A STUDY ON VARIOUS FACTORS INFLUENCING THE SURVIVAL OF SPLIT SKIN GRAFT

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ABSTRACT

BACKGROUND
The present study is designed to find the various factors, which are responsible for acceptance and rejection of split skin graft. This study also deals with effect of intraoperative techniques and postoperative management in getting good graft acceptance. This study aims to identify the factors, which influence the skin graft and also help in minimising the complications.

MATERIALS AND METHODS
Patients are selected on the basis of nonprobability (purposive) sampling method. Patients and relatives were explained about the split skin grafting procedure and study and necessary approval was obtained from them prior to intervention. Data regarding the name, age, sex, education, occupation address, chief complaint, treatment history before admission for present complaint, history regarding the mode of onset of disease, past medical and surgical history, personal history was collected from patient and accompanying relatives. Intraoperative and postoperative status of raw area and survival of graft in terms of percentage of take noted systematically.

RESULTS
There was a significant statistical association between preoperative random blood sugar more than 200 mg/dL with take of SSG (p=0.02). 25% of patients with diabetes have more than 80% of take on third postoperative day have less than 80% of take on discharge. Preoperative haemoglobin level less than 10 g also significantly reduces graft take (p=0.01).

CONCLUSION
Our study data indicates that preoperative random blood sugar and haemoglobin had impact on the take of split skin graft with P value of 0.002 and 0.001, respectively.

KEYWORDS
Split Skin Graft, Take of the Graft, Diabetes.

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BACKGROUND
Studies carried out earlier found that chronic leg ulceration affects about 1% of the population at some point in their lives. The Split-Thickness Skin Grafting (STSG) is the most common performed procedures to close defects unable to be closed with the simple approximation of the wound edges.

Objectives- To study the factors responsible for the acceptance of skin graft.

MATERIALS AND METHODS
32 patients with well-granulated wound in Department of General Surgery and Plastic Surgery, Government

Royapettah Hospital. Study will be conducted for duration of 7 months from April 2016 to September 2016. 32 of them are to be selected on the basis of nonprobability (purposive) sampling method. Patients and relatives were explained about the split skin grafting procedure and study and necessary approval was obtained from them prior to intervention. Data regarding the name, age, sex, education, occupation, address, chief complaint, treatment history before admission for present complaint, history regarding the mode of onset of disease, past medical and surgical history and personal history was collected from patient and accompanying relatives. Intraoperative and postoperative status of raw area and survival of graft in terms of percentage of take noted systematically.

Skin Graft- For large areas of skin loss, skin grafting is still the gold standard procedure. The skin grafts are used mainly in large wounds. Wound occurs around joints and anterior neck wounds.

Split-thickness skin graft- SSG is classified into two types according to thickness of dermis either.

1. Thin SSG (0.15-0.3 mm, Thiersch-Ollier).
2. Thick SSG (0.45-0.6 mm thickness-Padgett).

An SSG consists of epidermis and a variable amount of superficial to papillary dermis. Dermis is responsible for stability of the future skin due to its viscoelastic property.

Thin SSGs include the epidermis and a thin layer of the dermis and commonly taken from the lateral thighs and trunk.

Advantages- Reduced morbidity of the donor site and the possibility of performing multiple harvests from the same donor area about 2 weeks after the previous harvest.

Disadvantages- Thin SSG are unlikely to grow hair or to develop full sweat gland function, because they do not include the full length of appendages.

Thick SSGs include more dermis with a greater number of full hair follicles and glandular structures. These grafts will likely develop some hair growth and sweat gland function about 2-3 months after grafting.

Advantages- Tolerate high mechanical friction, so it can be used in joints, plantar soles and the palm. Sweat glands function is often better in thick than in thin STSGs.

Disadvantages- Hair regrowth is common, so donor site is chosen carefully to avoid unpleasant hair growth. Because of decreased nutrient diffusion, thick grafts require a better recipient wound for revascularisation process.

Technique- To minimise bleeding during graft harvest, infiltration of epinephrine-soaked saline can be used. Recently, automated dermatomes are available for graft harvest. They have adjustable guards to set graft thickness. Surgeons can skilfully take small to medium-sized skin grafts with a surgical knife or with the oscillating Guillain knife. The disadvantage of manually taken skin grafts is the difficulty of achieving uniform depth. Drum dermatomes are precision instruments that can take large graft areas reliably. To avoid contamination from wound better to harvest the skin graft first and covering the donor site. If the preparation of the recipient site performed first, a separate instrument setup is used for the donor site. The size of the graft needed should be accurately measured prior to harvest. The graft thickness can be adjusted between 0.1 and 1.0 mm. The surgeon presses the dermatome in 45° to the skin surface and moves the device from distal to proximal with uniform pressure and speed. If the desired length is taken, the dermatome will cut the edge when elevating it, while running the motor. Keeping the graft moist with saline-impregnated gauze is of vital importance, if not immediately grafted. Larger skin grafts should be incised with a knife multiple times to allow wound fluid drainage and prevent collections between the skin graft and the wound bed.

