Negative pressure treatment for improvement of surgical wounds after circumferential thigh lift

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Negative pressure treatment for improvement of surgical wounds after circumferential thigh lift.

BACKGROUND: *The circumferential thigh lift (CTL) with vertical scar is a more extensive and effective procedure compared to the traditional lift, but the scar is not aequally concealed. Negative pressure treatment (NPT) is considered to have a beneficial effect on the physiological process of wound healing and early scar formation. A comparison study was therefore carried out in order to evaluate the effect of NPT on scar quality.*
METHODS: *All postobese patients consecutively treated for thigh laxity in the period January 2012 to April 2013 were recruited in a prospective cohort study. All patients underwent CTL. In group A, NPT was applied on the sutured wound in the immediate postoperative phase for a period of one week. In Group B traditional dressings were used. The quality of scars was evaluated by means of the Stony Brook Scar Evaluation Scale (SBSES) at 7, 15, 30 and 365 days postoperatively.*
RESULTS: *91 patients were included in the period defined, of whom 48 in group A and 43 in group B. In group A, the mean SBSES score was 4.4 at 7 days, 4 at 15 days, 4.6 at 30 days and 4.8 at 365 days. In group B the SBSES score was 3.2 at 7 days, 3 at 15 days, 3 at 30 and 365 days.*
At all postoperative stages the quality of the scar showed to be significantly improved by the use of NPT ($p<0.05$).
CONCLUSIONS: *NPT is a useful adjunct to the postoperative wound healing after circumferential thigh lift, when compared to a hostile cohort of patients whose wounds are not treated with NPT.*

KEY WORDS: Thigh lift, Negative Pressure Therapy

Introduction

Body contouring procedures after massive weight loss currently represent an important workload in plastic surgery, due to the epidemics of obesity and parallel diffusion of bariatric surgery. The fundamental role of body contouring after massive weight loss has been recently demonstrated by Balagué and coworkers, who showed that Plastic surgery improves long-term weight control after bariatric surgery [1].

However thigh laxity is a challenging area with potentially unsatisfactory results from body contouring, due to an incomplete correction of the deformity with a conventional thigh lift or an early recurrence of the skin ptosis.
In addition complications of the surgical wound/evolving scar are potentially relevant problems in terms of doctors and patients satisfaction after surgical procedures in cosmetic surgery and body contouring after weight loss.
The circumferential thigh lift (CTL) with vertical scar in massive weight loss patients has been recently proposed in the medical literature [2] as a more extensive and effective procedure compared to the traditional lift, but the scar is not equally concealed in the CTL.
The resulting vertical scar is often unacceptable for the most demanding patients in terms of necessity to hide surgery. In case the patient accepts the CTL procedure, delayed healing, wound dehiscence, scar widening or pathologic scarring may cause an unsightly scar and compromise the overall result and patient's satisfaction.

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Negative pressure treatment (NPT) applied on early postoperative scar is a technique considered to have a beneficial effect on the physiological process of wound healing and early scar formation [3,4]. This novel application of NPT allows a closed environment along the surgical wound/early scar in the immediate postoperative days. This strategy aspirates exudates and other potentially infectious material, provides a support in holding the wound edges together and protects the incision area from external contamination, thereby promoting wound healing. In addition to preventing complications, wound healing is most probably cosmetically improved, as this study aims at confirming.
A prospective comparison study was carried out in order to evaluate the effect of NPT on scar quality, by comparing NPT and traditional dressings as the postoperative treatment of the surgical scar deriving from CTL.

Surgical technique

Under general anesthesia or spinal block with sedation the patient is operated supine in gynecological position, with lower limbs abducted and slightly flexed at hips. Knees are also slightly flexed.
An elliptical incision is performed on the medial aspect of the thigh, such that the excess skin is excised and the two wound margins come together as per preoperative markings. The incision is continued down to fascia. Some degree of circumferential undermining is performed to both the anterior and the posterior wound edges. An accurate hemostasis is obtained. Drains are positioned and the incision is closed with subcuticular absorbable stitches.
The wound is then dressed with a sponge connected to a negative pressure pump in Group A (Fig. 1) and plain gauze in Group B. A pressure garment is worn for one month postoperatively. Early mobilization is encouraged. An antibiotic shot is infused at induction and low molecular subcutaneous heparine antithrombrotic prophilaxis is administered for two weeks.
Patients from both groups were reviewed one week after discharge in the office where the negative pressure treatment was stopped and the dressings changed.

