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ORIGINAL ARTICLE BREAST SURGERY

Sub-muscular Breast Augmentation Using Tumescent Local Anesthesia

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Abstract

Background Tumescent local anesthesia (TLA) consists of infiltration of saline solution with lidocaine and epinephrine into the tissues to obtain regional anesthesia and vasoconstriction. The use of TLA in augmentation mammoplasty has been described for sub-glandular positioning. We describe a modified TLA technique for primary sub-muscular breast augmentation reporting our experience during the past 7 years.

Methods From 2010 to 2017, 300 patients underwent bilateral primary sub-muscular breast augmentation under TLA and conscious sedation. The tumescent solution was prepared with 25 mL of 2% lidocaine, 8 mEq of sodium bicarbonate, and 1 mL of epinephrine (1 mg/1 mL) in 1000 mL of 0.9% saline solution. Firstly, the solution was infiltrated between the pectoral fascia and the mammary gland, secondarily, during surgery, under the pectoralis major muscle.

Results The average amount of tumescent solution infiltrated while performing TLA was 740 mL per breast. No signs of adrenaline or lidocaine toxicity were reported and conversion to general anesthesia was never required. In all patients, no pain nor discomfort was reported during the pre-operating infiltration and surgical procedure. We reported a major complication rate of 3.3% (4 hematomas and 6 seromas) and a minor complication rate of 6.0% (8 implant dislocation and 10 dystrophic scars formation).

Conclusions TLA represents a safe and efficacious technique for performing breast augmentation surgery with sub-muscular implant positioning. This technique guarantees good pain control during and after surgery and has low incidence of postoperative side effects. Patients subjected to sub-muscular breast augmentation with TLA were satisfied.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Breast augmentation · Sub-muscular · Tumescent local anesthesia · Breast implants

Introduction

Breast augmentation is one of the most popular procedures in esthetic surgery even if its scenario has changed a lot over the past 5 years. The benefits of pocket location choices are well established and there are precise indications to ensure a good esthetic result to the patient. All these options must be considered in patient consultation. The main advantage of using sub-muscular positioning is an improved upper pole appearance. Also, recent studies suggested that the sub-muscular position decreases the incidence of capsular contracture [1]. At surgery, the choice of local or general anesthesia depends on many

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factors, but essentially the invasiveness and the risk of the surgical procedure and the preferences of patient and surgeon. The use of tumescent local anesthesia (TLA) is a technique developed in several surgical procedures but mainly in liposuction; it consists of infiltration of large volumes of saline solution with lidocaine and epinephrine in the surgical filed [2, 3]. In augmentation mammoplasty, TLA has been described for sub-glandular implant positioning [4]. With TLA, in sub-glandular breast augmentation, the time of surgery is shorter, the dissection is facilitated and bleeding and postoperative pain are reduced [4]. In this article, we describe a modified technique of TLA for primary sub-muscular breast augmentation, reporting our cumulative experience during the past 7 years.

Methods

From 2010 to 2017, 300 patients underwent bilateral primary sub-muscular breast augmentation. All procedures were performed in two accredited outpatient clinics. The surgical team was composed of a board-certified plastic surgeon, an assistant surgeon, an operating room nurse, and a board-certified anesthesiologist. The patients were fully informed about implant-based breast surgery use, indications, and possible complications (i.e., implant infections, postoperative bleeding). The preoperative exams included routine blood check, cardiac examination, and breast ultrasound and/or mammography. All patients met the criteria of the American Society of Anesthesiologists (ASA) for status I or II. Exclusion criteria were ASA status III or more, pregnancy and BMI > 35.

