

Aquacel Surgical Dressing after Thigh Lift: A Case–Control Study

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Background: The postoperative dressing in patients undergoing thigh lift is often difficult, not very resistant to movement, and uncomfortable for the patient, and often exposes surgical site to infection, maceration, or delay in wound healing.

Methods: We included 40 patients in a case–control crossover study with no period effects, who were treated both by Aquacel Surgical and a traditional wound dressing. Surveys with a 10-point scale evaluation were used to assess nontraumatic removal level, ease of application, adhesion, and strength of the 2 treatments. We reported the number of days necessary for wound healing, the number of infection cases, and wound-related complications. Costs of the 2 medications were also considered. Ten days after surgery, patients answered a questionnaire with 6 multiple-choice questions to assess comfort, pain at dressing change, pruritus, strength, and number of dressing changes.

Results: Compared with controls, surveys revealed Aquacel Surgical to be less traumatic to remove, easier to apply, and to be more adherent and stronger. Significant acceleration of the wound healing was also evident with Aquacel Surgical compared with the traditional dressing. Nonsignificant differences were reported about the risk of infection and wound-related complications between the 2 treatments. A statistical analysis of costs revealed that Aquacel Surgical is significantly more expensive than the traditional medication.

Conclusion: We recommend the use of Aquacel Surgical in all the surgery procedures where the risk of wound dehiscence and maceration is high. (*Plast Reconstr Surg Glob Open* 2016;4:e863; doi: 10.1097/GOX.0000000000000750; Published online 15 September 2016.)

Body-contouring surgical procedures are intended to correct skin excess and skin ptosis in patients who have undergone major weight loss, restoring a proper elasticity to the tissues. These procedures include brachioplasty, tummy tuck, torsoplasty, buttock lift, and thigh lift.¹

In our department, thigh lift is the second most requested surgical procedure in ex-obese body-contouring surgery. This procedure is followed by a high rate of minor complications that include wound dehiscence, infection, and hypertrophic scars.

The postoperative dressing in patients undergoing thigh lift is often difficult, not very resistant to movement, and uncomfortable for the patient. The lack of effective-

ness of traditional dressing with sterile gauze and a patch exposes the surgical site to infection, maceration, or a delay in wound healing.

The study aims to demonstrate the effectiveness, durability, and patient's comfort of the surgical dressing, AQUACEL Surgical (ConvaTec Inc., Greensboro, N.C.), compared with traditional wound dressing.

MATERIALS AND METHODS

Patients

The study was conducted in the Department of Reconstructive and Aesthetic Plastic Surgery at the University Hospital Città della Salute e della Scienza, Turin, Italy, during the period from May 2013 to July 2014. We included 40 patients who performed thigh lift in a case–control crossover study with no period effects (8 men and 32 women; age between 18 and 60 y; mean age, 39 y; average body mass index, 27.6).

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Fig. 1. Aquacel Surgical dressing composition. Copyright © ConvaTec Italia S.r.l. Reprinted with permission.

The exclusion criteria were diabetes, smoking, and vascular diseases. All the patients had undergone bariatric surgery (25 vertical banded gastroplasty and 15 gastric bypass).

Liposuction was not performed contextually with the thigh lift. All surgical incisions were positioned in the inguinal crease, extended anteriorly 1 to 2 cm over the pubis level and posteriorly arriving at the gluteal fold. The average removal of excess tissue was about 350 g; mean wound length, 27 cm; mean weight loss, 30 kg. In all the patients, tubular drains were positioned. The suture was performed using Vicryl 2/0, Monosyn 3/0, and metal staples. The same surgeon closed both thighs for each patient.

Dressing Application and Composition

At the end of the procedure, in the operating room, a dressing with sterile gauze and patch was put on a thigh, selecting it randomly; on the other one, Aquacel Surgical was positioned. This dressing is composed of hydrofibrina in combination with hydrocolloid. The core is made of aquacel that is a hydrofiber enriched with silver ions; the border is a hydrocolloid sheet. Aquacel provides absorbent and antimicrobial properties. The hydrocolloid border is water proof and transpirable (Fig. 1).