Fig. 1: intraoperative application of the negative pressure dressing on the wound.

Methods

All postobese patients consecutively treated for thigh laxity in the period January 2012 to April 2013 by the plastic surgeons of the All Medical Services were recruited with their informed consent in a prospective cohort study, approved by the local board. All patients underwent CTL, but two different postoperative treatment were administered. In group A, consisting of the most recently treated patients (December 2012-April 2013), NPT was applied on the sutured wound in the immediate postoperative phase for a period of one week. Group A was compared with a parallel cohort of patients (Group B) who were treated with traditional dressings (previous period January 2012-November 2012). Demographic data, comorbidities and surgical complications were recorded. The quality of scars was evaluated by means of the Stony Brook Scar Evaluation Scale (SBSES) at 7, 15, 30 and 365 days postoperatively.
The SBSES was created in 2007 by Singer et al [5]. This consists of a 6-item ordinal wound assessment scale intended to grade short-term cosmetic outcome of surgical incisions or wounds 5 to 10 days postoperatively or post-injury, until stitch removal. This evaluation scale (Table I) includes the evaluation of individual attributes with a binary response (1 or 0) for each, in addition to overall appearance, to yield a score ranging from 5 (best) to 0 (worst).

Statistical Analyses

Statistical analyses were performed using the MedCalc Software 7.5.0.0 (Mariakerke, Belgium). The clinical

Table I - *The Stony Brook Scar Evaluation Scale.*

Scar parameter	Outcome	Points
Width	> 2 mm	0
	≤ 2 mm	1
Height	Elevated/depressed in relation to surrounding skin	0
	Flat	1
Colour	Darker than surrounding skin	0
	Same color or lighter than surrounding skin	1
Hatch marks/Suture marks	Present	0
	Absent	1
Overall appearance	Poor	0
	Good	1

question was whether the postoperative treatment could influence the clinical outcome, i.e. the continuous (numerical) and discrete (nominal) variables considered as outcome measures. Quantitative results were expressed as means and standard error of the means (SEM), and the unpaired t-test was used to evaluate the hypothesis that the treatment could influence the numerical parameters. Qualitative results were expressed as frequency of events occurring in the case series and a two-way contingency table (Fisher's exact test) was used to evaluate the effect of the treatment. Unpaired t-test and Fisher exact test were used also to evaluate if the demographic and presugery characteristics were homogenously distributed in A and B groups. *P* values ≤ 0.05 were considered as statistically significant.

Results

The total number of patients included in the period defined is 91. The average age was 39, with a minimum of 24 and a maximum of 65. Group A consisted of 48 patients, group B included 43 patients. No patients suffered from major comorbidities causing interference with wound healing. The distribution of demographic and clinical variables across the patients into the two study groups was homogeneous (Table II).
In the group treated with NPT, the mean SBSES score was 4.4 at 7 days, 4 at 15 days, 4.6 at 30 days and 4.8 at 365 days. In the group not treated with NPT the SBSES score was 3.2 at 7 days, 3 at 15 days and 3 at 30 and 365 days. As shown in Fig. 2, at all postoperative stages the quality of the scar showed to be significantly improved by the use of NPT (p<0.00001). Fig. 3 shows a scar from Group A 15 days postoperatively.
The frequency of wound dehiscence was 37% in group B, 25% in group A. Seroma occurred in 41% of group B patients and 29% of group A. The frequency of haematoma was 21% in group B, 10% in group A. Although all these frequencies show a benefit from NPT application, the differences are not statistically significant (p value>0.05).

