

Tension Suture Technique Combined with Lidocaine-Adrenaline-Saline Infiltration Decreases Complications and Promotes Recovery in Abdominoplasty

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34.1 Introduction

Abdominoplasty is one of the most common plastic surgery procedures, not only improving body contour but also improving quality of life, self-esteem, and body satisfaction and decreasing anxiety and eating disorders [1–4].

Bariatric surgery, extensive weight loss, and sequelae after pregnancy are usually the most common indications for abdominoplasty [5, 6]. However, rectus abdominis muscle diastasis with or without pendulous lower abdominal tissue is even a more common problem; just one pregnancy can result in an overstretched and very wrinkled skin and diastasis of rectus abdominis muscles in women with normal weight (own observation).

Abdominoplasty can be combined with liposuction. However, the author uses liposuction only to improve the contour of the flanks. If thinning and liposuction of the upper abdomen are needed, it is done a few months after abdominoplasty with local anesthesia and with water-assisted liposuction (WAL) technique. Complications after thinning the upper flap are rare but can be very severe. Secondary liposuc-

tion can be done safely in local anesthesia after a few months after the primary operation.

Most common complication of abdominoplasty is seroma formation (5–17.4 %) followed by hematoma (3–5.8 %), wound healing complications, and skin necrosis (1.5–6.7 %) being next on the list [7–10]. More serious and rare complications include deep venous thrombosis and pulmonary embolism [11, 12].

In order to reduce the rate of complications, new techniques are needed. Tension sutures or quilting suture technique was introduced to decrease the number of seromas after abdominoplasty [6, 13–17]. In this technique, sutures are placed between the fat and abdominal muscle fascia to close space between these two layers with the intention to close and eliminate “dead space” between tissues [18, 19]. Tension sutures also decrease tension to wound edges and decrease the risk of wound dehiscence [20].

Lidocaine combined with adrenaline has been used in reduction mammoplasties and even in microsurgery to reduce perioperative bleeding, to avoid blood transfusions, and to shorten operating time [21–24]. In this technique, local anesthetic is infiltrated under the planned incision lines causing vasoconstriction and less bleeding with better visibility and better identification of tissues.

This chapter is based on the author’s study [25] and experience with progressive tension

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sutures combined with lidocaine-adrenaline infiltration to reduce complications and to promote healing and recovery in abdominoplasty.

34.2 Technique

Preoperative markings are made in standing position. Lower incision line is in pubes above the hairline and upper incision just proximal to the umbilicus. Liposuction of the flanks is done as usual using a topographic map which is drawn to the flanks prior to operation. All patients receive 1.5 g intravenous cefuroxime in induction and 20–40 mg Klexane^R subcutaneously at the end of the operation when starting to close the abdomen with tension sutures.

Operations are done in general anaesthesia or in epidural anaesthesia which promotes early mobilization and home going.

The whole operating area is infiltrated with 1000 mL saline mixed with 50 mL 0.5 % lidocaine-adrenaline^R (or 250 mg lidocaine and 1 mg adrenaline). Infiltration is started from the flanks (if liposuction of the flanks is done) continued superficially under the planned skin incisions and thereafter all over the operating area (Fig. 34.1). Infiltration can be done with a 250–300 mm long metal cannula (3–4 mm in diameter) with multiple holes on the tip. Cannula is connected to the i.v. line tubing which is connected to plastic saline bag which can be pressed to increase pressure and to facilitate infiltration (Fig. 34.2).

The more convenient, more effective, and a faster method is to use Body-Jet^R (Human Med, Schwerin, Germany) for infiltration. With Body-Jet, saline is infiltrated with higher pressure (up to 110 bar) causing more effective and more immediate vasoconstriction (Fig. 34.3).

Skin incision is made with scalpel, and thereafter, dissection is continued with electrocautery meticulously coagulating all visible vessels. Because of vasoconstriction, vessels are easily identified and coagulated (Fig. 34.4). After dissecting and discarding the lower flap, an upper flap is formed from the umbilicus up to the xiphoides to expose abdominal rectus muscles and the muscle sheet. The distal edge of the upper



Fig. 34.1 Superficial infiltration of lidocaine-adrenaline under the planned skin incisions. Tip of the steel cannula can be seen right under the skin.