Used breast implants had a silicone gel content, a textured silicone surface and an anatomic (Sebbin: Groupe Sebbin SAS, Boissy-l'Aillerie, France; Nagor: Nagor Limited, Isle of Man, UK) or round shape (Mentor: Mentor Corporation, Santa Barbara, CA, USA; Motiva: Motiva European Distribution Center, Wommelgem, Belgium). Before surgery, the implant size and shape were selected considering breast diameters and anterior thoracic wall size. Before surgery, patients wore implant sizers with a sports brassiere in front of a mirror to better select the implant volume. Medications influencing platelet clotting were stopped 5–7 days before surgery or they were changed to acceptable alternatives. Before anesthesia, preoperative markings were done with the patient in the upright position and photographs were taken. Each patient received a peripheral intravenous access and vital parameters were constantly monitored during surgery and recovery. Breast anesthesia consisted of two phases, one before the incision and the second one after pectoralis major muscles fascia exposure. Tumescent solution was prepared with 25 mL of 2% lidocaine, 8 mEq of sodium bicarbonate, and 1 mL of epinephrine (1 mg/1 mL) in 1000 mL of 0.9% saline solution [4]. Overall 700–780 mL were introduced per breast. The cutaneous surgical incision site was infiltrated with 1% lidocaine with 1:100,000 epinephrine. During the first anesthesia phase, the plane between the gland and superficial fascia of the pectoralis major muscle was identified by pinching the breast across the chest wall and a spinal needle was connected to a peristaltic infiltration pump and positioned in this plane. The device was stopped when glands became turgid and vasoconstricted; in our case series, this corresponds to a mean volume of 520 mL per breast. The volume of tumescent solution infiltrated was different in relation to breast size and BMI of the patient. In patients with small breasts and low body weight, less tumescent solution was needed to obtain breast turgidity and to prevent reaching drug toxicity levels. The sub-glandular infiltration guaranteed complete anaesthetization by direct contact. The first incision was made 40 min later to allow epinephrine and lidocaine to have their effect. A 4-cm skin incision was made for round implants and 6-cm one for anatomic implants. After exposure of the pectoralis major muscle fascia, it was infiltrated with 1 mL of 1% lidocaine with 1:100.000 epinephrine (Fig. 1) and a cannula (2 mm diameter $\times$ 200 mm) was inserted within the muscle and fixed with a silk 4-0 round block suture (Fig. 2). Then, a volume of 180–240 mL of tumescent solution was injected with a Luer-lock syringe (Fig. 3). After the completion of the same procedure in the contralateral breast, the incision of the muscle was performed with electrocautery and the dissection proceeded until the pectoralis major muscle was completely released inferiorly and medially up to the superior limit of the areola (4th–6th rib). Blood vessel coagulation was performed progressively during pocket dissection before insertion of the implant to prevent secondary bleeding after clearance of the vasoconstrictive

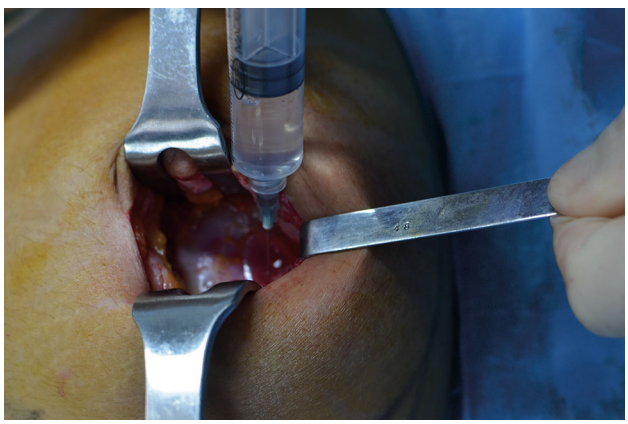

Fig. 1 After exposure, the pectoralis major muscle fascia was infiltrated with 1 mL of 1% lidocaine with 1:100.000 epinephrine

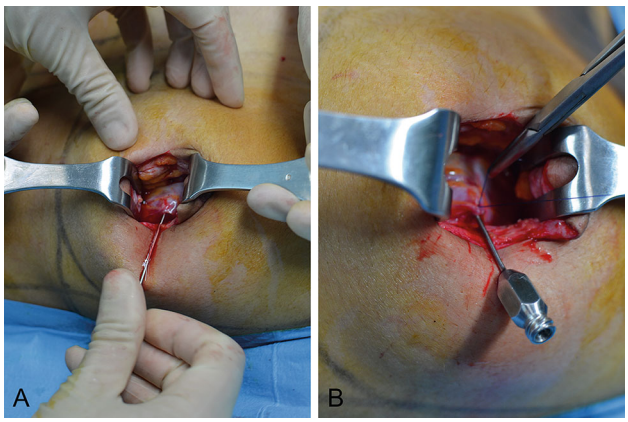

Fig. 2 A cannula of 2 mm diameter was inserted within the pectoralis major muscle (**a**) and fixed with a silk 4-0 round block suture (**b**)

