Optimal Use of Skin Thiersch Graft

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Abstract: The most popular and most widely used mode for short-term storage of grafts was curing them in a standard fridge at a temperature of +4 °C. According to the literature, the usability of the same ranges from 10 days to 21 days. The aim was to determine the usefulness of such a maximum time preserved grafts. This study comprised 50 patients, of which, take parts of skin with the size of 3 cm × 5 cm. It started from the 11th day after the 5 preparation were divided, one of which is a part applied to a suitable surface for accepting the transplant, the second part of the extended conservation 10 more days (to be transplanted) and the third placed in formalin and sent to histopatological analysis. Then, a series of five preparations were made, in which each subsequent extended period of conservation by one day longer, ending their 20th day. Usability over 50% of grafts preserved in NaCl solutions up to 20 days, and then fell. It is possible that a transplant is used with 30 days of preservation, but this is the exception, not the usual state.

Key words: Thiersch graft, transplantation, scin.

1. Introduction

Defects of the skin or mucous membranes are open wounds and cause loss of fluids, electrolytes and proteins. Later, these wounds heal at long term, per secundam due to unavoidable infections, and the result is a scar [1].

Small wound area, that is not infected, can be covered by the surrounding skin or mucous membrane, or if the wound area is larger, an option to cover skin graft or skin flap will be needed.

Leather flap has the advantage, in terms of results, or sometimes the state of patients' localization and size of the defect do not allow the formation of lobes, especially if the place is taken by a flap which must cover the skin graft.

Revedin [2] first noted the success of scin grafting in a human patient in 1969, when he removed multiple small pieces of epidermis and autotransplanted them onto a bed of granulation tissue. Due to techniques with "pinch" grafting, Lawson demonstrated success with larger full-thickness grafts in 1870. Ollier [3]

thereafter reported improved success with grafts when the donor site was prepared and debrided to healthy fresh tissue. Thiersch [2,3] envolved the principles of proper debridement and also was the first to demonstrate success using thinner grafts with improved survival and allowing the donor site to heal by reepithelization without an open wound. Blair and Brown's paper [4] published in 1929 highlighted the benefits and disadvantages of split-thickness grafts and explained how to achieve reliable success and survival. The current focus is on tissue preparation, innovative dressings to improve and accelerate healing, and tissue engineering techniques that will expand cell populations for vastly reduced donor site size [2-5].

Thiersch is available epidermal skin graft, described in 1866. It represents ¼ thickness of the skin, the epidermis, and a developer peaks papillae with basal cells. This is a piece of skin that is completely separate from the local blood supply to the wound and transferred to another place, where the exercise of the new vascular connections through the receiving region, which is necessary for its survival [6].

It's good for easy acceptance, but his shortcoming in the secondary contraction and hyperpigmentation. Over time, it can lead to contractures due to

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contraction and aesthetic deficits caused by hyperpigmentation [7].

Within the scope of oral and maxillofacial surgery, there are several indications for split-thickness grafting. Thiersch grafts are frequently required to repair defects to the head and neck region related to trauma, pathologic/oncologic resection, facial burns, contracture release, and congenital or developmental conditions [8].

Likewise, defects in mucous membranes cover Thiersch graft. Hynes [9] in 1957 used the same graft to cover scars and tattoos, which he called "overgrafting" [9].

Thinner dermis is located in the eyelids and scalp, and it is thickest over the back. The dermis thickness changes as children become mature to adulthood and it then thins out after the fifth decade [2].

The epidermal layer is quite thin (0.075~0.15 mm).

Many skin grafting techniques require little experience and only basic equipment and surgical [10].

The donor site often heals within a period of 7~21 days, and a variety of dressings are advocated to minimize delays in healing [11].

Large flat surfaces of the upper leg, upper arm and less belly take into account the thickness of the hair transplant and the donor region. As for the acceptance of the substrate, there are on-site no problems with nutrition coil, due to good blood flow. Even the scar and keloid capillaries have enough to feed spool [9].

The transplant should not be put on the deperiosteal bone, cartilage or fat naked, because such substrates can feed it [12, 13].

Also, ventilated area, atherosclerosis and diabetes reduced the chances of acceptance of the transplant. Infected substrates, particularly *Streptococcus* and *Pseudomonas*, are usually fatal to a skin graft, because of the lifted purulent exudate, a lack of intimate contact and coil mats on the surface of greater than 1 cm, which leads to rejection of the graft. It has been found that the endothelium of the substrate is 12 h to pass

0.5 mm thick clot, while the clot more than 5 mm, within five days [14].

Therefore, receiving area must not bleed and better transplants was postponed after 24~48 h, when it costs the bleeding, but to put on the transplant hematoma. If underlying granulation, they must be fresh, healthy, uninfected, and a sewing bobbin, along the edges of the wound must not be dead spaces [15, 16].

