Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/17891
DOI URL: http://dx.doi.org/10.21474/IJAR01/17891

RESEARCH ARTICLE

SKIN GRAFT : TECHNIQUE, INDICATIONS AND OUTCOMES

Dehhaze Adil[1], Echmili Mouad[2], Tazi Hanae[2], Tita Sara[2], Taybi Otmane[2], Diher Issam[2], Daghouri Nada Imane[2], Laabaci Rim[2], Mai Aicha[2], Bouaza Omar[2], Barij Hamza[2] and Mahioui Mimoun[2]

1. Assistant Professor and Head of the Department of Plastic, Reconstructive and Aesthetic Surgery, Center for Burned Patients, University Hospital Tangier-Tetouan-Al Hoceima, Morocco.
2. Resident, Department of Plastic, Reconstructive and Aesthetic Surgery, Center for Burned Patients, University Hospital Tangier- Tetouan-Al Hoceima, Morocco.

Manuscript Info

Manuscript History
Received: 16 September 2023
Final Accepted: 19 October 2023
Published: November 2023

Key words:-
Skin Graft, Defect, Split-Thickness Skin Graft, Graft Failure

Abstract

Background: Skin graft is one of the most indispensable techniques in plastic surgery. They constitute a common method of covering skin defects. The literature comparing methods of graft application and subsequent outcomes is poor, but reports indicate a graft failure rate between 2 and 30%. In the present review, we describe how to perform skin grafting successfully, their main indications, some variation of skin grafting and possible outcomes.

Methods: Data were collected retrospectively on all skin grafts performed by the plastic and aesthetic department in tangier,morocco between februry 2022 and october 2023. Data included for each patient basic demographics such as age, gender, graft indication and the site, application method, comorbidities, length of stay, and graft outcomes including graft take post-operatively.

Results: There were 68 grafts performed on 63 patients, median age 41 years (4–78 years), men were the predominent recipients in our study (69%) ,split-thickness skin grafts were the most used type of grafting, with 53 (77%) performed for defects after oncologic resection, autologous skin graft was the only option for all patients. Successful grafts (>80% take) were performed in 65 (95%) patients. The overall graft complication rate was 4.4% (3 of 68 grafts). Only one of them underwent re-operation for graft failure. No patient has received prophylactic antibiotics to reduce risk of graft failure.

Conclusion: Skin grafts were performed successfully in the majority of patients. Graft complication and failure rates compare well with the world literature. Infection was the only major complication causing the graft failure.

Introduction:-

Skin graft is one of the most indispensable techniques in plastic surgery . Since Reverdin first peroformed skin autotransplantation in 1869 [1], many pioneers have tried to improve the results of grafting [2–3]. In 1929, Brown et al. established their technique of split-thickness skin grafting, and they differentiated between full-thickness, intermediate-thickness, and epidermal (Thiersch) grafts, pointing out the advantages and disadvantages of each.

Corresponding Author:- Echmili Mouad
Address:- Resident, Department of Plastic, Reconstructive and Aesthetic Surgery, Center for Burned Patients, University Hospital Tangier- Tetouan-Al Hoceima, Morocco.

These fundamental principles of skin grafting still hold true today [4, 5]. Skin grafts are used in a variety of clinical situations, such as traumatic wounds, defects after oncologic resection, burn reconstruction, scar contracture release, congenital skin deficiencies, hair restoration, vitiligo, and nipple-areola reconstruction [6–7]. Skin grafts are generally avoided in the management of more complex wounds. Conditions with deep spaces and exposed bones normally require the use of skin flaps or muscle flaps. Because there are different types of wounds, treatment should be selected individually for each defect after consideration of all closure options[8,9]. When selecting a technique to cover a wound, the major goal is to restore the functional integrity of the skin with the best possible cosmetic outocome.