Fig. 34.2 Simple set for lidocaine-adrenaline infiltration: pressure bag, 3.5 mm cannula, i.v. tubing, and 1000 mL saline with lidocaine-adrenaline for infiltration

flap is thinned from deep fat with electrocautery along the fascia of Scarpa.

All women who have had pregnancy seem to have diastasis of the rectus abdominis muscles varying from a few centimeters up to 6–7 cm. Muscles are plicated from the pubis to the xiphoid using nonabsorbable, multifilament, inverted 0 (Surgilene^R or Mersilene^R) X knots bringing the edges of the muscles to each other. The second layer of sutures is started from the xiphoides all the way down to the pubis using continuous, absorbable, monofilament 0 (PDS^R) loop. This suture covers and hides the knots of the previous layer and further tightens the horizontal width of the abdomen. It also shortens vertical length of the rectus sheet.



Fig. 34.3 Water-assisted liposuction and infiltration with Body-Jet[®] makes infiltration faster and facilitates vasoconstriction. We can use pulsating water pressure up to 110 bar to facilitate vasoconstriction. Tubing is for single use and cannot be sterilized

To close the space between the fat and muscle fascia, we use absorbable multifilament thread (2-0 Vicryl[®]) as tension sutures (Fig. 34.5). First sutures are placed in the midline below the xiphoid and are continued down to the umbilicus. On the lateral sides (flanks), tissue is pulled toward the midline to avoid lateral dog ears. After suturing the upper half of the abdomen down to the umbilicus, a hole is made with scalpel in the midline for the umbilicus. Incision is 1 × 1 cm,

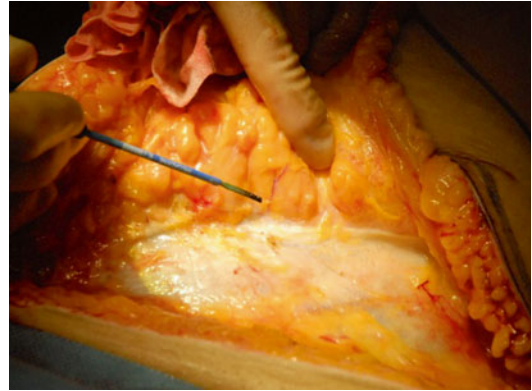


Fig. 34.4 After infiltration and vasoconstriction, vessels are easily identified and cauterized. Note the overall lack of bleeding and clean operating field

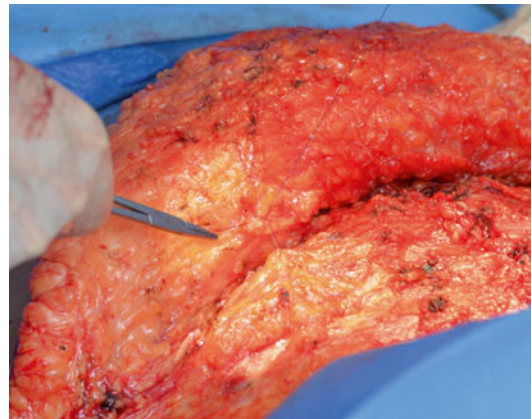


Fig. 34.5 Tension sutures are placed between the deep fat and the muscle fascia with 2–3 cm intervals. The number of the sutures depends on the size of the patient or rather the size of the area that has to be closed

the caudal part of the incision being an inverted V-flap to match the incision made in the umbilicus (Fig. 34.6), which is pulled through the hole with a Crile. Care must be taken to keep the umbilicus in the midline. Thereafter, tension sutures are placed on the lower half of the abdominal wall with 2–3 cm intervals. Skin edges are pulled together with 2-0 absorbable sutures (Vicryl[®]). Skin is closed with continuous intracutaneous 3-0 absorbable monofilament thread (Monocryl[®]). No suction drains are used.

