

## PHYSICAL THERAPY IN WOUND CARE

*J.M. HEBTING, Kinesitherapist, 2, rue Dubreuil, F-34000 Montpellier*

Traumatology, neurology and rheumatology have given massokinesitherapy an opportunity to win recognition. No orthopaedist would now contest its usefulness, and it is implemented increasingly early.

However, the same cannot be said of reparative and aesthetic surgery, where the massokinesitherapist is still too often called in after a lapse of time so long that the efficacy of the treatment is compromised.

The proliferation of domestic and road accidents justifies increasingly early intervention of our therapy.

### **Anatomy and physiology**

When confronted with a wound, the massokinesitherapist should be able to achieve «ad integrum» recovery of the damaged area. This research stems from the experiences of Castex which showed that the structures of muscle and other tissues when massaged recover normal histology after healing of the lesion, unlike those observed on a region with exactly the same trauma, but this time without massage.

Our action in this kind of pathology is exercised on the skin, i.e. the epidermis, the dermis -which is well vascularised -and the hypoderm -made up of networks of conjunctive tissue. The hair follicles and sweat glands are enclosed in these tissues.

### **Types of lesions and methods of repair**

Burns have deliberately been excluded from this paper, as they have already been dealt with in a number of publications.

The role of the massokinesitherapist is nonetheless important in the evolution of a traumatic or surgical wound.

In the case of a very limited wound, the healing process is spontaneous and will not require the intervention of a massokinesitherapist.

We will briefly consider:

- sutures with or without excision,
- loss of substance,
- flaps.

## Suture

### primary

This is the ideal mode of repair. Its quality conditions the result. It consists in obtaining the best possible coaptation of the edges of the wound. When perfect, it presents no horizontal or vertical discrepancy. It is indicated especially for clean neat-edged wounds. The technique used varies :

- suture with individual stitches,
- intradermic suture with individual stitches,
- suture with dermic cutaneous stitches,
- continuous suture,
- transcutaneous continuous suture,
- intradermic continuous suture;

### secondary

The wound was seen too late, or «priority» lesions (skull, rachis, viscera) were more important than cutaneous repair. It requires cleaning and removal of dead tissue, a clean wound allowing later or secondary suture.

## Loss of substance

- *small*, the wound is closed by junction up to the centre from the edges;
- *large*, marginal epidermisation is insufficient. There will be loss of plasma. Grafts will be a palliative;
- *deep*, reaching down to the hypoderm, often requiring grafts or autoplasty;
- *contused and deep*, with detachments in the muscle mass. These wounds are often seen later on as they are often sustained in cases of multiple trauma. The presence of fleshy exuberant granulation, preventing excision, require a flat dressing with healing in second intention.

In short:

- small, spontaneous healing,
- with major loss of substance: spontaneous repair defective or even halted by infection and low epithelial migration;
- following detachment of an eschar or subsequent to a burn, the very active underlying zone causes the eschar to drop off by pressure from the granulation caused by trophic disorders. The evolution is slow, the low underlying vitality gradually leading to scar retraction.

## Flaps

This is a very recent technique: Pers, 1955 and Owens 1956 which is very reliable: 5 to 10% failures, and leads to rapid healing: 12 to 20 days. Well adapted for the case of traumatic loss of substance and loss of substance caused by cancer, for treatment of irradiated tissue or for asepsis of infection zones. Its quality: vascular reliability, stable results, choice of the degree and location of the mutilation.

This concerns more especially the following zones:

- musculo-cutaneous flap of the musculus latissimus dorsi with a large suturable area, responding favourably to wound healing processes, for reconstruction of the thorax or of thoracic radionecrosis;
- musculo-cutaneous flap of the musculus pectoralis major, which is highly reliable for loss of cervico-facial tissue or post-traumatic cervico-facial damage. The detriment is moderate, but greater than with the previous technique.

The quality of these flaps depends on conservation of the pedicle which provides its blood supply.

The various most widely used flaps are:

- muscular flaps,
- free flaps,
- osteo-musculo-cutaneous flaps.

## Principles of healing and development of the wound

Healing is the organism's defence mechanism; it seeks to restore the continuity of the tissue after interruption, after an attack on its integrity. But this process depends on the extent of the lesion, which, beyond a certain size, may be too large for the body's capacity for regeneration alone. The damaged connective tissue creates a fleshy exuberant granulation composed mainly of capillary loops and collagen. This tissue, through cell mutations (in which fibroblasts play an important role), rebuilds the framework of the connective tissue:

- filling and repair: the epidermis, on this terrain, «grows back» on the surface of this tissue and completes the rebuilding;
- rebuilding: the junction of the free edges of the epidermis stops the exuberant granulation. Growth is always centripetal with contraction of the zone en bloc. The epidermis thickens at a later stage. The covering is good if the activity of the fleshy granulation was good. If it is too slow, epidermis growth ceases, but if it too active, a hypertrophic granuloma will form a bump between the edges of the wound.

The duration of the apparent «healing» is of the order of 10 days, depending on the thickness of the skin. Inflammation continues with an increase from the 20th day, reaching a maximum at the 40th to 50th day.

