

Tumescent Anesthetic Breast Surgery (TABS)

A Consecutive Case Series Review of Primary and Secondary Breast Augmentation Surgery in an Office Based Surgical Center

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Introduction: Review the risks, benefits, safety and limitations of TABS based on our first 504 surgical cases performed in our office based surgical center.

Materials and Methods: From December 1, 2008 to November 15, 2011, 448 primary breast augmentation and 56 secondary breast augmentation surgeries were performed using tumescent lidocaine anesthesia. Age range of patients was between 19-68 years of age. All surgeries were performed at Perfect Image Cosmetic Surgery MedSpa located in El Paso, Texas.

Results: No patient requested termination of surgery. 502/504 patients would repeat the surgery using tumescent lidocaine. Complications were equal to or lower than those listed by the Allergan Corporation.

Conclusion: TABS is safe and effective in an Office Based Surgical Center.

Introduction

Tumescent Anesthesia Breast Surgery (TABS) is based on a modified use of the Klein "Tumescent Technique" for liposuction, developed in the 1980's by Dr. Jeffrey Klein.^{1,2,3}

The goal of TABS is to perform primary or secondary breast surgery without the use of any PO, IV or IM analgesic or anxiolytic medication.

The purpose of this study was to review the risks, benefits, safety and limitations of primary and secondary breast surgery using tumescent lidocaine anesthesia in an Office Based Surgical Center.

Preliminary Screening

Patients excluded for surgery for medical reasons including Diabetes, Hypertension, Cardiac, Respiratory and Bleeding Disorders. Patients excluded for psychological reasons included Anxiety and Panic Disorders, Body Dysmorphic Disorder, Depression and history of Syncope. Patients excluded because of anatomical anomalies included Breast Mound Asymmetry, Chest wall Asymmetry, Inframammary Crease Position Asymmetry, Nipple-Areola Complex (NAC) Asymmetry and Ptosis.

Once selected, (448) patients underwent primary breast augmentation with a Minimally Invasive Inframammary incision, submuscular (subpectoral) implant placement.⁴ Allergan Natrelle High Profile (HP) Saline implants were placed in (439) patients, Allergan Natrelle Moderate Profile (MP) Saline implants were placed in (2) patients and Allergan Style 45 Silicone implants were placed in (7) patients. (56) patients underwent secondary breast augmentation for requested implant exchange and complications related to primary surgery.

Breast Implant Size Calculation

The calculations were made as followed:

- Measured Distance from the lateral sternal line at the sixth rib, across the nipple to the anterior Axillary line (the lateral edge of the breast tissue). This distance, measured in centimeters (cms), is called Distance A. (Minimum Implant Size)
- Measured Distance from the lateral sternal line at the sixth rib, across the nipple to the midaxillary line. The measured distance is called Distance B. (Maximum Implant Size)
- Conversion of Distance A and B to centimeters for implant size selection is calculated by multiplying Distance A or B by 20cc/cm.
 - o i.e. Distance A is 20cm= 20cc/cm x 20cm = 400cc implant size.
 - o i.e. Distance B is 24cm= 24cc/cm x 20cm = 480cc implant size.
- Distance C, is the distance from the nipple to the inframammary crease plus 1cm.

Tumescent Anesthetic Preparation Protocol

The tumescent anesthetic formula, based on the Klein Tumescent Technique, is as follows:

- 1500mg lidocaine + 3mg Epinephrine + 13mEq Sodium Bicarbonate diluted in 1000cc of 0.9% Normal Saline.
- 750mg lidocaine + 1.5mg Epinephrine + 6mEq Sodium Bicarbonate diluted in 500cc of 0.9% Normal Saline.

1500cc of tumescent anesthesia was most often used. Up to 750cc of tumescent solution was infiltrated per breast. Larger volumes were occasional prepared, as needed, but volumes greater than 1000cc of tumescent solution per breast were rarely used.

TABS Protocol for Primary Breast Surgery

Tumescent anesthetic is placed at five specific points along the breast (Point 1-5).

- Point 1: Xiphoid process, midsternal up to the second rib. (100cc)
- Point 2: Inframammary crease at point of marked incision line. (100cc)
- Point 3: Junction of perpendicular line drawn from the Inframammary crease and lateral edge of breast. (100cc)
- Point 4: Junction of perpendicular line drawn from the Inframammary crease to Anterior Axillary Line. (50cc)
- Point 5: 4-5cm above Point 4, along the Anterior Axillary Line. (50cc)

Approximately 350cc of tumescent solution is then infiltrated from the inframammary incision underneath the pectoralis muscles.

The same procedure is repeated on the opposite breast. The inframammary incision is made at the previous marked Distance C line to a length of between 1.7-2.0cm for saline implants and 5cm for silicone implants.