Skin incision is covered with paper tape (Micropore[®]), and preordered custom-made textile garment or elastic belt is put on the operating



Fig. 34.6 Skin markings for the umbilicus. Note inverted V-flap on the caudal part to avoid circumferential and unfavorable scarring

table. Patients are recommended to wear elastic garment for a minimum of 3–4 weeks, but most patients get used to them and have them 2–3 months postoperatively (which can be inconvenient in hot climate).

Patients are mobilized as soon as they recover from the anesthesia and are able to stand. No bedpan or urinary catheter is used. All patients are discharged the same evening or not later than the next morning and have appointment with the operating surgeon a month and 6 months after surgery. No heavy lifts (>10 kg) are recommended for the next 4 weeks after surgery.

Pain after abdominoplasty can be significant. However, the author tries to avoid opioids to be able to mobilize patients as soon as possible. Patients are discharged with oral medication (combination of Panadol 500 mg and codeine 30 mg tablets: 1–2 tablets three or four times daily as needed and ibuprofen 600 mg four times daily).

This technique has been used with over 350 patients. First 95 patients were analyzed and published [25]. In the study, 60 patients had additional operations with abdominoplasty: 49 had liposuction of both flanks (100–350 mL fat/flank). First 12 patients had drains, but since then, drains were abandoned because of no or minimal discharge. Mean age of the patients in the study was 43 years and BMI 27.1 (range 19–39).

Table 34.1 Operative data

	No.	Mean	Min.	Max.	SD
Operating time (min)	93	82	45	173	28
Perioperative bleeding (ml)	95	233	20	1100	204
Weight of removed mass (g)	94	1422	135	6824	1009
Fat removed in liposuction (ml)	49	576	200	1400	245

Operative data is shown on Table 34.1. Results of abdominoplasties are shown in Figs 34.7 and 34.8. The technique is suitable also for obese patients; we have used it with success to patients weighting over 140 kg and removal of fat over 9 kg.

In the first 95 cases, abdominoplasty as the only operation took a mean of 65 min. Mean perioperative bleeding with only abdominoplasty was significantly less compared with abdominoplasty combined with other operations. There were no major complications (pulmonary embolism, deep venous thrombosis or flap necrosis, or dehiscence). The incidence of minor – not clinically significant – complications was 12.6 %: two small seromas and three small hematomas not requiring aspiration, one local wound infection, one small necrosis of the wound edge, and three small fistulas made by the multifilament subcutaneous thread. All were treated conservatively.

34.3 Discussion

Abdominoplasty is one of the most common procedures in plastic surgery and should be a safe, fast, and reliable operation with minimal complications, fast recovery, and standardized results. To obtain these goals, preoperative infiltration of adrenaline and lidocaine must be done to get vasoconstriction combined with tension sutures to close all the dead space between the deep fat and



