

Surgical treatment of burns

Surgical treatment of burns represents several types of surgical interventions used in the treatment of deep burns.

Escharotomy

Thermal destruction of the skin and subcutaneous tissue often leads to the formation of an eschar.

Eschar

- the skin loses its original elasticity;
- tissue stiffness causes compression of deeper structures;
- there is a risk of serious oppression in the case of chest circumferential burns (restricts breathing movements) and on the limbs (may restrict blood supply to the peripheral part of the limb)
- in addition to risk of losing the limb, reduced blood flow can also deepen the burn peripherally from a circumferential injury.

The most serious is the circumferential burn of the neck. Jugular veins are compressed. In this case the releasing incision can not be delayed and should be performed at the scene of the injury.

Escharotomy

- is performed by a saw-shaped or wave-shaped incision of the skin and subcutaneous tissue with a scalpel;
- the bleeding is usually not significant and stopping it is not a problem for the surgeon.

Necrectomy (dead tissue excision)

Before replacing the lost skin cover it is necessary to remove the dead tissue. There are two basic types of necrectomies:

Tangential necrectomy

- progressive superficial cutting off the dead skin to the vital blood-filled base;
- a special tool is used for it - *Watson skin graft knife* which is designed in such a way that there is no deep cut into the tissues;
- the effort is to preserve as much vital tissue as possible which is why only the skin that is obviously dead is cut off, areas of uncertain vitality are left to be dealt with at a later time.

Fascial necrectomy

- removal of skin including subcutaneous fat in one block up to the level of the muscle fascia;
- the advantage of such a procedure is obtaining a well-perfused base suitable for receiving skin transplants;
- however, a major disadvantage is the permanent loss of subcutaneous tissue as a mechanical protection against injury, damage to nerves and lymphatic vessels;
- this method is therefore used more often in old patients where function is less important and it is mainly about saving life by shortening the treatment time.

Skin transplantation

Skin transplantation is the transfer of skin from one (donor) area of the body to another (receiver) area of the individual. The more accurate term **skin autotransplantation** is used to distinguish the transfer of skin from the same donor.

- The transferred part of the skin is called a **skin graft**. A skin graft is always composed of the entire layer of the epidermis and several layers of the dermis.

According to the thickness of the graft we divide transplants into 2 basic types:

- In the **acute** phase of burn trauma:
 - we use *dermoepidermal grafts*, more often referred to as *split-thickness skin grafts*;
 - the skin is not removed in full thickness, it is cut at different levels of the corium (dermis);
 - the thinner the skin graft, the better it heals but it has less biological value because it is more fragile and shrinks more after healing;;
 - the area after graft removal heals *by spontaneous epithelization*, if necessary, the graft can even be removed repeatedly from the same place after healing.
- In **reconstructive burn surgery**:
 - they mainly use full-thickness grafts, which are mechanically more resistant, have an appearance more similar to intact skin and shrink only minimally;
 - the disadvantage is the increased demands on blood supply of the receiving area and the necessity of

performing a skin suture on the donor site.

Skin transplantation is technically a trivial procedure. However, successful treatment depends on a number of factors, one of which can ruin the whole effort.

Treatment success factors

1. Ensuring transplant has an efficient nutrient intake:

- the receiving area must not be avascular
- we do not attach the graft to exposed bone, scar or tendon tissue
- the contact of the graft with the receiver base area must be ensured so that the plasma of the recipient tissue can diffuse into the graft and the subsequent ingrowth of blood capillaries can begin
- hematoma must not accumulate under the graft and the graft must therefore be sufficiently pressed and secured against displacement
- therefore temporary immobilization is carried out in places of greater movement, usually with the help of a splint.

2. Prevention of infection:

- burnt areas cease to be sterile within a short time and bacteria colonization occurs early;
- these bacteria must not multiply to such an extent to cause infection after transplantation;
- it is important to perform an adequate evaluating assessment of the appearance and level of secretion from the burned area, a certain experience of the doctor in this assessment is necessary;
- administration of antibiotics differs at different workplaces;
- early inspection of the transplanted area is very beneficial, the timing varies according to the experience and preferences of individual workplaces;
- if the development of inflammatory changes is detected in time, the final success can be achieved by taking the appropriate steps, if, on the other hand, the infection is detected late, the transplant becomes liquefied and the treatment becomes extended by many days or weeks

3. Prevention of residual defects:

- the size of transferred grafts is limited by the size of the dermatome, approximately corresponds to 1% of the body surface of an adult individual;
- larger areas must therefore be covered by several transplants placed next to each other;
- if a larger gap remains between them, an unhealed area is formed, the epithelization of which sometimes takes much longer than the healing of the entire burn;
- residual defects sometimes arise from worse blood supply, localized infection, etc. but sometimes also due to insufficient attention paid to this "minor" problem.

4. The right choice of skin source:

- dermoepidermal grafts are usually taken from the most easily accessible body parts - from the front or outer side of the thighs;
- if this body part is aesthetically important (e.g. in women), skin is most often taken from the buttocks;
- a variant solution is to take a graft from the scalp but the hair must be cut and there is a risk of alopecia;
- skin grafts taken from the lower limbs tend to turn brown, from the buttocks turn yellow;
- these color changes are most inconvenient on the face where even a small color difference is very noticeable, that is why we use in this case transplants taken from behind the ear, from the eyelids, or from the area of the clavicle;
- however, the size of these grafts is limited and is often not enough to cover the burn defect, so the solution for larger defects is the transplantation of a graft from any body site we want and the unsatisfactory aesthetic result to be solved later with the help of reconstructive surgery.

5. Prevention of skin source infection:

- the area of skin source heals spontaneously within approximately 2 weeks in a normal course;
- the treatment of the skin source area may differ from workplace to workplace, the cheapest and at the same time abundantly sufficient is to apply a layer of oily tulle and dry sterile gauze immediately after the graft is taken;
- the area is compressed with an elastic bandage to prevent further bleeding after graft removal on the limbs;
- the layer of gauze adheres tightly due to the capillary bleeding, tearing off the gauze from the early skin source area would be enormously painful and would also cause further bleeding, therefore this covering layer is left until spontaneous separation;
- if the dressing remains dry in the following days, layers of the gauze can be gradually removed;
- the cover falls off by itself after about 2 weeks.

Although the main attention is paid to the healing of the burn itself, the skin source area must be also monitored carefully. When first signs of an incipient infection are present (oozing, increasing pain), the soaked gauze must be immediately carefully removed and the inflamed area treated.

If caught early, the complication is limited to a small area and is easily manageable. However, if the infection is detected late, the developed inflammation can take several weeks to heal and may cause more pain than the burn itself.

Links

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- Tangential burn excision

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