Fig. 3 The volume of 180–240 mL of tumescent solution was injected with a Luer-lock syringe

effects of adrenaline. During pocket dissection, a fiber-optic retractor with smoke evacuation capabilities was used. Before implant positioning, sterile drapes and gloves were changed and instruments were cleaned with Clorexidina; the pocket was consequently irrigated with a 50% diluted hydrogen peroxide solution, a saline solution and finally with a gentamicin solution. Surgical drains were not used. Closure of the wound was performed in layers, using reabsorbable sutures and the wound was covered with a sterile dressing. After surgery, patients wore an adherent sports brassiere for 1 month after surgery. After 4 h of observation, patients were discharged. According to allergy status, an oral antibiotic (amoxicillin 875 mg/clavulanic acid 125 mg or ciprofloxacin 500 mg twice a day) was prescribed for 5 days and postoperative controls were planned after 1 day, 1, 2 weeks, 1–3–6 months, and 1 year (Figs. 4, 5).

Results

During a 7-year period, we analyzed 300 female patients who underwent sub-muscular breast augmentation. All surgical procedures were performed using the TLA technique. The mean patient age was 31.4 years (ranging from 22 to 55 years) and the mean body weight was 60.3 kg. The mean BMI was 22.6. The average amount of tumescent solution infiltrated was 740 mL (700–780 mL). No signs of adrenaline or lidocaine toxicity were reported. Conversion to general anesthesia was never required.

The average period of time from infiltration to skin incision was 40 min and it was selected by analyzing the response time of patients treated, together with the anesthesiologist. Starting the dissection before 40 min resulted in pain in most patients, whereas waiting longer provided no additional benefits for the patient. During surgery, no pain was reported during skin cutting or major pectoralis muscle lift in all patients. The range of implant size was from 225 to 420 cc. The average surgical time using this technique was 1 h and 40 min. This time included bilateral infiltration, waiting time and surgical procedure until completion. Among the major postoperative complications (3.3%), we reported 4 cases of hematomas and 6 of seromas (2 requiring reoperations). We reported a minor complication rate of 6.0% (18/300) represented by 8 cases of implant dislocation (2.7%) and 10 cases of dystrophic scars (3.3%) (Table 1). Capsular contraction was evaluated according to the Baker classification [5]. After 1 year, 223 patients (74.3%) had Baker grade I capsular contracture, 71 patients (23.7%) had grade II, 6 patients (2%) had grade III or IV. Patients were satisfied with the TLA procedure and did not report any discomfort during the pre-operating infiltration or the complete surgical procedure. Most of the patients were satisfied with the esthetic results 1 year after surgery. Patient satisfaction was evaluated using a satisfaction survey 3 months after surgery. In the survey, they were asked to rate the pain management and satisfaction of esthetic result from “unsatisfactory” to “excellent”. Patients were mostly highly satisfied. The patients who were unsatisfied were those who experienced complications such as implant dislocation. Those patients underwent correcting surgery to improve the esthetic result.

All our patients had a follow-up of more than 1 year, in particular 42 patients had a follow-up of 6 years which is the longest follow-up in our experience with this technique. Six patients had a follow-up of 1 year and it is the shortest follow-up in this case series.