After 60 days, it decreases but the evolution may extend over 2 years in the case of a hypertrophic wound, or, in the case of a keloid wound, never diminishes.

## Various types of wounds -residual scarring

While a good many wounds develop favourably, this is not always the case. The most frequent complications are :

- «tattooed» wounds, with inclusion of tar at the trauma ;
- depressed or hollow wounds, reflecting an adherent character ;
- wounds with deep adhesions ;
- enlarged wounds ;
- wounds with pigment disorder, with unfavourable evolution, which may present hyper or hypo-pigmentation;
- with disparity. Generally caused by an unsatisfactory edge to edge fit or irregularities caused when the lesion occurred ;
- retractile. They affect the skin and sub-cutaneous tissues while respecting underlying tissues. They form an adhesion which may raise adjacent healthy tissue and impair function;
- hypertrophic, which differ from keloid wounds by their evolution which proceeds towards regression in two years, and are painless. Highly coloured, with collagen arranged in parallel fibres, they develop into a depressed scar after two years ;
- keloid, red and painful, pruriginous, probably due to or favoured by a racial and endocrine factor. They grow by extension through healthy skin. They are evolutive and relapse after exeresis.

## Indication and aims of physical therapy

The aim of massokinesitherapy is to favour harmonious healing and thereby prevent residual scarring.

For this purpose one should seek to :

- avoid and even eliminate retractions,
- improve active circulation,
- increase capillary permeability,
- favour lymph flow,
- facilitate the passage of polynuclear cells.

So the action of the massokinesitherapist must to begin with have an effect on circulation, but also a depolymerising effect which will thus supple up the connective tissue and regenerate the elastic fibres; and hence slow down the tendency to fibrosis.

Morice wrote of this form of therapy: «Reduction in blood flow would slow down the formation of new capillary loops.»

## Physiotherapeutical techniques

Apart from the treatment of burn victims, the involvement of a massokinesitherapist is only ever mentioned, when it is mentioned at all (in the context of lesions of integuments and their repair), under the sole label of additional therapy, and is always seen in terms of massage alone, all too briefly cited.

And yet the contribution of physical therapy is undeniable as Vilain specifies (31) in *Plaies, Brûlures et Nécroses* (Wounds, Burns and Necrosis): «The importance of massage is such that a quarter of the wounds which are referred for re-operation ... no longer require surgery.»

Massage is however not the only weapon in the physical therapist's arsenal, but rather the main component of treatment involving:

- massage,
- muscle re-training,
- vacuotherapy,
- physiotherapy.

## Massage

It deserves a special place in wound care. It is mentioned in this respect by a number of authors, but as the only massokinesitherapy technique. Bodian recommends it for improved aesthetic results after surgery of the eyelid and Drinker & Yoffey acknowledge that it is the best technique to mobilise extra-vascular liquids towards the lymph vessels.

In all cases, massage must be practised early and progressively. It aims to combat the formation of retractile fibrous tissues. Treatment begins in all cases by the least aggressive techniques which can:

- win the trust of the patient who generally has difficulty coming to terms with his or her wound;
- allow the therapist to become familiar with and assess the tissue to be treated and the defect involved.

*Loco-regional effleurage*, a sedative technique par excellence. Gentle stroking with the fingertips which precedes more vigorous movements. It allows a better insight into the nature of the lesion, as well as into indurations or retraction zones.

*Stroking pressure movements*, like the former technique, are performed slowly. The required effect is drainage and the liquid flow occurs slowly. The aim is to act against obstruction to the flow of lymph.

Another not unimportant effect of this technique is to reduce cutaneous resistance to electric currents.

#### *Locally*

*Jacquet-Leroy pinching*, which consists in mobilising very localised zones between the tips of the thumb and forefinger, and is performed both on the wound itself and on zones around the wound, thus exerting a transverse action at the same time as mobilisation of the integuments towards the surface.

*Petrissage*, during which the therapist seizes the zone to be treated, and moves it transversally while raising it with a twisting movement: this is done for the whole area of the wound zone by zone progressively over its entire length. Petrissage provides maximum stimulation of exchanges and forces exudates out from the region treated, and at the same time suppling up the region.

*Morice orthodermic stretching* which consists in pressing the fingertips of each hand over a small area to be treated; sustained pressure is applied to the deeper tissues and then the integuments are stretched moderately to either side of the initial point.

*Wetterwald manoeuvres*, which create much greater hyperaemia than the previous techniques, should not be practised during the first few days, particularly as they represent a disagreeable feeling for the patient. They consist in pinching and rolling during which the skin is raised and pinched between the thumbs and fingertips in opposition, rolling it progressively from one part of the zone to the next. Detachment is maximal in this manoeuvre.

## **Vacuotherapy or Pressotherapy**

In this technique the skin is mobilised by means of a cupping glass. The suction effect causes stretching and detachment of the skin from the underlying layers vertically and towards the surface. Linked with a vacuum pump, the pressure used is variable and adjusted according to requirements using data displayed on a manometer. It may be applied locally: in this case the cupping glass is gradually displaced or used in sliding-stretching movements.

