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# The Fixation and Dressing for Meshed and Sheet Skin Graft

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Additional information is available at the end of the chapter

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## 1. Introduction

When a graft is placed on a recipient bed, the process of accepting the graft begins. For some hours, the graft is bathed and nourished by plasmatic circulation or serum imbibition. Simultaneously, fortuitous and accidental apposition of the vessels in the bed and those in the graft allows blood to be sucked into the graft. Soon afterwards, active penetration of the graft by blood vessels from the bed begins and is well-established by the fifth day. These 5 days are the most important period for skin graft acceptance.

In other words, to improve the survival of the transplanted skin graft, it is important to ensure that the graft is not misaligned with the recipient bed and that moderate pressure is applied on the transplanted skin so that it is in contact with and adheres to the recipient bed. These measures are achieved through fixation and dressing. This chapter will cover various types of fixations and dressings.

## 2. Fixation of skin grafts

With the exception of particular skin grafting methods, such as those used in skin chip grafts, fixation is essential to prevent the skin graft from being misaligned with the recipient bed, whether the graft is a mesh skin graft or a sheet skin graft. The following sections enumerate 3 such methods and describe their respective advantages and disadvantages. Of course, these methods can also be used in combination with each other.

### 2.1. Suturing

The most cost-effective and common method is to fix the skin grafts with unabsorbable sutures (Figure 1). This is the most basic method, but its disadvantage are that it is very time consuming

because the sutures are sewn one by one and that the removal of the stitches is time-consuming. In addition, if there is epithelialization of the anchoring suture in a mesh skin graft, the suture will be buried in the skin and will be difficult to remove. On rare occasions, because of the thinness of the skin, the sutures may cause stitch abscesses if they are left in place. Therefore, methods involving absorbable sutures are used in order to avoid these issues (Figure 2). In such cases, there is no need to remove the sutures, and no problem occurs even if the anchoring site is epithelialized. However, the suturing time remains the same. Therefore, fixation with an unabsorbable suture is useful in the case of sheet skin grafts, whereas fixation with an absorbable suture is useful in the case of mesh skin grafts.



**Figure 1.** Graft fixation with nylon



**Figure 2.** Graft fixation with absorbable sutures.

## 2.2. Surgical stapler

The greatest advantage of this method is that it is not time-consuming. For this reason, it is used for various purposes, such as when the skin graft extends over a wide area or when the surgeon wants to complete the surgery as early as possible because of the patient's overall condition (Figure 3). However, there are 2 disadvantages: patients often complain of pain during the removal of the sutures and if a mesh skin graft is used in the same way as in the case of fixation using the aforementioned unabsorbable sutures and if epithelialization extends to the stapled sites, then the removal of the sutures will become very difficult.





**Figure 3.** Graft Fixation with skin stapler

### 2.3. Octyl-2-cyanoacrylate

This is a new fixation method that we have devised, and it consists of fixing the skin graft by using octyl-2-cyanoacrylate at the time of closing of the surgical wound (Figure 4). As in the case of the staplers, this procedure can be performed in a short time and there is no need for suture removal; therefore, this method is suitable for children. The disadvantage of this method is that it is expensive.

### 3. Dressing of skin grafts

The dressing of a skin graft has more influence on graft survival than on graft fixation. The main purpose of dressing is to ensure circumferential contact between the graft and the host bed. Ideally, all skin grafts should be accepted; however, complications such as hematoma, movement, and infection occur, notwithstanding the pressure on the skin graft. In addition, pressure necrosis can occur if too much pressure is applied to give priority to adhesion. And a pressure of 30 mmHg was optimal for graft take because it totally compressed venous vascularization and partially compressed arterial vascularization <sup>1)</sup>.

In the following section, various dressing methods have been discussed; however, regardless of the method used, the dressing is usually left in place for approximately 5 days. If the

transplanted skin and the dressing adhere to each other at the time of change of the first dressing, the transplanted skin that has adhered to the recipient bed could end up getting peeled off. Therefore, a non-adherent siliconized gauze is placed directly onto the transplanted skin to prevent it from adhering to the dressing.