Graft to the substrate compresses itself immobilized at the same time soft plastic sponge, which evenly presses graft itself and absorbs eventual secretion from the wound. Sometimes, if you expect the collapse of part of the graft and take a large piece of transplants than we need, I plummet by keeping it in the fridge, or leave it in place from which we have taken. And when we need it, after a long week II day, it is easy to lift it and we use [17].

Preservation of preparation aims to preserve the vitality of a certain procedure in conditions of tissue destructive effects of hypoxic metabolism. Separated from the dying blood supply tissue, the metabolic activity of the cells is reduced or the nutritional process is provided. How to isolate tissue which preserved its validity? It must be ensured tissue oxygen metabolism, nutritional elements and decay products.

Long-term storage of transplant requires a special technique of protection against cell death. Cooling causes gangrene because of accumulation of the lethal concentration of salt in the cell. A protective agent, such as glycerol, binds water and protects the graft of this type of injury.

Culture of cells of the epidermis may be obtained by the substantial surface area of tissue to be applied in patients with a loss of large regions of the skin.

There are other ways of conservation grafts, such as the storage media used for tissue culture, and then in 10% serum, dimethylsulfoxide, and others.

It is very important and general condition of the patient before the transplant setting. If the state of wound receiving infected regions or squashed, it is

necessary to postpone a transplant such preparation and curing. For these reasons, it originated the idea for this research. By keeping this mixture to improve general health and recoverable early recipient, the results are significantly better than those are in the region of the receiving inadequate immediately placed translatat. In this way, the risk of graft rejection can be reduced, and same for performance.

The literature states that the utilization Thiersch to a 21-day, or almost no papers that deal with examining the usability of skin grafts that were engaged in keeping the preparation in saline solution in such period.

The aim of this study is to assess to what day conservation in a solution of NaCl can be used free skin Thiersch graft.

Assessing to what day after taking Thiersch graft enables us to plan the transplant in the region where right are not good conditions for its implementation, with the aim of better performance and acceptance in the receiving region.

2. Material and Methods

This prospective study comprised 50 patients who had treatment in the Emergency Center in Belgrade, Serbia. Patients were aged 35~65 years, of both sexes. It was the patients who were admitted for surgery changes in the area of the face, neck, scalp, or changes in the mucosa of the mouth, patients with burns in this region or skin defect is caused by the infection.

Patients excluded from the study are being treated

for diabetes mellitus, cardiovascular disease, after radiation therapy, epilepsy, poor general condition and mental disorders, with their consent to take the parts of skin of size 3 cm × 5 cm, Thiersch preparations, during surgery.

To obtain a graft, electric dermatome has been used (Fig. 1). Graft thickness was 0.1 mm.

Grafts have been conserved in the usual way (Fig. 2). We put skin graft with epitel side on the vaseline dressing, then we wound the surface of one half and fold the lean on the fresh surface of the second half. Then we graft wrapped in moistened dressing NaCl solution and gentamicin. Like this, we put the prepared graft into a glass bottle with a lid, and leave in the fridge at +4 °C. We kept the preparation in a fridge at +4 °C to 30 days.

By the 11th day, conservation preparations were not used, but stood in the fridge. On the 11th day, we removed the 5 preparations from the fridge.

We divided every product (Fig. 3) into pieces. The 1/6 of preparations was immersed in formalin and sent for histopathological analysis. and the remainder divided into two parts:

- one half of the second part, we return to the fridge and continued conservation for 10 days in the same way as before;
- the other half are brought to the appropriate area on the same patient from whom it was taken graft.

We did the same every subsequent day until the 20th day. From 21-30 days, we took each day by 5 preparations in order, part of the compositions placed

Fig. 1 Electric dermatome.

Fig. 2 Thiersch preparations for preservation.

Fig. 3 Thiersch preparations for transplantation.

on a suitable surface, a 1/6 sunk formalin and sent to histopathological analysis.

When placing the preparation on the surface of wounds, previously we were preparing the receiving region. We did debridement receiving region in early after burns or after infection repaired, if necessary, to get the wounds surface with dotted hemorrhage, suitable for accepting the transplant. In some patients

with skin tumors, we removed the tumor and put Thiersch defect (Fig. 4). Also, we have done in patients with leukoplakia of the oral cavity or after removal of the tumor (Fig. 5).

For suture we used the appropriate non-resorbable suture. Compression shorts we get a close contact between the receiving region and graft. Every patient with a transplanted graft we gave to drink cephalosporin. The first time we bandaged patient 7th day after the placement of the graft.

We wound writhed with NaCl solution and 10% glucose each day after 7 days to complete acceptance or rejection of the graft. Analysis of acceptance of the graft was performed clinically and histologically.

The data were processed by standard statistic methods, the significance of $p < 0.05$.

Fig. 4 Patient after transplantation Thiersh on face.

Fig. 5 Patients after transplantation Thiersch in oral cavity.

3. Results

Usability above 50% of preserved transplants is up to 20 days for the preservation and then falls. The highest acceptance was the 17th day, then decreases with each successive day. The acceptance is optimum until the 20th day. With each day significantly decreases the acceptance of grafts, so does the smallest 30th day. From 25th to 30th days, usability Thiersch-a is minimal (Fig. 6).