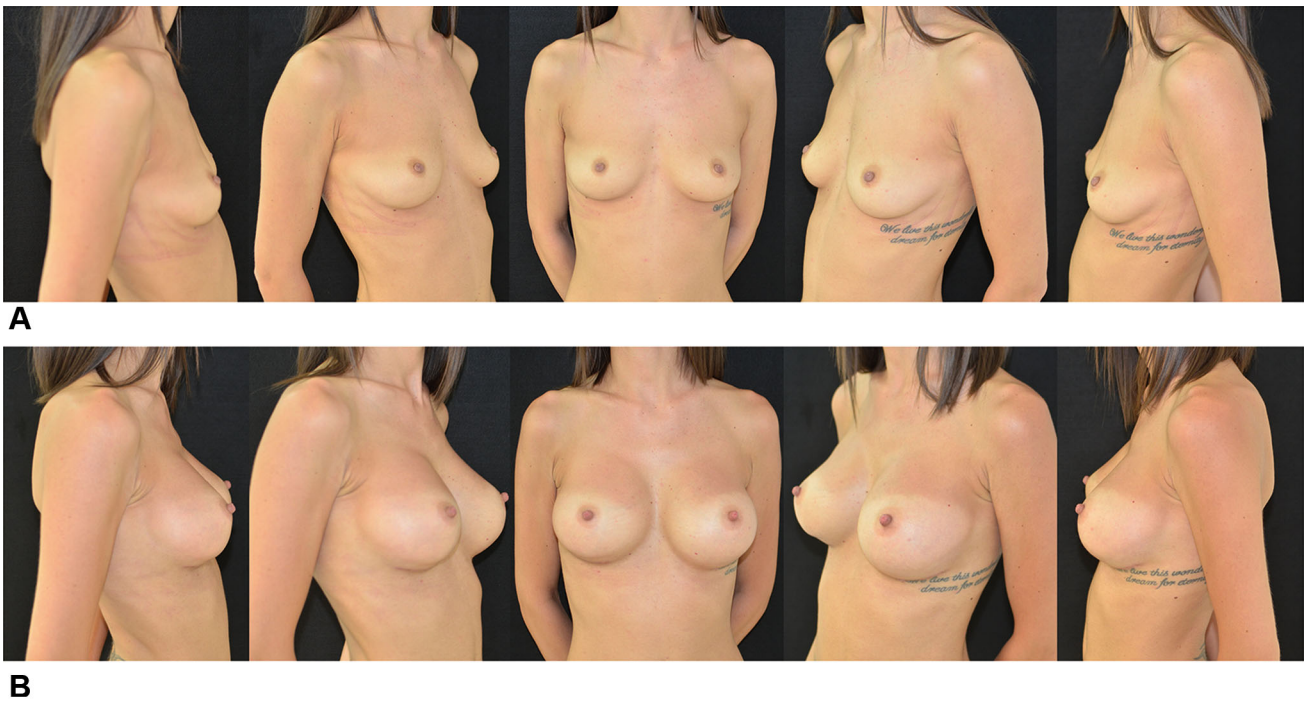

Fig. 4 **a** Preoperative view. **b** Postoperative view after 6 months

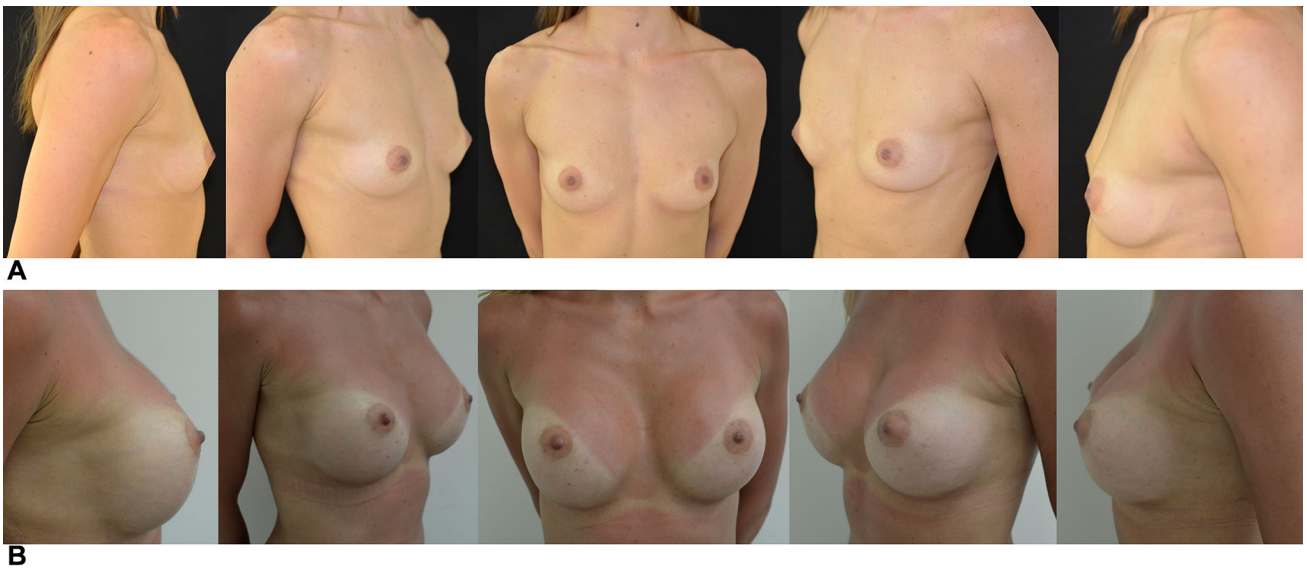

Fig. 5 **a** Preoperative view. **b** Postoperative view after 6 months

Discussion

In this article, we present our experience of 300 consecutive cases of TLA sub-muscular breast augmentation over a 7-year period time. Our postoperative complication rate was 9.3% including hematoma (1.3%), seroma formation (2%), dystrophic scars (3.3%) and implant dislocation (2.7%). In two cases, a reintervention was performed (0.7%). Conversion to general anaesthesia was never necessary and no adverse events during TLA were recorded.

Even though many authors described their experience using different types of local anesthesia, nowadays breast augmentation is still a procedure mostly performed under general anesthesia.

A study by Chung et al. [6] describes the use of a target-controlled infusion (TCI) system for performing intravenous anesthesia using propofol and remifentanil together

Table 1 Complication rate after sub-muscular breast augmentation in 300 patients

Complication	Patients	%
Hematoma	4	1.3
Seroma	6	2
Implant dislocation	8	2.7
Dystrophic scars	10	3.3
Need for reintervention	2	0.7

with local anesthesia. Local anesthesia is performed using a mixture of epinephrine, lidocaine and ropivacaine. They performed an intercostal nerve block in an area extending from the 2nd to 8th intercostal nerve on the mid-axillary and from the 2nd to 7th intercostal nerve on the parasternal area. Several studies have demonstrated that intravenous anesthesia causes a lower incidence of nausea and vomiting following surgery [7–9], but anesthesia using propofol and remifentanil is more expensive than other anesthesia methods [10, 11].

Another interesting article by Jabs et al. [12] evaluates the combination of general anesthesia with the intraoperative infiltration of standard tumescent solution (ringer lactate—1 mL, lidocaine 1%—50 mL, epinephrine 1:1000—1 mL) in the planned pocket area of each breast before dissection. In their retrospective review of sub-muscular breast augmentation performed under general anesthesia, the authors found a reduction in postoperative pain and a significant decrease in the use of postoperative pain medication in the immediate perioperative period. On the other hand, using general anesthesia still lengthens postoperative recovery time.