Methods:-

This was a retrospective observational study and included all skin grafts performed by the plastic and aesthetic Department at university hospital Mohammed VI in tangier, morocco.
Data were retroprospectively collected between februry 2022 and october 2023 onto a standardized proforma. patients medical records and demographics included dates of admission, gender and age , medical and surgical comorbidities, and medications. The site and indication for graft, type of graft, application method, type of anaesthesia , use of antibiotics and , and graft success or failure were recorded.
A direct phone call was performed by the author to ascertain survival, searching complications,recurences,esthetic results …

Surgical techniques :
Instrumentation/Equipment/Materials:
Lidocaine with epinephrine
sterile saline
Dermatome
Tissue forceps
Scissor
Sterile saline
Soft guaze
Vasiline guaze
Skin staples and sutures

We used common techniques to harvest and place skin grafts. Split thickness grafts were all harvested with the power driven dermatome because of its simplicity and reliability, Infiltration of the subcutaneous tissue with saline prior to using a motorized dermatome can facilitate skin graft harvest, especially when harvesting skin over a bony prominence [10]. a small amount of paraffine ou saline solution ointment were used in order to make it easier to harvest the skin by decreasing the friction between the skin and the dermatome.

Figure 1:- Items used in a split-tickness skin graft.

The donor site of split-thickness skin grafts is covered with wound dressing materials such as antibiotics topics ,vaseline to moisten the environment of the wound. after grafting, excess skin has been placed onto the donor site rather than thrown away. split-thickness skin grafts can be meshed to expand. This process helps increasing the surface area that can be covered and allowing the graft to adhere better to the recipient site [11]. we should mention that in our serie this method was not utilized on our patients. Hemostasis was achieved systematically to prevent graft loss due to hematoma. Before the dressing is applied, the graft is checked up for hematoma. Flushing saline solution under the graft prevents blood clots and provides better adherence of the graft. Then, a dressing is applied to the graft with gentle pressure to promote graft adherence without causing pressure necrosis [12]. "Tie-over dressing" is useful, because it minimizes the risk of hematoma or seroma formation and protects the healing wound from outside. sometimes it may be sufficient to place press fluffed gauze onto the wound after suturing the graft. the tie-over dressing to be removed earlier on 4-5 days after surgery to observe the grafted skin and ensure absence on any complication such as infection or necrosis.

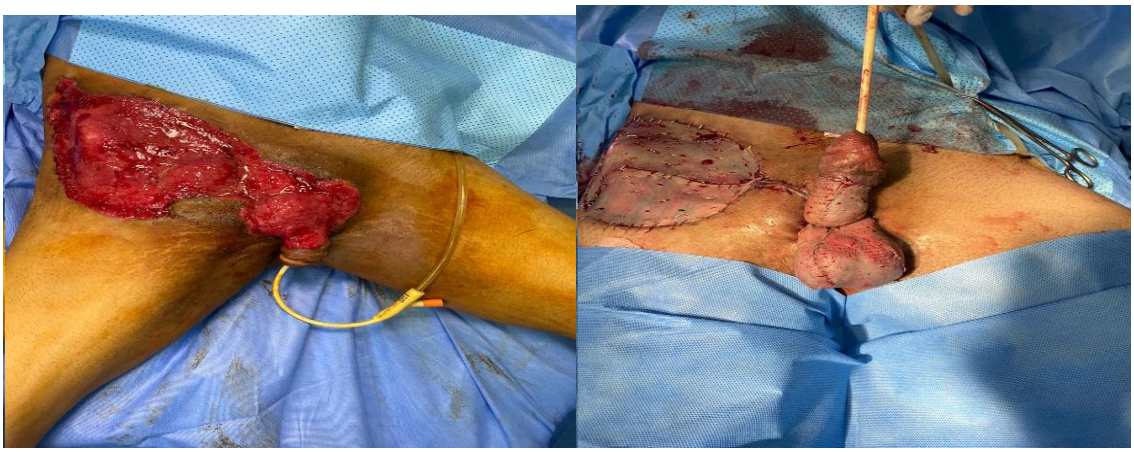

Figure 2:- Split thickness skin graft for inguino-scrotal defect.

A full thickness graft was used, with a scalpel, and the subcutaneous tissue was removed with scissors and the donor site is then closed primarily.. Grafts were then microperforated and either sutured or stapled in place. Tie over dressing were applied.

Figrure 3:- Full thickness skin graft placed for a malignant skin tumor defect (left) with the donor site (right).

In postoperative care, Thromboprophylaxis prescription was recomended for patients with lower limb grafts. The use of antibiotics was common in our experience to prefent infection.

