TECHNIQUE OF SUTURE LESS SKIN GRAFT FIXATION IN RAW AREAS OF BURN WOUNDS

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ABSTRACT A successful skin graft take requires the adherence of skin graft to its recipient area for 5-7 days. This is achieved by fixing the skin graft to its defect. Routinely it is done by using sutures and staplers. We describe a method of fixing skin grafts using the dressing material without the need for sutures. A non-randomized, non-controlled trial was conducted at a tertiary care burns referral center at Mumbai, India, attached to Dept. of plastic surgery of a tertiary care teaching hospital, from August 2020 to July 2021. Twenty patients who underwent split skin grafting were included during the study period. All the patients had more than 90 percent skin graft take. This method of skin graft fixation is a safe, viable, cheaper, fast alternate option to the traditional methods of skin graft fixation, viz. sutures, staples or fibrin glue.

KEYWORDS skin graft, burns, skin graft dressing

Introduction

Suturing and stapling are the standard methods of split-thickness skin graft fixation for large raw areas in burns patients. However, suturing is a time-consuming process leading to increased chances of hematoma formation and skin graft failure. Stapling through a fast option, the staples tend to increase hypertrophic granulation and scar formation. Also, there are increased chances of staples being left embedded in the scar leading to artefacts on radiological images. Although fibrin glue has been used as an alternative to sutures and staples, their high costs, especially in large area burns, restrict their use.

We present a technique of sutureless skin grafting in large area burns patients using simple paraffin gauze dressing.

Patients and Methods

A non-randomized, non-controlled trial was conducted at a specialized burns centre at Kasturba General Hospital, Mumbai. Twenty successive patients with more than 20% burns were treated with technique in the months of August 2020 to July 2021. The research was conducted in accordance with Helsinki guidelines 2008 and the ICMR code of ethics 2006. Surgical technique was as follows:

Preoperative

Pre-operatively, the granulated raw areas were given normal saline dressings with paraffin gauze without any topical antimicrobial agents.

Intraoperative

DOI: 10.5455/IJMRCR.Techniqueofsuturelessskingraftfixation
First Received: November 27, 2021
Accepted: December 27, 2021
Associate Editor: Ivan Inkov (BG);
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- Raw areas were infiltrated with 1 in 1000 inj adrenaline upto 5-10 microgram per kg by diluting in 250 - 500 ml of normal saline solution depending upon area to be infiltrated
- Raw area debrided after a wait period of 20 minutes
- Hemostasis confirmed
- Adequate meshing to minimize primary contraction
- Skin grafts placed over the raw areas (Image 1)
- Long strips of paraffin gauze placed on the graft wound and intergraft edges first to prevent sheering (Image 2)
- Loose sheets of paraffin gauze then placed as a 2nd layer to cover the entire grafted area
- 4x4 gauze pieces soaked in solution containing 2 parts of betadene solution and 1 part of liquid paraffin and used as the 3rd layer of dressing
- Further, a 3 layered dressing of gamjee roll, roller bandage and crepe bandage given with gentle handling to avoid sheering of the graft
- Splint was given as and when required

Postoperative

- Every 48 hours, only superficial layers opened up to the paraffin gauze, as the paraffin gauze was by then firmly adherent to the wound bed along with the skin graft (Image 3). The graft was inspected through the paraffin gauze for any discharge or drying, and then again, a similar dressing did use the gauze soaked in a 3:1 mixture.
- After about 7-10 days, once the graft appeared dry, a new mixture of 3 parts of liquid paraffin and 1 part of betadine solution was prepared; and further dressings were done using the gauze soaked in this new mixture.
- With the new mixture, the stuck paraffin gauze loosened gradually, and it separated and fell off the wound bed, leaving a dried well-taken skin graft underneath. (Image 4)

Results

The Table given below summarizes the result of our dressing technique for skin grafting in burns wounds. (Table 1) Twenty

Image 1

Image 2

Image 3

Image 4

Table 1 Summary of result of our dressing technique for skin grafting in burns wounds.