TABLE II - *Distribution of demographic and clinical features in the NPT versus the RD (regular dressing) arm of the study. A non-significant variability between the groups was found.*

Independent Variable	NPT group	RD group	p-value
Sex			>0.05
Male	5	8	
Female	43	35	
Age	41±7.9	38±8.5	**0.04**
Variation of BMI from weight loss (KG/m^2)	19±6	18±7	>0.05
Preoperative BMI	28±4	27±4	>0.05
Smoking			>0.05
Yes	21	17	
No	27	26	
Duration of surgery (minutes)	148±18	150±17	>0.05
Total drained volume (ml)	139±63	133±78	>0.05
Duration of hospitalization (days)	2.4±0.5	2.6±1.3	>0.05

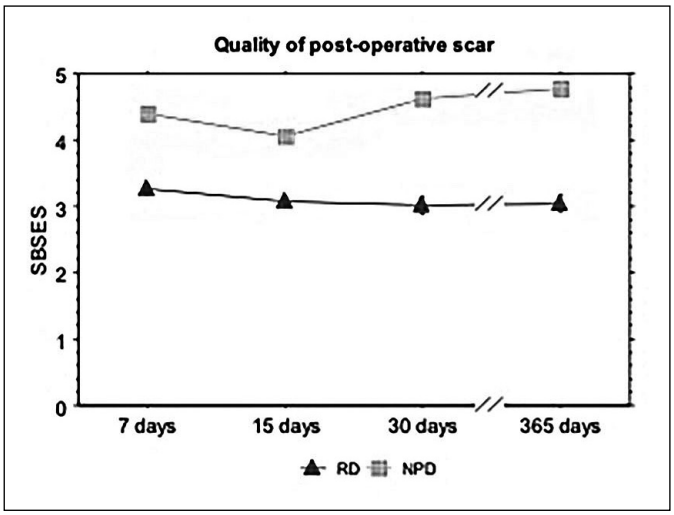

Fig. 2: SBSES score of the postoperative scars after circumferential thigh lift treated with postoperative regular dressings (RD) or negative pressure dressings (NPD). Use of NPD maintains the score consistently higher at 7, 15, 30 and 365 days postoperatively and results are statistically significant (p-value <0.0001 at all timings).

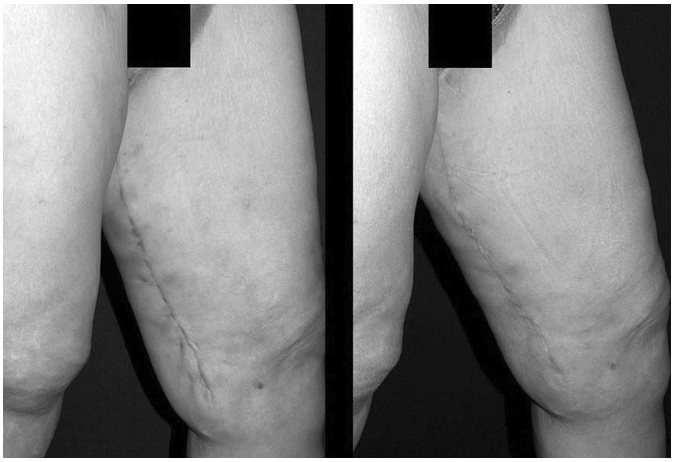

Fig. 3: good quality scar in patient from group A, six and twelve months postoperatively.

Discussion

The preferential indication of the CTL compared to the traditional one is based on the more extensive resolution of postobesity skin excess and laxity of thighs. However,

the resulting more visible scar warrants the necessity to prevent wound healing complications in a critical area and to improve the appearance of a potentially unsightly scar. The recently developed NPT surgical management system can be particularly useful in this procedure to prevent surgical wound complications and to improve the quality of the scar, as shown in this study. In addition, the application of this device only requires a few minutes at the end of the surgical procedure, a similar time in comparison with traditional dressings. This simple and easily accepted device creates a closed environment that eliminates exudates and other potentially infectious debris, protects the surgical incision from external contamination, provides support in holding the wound edges together and promotes wound healing. The recent medical literature supports the use of NPT-based incision wound management [3,4,6,7], even for obese patients [8] or incisions in the groin and thigh area [9], situations resembling the features of patients population in the present study. However nothing appears to have been published on the specific topic of postoperative wound management after circumferential thigh lift.