Shimuzu et al. [13] combined the use of intercostal nerve block with tumescent anesthesia for breast augmentation. Regarding the intercostal nerve block, the injection of bupivacaine was performed from the 3rd to 6th rib. Tumescent anesthesia was achieved using a blunt cannula for liposuction. About 200 mL of solution (epinephrine 0.01%—1 mL, lidocaine 1%—50 mL, saline solution—500 mL) was used for each side. According to the choice of implant placement, the solution was injected either in the space between the mammary gland and the fascia of the pectoralis major muscle (sub-glandular plane), or in the space between the fascia of the pectoralis major muscle and the muscle itself (sub-fascial plane), or in the space beneath the pectoralis major muscle (sub-muscular plane). The authors cited no complications in the 35 patients treated with a reported pain score ranging from "no pain" to "slightly painful". In our protocol, we utilized only TLA with no need for intravenous anesthesia nor nerve block. The procedure is done under local anesthesia, only using 1 g Midazolam. Rusciani et al. already proposed this protocol for sub-glandular breast augmentation [4]. This technique has proven to be safe and effective in properly selected candidates. Avoiding the use of propofol, ketamine or fentanest reduces the risk of drug-related complications such as respiratory depression, hypo or hypertension, bradycardia and nausea or emesis. In addition to that, the recovery time after surgery is short. This compensates for the longer preparing time before surgery for performing local anesthesia and allowing it to act. Moreover, Midazolam has excellent anxiolytic and amnestic effects, with minimal adverse effects on the respiratory system. Attention has to be paid to elderly patients with special conditions or comorbidities. In particular, it is extremely important to strictly select the candidates for this procedure, meeting the criteria for ASA status I or II [14]. We strongly advise the presence of an anesthesiologist during the operation, for continuous monitoring of oxygen saturation, and checking the patient's respiratory and cardiocirculatory status. It is also advisable to perform these procedures where it is possible to immediately convert to general anesthesia in case of need, even if we never experienced it in our case series.

Performing breast augmentation under TLA even when the implant has to be placed under the muscular plane has important advantages such as reduction of postoperative side effects of drugs used for general anesthesia. Different studies and reviews have evaluated the relationship between postoperative side effects and general anesthesia or other techniques used for breast augmentation.

Eldor et al. [9] compared breast augmentation under general anesthesia versus monitored anesthesia care. Vomiting was observed more frequently in the GA group. Most patients (84.1%) in the MAC group did not vomit al all, whereas only 60.9% of the GA group had no vomiting.

Tahiri et al. [15] published a review in which five studies compared the incidence of PONV between TPVB (thoracic paravertebral block) and GA for breast surgery. The rate of postoperative nausea and vomiting in subjects treated with TPVB (0–23.5%) was lower than that of patients undergoing GA (6.7–40%). In our case series, no patient had nausea or vomiting after surgery.

Because TLA infiltration takes approximately 20 min and it can be performed outside the OR, the patient can be prepared outside the operating theatre, but still in a monitoring environment. When compared with sub-glandular, the sub-muscular procedure requires higher quantities of lidocaine and adrenaline. In particular, the volume of solution (epinephrine 0.01%—1 mL, of lidocaine 1%—30 mL, saline solution—500 mL) used for sub-glandular injection ranged from 400 to 700 mL per breast, whereas in the case of sub-muscular implant placement, approximately 740 mL of solution per breast was needed. Anyway, this is

still largely within the safety limits; in fact, safe doses of TLA are up to 55 mg/kg in the adult population [16, 17]. Lidocaine toxicity is closely related to its plasmatic levels and these may vary due to excessively rapid systemic uptake, impaired liver metabolism, or drug interactions. For this reason, it is important to monitor the patient during infiltration.

To infiltrate tumescent solution under the muscle, it is suggested to insert the 2 mm diameter cannula under the pectoralis major muscle, directly superficial to the ribs and chest wall. For this reason, the potential risk of pneumothorax has to be considered. In our experience, because we partially expose the superficial aspect of the muscle before inserting the cannula, it is relatively easy to understand the shape of the thorax and the exact position of the ribs. This results in a negligible risk of causing pneumothorax. When approaching our technique, we advise performing this surgical step carefully, especially because, while inserting the cannula, it is possible to find some resistance from the muscular fibers. Another important aspect is to start the injection of tumescent solution slowly and to feel it with a hand over the breast, to assess if the solution is flowing in the correct plane, under the muscle.

Sub-muscular implant positioning involves sectioning the pectoralis major muscle insertions at the level of the ribs and sternum. The pocket dissection is performed both with blunt dissection and cautery. The large amount of fluid may affect the ability to dissect with the cautery; for this reason, it is important that the surgeon's assistant constantly suctions the surgical site. By suctioning and removing fluid with gauze sponges, cautery dissection can be performed easily. Even though no muscle relaxants were used, muscular tone was never a major concern during surgery.