Sr. no	Age (years)	Sex	Cause	Location of burns	Total Raw area size (cm)	Percentage take of Graft	Complication
1	35	F	Gas Stove Explo-sion	Chest wall and left arm	15 x 10	95	
2	27	F	Gas Stove explosion	Neck, chest wall right arm	25 x 10	90	
3	48	M	Kerosene Lamp	Chest wall	10 x10	97	
4	10	M	Firecracker	Forearm	7 x 5	98	
5	22	F	Oil Lamp	Chest Wall	20 x 10	85	Displacement
6	28	M	Gas stove explosion	Chest wall and left shoulder	15 x 15	90	
7	56	M	Hot water Scald burns	Chest wall	15 x 10	95	
8	48	F	Electric injury	Right leg	10 x 10	100	
9	35	M	Hot water Scald Burns	Chest wall	10 x 10	95	
10	50	M	Gas stove explosion	Chest wall	15 x 10	75	Hematoma
11	42	M	Electric burns	Left leg	10 x 10	98	
12	40	M	Gas stove explosion	Chest wall	20 x 10	90	
13	48	M	Gas stove explosion	Chest wall, Neck	10 x 10	95	
14	13	F	Hot water Scald burns	Lower abdomen	10 x 10	95	
15	21	M	Gas Stove explosion	Chest, Neck	20 x 8	90	
16	33	M	Electric injury	Right leg	15 x 10	95	
17	44	M	Car engine blast	Left hand	10 x 10	90	
18	40	F	Gas stove explosion	Chest wall and neck	15 x 10	95	
19	37	M	Gas stove explosion	Chest wall	15 x 10	90	
20	47	F	Kerosene lamp	Right forearm	10 x 10	100	

successive patients with raw areas following burns presenting at specialized burns centre at Kasturba General Hospital, Mumbai, in the months of August 2020 to July 2021 were included in the study. This included 13 male and 7 female patients. The mean age of our patients was 36.2. Gas stove explosion was the most common cause of the burns (9/20), and chest wall was the most common site of post burns raw area (13/20).

The mean take of graft in our series was 92.9%. There was 1 case of hematoma and graft displacement each. There were no infections or seromas.

Discussion

Suturing and stapling, the traditional methods of skin graft fixation. They prevent sheering of the graft and thus increase the graft take. However, these methods are not without their problems.

Suturing large grafts is a time-consuming process, increasing the operative time and consequently the time under anaesthesia. Increased suturing time allows for the collection of fluid underneath the graft, increasing rates of hematoma and seroma formation and consequent graft failure [1–3].

Suturing may be used with either tie-over bolster dressing or negative pressure wound dressing to ensure complete contact of the graft with the wound bed and prevent seroma or hematoma formation. Although of low quality, almost none of the studies have demonstrated any significant benefit of tie-over dressings over alternate fixation methods. It has been suggested that the downward pressure exerted by the tie-over dressings over the graft does not exceed the capillary pressure, thus not reducing complications [1]. In addition, the process of tie-over dressing is complex, may require assistance, may hinder inspection and wound care in the post-operative period. Lack of uniform pressure may lead to the lifting of the graft from the wound bed at the lower pressure areas, thus leading to patchy graft loss[1,4].

While negative pressure dressing over the suture fixed graft helps reduce the incidence of seromas and hematoma formation, it is a cumbersome and costly procedure. It does not allow for graft inspection [4,5].

Stapling through timesaving increases granulation and scar formation at wounds at staple sites leading to poor cosmesis and increased secondary scar contraction. In addition, some of the staple pins might get buried and might be left in-situ, leading to artefacts on radiological examinations [6,7]. Suture and staple-pin removal are laborious and time-consuming processes, often leading to sheering and graft loss at wound edges. Buried staple pins and knots are often a source of pain and discomfort to the patient while removing them [6,7]. To overcome these limitations, as well as to prevent graft sheering, thus achieving a stable skin graft fixation, various fibrin glues have been used over time. However, they have not gained popularity because of their increased costs. Especially in post-burns large raw areas, the quantity of glue required to be used is large [3].

Ours is an alternative, cost-effective, time-saving technique of graft fixation. The technique can be used in even the most modest healthcare setups. It is easy to learn and replicate. Liquid paraffin is cheap, easily available, and inert. It acts as an emollient for the skin graft and covers the exposed nerve endings. There is minimal manipulation of the skin graft postoperatively, thus reducing graft loss and increasing patient comfort. This technique also safely allows for inspection of the graft through the gauze itself and correspondingly wound care, thus further minimizing graft loss. The graft taken in our case series is 92.9% and has a complication rate of 10%. The graft take and the complication rates are comparable to the commonly performed techniques [1–3]. The dressing comes off by itself once the graft take is complete and the graft is dry, thus increasing the patient as well as surgeon comfort.

Suturing or stapling help reverse the primary skin graft contraction and thus help in covering larger raw areas. Although there are no vectors to counteract the primary contracture of the graft in our technique, this problem is offset by the adequate meshing of the skin graft, which allows for coverage of large raw areas with the same sheet of the graft.

Conclusion:

Our technique of sutureless skin graft fixation using paraffin gauze is a safe, viable, cheaper, fast alternate option to the traditional methods of skin graft fixation, viz. sutures, staples or fibrin glue.

Funding

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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