The relative vacuum created at the surface of the skin causes a major increase in the liquid exchanges stimulated in this way through the capillary walls.

On this subject, Nückerl says that as anatomic and physiological studies have shown, the local application of a partial vacuum has a significant effect on lymph flow.

Where the aim is to improve capillary permeability and ideal vascularisation of the affected region the best results are obtained with moderate pressure: 150 to 200 mm Hg. In this case the cupping glass should be applied zone by zone and to the areas on either side of the wound.

A higher pressure: 300-400 mm Hg is used for therapy to avoid retraction and favour suppling up.

Sliding movements along the edges of the wound and on the wound itself, longitudinally as well as centrifugally and transversely away from the wound. The traction is therefore exerted away from the wound, and cutaneous mobilisation thus occurs from the wound towards the neighbouring

zones and from the deeper layers towards the surface, similar as a manoeuvre to the effect achieved using the Wetterwald manoeuvre, which is however more precise.

Local manoeuvres, with the therapist's hand exerting traction towards the surface combined with the traction exerted by the aspiration. In this case the therapist applies and then detaches the cupping glass zone by zone over the whole wound. During the aspiration phases torsion or tangential traction may be applied, reproducing detachment and rolling of the skin simultaneous with this traction-aspiration. In all cases, this technique causes major coloration of the skin indicating a significant increase in exchanges within the region treated.

## Muscular re-training

In this kind of lesion, it plays an essential role by improving the circulation , thus contributing to the elimination of exudates.

It also mobilises the damaged area and thereby tends to restore satisfactory tone.

Cutaneous repair always involves resting of the region treated, either on the surgeon's request or spontaneously by the patient.

In order to compensate for the consequences involved in this non-functioning, the patient should be invited to commence early and frequent (12) isometric-type muscle re-training exercises.

Apart from the undeniable circulatory effect of these manoeuvres, they will also combat any possible amyotrophy (20).

## Physiotherapy

While it in no way constitutes an independent treatment, it is most definitely not a simple adjuvant which could be considered as negligible.

In the treatment of wounds, *medicinal ionisation* seems to be the preferential treatment, introducing into the organism the active ions of a substance in a water solution, knowing that they will migrate between the two electrodes.

It should be recalled that prior massage significantly improves cutaneous permeability to electric currents.

Penetration takes place mainly through the sweat glands or sebaceous glands. From there, the ions migrate into the dermis without going beyond the basilar level. From the dermis, the ions are then filtered into and transported by the vessels.

The interest of this technique lies in the fact that the medicinal action takes place during the session, involving very low doses (8). But this action is prolonged for a long time after the session, even when tiny concentrations of the substances are used.

There are two substances indicated in this type of treatment :

- IK at 1% pole -fibrolytic

- ClCa at 1% pole + sedative

Intensity is not varied during the session, the electrodes we use are small (8 cm<sup>2</sup>) and the intensity relatively low (3 mA).

In case of lymphoedema, Thiomucase seems to give better results than IK (Thiomucase in solution: 8 amp. for 100 ml water).

The negative electrode is applied directly to the wound treated and the positive pole positioned in the region around the wound or facing the oedema.

Studies published by several authors show that this treatment cannot be the only treatment used as it only produces tangible results after a large number of sessions (of the order of 80), a duration of treatment which can only be satisfactory in rare cases.

*Ultrasounds* only provide minor results and can never replace judiciously applied ionisation. Use of ultrasounds is only indicated in the period from the 20th to the 40th day to combat inflammation.

*Pulsed waves* (Curapulse used for this purpose), thanks to their enhanced penetration power, improve the process of coloration of the wound, because their anti-inflammatory effect is better than that of ultrasound.

Laser treatment, which we tested, proved unsatisfactory, contributing no improvement compared with other tried and tested techniques (ionisation).

Similarly, *magnetic fields* (magnobiopulses), used in the treatment of 20 patients, was able neither to reduce the healing time nor improve the quality of the wound healing. This treatment, having been considered a failure, was followed by a return to more «classical» treatment to obtain satisfactory results.

## Results

We have seen above that Vilain recommends «massage» treatment for 5 months. However the result will be better if the treatment is commenced immediately after removal of the sutures and if it lasts 45 to 60 days, covering the whole of the period during which development of wound healing is at its most active. It would also seem ideal to schedule the care provided by the massokinesitherapist, which causes a reaction in the organism, in cycles of 7 to 10 sessions followed by 8-day long rest periods.

There is no doubt that water micro-jet treatment of the kind recommended by Hardy (17, 18, 19) for use with burn victims, gives very significant results through its micro-massage effect, by its percussion and by its invigorating effect on the epidermis.

In all cases, well understood and well carried-out physical therapy is an integral part of reparative surgery and constitutes a complement to surgery, because of its action in favour of regeneration, drainage and conservation of skin and muscle tone, and it helps prevent complications due to defective healing.

Moreover the patient may be further reassured by the involvement of a massokinesitherapist who is aware of these problems.

However in no circumstances can this treatment be considered as an adjuvant; nor should it be restricted to the label «wound massage». It is too often ignored entirely by a number of physicians.