Skin graft retraction is the most common concern with split-thickness skin grafts . Immobilization with a splint was done in case the skin graft was used on the flexor side of joints.

Protecting the graft from sunlight was highly-recomended produre for all patients to avoid hyperpigmentation especially in those exposed aeras.

Most patients were discharged either on the operative day or after one or two days . All patients were reviewed 5 days afterwards to remove sutures.

Results:-

In 20 months, we performed 68 skin grafts on 63 patients, 43 males and 20 females. (77%) of skin grafts were indicated for cutaneous malignancy after excision of the lesion, trauma (including burns) for 15% of grafts and the rest for scar contracture release and infection diseases.

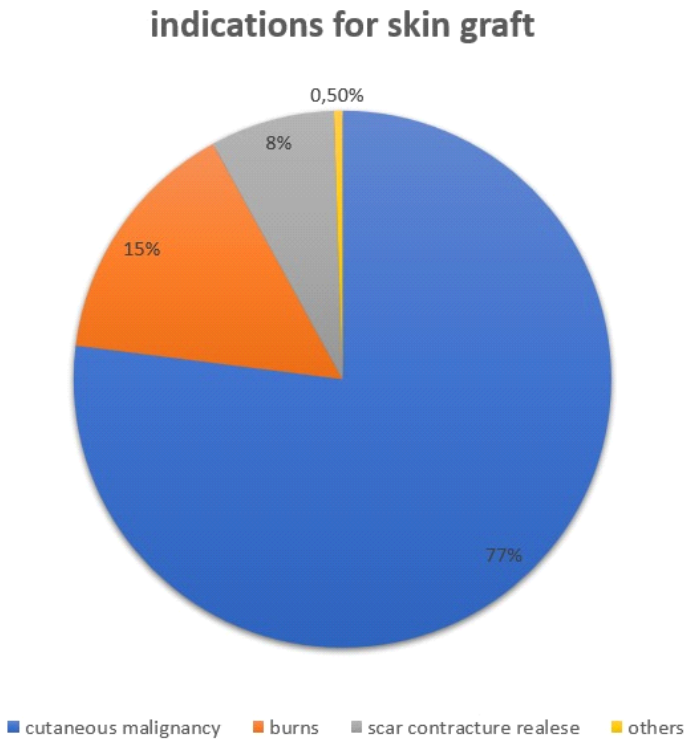

Figure 4:- Main indications for skin graft.

Two patients had repeated grafting (for recurrence and graft faillure). The median age was about 41 years (4–78). Comorbidities were found in some patients such as diabetes (10%), smoking (12%), peripheral vascular disease (ulcer in 1 case) , obesity/over-wheight (10%).

Only 10% of grafts were placed at the same time of tumor resection. No grafts were placed immedietly after burns (excision-graft).

We performed 52 (76%) split-thickness grafts and 16 full thickness grafts. The autologous skin graft was employed in all our grafts,. General anaesthetic was used for 59 (95%) patients, with the rest (5%) having regional or local anaesthetic. Perioperative antibiotics were given to only one patient who had infected wound. One day prior to the surgery, patients who underwent split-thickness skin graft, had an anti-inflamatory dressing to level out the granulation tissue and reduce secretions.

The donor site of split-thickness skin grafts : antero-intern region of the thigh (68%) , antero-intern region of the arm (30.5%), trunc (1 case).