This procedure causes bleeding by sectioning the perforating branches of the internal thoracic artery and vein. [18] TLA, by using epinephrine, causes vasoconstriction, reducing the blood loss and bleeding throughout surgery [19]. This allows the surgeon to operate in a clearer surgical field and makes it easier to complete the pocket creation under the muscle. Although, during surgery, it is extremely important to perform accurate hemostasis after the epinephrine effect ends to avoid postoperative bleeding. If the hemostasis is correctly achieved, no drains will be required, reducing the patient's discomfort and avoiding a possible cause of implant infection. In fact, we recorded hematoma occurrence only in 4 patients (1.3%) and seroma formation in 6 patients (2%). This complication rate is comparable with the literature related to sub-muscular breast augmentation [20, 21] regardless of the type of anesthesia technique used. TLA also helps in correct plane identification and elevation of the pectoralis major muscle by performing sub-muscular hydro-dissection. Because the volume of solution injected determines modification of the breasts shape, it is extremely important to perform precise preoperative markings of the implant placement and to alert the patient that the breasts will be swollen for the first postoperative weeks. We recorded only 8 cases of implant dislocation (2.7%).

In our opinion, surgeons who have previously performed breast augmentation under general anesthesia will experience a quick learning curve in adjusting to this technique.

We also performed sub-muscular breast augmentation in patients who had already been treated with breast enhancement with hyaluronic acid (Macrolane). In this case, TLA allowed not only breast implant positioning but also the removal of hyaluronic acid cysts within the glandular tissue [22, 23].

Another minor complication that we recorded was dystrophic scarring and delay in wound closure. In these cases, we applied a polyurethane dressing to facilitate wound closure [24].

In our experience with sub-muscular breast implant positioning using TLA, we obtained fully satisfied patients. Even if this procedure is more invasive than sub-glandular breast implant positioning and, due to muscle elevation and disinsertion, the intra and postoperative pain is higher, we can fully control it by associating TLA with low doses of Midazolam intraoperatively and by prescribing mild analgesics in the postoperative course. The pain level was assessed by the anesthesiologist during the procedure. After surgery and during follow-up, patients were asked to rate pain management giving a score from "satisfactory" to "excellent" with no complaints. Regarding the intraoperative pain management, most of the patients had almost complete amnesia due to the use of midazolam; for this reason, it is important that pain assessment, at this stage, is performed by the anesthesiologist.

Moreover, TLA allows early patient discharge and deambulation, reducing the risk for deep venous thrombosis and with higher satisfaction and better comfort for patients that can rest and recovery at home [25, 26].

Conclusion

TLA represents a safe and efficacious technique for performing breast augmentation surgery with implant positioning either in a sub-glandular or sub-muscular pocket. This technique has proven to have a low incidence of postoperative side effects, with good pain control throughout surgery and the immediate postoperative period even in sub-muscular implant positioning, usually related with greater pain. Patients were satisfied with the technique and no intraoperative complications were recorded. However, we still recommend the presence of a board-certified

anesthesiologist for correct selection of patients and in case of major anesthesia-related complications. This anesthesia technique must be applied together with a correct surgical technique and meticulous hemostasis during surgery to avoid surgery-related complications.

Compliance with Ethical Standards

Conflicts of interest None.