Postoperative Treatment

Dressing change was performed after 5 days for the thigh where Aquacel Surgical was positioned. On the

other thigh, the dressing was changed every day. At each dressing change, surveys with a 10-point scale evaluation were used to assess nontraumatic removal level, ease of application, adhesion, and strength of the 2 treatments. We reported the number of days necessary for wound healing, the number of infection cases, and wound-related complications. Costs of the 2 medications were also considered. All the patients wore a restraining sheath that was held in place for a month after surgery.

Ten days after surgery, patients answered a questionnaire with 6 multiple-choice questions to assess comfort, pain at dressing change, pruritus, adhesion and strength of the dressing, and number of dressing changes.

Data Analysis

This is a case–control crossover study with 2 dependent (paired) samples with no time period effects. Differences of quality characteristics between the Aquacel Surgical and the traditional dressing were evaluated using 2-tail matched pair *t* tests at a level $\alpha = 0.05$. Wound-healing speed and costs of complete treatments were evaluated using an exact sign 2-tailed (nonparametric) test at a level $\alpha = 0.05$. The proportion of infections and wound-related complications were evaluated using Fisher’s exact test at a level $\alpha = 0.05$.

The study was approved by the ethics committee of our institution and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

RESULTS

Descriptive statistics of quality measures of the 2 dressings are summarized in (Table 1). The frequency distribution graphs of quality evaluation variables are in (Fig. 2): black bars for Aquacel Surgical and gray bars for the traditional dressing.

Matched pair *t* tests revealed significant differences ($P < 0.001$) between the 2 treatments for quality measures (Table 2). The dressing change was about 3 to 4 points less traumatic on average ($|t| = 30.048$) and about 4 points easier ($|t| = 29.835$) on average with Aquacel Surgical than with the control traditional dressing. The medication remained in loco, adhesive to the skin in each of the patients in the 5 days: the adhesion and strength were about 4 to 5 points better on average with Aquacel Surgical than with traditional dressing ($|t| = 23.845$) (Fig. 3).

Table 1. Descriptive Statistics of Quality Measures of the Study Paired Samples

Variable	N	Minimum	Maximum	Median	Mean	SD
Nontraumatic removal level (higher = less traumatic)						
Aquacel Surgical	40	4.000	9.000	7.000	6.600	1.277
Traditional dressing	40	1.000	5.000	3.000	2.875	1.067
Ease of application (higher = easier)						
Aquacel Surgical	40	4.000	9.000	7.000	6.625	1.295
Traditional dressing	40	1.000	5.000	3.000	2.850	1.001
Adhesion and strength (higher = better)						
Aquacel Surgical	40	4.000	9.000	7.000	6.825	1.174
Traditional dressing	40	1.000	5.000	3.000	2.625	0.979
No. days for wound healing						
Aquacel Surgical	40	5.000	7.000	5.000	5.325	0.526
Traditional dressing	40	7.000	14.000	11.000	10.700	1.728

N is the sample size of each group. All but the last variable is evaluated by doctors in a 10-point scale.