Fig. 34.7 (a) Preoperative. (b) Four weeks after abdominoplasty

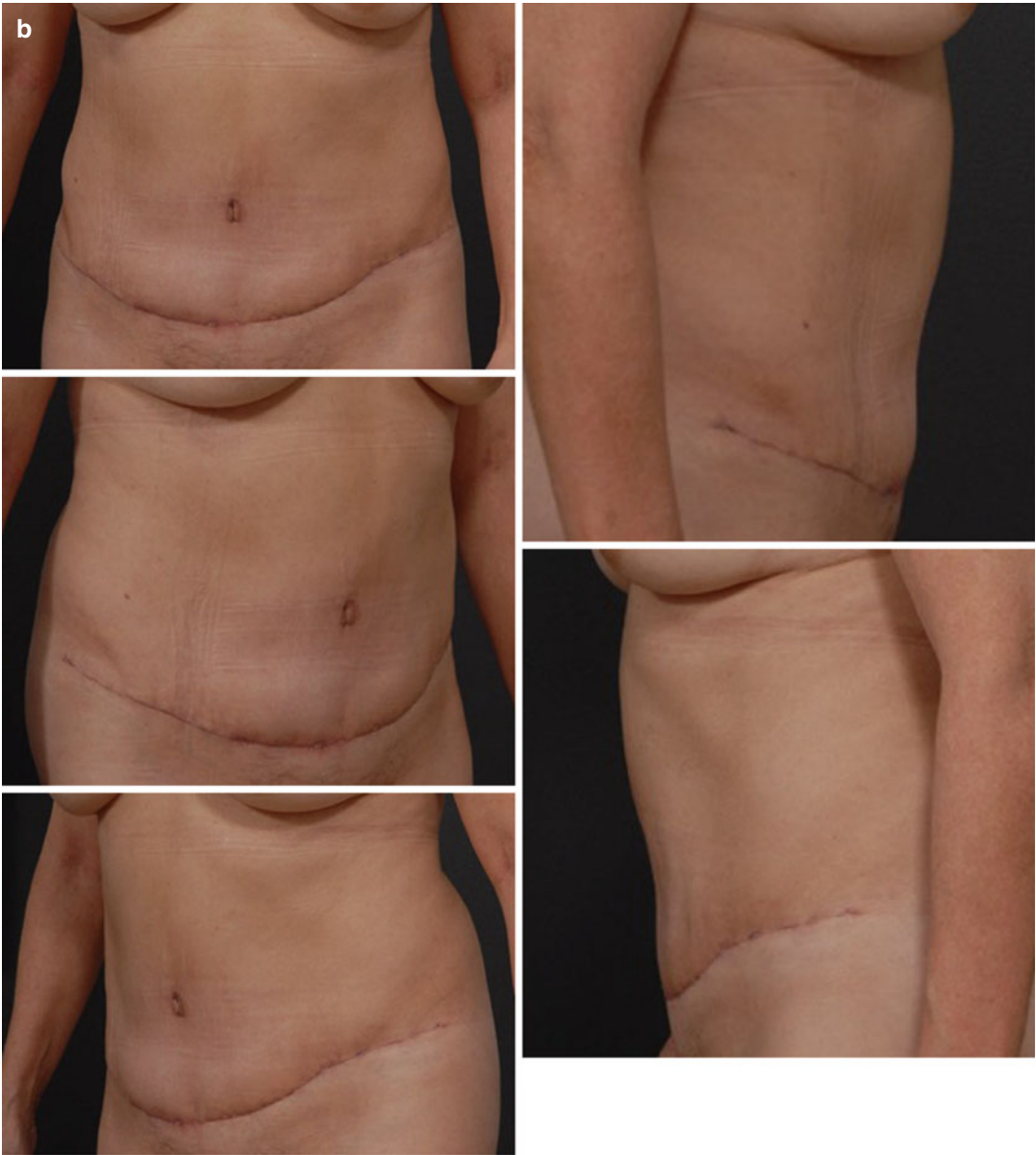


Fig. 34.7 (continued)

muscle fascia. Vasoconstriction has been used before to minimize bleeding, to avoid transfusions, and to make operations faster [21–24]. Tension sutures have been used before with abdominoplasty to avoid seromas [19, 20, 26].

By combining these two techniques, all major complications associated with abdominoplasties can be avoided. The incidence of small – clinically not significant – complica-

tions was 12.6 % which is less than in other studies 18–35 % [9, 27]. It is noteworthy that this technique allows the author to discard drains and possible prolonged drainage without causing postoperative seromas and repeated aspirations.

