

ORIGINAL ARTICLES (TRANSLATION)

CURRENT EVENTS
EPIDEMIOLOGIE

LPG AND THE CUTANEOUS SOFTENING OF BURNS

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INTRODUCTION

Massage has been used for many years to improve the physical properties of scar tissue resulting from burns. Hypertrophic fibrous zones can be softened by direct and gentle movements. The tissue, whose physical properties (slide, elasticity) and look (color, texture) have been altered, can be modified one to two years after healing through specific technique. Manual techniques are designed to lift the skin off its base using tangential pressure leading to the creation of a cutaneous fold.

The LPG device is designed to achieve a skin lift through suction without putting too much strain on the new epidermis. Our study focused on the effects of this machine on:

- skin elasticity,
- skin lift,
- inflammation
- the articular state,

which were quantified in clinical studies. They were then paired with an echographic study.

We compared the results of these different parameters obtained through:

- Continuous LPG technique
- Rhythmic LPG technique
- Traditional manual massage

Results show that the LPG techniques are more efficient than manual massage. Indeed, this method seems more successful than manual massage at mobilizing collagen without harming the surface epithelium.

ACTIVE FOLD ROLLS (or P.R.A.)

These are carried out on great surfaces of skin. The dorsal part of the trunk is the point of predilection. This operation is carried out is for an advanced stage of the scarring.

Indeed, several factors contribute to adopting this action:

- 1 °/ The mechanized head, that which has the largest opening, will have the most power of suction. It is necessary to be particularly vigilant during its use.
- 2 °/ Volume and the mechanization of the rollers allow for a closer monitoring of the skin. (with difficulty monitoring brought closer to the skin after the passage of the head.)
- 3 °/ The association of the suction and the movement of rollers succeeded has a very intense mobilization of the skin.

The POSE/RETIRE (or P.R. – *Touch-Withdraw*)

As soon as that is possible it is the operation that we generally employ and that brings us the best results. It is carried out by application of the head on the surface burned, suction, traction of the skin and withdraw of the head without displacement on the cutaneous level.

Indications:

- 1 °/ The PRP east indicates in the event of adherent skin. One uses a head of average size which one moves in parallel, perpendicularly or star shape with suction of average intensity (of 3 A 8).
- 2 °/ the P.R.A. east indicates in the event of mobile skin but hypertrophic with a depression between 3 and 6. Displacement is multidirectional.
- 3 °/ the P.R. east indicates in the event of very adherent skin: one carries out simply a cutaneous suction. The depression is maximum (7-9) remains function of the solidity of the skin.

CLINICAL ASSESSMENT

These methods of massage will be indicated only after one precise and rigorous appreciation of quality of the skin.

It will be done by test simple comparative and reproducible:

- the test of vitropression (V.P.)
- the test of cutaneous stretching
- the test of cutaneous sliding
- a measurement of articular amplitudes

These assessments could be possibly supplemented by an echographic study allowing the mist in obviousness important modifications of the scar structure.

1- VITROPRESSURE TEST

Clinical test assesses cutaneous inflammation.

It is a comparative referential test.

EQUIPMENT AND METHOD

I-POPULATION

We compared 606 patients:

- 202 subjects who had been treated before 1992 with manual massage on 250 zones
- 404 subjects who, after 1992, represented 500 burn zones treated with two LPG techniques:
 - 250 zones of continuous pulsated suction
 - 250 zones of intermittent pulsated suction

These patients benefited in all other respects from the same treatment: hydration, Pressure garment therapy, active and passive mobilization of the cutaneous fold, equipment, and filiform high-pressure showers. We made no assumptions as to the treatment or etiology of the burn.

II-EQUIPMENT

There are two types of apparatuses of massages. They have in common: a vacuum pump connected by a flexible device to a choice of several interchangeable heads, with different suction levels. All the heads, except the punctiforme one, move on the skin by 2 parallel and symmetrical mobile rollers.

These machines are adjustable in their intensity to allow essential safety. The depression of 650 millibars causes suction of the cutaneous plan, the two rollers allow a displacement of the cutaneous fold by decreasing the friction.

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The other machines, M50 and S70, have moreover, one adjustable intermittent rhythmic suction in intensity and time.

Possible adjustments:

- 1°/ standard heads (small, medium, large, punctiforme),
- 2°/ free rolling head or mechanically driven (big head): passive rolled fold (P.R.P.), active rolled fold (P.R.A.),
- 3°/ suction intensity: 1 to 9
- 4°/ programmable working time
- 5°/ rhythmic frequency, from 1 to 99
 - 1 correspondent with a beat every 12.2 seconds
 - 99 correspondent with 12.5 beats per second
- 6°/ The ratio of the cycle: is equal to the duration of the suction time compared to the duration of rest: the two times corresponds to one beat; it goes from 1 to 9. the resting period is equal to the working time accounting for 5.
- 7°/ The various parameters for each patient can be memorized in a program. This makes it possible to find those of the preceding session and to simplify manipulations.

