

A Prospective Study of Organisms Causing Infection after Skin Grafting

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Abstract: *Introduction:* Skin grafting is a common surgical procedure where graft may or may not be taken up completely. One of the cause of graft rejection is bacterial wound infection. This prospective study was done to analyse the type of bacteria causing skin-graft loss in a general population. Organisms isolated were grouped further based on the culture report obtained from post graft culture and sensitivity report. *Materials and Methods:* 50 patients who had come to MGM hospital with complaint of ulcers due to various causes were included in the study. In this study swab culture was sent from wound site on 3rd post-operative day of the grafting. *Conclusion:* Out of 50 samples sent, 13 had growth of Staphylococcus Aureus and 10 patients had Pseudomonas. These were the most common organism isolated. Out of these 44% graft loss was seen in Pseudomonas and 27.6% graft loss was seen in Staphylococcus Aureus.

1. Introduction

Skin is an important biological layer for homeostasis. Many wounds or ulcers especially post burn, trauma and diabetic foot need skin graft to hasten the wound healing. Grafted skin helps in prevention of further infection and return of function. Split thickness skin grafting is the most commonly performed procedure done to cover clean granulating ulcers. Pre requisites for successful grafting are⁽¹⁾, an adequately vascularised recipient bed, a good graft, accurate approximation to wound and immobilization of the graft and good wound care. Even when these conditions are satisfied, the graft may get rejected due to post procedure bacterial colonisation of the ulcer. The types of bacterial growth which reduces the success rate of skin grafting⁽¹⁾ are Beta hemolytic streptococci, Pseudomonas and Staphylococci. This study was conducted in a tertiary care centre and conducted in a group of 50 patients admitted with ulcers secondary to vascular cause, trauma, burns and diabetic foot. Split thickness skin grafting was planned once the ulcer bed was debrided and granulation tissue was healthy.

2. Material and Methods

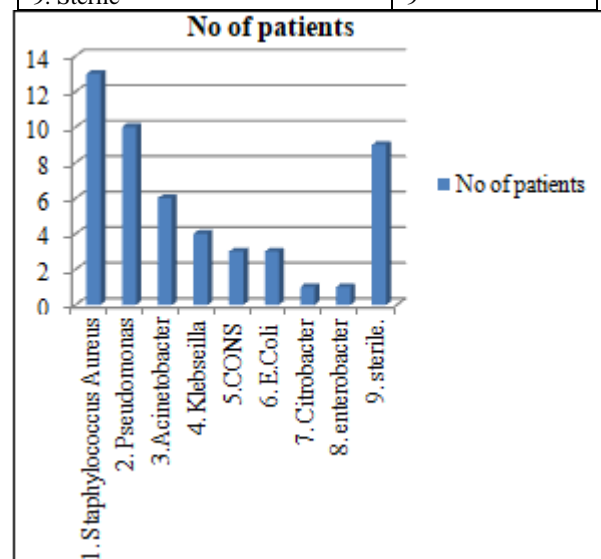
This Prospective study was conducted in MGM Medical College and Hospital, Navi Mumbai in 50 patients admitted with ulcers which required skin grafting. Written Informed consent was obtained from all patients and Institutional Ethics Committee approval was obtained before the start of study. Patient who were diabetic, hypertensive and had chronic vascular disease were treated accordingly. Blood sugar level, Blood Pressure and adequate vascularity of the grafting area were confirmed before the procedure. All patients with malignancy, infected wound which needed debridement and micro vascular procedures and showing bacterial growth in the preoperative swab culture report were excluded from the study. All patients underwent split thickness skin grafting by the same group of surgeons after adequate bed preparation. This study was done on all patients in the age group of 18- 60 years. All the grafts were taken from thigh thigh. One dose of Injection (third generation cephalosporin) 1gram IV was given to all patients pre-operatively. General/ spinal anaesthesia was given according to recipient site. Donor and recipient sites were painted and draped according to hospital protocol. Recipient site was prepared with adequate scooping and debridement

in all patients. Adequate haemostasis assured before placement of the graft. Split thickness skin graft was harvested using Bard Parker knife. Meshing of graft was done. Graft placed on recipient site and fixed with skin stapler. Sofratulle dressing was given to donor and recipient site and POP (Plaster Of Paris) slabs or tie over dressing applied whenever applicable. Antibiotic injection (third generation cephalosporin) 1 gram IV 12 hourly given for one day. Swab culture was sent on 3rd post-operative day during check dressing. Graft uptake was compared with amount of graft placed on 7th post-operative day and recorded. Culture report was collected on the same day and compared with graft uptake.