RESULTS

In this study, a total number of 32 cases of well-granulated wounds were treated with SSG and evaluated during this prospectively from April 2016 to September 2016 in General Surgery and Plastic Surgery Departments of Government Royapettah Hospital. Following inferences are made from the study.

Age Distribution- In our study, 50% of patients are coming under age group of 46 to 50 years. Second highest group is 61 to 75 years. They occupy 21.88% of total patients studied. So, majority of patients with chronic ulcers are coming under 46 to 50 yrs. of age group. Diabetes is more common in older age group more commonly above 40 years. The mean age group of the patient in our study is 50.88.

Sex- Male patient exceeds in number than female patients in our study. Male patients were 62.5% comparing to female 37.5%. Males are more than females in all age group except in 31 to 45 years in that female exceeds male patients.

Aetiology- Comparing the cause, more patients fell under diabetic post infective aetiology, 62.5% patients fell under diabetic cause and 34.38% of patients are due to traumatic aetiology. In 46 to 60 years age group, more common cause of ulcer is diabetes, out of 17 patients in this age group, 12 patients are having diabetes mellitus.

Site of Ulcer- In our study, most ulcers are in dorsum of foot. Totally, 68.75% patients are having ulcers over dorsum of foot, next are in leg 18.75%.

Size of the Ulcer- According to size, more of ulcers 75% falling under 6 to 10 centimetre in one dimension.

Cultured Organisms from the Wound- In our hospital from the study came to know that most common organism grown from the culture of wound swab is Escherichia coli and Pseudomonas (25%). Next is Klebsiella 21.9%.

Preoperative and Postoperative Stay in Hospital- Mean preoperative stay in hospital is 11.50 days and maximum of 25 days. Mean postoperative stay in hospital is 10.80 and maximum of 15 days. So, post procedure hospital stay is significantly reduced.

DISCUSSION

In our study, the overall percentage of male patients were higher than that of female patients in all age groups. Male patient exceeds in number than female patients in our study, male patients were 62.5% comparing to female 37.5%. Males are more than females in all age group except in 31 to 45 years, in that female exceeds male patients.

In our study, 50% of patients are coming under age group of 46 to 50 years. Second highest group is 61 to 75 years. They occupy 21.88% of total patients studied. So, majority of patients with chronic ulcers are coming under 46 to 50 yrs. of age group. Diabetes is more common in older age group more commonly above 40 years. The mean age

group of the patient in our study is 50.88. Cornwall et al[1] found in his study, 70% of patients were over the age of 70 years. But, according to study done by Callam MJ,[2] the elderly are not the only population at risk; in their study, ulceration began before the age of 40 years in 22% of the population studied. In our study, ulceration began before the age of 46 years 38% of the patients. Sundresh NJ et[3] al in their study in 2012 found that 64% ulcer patients were above 40 years who underwent spilt skin grafting.

In our area, more ulcer patients are older age group maybe due to diabetes is more common aetiology in urban areas like Chennai. Comparing the cause, more patients fell under diabetic post-infective aetiology, 62.5% patients fell under diabetic cause and 34.38% of patients are due to traumatic aetiology, 3.125% is due to infective aetiology. In 46 to 60 years age group, more common cause of ulcer is diabetes, out of 17 patients in this age group, 12 patients are having diabetes mellitus. Sundresh NJ et[3] al in their study grafted 26% traumatic, 38% healing, 14% burn, 8% diabetic, 6% scar ulcers and 2% each of infective (cellulites) and bedsore ulcer patients. According to study done by Gilliland,[4] 95% of leg ulcers were due to vascular aetiology and among all chronic wounds in the lower extremity. Venous ulcer dominated the differential diagnosis accounting for up to 90% of the cases. Arterial diseases accounts for 5% to 10%. Most others are due to neuropathy or a combination of both 49. In our study, traumatic ulcer were accounted for 34.38% patients, infective aetiology ulcers 3.125%, diabetic ulcer were accounted for 62.5% of total patients. This difference is because all above-mentioned studies were done in western population, and/or chronic in our study, we included only those ulcer patients who underwent split skin grafting.