Earlier studies with other operations show that [24] using lidocaine-adrenaline infiltration prior to skin incision reduces bleeding from wound



Fig. 34.8 (a) Preoperative markings. (b) Four weeks after abdominoplasty

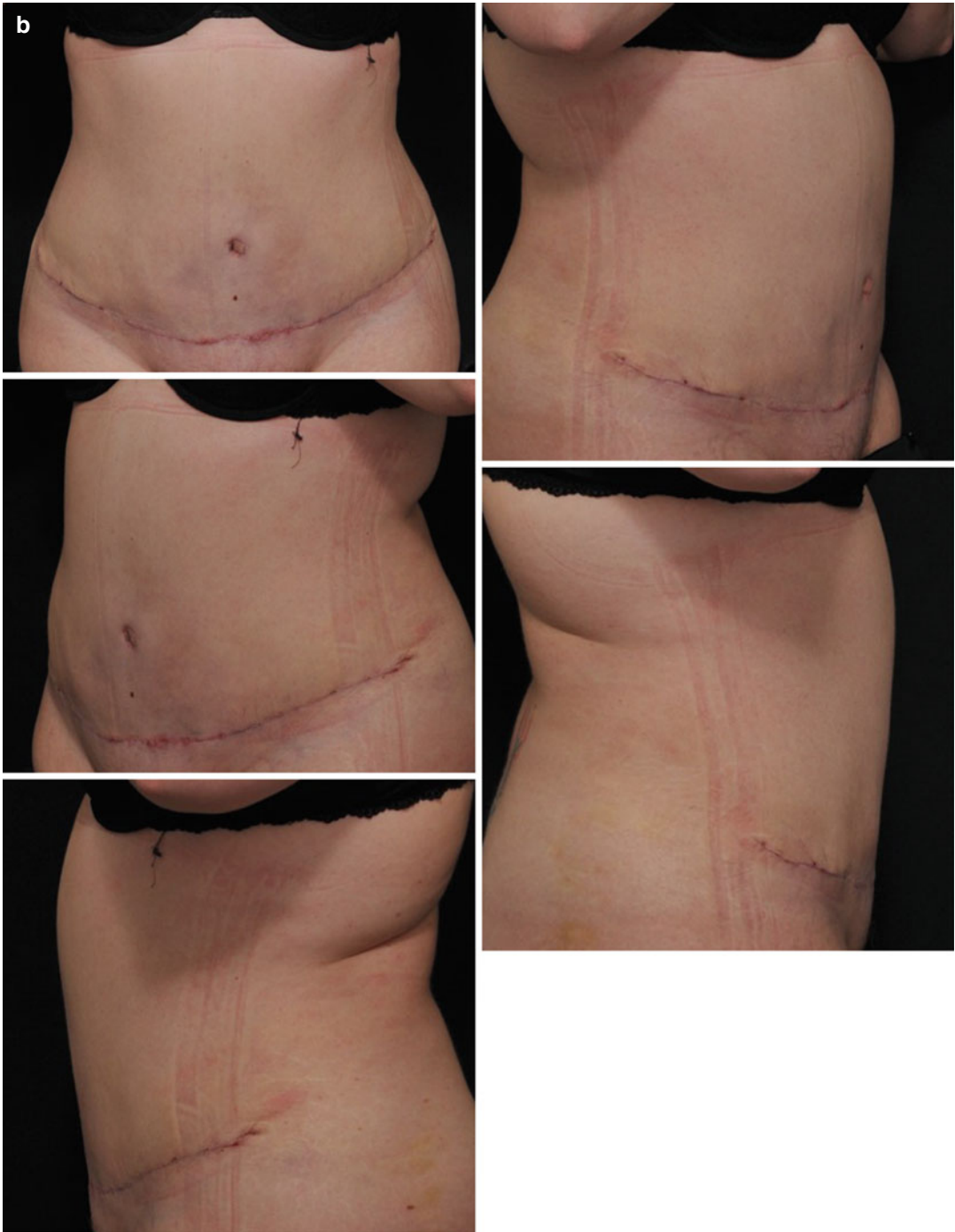


Fig. 34.8 (continued)

edges and blood loss. However, in this study, infiltration was not only superficially under the planned skin incisions, but also the whole operating area with 1000 mL of saline with

lidocaine-adrenaline. Infiltrating the whole area results to overall vasoconstriction, which further reduces bleeding and makes vessels more visible and easier to cauterize before cutting them. Even

large veins (now constricted by adrenaline) can be safely cauterized.