3. Results and Observation

Table 1: Showing organism and number of patients

Organism Involved	No of patients
1. Staphylococcus Aureus	13
2. Pseudomonas	10
3. Acinetobacter	6
4. Klebsella	4
5. CONS	3
6. E.Coli	3
7. Citrobacter	1
8. Enterobacter	1
9. Sterile	9



Graph 1: Showing organism and number of patients

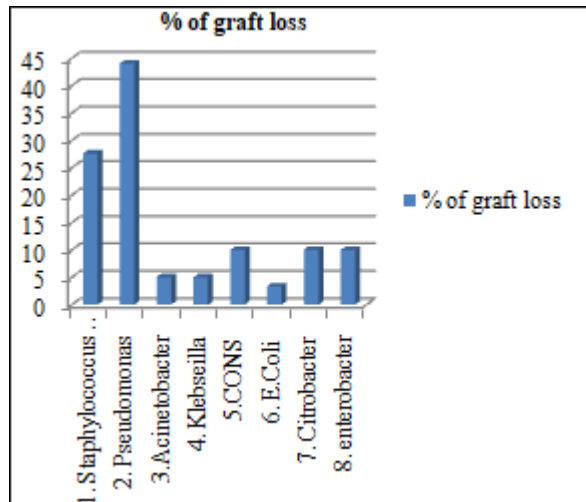
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Table 2: Organism and % of graft loss

Organism Involved	% of graft loss
1. Staphylococcus Aureus	27.6
2. Pseudomonas	44
3. Acinetobacter	5
4. Klebseilla	5
5. CONS	10
6. E.Coli	3.3
7. Citrobacter	10
8. Enterobacter	10

**Graph 2:** Organism and % of graft loss

4. Discussion

From sample size of 50 patients, Staphylococcus was the most common bacteria isolated from 13 and 2nd most common organism isolated was pseudomonas from 10 patients. Acinetobacter was isolated from 6 patients. Klebseilla was isolated from 4 patients. CONS and E.Coli was isolated from 3 patients each. Citrobacter and enterobacter was isolated from 1 patient each and 9 swabs were sterile. 44% of graft loss was due to pseudomonas infection and 27.69% of graft loss was due to staphylococcus. Few studies have analysed the effect of bacteria on skin graft healing. Particularly in the field of chronic lower limb ulceration. Liedberd et al⁽⁴⁾, conducted a study in rabbits on effect of bacteria on take of split thickness grafts, in which concluded that Group A beta hemolytic streptococci and *Ps. aeruginosa* deleteriously affect the take of skin grafts in white rabbits. *Staph. Aureus*, coagulase +ve, seemed to produce a less deleterious influence. Interaction (synergism or antagonism) was not demonstrated between the streptococci and the pseudomonas or between the staphylococci and the pseudomonas⁽⁴⁾.

Another study conducted by Hosberg et al⁽⁵⁾, stated that no unifying hypothesis can explain the loss of skin grafts. A wide range of things are believed to adversely influence the skin graft take, which include haematoma or shearing movements, inadequate compliance, deficient blood supply, presence of microthrombin in the dermal blood vessels, local fibrin deficiency in the wound bed and former thrombophlebitis in relation to primary deep vein incompetence⁽⁵⁾. In that study only 33.3 % of ulcers with *Pseudomonas aeruginosa* were healed by 12 week follow up while 73.1 % of ulcers without *Pseudomonas aeruginosa*

healed by the same time thus supporting hypothesis that *P. aeruginosa* in chronic venous leg ulcers, despite treatment, plays a considerable role in partial take or rejection of split thickness skin grafts. The study conducted by us had 44% of graft loss in patients affected in pseudomonas after follow up of 1 week.

In our study, among the ulcers infected with *S.aureus*, 76.9 % showed complete uptake while 23.1 % had partial uptake. In case of pseudomonas infection only 30% had complete uptake while 60 % of them had partial uptake and 10 % showed graft rejection. In the presence of *Streptococcus*, none of the cases Showed complete uptake, 60% showed partial uptake and 40% showed graft rejection. In cases of *Klebseilla* and *E.coli* infection, graft uptake was complete in 80% and 66.7% respectively. It showed a statistically significant co-relation between the type of bacteria and graft uptake with *Pseudomonas*, *Streptococcus* and *S.aureus* being the most frequent causes for graft loss.

There are few studies relating the correlation between graft uptake and bacterial colonisation. A study conducted at Karnataka, India by Rudraiah et al⁽⁶⁾, showed that 92.3% of ulcers without any bacterial growth detected pre-operatively had complete uptake of graft and 7.7% of them had partial uptake while in the infected group, only 51.4 % had complete uptake and 40.5 % had partial uptake⁽⁶⁾.

5. Conclusion

In the study conducted, out of 50 patients, the most common organism causing graft rejection was *Pseudomonas* and 2nd common organism was *staphylococcus aureus* irrespective of the aetiology of the ulcer. Thus, prevention of infection from *Pseudomonas* in post skin grafting period can improve skin graft uptake results.

References

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