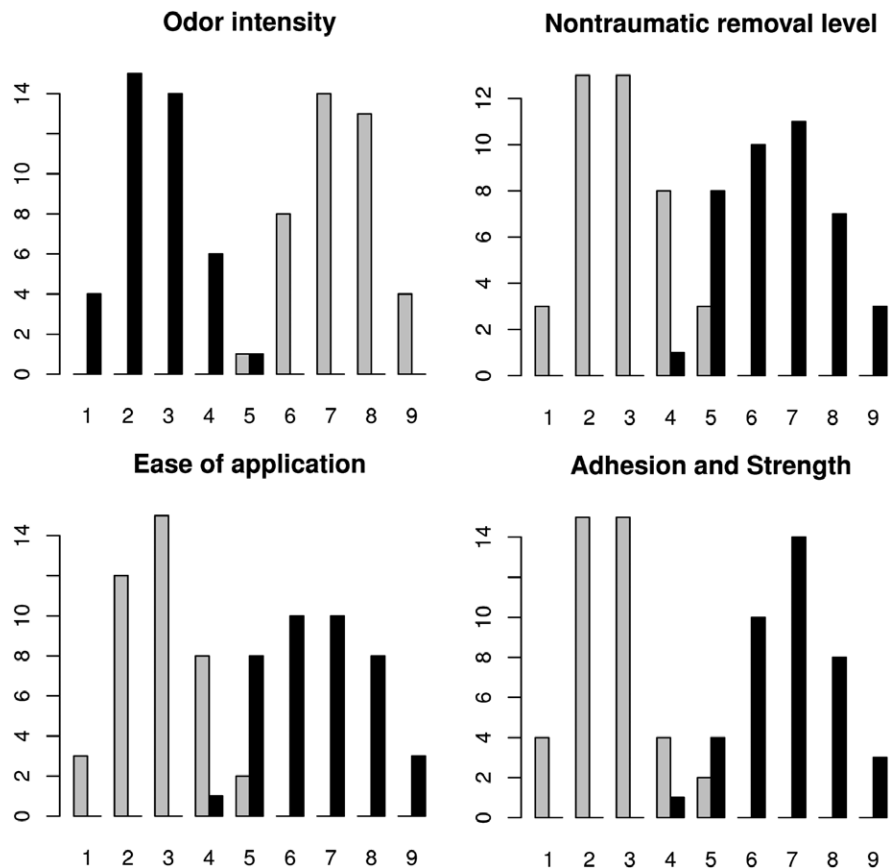


Fig. 2. Frequency distribution graphs of quality measures variables (evaluated with a 10-point scale). *Black:* Aquacel Surgical; *gray:* traditional dressing.

Table 2. Paired t Test Statistics for the Quality Measures of the 2 Medications, with df = 39

Variable	t Value	P
Nontraumatic removal level	30.048	<0.001
Ease of application	29.835	<0.001
Adhesion and strength	23.845	<0.001



Fig. 3. One day after operation. Dressing with sterile gauze on the right thigh and Aquacel Surgical on the left thigh.

The number of days for wound healing exhibits a different distribution depending on the treatment (Fig. 4), and also the SDs are very different (0.526 and 1.728 for Aquacel Surgical and the traditional dressing, respectively) as reported in (Table 1). For these reasons, an exact sign 2-tailed test (nonparametric) was performed to compare the differences of number of days for wound healing in the 2 treatments.² Aquacel Surgical elicited a statistically significant median acceleration (about 5–6 d less) for a complete healing compared with the control medication ($P < 0.001$) (Fig. 5).

Statistical analysis³ revealed no significant differences between the risk of infection and wound-related complications with the 2 treatments. Four of 40 subjects had infections with the traditional dressing and none with Aquacel Surgical ($P = 0.116$, Fisher’s exact test), whereas 4 of 40 subjects had wound-related complications with Aquacel Surgical compared with 5 of 40 subjects with the traditional dressing ($P = 1$, Fisher’s exact test).

In Italy, the unitary cost of Aquacel Surgical dressing is 9.89 euros, whereas the unitary cost of a traditional dressing is 38 cents. Aquacel Surgical needs to be replaced every 5 days and the traditional dressing twice a day. In our sample, all the patients needed 1 replacement of Aquacel Surgical, and the total expenditure with this medication was 19.78 euros. On the contrary, the time for a complete recovery and the number of required changes of the tradi-

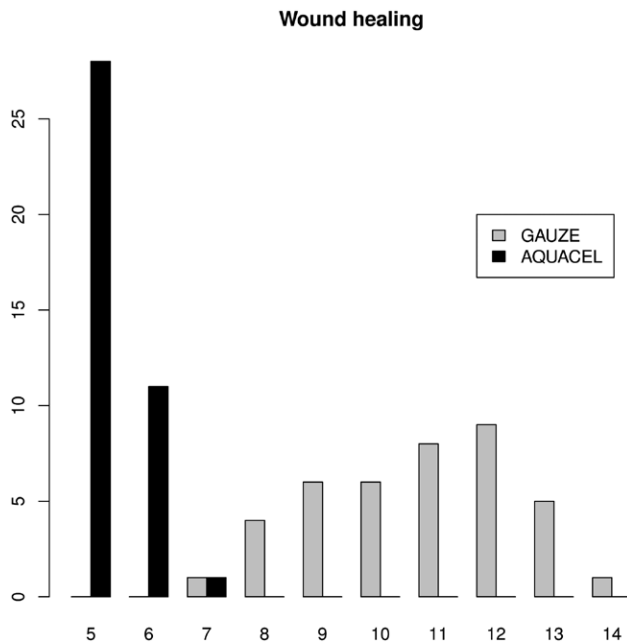


Fig. 4. Distribution graph of the number of days for healing with the 2 medications: Aquacel Surgical (black) and the traditional dressing (gray).

tional dressing led to a higher variability of costs with this medication (Table 3).