**Figure 4.** Graft fixation with Octyl-2-cyanoacrylate

### 3.1. Simple pressure dressing

This is the most basic skin graft fixation method. It is indicated for flat and poorly operational areas. This method consists of placing a silicon gauze on the skin graft and laying a piece of cotton or gauze on top to compress the skin graft. Fixation is ensured by compression with tapes or bandages.

### 3.2. Tie over dressing

A tie-over dressing is the most optimal and reliable technique. In the past, tie-over fixation seemed to be the standard procedure for skin grafting; however, comparison with simple pressure dressing has been reported to show no difference in terms of graft survival <sup>2)</sup>. Therefore, this method is basically indicated for locations where tapes are difficult to attach, including mobile areas such as the shoulders, concave and convex surfaces such as the face, and the scalp. The method is performed as follows. Traditionally, nylon sutures are applied

along the borders of the graft. The threads of the sutures are long. Next, the graft is dressed with nonadherent gauze, and a bolus of cotton is placed over the graft. Then, the threads on the opposite side are tied together and secured in order to establish a pressure dressing. Regarding cotton, 2 options are available: nylon cotton and raw cotton. If raw cotton is used, moderate pressure can easily be achieved by spreading a wetted piece of raw cotton directly onto non-adherent gauze and by placing fluffy and raw cotton on top. However, because the exudate will be absorbed by the cotton, odor could be an issue and there is risk of infection. However, if nylon cotton is used, there is less risk of infection because the exudate soaks the gauze located on the nylon cotton, which cannot be contaminated because of the capillary phenomenon. Meanwhile, a certain extent of skills is required for the fastening.

The disadvantages of the conventional technique are that the long sutures require time and effort for securing the suture ends. Furthermore, once a conventional tie-over dressing is removed, another similar tie-over dressing cannot be placed on the graft. Furthermore, the stitch marks surrounding the skin graft are unfortunately a common problem. Several unique suturing techniques have been reported as a solution for these issues; but the method described below is the best strategy.

### **3.3. Negative-pressure dressing**

In terms of wound healing, negative-pressure wound closure has been the focus of attention. Since this dressing method uses the principle of negative pressure, we have named it “negative-pressure dressing” (NPD). The greatest advantages of NPD are that it is not time-consuming and that it can be used at locations where tie-over and simple pressure fixation are difficult to achieve as well as in areas with a complex morphology. It can be performed regardless of the size of the skin graft. And it is said the rates of graft loss may be lower when NPD is used <sup>3</sup>.

For the procedure, preparations are performed in accordance with the conventional NPWC, and for pressure, a sponge and a film are used. As stated above, this method also requires the use of silicon gauze, which must be sandwiched between the sponge and the skin graft. And the sponge have to be cut its size same as the defect area. Then the sponse is put on the middle of the film, and the sponse and film push over the graft. So you can avoid the movement of graft over recipient site during application of sponge and film over it.

Basically, negative pressure of about 25 to 75 mmHg is applied for 5 consecutive days. Management is easy because, during that time, there is no need to replace the dressing. Even in the case of skin grafting at an infectious site at which the condition of the skin graft needs to be checked once every 2 or 3 days, dressing with NPD can be removed and then be applied again. At that time, a sponge and suction disk change to new ones. However, if NPD is used continuously over a period of 1 week or longer in order to give priority to the survival of the skin graft, an ulcer may develop.

The use of NPD is contraindicated on the scalp, where it is difficult for the film to adhere, and on the penis and the fingers and toes, where problems with blood flow may develop. In addition, NPD is not used for the fixation of very small-sized skin grafts because of cost issues.



## 4. Conclusion

In the above chapter, fixation and dressing of skin grafts were discussed. Although these are the most basic methods, they are extremely important and can influence the survival of skin grafts. In addition, various ideas to improve the survival rate of skin grafts have been reported. We hope that our readers will also report new methods in the future.

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