Infiltration can be done with a very simple system: a 3–4 mm cannula connected to i.v. tubing. This technique is inexpensive and in principle available to everyone. More modern, more expensive, and more sophisticated system is to use WAL technique and high pressure for infiltration. Even very superficial infiltration can be done with high pressure safely without increasing wound or other complications. WAL is also faster to use than a single “manual” cannula. Higher pressure causes also faster and more pronounced vasoconstriction as well as less bleeding – though what the exact difference with these two methods was not measured in this respect. Infiltration takes some time to do, but time lost is gained back with less bleeding and cleaner operating field.

Possible risk relating to lidocaine-adrenaline infiltration is formation of postoperative hematoma usually after a few hours after the operation. There has not been this complication – this far – even though the whole operating field is infiltrated, not only the superficial layer under the marked skin incisions. Lidocaine-adrenaline solution is readily available in small bottles making their use convenient, fast, and safe.

The mean operating time with this technique is a little bit more than 1 h which is less than in other studies. Also average bleeding less than 200 mL indicates that less bleeding means better seeing, easier operation, and shorter operating time. On the other hand, the shorter the operating time, the less wound infections can be expected.

Tension sutures take some more operating time. In a study, tension sutures added operating time by 50 min and did not prevent postoperative seromas [17]. How long does it take to place tension sutures was not measured. Sutures are placed 2–3 cm from each other, each patient requiring 20–40 tension sutures depending on the size of the operating area. The estimate is that it takes 10 min more time to apply tension sutures, but this time is saved multifold at the other end of the patient’s recovery. There are no seromas needing aspiration meaning less postoperative visits to doctor. On the other hand, tension sutures make the use of drains and possible prolonged draining

unnecessary. Usually drains are inconvenient and removal of drains can be painful.

The author has not had clinically significant wound complications nor late scar revisions. This is most likely because tension sutures decrease tension to wound edges and later to scar allowing normal wound healing and better scarring. Tension sutures tend to cause pumps and unevenness on the skin after surgery. They will disappear in 2–3 weeks when sutures’ tension strength is lost.

Patients’ pain is prominent after major abdominal surgery. Lidocaine-adrenaline infiltration prior to surgery has been shown to decrease postoperative pain after reduction mammoplasty. The strength of pain after abdominoplasty with or without lidocaine infiltration was not studied. However, there appears to be less pain after adrenaline infiltration, and general anesthesia can be more superficial. However, studies are needed on this subject to make reliable conclusions. Also the effect of local anaesthetics with longer duration should be studied. After abdominoplasty, recovery is fast, and usually after a few weeks, patients are all capable for physical work.

Klexane^R is usually (not with thin, young, healthy without any risk factors for embolism) used at the end of the operation and an extra dose (20–40 mg s.c.) is administered the next morning if patients have a long journey home or early mobilization has been difficult.

One reason for the low rate of complications could be the avoidance of morbidly obese patients. However, earlier studies show that obesity does not increase complication rate [20, 24, 28]. Smoking seems to have a trend to increase complications. Smoking has been shown to increase wound healing problems. In their study, Manassa et al. [29] had almost half of the smokers with wound healing problems. In this author’s study, a little bit more than one quarter of smokers had minor complications – not needing clinical intervention.

Some earlier studies show increased complication rate with tension sutures [11, 16, 17]. However, tension sutures do not increase the incidence of complications when combined to lidocaine-adrenaline infiltration prior to operation. Postoperative seroma is the most common complication after abdominoplasty. With the

combined technique, the author has been able to avoid clinically significant seromas needing aspiration.

Conclusions

Abdominoplasty with or without liposuction of the flanks can be done safely using lidocaine-adrenaline-saline infiltration prior to skin incision and tension sutures during the surgery. With this technique, it is possible to avoid major complications, decrease perioperative bleeding, and shorten operating time. Also drains can be dumped. The author routinely uses WAL technique to facilitate vasoconstriction and also for liposuction. Further studies are needed to evaluate the effect of lidocaine infiltration on pre- and postoperative pain.

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