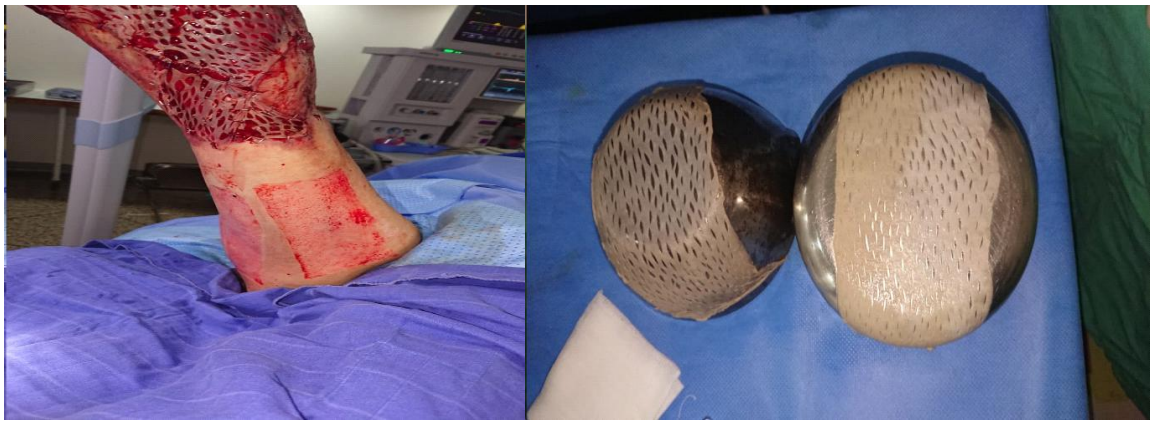

Figure 5:- Donor site of split thickness skin graft.

The donor site of full-thickness skin grafts : subclavicular region (40%), Inguinal region (35%), Upper arm (15%), Retroauricular (10%)

The anatomical location of the grafts were like (see figure below) :

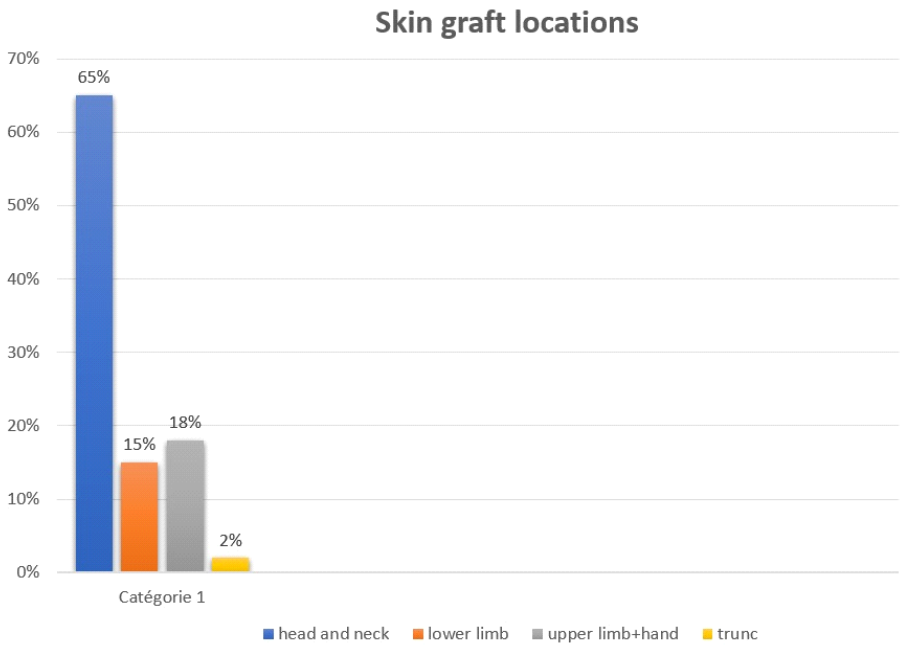

Figure 6:- Skin graft locations.

Figure 7:- Scar contracture release in the elbow grafted immedietly.

"Tie over dressing" was done for almost all our patients with vaseline and a moister beneath. Postoperative antibiotics were given to most of our patients. Patients with lower limb grafts (9%) were placed on post-operative thromboprophylaxis. Most of our patients were discharged 5 days after surgery.

Outcomes and complications

For the purposes of our study, a successful graft had a clinically estimated take of greater than 80% at each assessment.

Figure 8:- Full thickness skin graft of the hand after scar contracture release.

Graft failures were observed on 3 patients , one of them an adult female had chronic leg ulcer with unbalanced diabetes; the two others "smookers" (2 males) with no cause identified but most likely infection.

The most common complication noted was hyperpigmentation due to sun exposure (12%), graft retraction in 12 cases (17%), itching in almost half the sample treated with antihistaminic medication.

Figure 9:- 3 months after split-tichkness graft placed for burn injury.