PASSIVE FOLD ROLLS (or P.R.P):

It is used in the beginning of the treatment. The first operations are performed on the circumference of the scar. They are centrifugal in order to drain from the periphery a maximum of the haematic collection. As soon as the skin offers a more important solidity and the test of vitropression increases, we start on the scar, longitudinal, transverse and "star shape" maneuvers.

The measuring apparatus is composed of a cutaneous temperature gauge, a stop watch to the 1/10 of second with a transparent surface in the center and a concave protuberance of 15mm of diameter.

The application of the pallet on the zone to be treated will allow:

- 1° / to test the temperature
- 2° / to carry out a cutaneous bleaching

Normal recoloration timing is 3 seconds. The shorter the interval, the more inflammatory the skin is.

2- CUTANEOUS STRETCH TEST

The clinical test assesses

- cutaneous expandability
- adhesion to deep layers

-This is a test conducted with a tape measure:

One chooses:

Separate from 1 to 5 cm, according to topography. One then measures the difference in length between the position of maximum stretching and the position of cutaneous relaxation. This test is also carried out in a healthy zone in order to compare the elasticity of the skin.

3- CUTANEOUS SLIDING TEST:

It is possible to assess the mobility of the skin in relation to the deep layer as well as skin thickness: a rating from 0 to 5 is available, ranging from maximum adhesion (rating 0) to the possibility of an appreciable cutaneous fold displacement between the thumb and the index finger (rating 5).

Test can be carried out with 2 fingers or hands flat:

- 0 Impossibility of lifting the skin
- 1 Slight lift of the skin
- 2 Complete lifting of the skin

Measure between the inch and the index or with a adipometer

- 3 Possibility of pinching of the fold
- 4 Measurement of the easily gripped fold
- 5 Rolled fold

4- ARTICULAR RECOVERY:

This is controlled by weekly assessments. Measurement machines include:

- goniometer,
- tape measure

The amplitudes of the majority of the articulations are taken in degree.

For the hand, there is:

TPM

Total Passive Movement
Analytical, comparative, referential

| | |
|-----------------------|--|
| <u>DPPPD</u> | Distance finger pad / palmar distal fold for long fingers |
| <u>KAPANDJI Index</u> | Mobility of thumb column |
| Rachis | Mobility sought for: Schober Test Thoracic Expansion |

5- CUTANEOUS STRENGTH

Cutaneous solidity is appreciated visually by a concerted examination (Doctor / Nurse / Physical Therapist): aspect, coloring, detail of scarring.

PROTOCOL:

Tests were performed on 606 patients in 750 zones (3 x 250). A vitropressure test (V.P.) was done three times a week after scarring, at Day 15 and Day 30. The test examiner was always the same for various assessments. The therapist and the test examiner were different in order to preserve a certain objectivity for the study.

TYPICAL SESSION:

a-Patient set up:

Bone segments are laid out so that the cutaneous coating is fully relaxed to facilitate the LPG-generated suction.

b-Technique options:

- Dimensions of the head (treatment zone functions)
- Suction intensity
- Frequency
- Cycle choice
- Techniques used

This choice is made according to the feelings perceived by the patient, before all indolence, then the cutaneous reactions. Parameters are readjusted as needed.

c-After the session:

- Make the patient aware of cutaneous inflammation (Color of the Skin)
- Monitor closely the changes of the inflammation.

TECHNIQUE SELECTION BASED ON SKIN TYPE

1/ ADHERING SKIN

- The operation of predilection remains the P.R. (touch / withdraw)
- Time on the scar tissue is a function of the inflammatory state and cutaneous solidity. On a small zone that goes from 10 to 20 suctions for 3 or 4 minutes.
- The choice of the head is a function also of cutaneous solidity. In reality, the larger the surface of the head, the more important the suction.

In ascending order, one starts with the punctiforme, then the small head and finally the average head.

In the event of maneuvers on stiff fingers, we start with suction on the lateral side strips of the I.P.P. in order to release as much adherence as possible.

2- SKIN WITH LITTLE ADHERENCE

From the start we adopt a head of average surface. It uses the technique of the P.R.P. with suction parameters of about 50% of the maximum power.

Indeed this displacement of the head by the intermediary rollers causes a skin fold rolling which at the time of the first session is painful.

In time, the painful feelings decreasing, the suction power is increased and the head is changed for a larger one.