References

1. Schwartz MR (2017) Evidence-based medicine: breast augmentation. Plast Reconstr Surg 140:109e
2. Conroy PH, O'Rourke J (2013) Tumescent anaesthesia. Surgeon 11(4):210–221
3. Gutowski KA (2014) Tumescent analgesia in plastic surgery. Plast Reconstr Surg 134(4 Suppl 2):50S–57S
4. Rusciani A, Pietramaggiori G, Troccola A, Santoprete S, Rotondo A, Curinga G (2015) The outcome of primary subglandular breast augmentation using tumescent local anesthesia. Ann Plast Surg 76:13–17
5. Spear SL, Baker JL Jr (1995) Classification of capsular contracture after prosthetic breast reconstruction. Plast Reconstr Surg 96(5):1119–1123 **(discussion 1124)**
6. Chung KJ, Cha KH, Lee JH, Kim YH, Kim TG, Kim IG (2012) Usefulness of intravenous anesthesia using a targetcontrolled infusion system with local anesthesia in submuscular breast augmentation surgery. Arch Plast Surg 39:540–545
7. Jost U, Dorsing C, Jahr C et al (1997) Propofol and postoperative nausea and/or vomiting. Anaesthesist 46:776–782
8. Gupta A, Stierer T, Zuckerman R et al (2004) Comparison of recovery profile after ambulatory anesthesia with propofol, isoflurane, sevoflurane and desflurane: a systematic review. Anesth Analg 98:632–641
9. Eldor L, Weissman A, Fodor L et al (2008) Breast augmentation under general anesthesia versus monitored anesthesia care: a retrospective comparative study. Ann Plast Surg 61:243Y246
10. Suttner S, Boldt J, Schmidt C et al (1999) Cost analysis of targetcontrolled infusion-based anesthesia compared with standard anesthesia regimens. Anesth Analg 88:77–82
11. Fombeur PO, Tilleul PR, Beaussier MJ et al (2002) Cost-effectiveness of propofol anesthesia using target-controlled infusion compared with a standard regimen using desflurane. Am J Health Syst Pharm 59:1344–1350
12. Jabs D, Richards BG, Richards FD (2008) Quantitative effects of tumescent infiltration and bupivicaine injection in decreasing postoperative pain in submuscular breast augmentation. Aesthet Surg J 28:528Y533
13. Shimizu Y, Nagasao T, Taneda H, Sakamoto Y, Asou T, Imanishi N, Kishi K (2014) Combined usage of intercostal nerve block and tumescent anaesthesia: an effective anaesthesia technique for breast augmentation. J Plast Surg Hand Surg 48:51–55
14. Daabiss M (2011) American Society of Anaesthesiologists physical status classification. Indian J Anaesth 55(2):111–115. https://doi.org/10.4103/0019-5049.79879
15. Tahiri Y, De Tran QH, Bouteaud J, Xu L, Lalonde D, Luc M, Nikolis A (2011) General anaesthesia versus thoracic paravertebral block for breast surgery: a meta-analysis. J Plast Reconstr Aesthet Surg 64:1261e1269
16. Klein JA (1990) Tumescent technique for regional anesthesia permits lidocaine doses of 35 mg/kg for liposuction. J Dermal Surg Oncol 16:248Y263
17. Klein JA (1988) Anesthesia for liposuction in dermatologic surgery. J Dermal Surg Oncol 14:1124Y1132
18. Maxwell GP, Gabriel A (2009) Breast reconstruction. In: Aston SJ, Steinbrech DS, Walden JL (eds) Chapter 57, Aesthetic plastic surgery. Elsevier, Philadelphia
19. Namias A, Kaplan B (1998) Tumescent anesthesia for dermatologic surgery. Cosmetic and noncosmetic procedures. Dermatol Surg 24:755Y758
20. Araco A, Gravante G, Araco F, Delogu D, Cervelli V, Walgenbach K (2007) A retrospective analysis of 3,000 primary aesthetic breast augmentations: postoperative complications and associated factors. Aesth Plast Surg 31:532–539
21. Stutman RL, Codner M, Mahoney A, Amei A (2012) Comparison of breast augmentation incisions and common complications. Aesth Plast Surg 36:1096–1104
22. Fallico N, Faenza M, Dessy LA, Pili M, Trignano E (2014) Augmentation mammaplasty after breast enhancement with macrolane. Plast Reconstr Surg 133(3):439e–440e
23. Trignano E, Rusciani A, Armenti AF, Corrias F, Fallico N (2015) Augmentation mammaplasty after breast enhancement with hyaluronic acid. Aesthet Surg 36(6):NP161–NP168
24. Cigna E, Tarallo M, Bistoni G, Anniboletti T, Trignano E, Tortorelli G, Scuderi N (2009) Evaluation of polyurethane dressing with ibuprofen in the management of split-thickness skin graft donor sites. Vivo. 23(6):983–986
25. Peled IJ (2002) Tumescence in augmentation mammaplasty. Plast Reconstr Surg 110(1366–1367):13
26. Weiss A (2002) A tumescent twist to breast augmentation. Plast Reconstr Surg 110:1810