulcers.

4. When a general anaesthetic is contraindicated, and the area required is larger then can be taken with infiltration of 30ml of 1% local anaesthetic<sup>2</sup>.

In skin grafting operations for patients with extensive burn injuries, mesh techniques are often employed to enlarge the effective surface area covered by autografts. However, substantial strips of autograft are required and the distribution of autograft elements ont he wound surface is relatively uneconomical. An alternative technique for expanding autografts, first described by Meek in 1958, makes use of a special dermatome and prefolded gauzes to obtain a regular expansion of autograft squares from small pieces of split skin grafts. The maximum distance between the graft elements obtained with the Meek technique was 9mm, compared to a maximal distance between the strands of mesh graft of 12mm. The Meek technique useful alternative to mesh grafts when donor sites are limited. Clinical experience also suggests that Meek grafts are also particularly suitable for grafting on granulating wounds under poor condition<sup>3</sup>.

Mesh grafts are split thickness or full thickness skin grafts in which parallel row of staggered slits have been cut. The mesh incisions allow the graft to be expanded to cover large defects, provide a route for drainage of blood or serum from under the graft, and increase the flexibility of

the graft so that it can conform to the uneven recipient beds. Meshing can be done by using a No. 11 scalpel blade or a special meshing machine. The use of unexpanded full thickness mesh grafts is recommended because their cosmetic appearance equals that of sheet grafts, but the mesh incisions still allow drainage of blood/and or serum from under the graft. This technique has been very successful, with 90-100% "take" when the grafts have been applied on healthy granulation beds<sup>4</sup>.

Therefore, we strongly recommend the mesh grafting on extensive burn wounds. Cosmetic appearance can be improved by using the unexpanded full thickness mesh grafts.

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