Discussion:-

In our case series, 68 skin grafts were performed on 63 patients over 20 months. the main indication was largely for cancerous lesions using autologous split-thickness skin grafts wich agrees with the results of this study[15]

On the other hand numerous review studies hava shown different results, mostly burns and chronic ulcers at first place as indication.

The head and the lower limb were the most common recipient for skin grafts. There were 3 graft failures (4.4%) and 53 graft complications (79%) beetween hyperpigmentation ,retraction and itching, those results conform with current world literature on split skin grafts[13,14,15].

A retrospective study had reported a 2% graft failure rate on burns in children[16], our failure rate was around 4.4%, as one had subsequent re-graft for failure. Grafts placed for chronic wounds have a lower success rate and require ongoing dressings and possibly multiple re-grafts [13,14,17]. The other two patients required ongoing dressings for a number of weeks.

Two surgeons applied suction dressings to lower limb grafts, while two applied standard sponge bolsters. Sponge bolsters and/or suction dressings are important in stabilizing the graft, reducing shear stress and haematoma and seroma formation between the graft and graft bed that could be exacerbated by patient's movement[14,18,19,20]. In our study, No suction dressings nor standard sponge bolster were used. We used regular dresssings with vaseline, moister and antibiotic topic with a "tie over dressings" to cover the graft.

In the literature lower limb grafts and patients with arterial or venous disease or previously treated with radiotherapy show increased rates of graft failure. Compression and elevation are of great benefit in patients with venous disease

[21]. In our series only one graft was placed on an site suffring of a chronic ulcer . The graft take had failed, which is consistent with current literature.

Failures were mostly because of infection[14,17,22] with a small number having no specific cause identified. In our case series two of our failures were of no cause identified, no culture swabs were taken to exclude an infection. A thorough follow-up with wound swabs may aid in better identifying and managing causes of failures. A recent study reported an increased rate of graft failure in patients who are obese[22]. While this is an important point to note for risks of graft failure, this is not easily modified and is not something we looked at in the course of our study.

In recent literature , Smokers had a significant trend towards high risk of graft intake because they are known to have poorer microvascular circulation due to vasoconstriction [23,24], in our series ,it is difficult to link those failures with smooking,although it is highly recomended to quit smooking before surgery.

Patients who had been given intra-operative antibiotics had a statistically significant decreased risk of graft failure. These patients were not randomized and may be subject to selection bias. These findings do warrant further investigation, and a randomized controlled trial on the use of perioperative antibiotics for patients requiring skin grafts could be easily performed[15]. There has been one previous blinded randomized controlled trial in the literature on the use of prophylactic antibiotics for split skin grafts, from 1982[25]; This study used three doses of Cephalothin one prior, one during and one after theatre in clean burns patients. There was one adverse reaction to the antibiotic, and patients treated with antibiotics went home significantly earlier, had less graft loss and had fewer infections. Another study in new zealand support this finding [15].

Conclusion:-

A working knowledge of the indications, techniques, donor site considerations, and postoperative complications of all types of skin grafting is necessary for soft tissue reconstruction. As the incidence of skin cancer continues to rise, increasing numbers of patients are likely to require reconstructive procedures to repair their defects. With proper defect assessment, reconstructive planning, and attention to detail preoperatively, intraoperatively, and postoperatively, optimal cosmetic and functional results using skin grafting techniques can be achieved. A thorough understanding of skin grafting is invaluable for all physicians performing reconstructive surgery.