Necrosis of the graft was not until the 13th day, for a time from 13th to 22th day is below 5%, from 23th to 26th day and 10%, there after increasing to 30th days was about 25 % (Fig. 7).

Necroses were analyzed histologically primarily based on the cell membrane looks and looks cellular core.

4. Discussion

Good results grafts preserved in NaCl solutions in accepting graft in the receiving regional segments of the 11~21th day (> 50%) are to be expected and proven in previous research.

In our study, necrosis histologically speaking was

present below 5% by the 20th day, which is correlated with the results of transplantation success we get.

Order an increase in necrosis of the 26~30th day coincides with the results of the acceptance Thiersch's that we get.

These results can be explained by the fact the temperature has primarily affects the fluidity of the cell membrane, with temperatures that are too low causing it to solidify.

Cell membranes at functional temperatures are relatively viscous liquid bubbles. Their structure is maintained by using a phospholipid bilayer and its inherent hydrophilic and hydrophobic qualities [17].

Like any fat or oil, the phospholipids in the cell membrane are more or less solid based on temperature. The membranes of cells at low temperatures use unsaturated fatty acid chains to stay liquid.

Cooling causes the extinction of tissue due to accumulation of lethal salt concentration in the cell.

The first sign of microscopic cell death of changes to the kernel visible light microscope only when the cell is long since dead: shrunken basophilic nucleus cut into pieces in a dark violet powder, or completely

Fig. 6 Thiersch usability from 11th to 30th day after preservation.

Fig. 7 Presence of necrosis in Thiersch by day.

glued-hard-core are undoubtedly noticeable sign of necrosis.

Many wounds demonstrate a bed of granulation tissue, and it is imperative that this is healthy and has minimal bacterial colonization. Sampling tissue for approximate bacterial counts from the recipient bed in delayed procedures can help guide treatment to avoid untoward difficulties with graft healing. It is well accepted that bacterial counts less than 100,000 tissue can successfully take a graft, with lower counts affording better results in ideal situations. Local and systemic antibiotics and dressing management can help surgeons to disinfect and decontaminate the wound.

Facial area, because of the excellent blood flow, allows good reception of skin grafts, and on the other hand, due to aesthetics and important structures, requires special attention in the selection of a suitable free skin graft [18]. It must be as close to the receiving region and giving the region must be as close as possible. Graft placed on the surface but after about ten minutes glued with fibrin wound, a plasma will soon begin to permeate fine capillary network transplants and also by eating the first 48 hours. After

that, take the blood vessels feeding, because it comes to connecting the open lumen of the courts of the substrate and the graft. In a few days appear new capillary endothelium of ingrown from the substrate, and comes to the establishment of lymphatic drainage [6, 19].

Immediately after taking, a little thinner Thiersch shrivels, it is called. primary contraction. After ten days starting a secondary contraction due to scarring, which is created and lasts up to six months. Contraction favors soft lining and depression, as well as the partial decay transplant. In our region is particularly manifest in the neck and the soft surface of the oral cavity, while the periosteum of bone is minimal. It is therefore recommended immobilization thinner skin grafts and up to six months and massage [20].

Thiersch color stands out from its surroundings, the first was pale, and after exposure to ultraviolet rays becomes hyperpigmented [19].

Innervation occurs in the transplanted skin after 4~5 weeks, and normalizes after 1.5~2 years. Thiersch in the mouth is subject to change due to the changed look, it becomes similar to the mucosa, but it never

comes to a complete metaplasia in the mucosa, because the skin is highly differentiated organ.

Today is investigating the use of several different methods and medications to improve survival random lobe [21-25.]. They also questioned the success of graft acceptance.

Acceptance Thiersch graft is possible to monitor clinical, but it is essential Assessment wounds on his face, and even on the body, prepare without necrosis and infection for transplant setting as one of the ways of solving the defect skin or mucous membranes of the oral cavity. We should bear in mind the optimum period of conservation, which until twenty days after the graft.

In the literature, there is no research that is conserved preparations NaCl solutions up to 30 days, so they histologically analyzed. There is research that instead of NaCl preparations soaked in glycerol, to improve food preparation and examined the glukose metabolism in Thirsch graft [18, 26].

The study efficacy grafts in this way on a number of patients, would significantly increase the possibility of planning surgery to graft Thiers.

5. Conclusions

Region head is suitable for all types of transplants, due to good blood circulation and thus for Thiersch.

Usability exceeding 50% of canned Thiersch grafts of up to 20 days for preservation, and then fall. So saying, it is possible that a transplant is used and 30 days of preservation, but this is the exception, not the usual state.

Skin graft, put on a good foundation and immobilized with certainty be received and because of this we can say that Thiersch tool of choice for reimbursement of the skin and mucous membranes, and even when there is no requirement to perform a transplant immediately.

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