Lower limb is the most common site for ulcer occurrence, because it is the most neglected area and it is the region with hampered peripheral arterial as well as venous system. Sundresh NJ[3] et al in their study also found lower limb being the most common site for skin grafting, i.e. 62%.

In our study, we found 75% of patients undergoing split-skin grafting for lower limb ulcers being the most common site and it is consistent with the above-mentioned study. In that ulcers in dorsum (68.75) of foot exceeds plantar aspect of foot.

Ulcers with burns and malignant aetiology had chest involvement more commonly than other ulcers. Most of the burn patients were females with suicidal or accidental burns and trunk was the most common site of involvement.

According to the size of the ulcer, more than 75% falling under 6 to 10 cm size. In large ulcers, the take of SSG is less compared in smaller ulcers.[5] In our hospital, from the study, most common organism cultured from wound is Escherichia coli followed by Pseudomonas. In this study, we reviewed mean hospital stay of patients with different aetiological factors. In our study, mean preoperative stay is 11.50 days and maximum of 25 days, mean postoperative stay is 10.80 days and maximum of 15 days. So, post procedure hospital stay is significantly reduced. It shows that mean hospital stay was almost similar in all aetiological groups. But, when we compared pre-grafting hospital stay in all aetiological group, it was found to statically different in all group (p value <0.05).

In our study, 5 patients have 100% take on 3rd postoperative day. On discharge, two of them have only 95% of take. In their study recorded, 100% skin graft take in 84% of the patients on the fifth postoperative day and in 62% on weeks 3 and 8.[6] All patients in the graft group healed completely, but 8% had an ulcer recurrence and 4% a superficial infection within the following year.

In healthy human volunteers, there was a significant delay of 1.9 days in the epithelialisation of superficial skin defects in those older than 70 years of age when compared to younger volunteers.[7] However, more recent clinical experience suggests that major operative interventions can be accomplished safely in the elderly patients are more likely to sustain surgical wound rupture and delayed healing than younger patients are with ageing, collagen undergoes qualitative and quantitative changes. Dermal collagen content decreases with age and ageing collagen fibers show distorted architecture and organisation.

Depressed collagen synthesis and impaired angiogenesis with decreased levels of multiple growth factors including the proangiogenic factors FGF-2 and VEGF. Other studies[8] have suggested that the early inflammatory period of wound healing is altered in the elderly, including impaired macrophage activity with reduced phagocytosis and delayed infiltration of macrophages and B lymphocytes into wounds.

The study also assessed site wise distribution of graft acceptance. Among the patients of lower limb ulcers in 77% patients grafts was accepted, whereas in 22.3% patients, graft was partially accepted, and in 0.7% patients, it was rejected. In patients of upper limb ulcers grafted acceptance, partial graft acceptance was seen in 33.3%, 66.7% patients, respectively.[9] There was no significant association between site of ulcer and % of graft acceptance. This was statistically proved (p>0.05%).

In our study, patients with diabetes have 20% increased risk of take below 80%. On comparing, the take of SSG on third postoperative day, and on discharge, 17.4% of reduced take of graft present, which is significant. 25% of cases had more than 80% of take in third postoperative day has gone to less than 80% on discharge. Preoperative random blood sugar significantly affecting the graft take, if random blood sugar is more than 200, graft take is reduced more than 43%. The P value is 0.02, so statistically significant.

One more inference obtained from our study is, if preoperative haemoglobin is less than 10 g, it is reducing the take of SSG. The P value is 0.001, which is statistically significant.

CONCLUSION
The Split-Thickness Skin Grafting (SSG) is one of the most common performed procedures that are done to close defects that are unable to be closed with simple approximation of the wound edges.

From this study, we could observe the effect of split skin graft in promoting the wound healing and it has also shown to reduce the length of hospital stay, thereby it reduce the expenses spent on treating these ulcers. Moreover, it helps the patient to walk again and also prevents major complications.

From the above study, it was observed that the length of hospital stay in the postoperative period has come down to about 35% of the preoperative operative. The mean preoperative stay of patient is 11.5 days and maximum of 25 days. The mean postoperative day is 10.5 days, maximum of 15 days. As per the literature, the mean postoperative stay is about 12 days. In the above study, it was observed that 45% of patients have stayed for 12 days in the hospital after surgery. In our study, preoperative random blood sugar significantly affecting the graft take the P value is 0.02, which is statistically significant. On comparing the take of graft on third postoperative day and discharge 25% of cases had more than 80% of take in third postoperative day has gone to less than 80% on discharge.

In our study, the preoperative haemoglobin level has impact on the take of the graft, the 'P' value is 0.01, which is statistically significant.

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