References:-

[1] J. L. Reverdin, “Greffes epidermiques,” Bulletin de la Societe Imperiale de Chirurgie de Paris, vol. 10, p. 51, 1869.
[2] G. Lawson, “On the transplantation of portions of skin for the closure of large granulating surfaces,” Transactions of the Clinical Society of London, vol. 4, p. 49, 1871.
[3] C. Thiersh, “Uber die feineren anatomischen veranderungen bei aufheilung von Haut auf granulationen,” Verhandlungen der Deutschen Gesellschaft fur Chirurgie ¨ , vol. 3, p. 69, 1874.
[4] V. P. Blair and J. B. Brown, “The use and uses of large split skin grafts of intermediate thickness,” Surgery Gynecology & Obstetrics, vol. 49, p. 82, 1929.
[5] J. B. Brown and F. McDowell, Skin Grafting, JB Lippincott, Philadelphia, Pa, USA, 2nd edition, 1949
[6] I. C. Valencia, A. F. Falabella, and W. H. Eaglstein, “Skin grafting,” Dermatologic Clinics, vol. 18, no. 3, pp. 521–532, 2000
[7] S. Mutallik and A. Ginzburg, “Surgical management of stable vitiligo: a review with personal experience,” Dermatologic Surgery, vol. 26, no. 3, pp. 248–254, 2000
[8]. Johnson TM, Ratner D, Nelson BR Soft tissue reconstruction with skin grafting. J Am Acad Dermato 27:151-165,1992
[9]. Ovington LG: The well-dressed wound: An overview of dressing types. Wounds 1OS:lA-llA, 1998
[10] P. Silverstein, W. F. McManus, and B. A. Pruitt Jr, “Subcutaneous tissue infiltration as an adjunct to split-thickness skin grafting,” The American Journal of Surgery, vol. 123, no. 5, pp. 624–625, 1972
[11] J. C. Tanner, J. Vandeput, and J. F. Olley, “The mesh skin graft,” Plastic and Reconstructive Surgery, vol. 34, pp. 287–292, 1964.
[12] A. Sakurai and O. Fukuda, “The effect of tie over pressure on skin graft “take”,” Japanese Journal of Plastic and Reconstructive Surgery, vol. 4, p. 917, 1984.
[13]. Moisidis E, Heath T, Boorer C, Ho K, Deva AK. A prospective, blinded, randomized, controlled clinical trial of topical negative pressure use in skin grafting. Plast. Reconstr. Surg. 2004; 114: 917–22.

[14]. Hynes PJ, Earley MJ, Lawlor D. Split-thickness skin grafts and negativepressure dressings in the treatment of axillary hydradenitis suppuritiva. Br. J. Plast. Surg. 2002; 55: 507–9
[15] Skin grafts: a rural general surgical perspective* Nigel J. Henderson, Michael Fancourt, William Gilkison, Stephen Kyle and Damien Mosquera Taranaki Base Hospital, New Plymouth, New Zealand
[16]. Davey RB, Sparnon AL, Lodge M. Technique of split skin graft fixation using hypafix: a 15-year review. ANZ J. Surg. 2003; 73: 958–62.
[17]. Unal S, Ersoz G, Demirkan F, Arslan E, Tütüncü N, Sari A. Analysis of skin-graft loss due to infection: infection-related graft loss. Ann. Plast. Surg. 2005; 55: 102–6.
[18]. Chang K-P, Tsai C-C, Lin T-M, Lai C-S, Lin S-D. An alternative dressing for skin graft immobilization: negative pressure dressing. Burns 2001; 8: 839–42.
[19]. Rozen WM, Shahbaz S, Morsi A. An improved alternative to vacuumassisted closure (VAC) as a negative pressure dressing in lower limb split skin grafting: a clinical trial. J. Plast. Reconstr. Aesthet. Surg. 2008; 61: 334–7.
[20]. Vidrine DM, Kaler S, Rosenthal EL. A comparison of negative pressure dressings versus bolster and splinting of the radial forearm donor site. Otolaryngol. Head Neck Surg. 2005; 133: 403–6.
[21]. Jones JE, Nelson EA. Skin grafting for venous leg ulcers. Cochrane Database of Systematic Reviews 2007, Issue 2. Art. No.: CD001737. DOI: 10.1002/14651858.CD001737.pub3
[22]. Pennington AJ, Morrison WA. Skin graft failure is predicted by waist-hip ratio: a marker for metabolic syndrome. ANZ J. Surg 2007; 77: 118–20
[23]. Akoz T, Akan M, Yildirim S. If you continue to smoke, we may have a problem: smoking's effects on plastic surgery. Aesthetic Plast. Surg. 2002; 26: 477–82. [24]. Chang LD, Buncke G, Slezak S, Buncke HJ. Cigarette smoking, plastic surgery, and microsurgery. J. Reconstr. Microsurg. 1996; 12: 467–74
[25]. Alexanander IW, MacMillan BG, Law EW, Krummel R. Prophylactic antibiotics as an adjunct for skin grafting in clean reconstructive surgery following burn injury. J. Trauma 1982; 22: 687–90.