Because neither the distributions of costs are normal nor the distribution of the differences of cost is symmetric (test statistic = 1.4313, $P = 0.1524^4$), we performed an exact

sign 2-tailed test to compare the 2 treatment costs at a level $\alpha = 0.05$. The test revealed a statistically significant median higher cost with Aquacel Surgical (about 11–12 euros more expensive for a complete medication treatment) compared with the control treatment cost of medication ($P < 0.001$).

We analyzed the data gathered from the questionnaires completed by the patients. Thirty-six patients reported that the dressing change, in the thigh where Aquacel Surgical was not positioned, was more painful. Four patients did not report any change in pain between the 2 dressings. Twenty-four patients referred less pruritus in the thigh where Aquacel Surgical was positioned. Sixteen patients did not notice any difference in terms of pruritus.

All the patients reported more comfort during dressing application, a longer duration, and total atraumaticity during the dressing change with Aquacel Surgical.

DISCUSSION

Among the various surgical procedures of body contouring, thigh lift is definitely most at risk of surgical site infection.⁵ What predisposes this type of procedure to the risk of infection is the anatomical site involved and the difficulty of medication that creates a greater facility to contamination. The dressing change is often difficult and unstable.

The advanced wound dressing Aquacel Surgical consists of an association between hydrofibr enriched with silver ions and hydrocolloid. The hydrocolloid part is composed of a layer of gelling material adherent to a semipermeable film. The hydrocolloid creates a moist

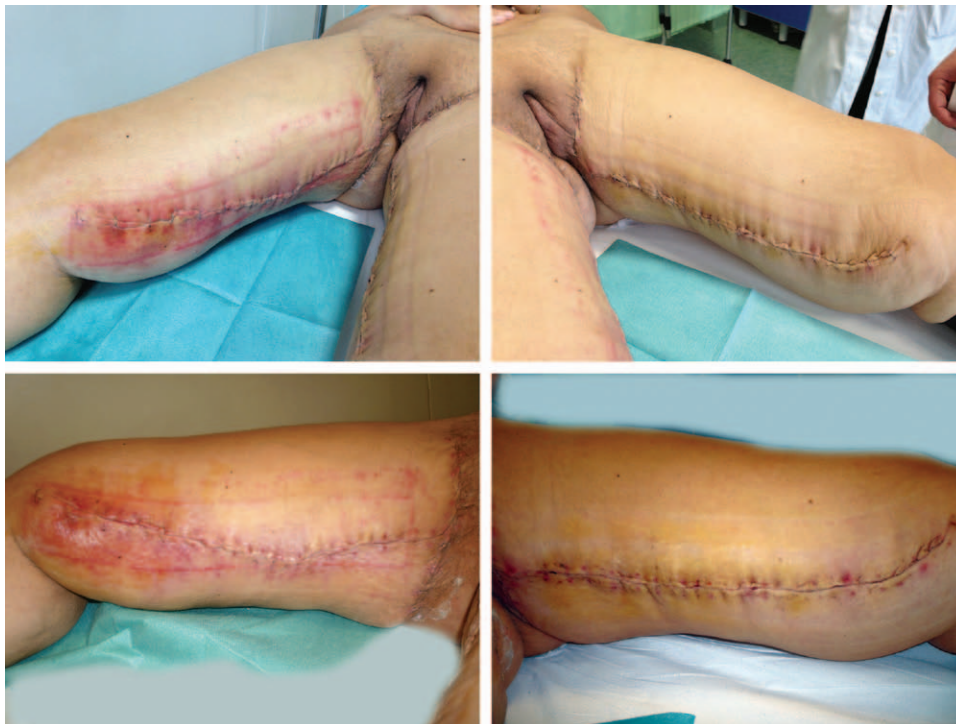


Fig. 5. Five days after operation at dressing change. On the left thigh after dressing with sterile gauze; on the right thigh after dressing with Aquacel Surgical.