NPT effects comprise rapid wound granulation, epithelialisation and contraction [10], reduction of dressing changes [11], reduced infection risk [12], reduced treatment costs [13], control of exudate [14], concurrent rehabilitation [15], and better patient tolerance [16].

Accelerating the biological phases of wound healing is important in a very mobile area as the inner thigh, which could render the wound prone to a longer and more intense inflammation and therefore hypertrophic scarring. The main cause of bad scarring is the absence of an organized collagen network and NPT may favor a tidy deposition of collagen fibers thanks to a consistent direction of the mechanical forces, which are known to determine the direction of collagen fibers.

Diminishing the number of dressing changes thanks to the efficient sealing, not only limits the exposure of the incision to the outside environment and the genitalia vicinity but also improves patient's and surgeon's comfort, as well as reducing ward workload before discharge.

Reducing the risk of infections allows a safer process of wound healing in terms of both acute infections and consequent dehiscence, or more subacute infectious processes and prolonged inflammatory phase with a more likely unsightly scar. Considering the relatively high contamination of the local area in the inner thigh, NPT allows a perfect sealing of the area, with ideal management of the wound, urination, defecation and orifices hygiene.

The treatment is highly cost-efficient and cost-effective and less time-consuming if material and time for change of dressings are considered. The NPT is kept for one week on the wound, whereas the ordinary dressing has to be replaced more frequently.

The vacuum obtains a perfect control of exudates, thereby reducing the workload on drains and helping keep the wound at the right level of moisture.

Comfort and everyday's life are improved in particular in terms of safe postoperative return to deambulation, urination and defecation.

The limits of this study are the relatively low number of patients, the absence of randomization and blindness, which are ethically and practically not feasible.

Conclusions

NPT is a useful adjunct to the postoperative wound healing after circumferential thigh lift in massive weight loss patients, when compared to a hostile cohort of patients whose wounds are not treated with NPT.

Riassunto

Il lifting circonferenziale della coscia (CTL) con cicatrice verticale è una procedura più ampia ed efficace rispetto al sollevamento tradizionale, ma la cicatrice non è egualmente nascosta. È noto che il trattamento a pressione negativa (NPT) abbia un effetto benefico sul processo fisiologico di cicatrizzazione delle ferite e sulla formazione iniziale della cicatrice. È stato quindi condotto uno studio comparativo per valutare l'effetto del NPT sulla qualità della cicatrice.

Tutti i pazienti ex obesi trattati consecutivamente per lassità della coscia nel periodo gennaio 2012 - aprile 2013 sono stati reclutati in uno studio prospettico di coorte. Tutti i pazienti sono stati sottoposti a CTL. Nel gruppo A, NPT è stato applicato sulla ferita suturata nella fase immediatamente postoperatoria per un periodo di una settimana. Nel gruppo B sono state usate le medicazioni tradizionali. La qualità delle cicatrici è stata valutata mediante la Stony Brook Scar Evaluation Scale (SBSES) a 7, 15, 30 e 365 giorni dopo l'intervento.

I pazienti inclusi nel periodo definito sono stati 91, di cui 48 nel gruppo A e 43 nel gruppo B. Nel gruppo A, il punteggio medio SBSES era 4,4 a 7 giorni, 4 a 15 giorni, 4,6 a 30 giorni e 4,8 a 365 giorni. Nel gruppo B il punteggio SBSES era 3,2 a 7 giorni, 3 a 15 giorni e 3 a 30 e 365 giorni.

In tutte le fasi postoperatorie, la qualità della cicatrice è risultata significativamente migliorata dall'uso di NPT ($p < 0,05$).

In conclusione il NPT è un'utile aggiunta alla guarigione postoperatoria della lesione dopo il lifting della coscia di tipo circonferenziale, se confrontato con una coorte di pazienti le cui ferite non sono trattate con NPT.

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