- At the end of the treatment, we use the main head of the <<ES 2>>. This head performs the P.R.A.
- the monitoring of the state of the skin is important, because of the power of the suction of this head. We seldom exceed 50% of the maximum of intensity.

3- LOOSE BUT HYPERTROPHIC SKIN

As in the preceding chapter, we start with an average head.

- the course of the sessions will be identical with a faster progression in the rise in power of the suction.
- the most important head will be used according to the extent of burned surface.
- In all the cases, a very strict monitoring of the cutaneous state and inflammatory state will be observed.
- Motion techniques should be slow and head should be moved around without losing skin contact.

SPECIAL CASES

We have utilized LPG technique on the eyelids. In all of these cases:

- low pressure is applied
- the smallest head is used
- in the beginning of the technique, P.R. is used and with time multidirectional P.R.P. technique is used.

Here one must listen to of the reactions of the patients.

RESULTS:

They more take account of the progression of the same patient and the evaluations for each test.

1-VITROPRESSURE TEST

It must be carried out less than one half an hour after the end of the treatment.

Two elements appear:

- a) After 30 days of massages, LPG rhythmic technique appears definitely less aggressive than LPG continuous technique. Traditional massage comes in third place. (Table 1)
- b) Earlier increase in the time of the test with LPG rhythmic technique sign a faster regression of the inflammatory state.

We begin the treatment by the LPG rhythmic technique in order to avoid:

- painful phenomena
- the hyper-vascularization
- cutaneous aggravations.

We begin 2 months approximately after the scarring of a burn. The next step is the technique known touch-withdraw which is adapted and more effective on less inflammatory skin.

2- SKIN FOLDING TEST

It is difficult to quantify the effects of the massage on this test for the delay of day 30 is too short.

This test is improved more quickly with the continuous LPG technique, then the LPG rhythmic technique, and finally the traditional massage.

We have tests relatively homogeneous being in the choice of the patients and it is necessary to take account of the variation of the times of assumption of responsibility after the burn. Broadly, we deal with two types of patients:

- either in an important proportion, those whose burn (or condition) is recent and who test results are between 0 and 1.
- or those who return for maintenance treatments whose skin folding test results are between 3 and 4 (Table 2).

3- STRETCHING TEST

The progression is faster with the LPG continuous, then LPG rhythmic then the manual massage. The mathematical assessment could not be carried out taking into account too great differences in scar surfaces.

However, the opinion of the 6 physical therapists and occupational therapists is unanimous: the continuous technique touch- withdraw is most effective and the most used then the rhythmic technique, the choice comes being guide by the inflammatory evolution of the skin.

4- ARTICULAR ASSESSMENT

It is difficult, in the current state of this study, to quantify the profits obtained. However, it would be necessary to defer the effectiveness of the method has the topography of the burn. In a general way, the continuous LPG affects articular recovery in 2/3 of the cases. Then the rate/rhythmic comes which largely exceeds the effects of the manual massage. This effectiveness is all the more remarkable since the zones are difficult to access such as the face or the hands.

CONCLUSION

Results of LPG technique used on burns are very encouraging, especially in treating sub-cutaneous adhesions. In our opinion, the combination of suction, garment therapy massage is a perfect example of effective mechanical treatment of collagen scar tissue.

The four years of use currently enable us to adapt in very precise manner the intensity of the treatment has the inflammatory changes of the scar.

The LPG technique is important for range of mechanical proposals: frequency, suction, rhythmicity, diversity of morphology and surface of the suction heads seems perfectly adapted has the chronology of the scar changes.

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Table 1
Results of Day 30

| | Improved | Same | Worsened |
|--------------------------|------------------|-------------|-----------------|
| Manual Massage | 62 (T+8/10 sec) | 187 | 1 |
| LPG Rhythmic Technique | 103 (T+8/10 sec) | 145 | 2 |
| LPG Continuous Technique | 105 (T+8/10 sec) | 141 | 4 |

Table 2

| | LPG Continuous | | LPG Rhythmic | | Manual Massage | |
|---|-----------------------|-----|---------------------|-----|-----------------------|-----|
| | D0 | D30 | D0 | D30 | D0 | D30 |
| 0 | 172 | 52 | 161 | 59 | 166 | 104 |
| 1 | 44 | 119 | 49 | 111 | 47 | 86 |
| 2 | 24 | 35 | 29 | 36 | 27 | 26 |
| 3 | 7 | 18 | 8 | 17 | 7 | 14 |
| 4 | 2 | 19 | 3 | 21 | 3 | 13 |
| 5 | 1 | 7 | 0 | 6 | 0 | 7 |