Table 3. Statistical Description of the Cost of a Complete Treatment with the Traditional Medication (in Euros)

Cost	N	Minimum	Maximum	Median	Mean	SD
Traditional dressing	40	5.32	10.64	8.36	8.13	1.313

environment for optimal wound healing, as it promotes angiogenesis, increases the number of dermal fibroblasts, and increases the amount of synthesized collagen.⁶ Furthermore, the formation of gel during the use of the dressing makes removal nontraumatic and easy. It is believed that the moist environment without oxygen protects the nerve endings giving pain reduction.⁷ The ability of hydrocolloids to retain moisture helps soften and rehydrate any necrotic tissue. Hydrocolloid also acts as a barrier against viruses and bacteria (methicillin-resistant *Staphylococcus aureus*, hepatitis B virus, and HIV1), where integrity of the dressing is preserved, and in the absence of leakage or infiltration.^{8–10} Therefore, it gives benefits in high contamination areas. Because of this property, the vesical catheter can be removed in less time, preventing urinary tract infections. Hydrofibra is a sterile dressing, made from soft hydrocolloid fibers (sodium carboxymethylcellulose). Thanks to its particular structure, it retains exudate within the hydrofibers, preventing the propagation and reducing the risk of maceration of surrounding skin. The combination of silver ions adds antimicrobial properties.¹¹

Dressing change twice daily or daily for the control group is a weak part of the study, but the dressing in the control group was changed because it got dirty or wet very frequently because of the anatomical area. We could not avoid it. Aquacel Surgical retains exudate within the hydrofibers, preventing the propagation so the dressing does not get wet. Dressing change frequency may have also influenced tendency to report more pain in the control group.

This is not a blinded study. Wound healing was assessed in terms of days needed to gain a complete wound healing. In this group of patients, we did not have a high rate of infection and wound dehiscence. In our opinion, this was also due to the exclusion criteria: diabetes, smoking, and vascular diseases. Maybe in a higher number of samples with patients presenting this comorbidity, differences would have been much more evident between the treated thigh and the control one.

The Aquacel Surgical combines the effectiveness of hydrofibra and hydrocolloid. We think that this wound dressing allows the skin to regenerate quickly without any complication such as dehiscence or superficial infection.

CONCLUSION

From the results of our study, we can confirm that Aquacel Surgical seems to be more comfortable and easier to manage for the patient, durable, waterproof, and nontraumatic at dressing change. We recommend the use of Aquacel Surgical in all the surgery procedures where the risk of wound dehiscence and maceration is high.

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PATIENT CONSENT

Patients provided written consent before their inclusion in the study.

REFERENCES

1. Shermak MA. Body contouring. *Plast Reconstr Surg.* 2012;129:963e–978e.
2. Gibbons JD, Chakraborti S. *Nonparametric Statistical Inference.* New York: Marcel Dekker Inc; 1992.
3. Agresti A. *Categorical Data Analysis.* 2nd ed. New York: Wiley; 2002.
4. Miao W, Gel YR, Gastwirth JL. A new test of symmetry about an unknown median. In: Agnes Hsiung, Cun-Hui Zhang, Zhiliang Ying, eds. *Random Walk, Sequential Analysis and Related Topics—A Festschrift in Honor of Yuan-Shih Chow.* Singapore: World Scientific Publisher; 2006.
5. Michaels JV, Coon D, Rubin JP. Complications in postbariatric body contouring: strategies for assessment and prevention. *Plast Reconstr Surg.* 2011;127:1352–1357.
6. Queen D. Technology update: understanding hydrocolloids. *Wounds Int.* 2009; 1(1).
7. Wyatt D, McGowan DN, Najarian MP. Comparison of a hydrocolloid dressing and silver sulfadiazine cream in the outpatient management of second-degree burns. *J Trauma* 1990;30:857–865.
8. Wilson P, Burroughs D, Dunn J. Methicillin-resistant *Staphylococcus aureus* and hydrocolloid dressings. *Pharm J.* 1988;243:787–788.
9. Lawrence JC. Reducing the spread of bacteria. *J Wound Care* 1993;2:48–52.
10. Bowler PG, Delargy H, Prince D, et al. The viral barrier properties of some occlusive dressing and their role in infection control. *Wounds* 1993;5:1–8.
11. Bowler PG, Jones SA, Walker M, et al. Microbicidal properties of a silver-containing hydrofiber dressing against a variety of burn wound pathogens. *J Burn Care Rehabil.* 2004;25:192–196.