The same technique used to create the breast implant pocket under General Anesthesia can be used. Once the Sizers are placed, the patient is inclined to a seated position and allowed to view the appearance of her implants in a frontal and profile view. Once the final implant size has been determined by the patient, she is placed in the supine position. The fill tubing is removed and the incision is closed in three layers (fascia, subcutaneous and subcuticular).

The size of the incision marked at Distance C averages between 1.7cm-2.0cm for saline implants and 5cm for silicone implants.⁴ The use of Quill sutures (2-0 Monoderm) allows for a significant degree of shrinkage and is the preferred suture for closure.

TABS Infiltration Effects

Infiltration anesthetizes the sensory innervation of the breast derived medially from the anterior cutaneous branches of the intercostal nerves (T1-T6) and laterally from the lateral cutaneous branches of the intercostal nerves (T2-T7).^{5,6}

Innervation of the Nipple-Areola-Complex (NAC) is derived by the anterior and lateral cutaneous branches of T4 and cutaneous branches of T3 and T5.^{5,6,7}

Infiltration also causes significant vasoconstriction of the perforating branches of the internal thoracic artery and vein (most notably the second to the fifth perforator).⁸

Vasoconstrictor of these perforators allows for a significant reduction in overall blood loss since the superomedial perforator supply from the internal thoracic vessels accounts for up to 60% of the total blood supply to the breast.⁸ This

also explains why proper dissection of the breast pocket using tumescent anesthesia produced minimal to less than 10cc of blood loss per side.

Intra-Operative and Post-Operative Findings

PO, IV and IM analgesic and anxiolytic medication for pain management was available upon request.⁹ However, patients undergoing primary or secondary breast surgery with either saline or silicone implant replacement required no adjunctive PO, IV or IM analgesic or anxiolytic medication for pain management. The anesthetic effect following surgery lasted approximately 2 hours.

Primary Breast Surgery Group:

- One patient would have preferred to have had the procedure done under General Anesthesia due to an increased level of anxiety and initial discomfort with the stinging affect of the lidocaine rather than suboptimal anesthetic effect of the tumescent solution.
- Two patients required prophylactic placement of Jackson Pratt (JP) drains with estimated blood loss of approximately 30cc and removal of the drains on Post-Op Day 1.
- Three patients required evacuation of hematomas (3/448) within 48 hours of surgery and were also included the secondary breast surgery group.

Secondary Breast Surgery Group:

- Surgical correction for capsular contracture were performed only on patients with firm, distorted breasts (Baker Grade III) or hard, distorted and painful breasts (Baker Grade IV).
- One patient (Baker Grade IV) would have preferred to have had the procedure done under General Anesthesia due to increased level of pain with capsulotomy while dissecting capsular contracture scar tissue.
- One patient required placement of a JP drain with estimated blood loss of approximately 100cc and removal of the drain on Post-Op Day 7.

Intraoperative and postoperative findings and complications rates were similar to those documented in the Allergan Natrelle Directions For Use (DFU).^{10,11} The number of patients diagnosed with Baker Grade III/IV was lower than the published data or 21/504 (4.2% compared to 11.4%). Twelve patients underwent surgical management of capsular contracture to include removal of implants (4), removal and replacement of implants (4) and extrusion (4). The remaining nine patients stated satisfactory improvement of contracture using non-surgical management to include the use of Accolate, massage therapy, herbal and vitamin therapy and did not desire surgical correction.

Intraoperative bleeding averaged less than 10cc per case. In the case of primary surgery, hematomas were associated with

tumescent anesthesia infiltration levels of less than 400cc per side (3/504). When increased to 750cc per side, no hematomas were seen. The incidence of hematoma, however, was found to be similar to that listed in the Allergan Natrelle DFU.^{10,11}

The use of TABS as the sole method of anesthesia when correcting capsular contracture (Baker Grade III/IV) in open capsulotomy required higher amounts of tumescent anesthetic as compared to amounts of 750cc per side. Increased bleeding of between 10-100cc was also seen. In the secondary surgery case (swap out with capsulotomy) where increased intra-operative bleeding was seen, it was associated with capsular contracture Baker Grade III.

Primary Breast Augmentation Surgery

Saline	HP	439
	MP	2
Silicone	Style 45	7
	TOTAL	448

Secondary Breast Augmentation Surgery

Procedure	Saline	Silicone	Total
Swap Outs	11	4	15
Replacement 2nd to Deflation	2	0	2
Removal 2nd to Capsular Contracture (III/IV)	4	0	4
Replacement following Capsulotomy	4	1	5
Replacement following Capsulorrhaphy	18	1	19
Replacement following drainage of Seroma	1	0	1
Replacement following drainage of Hematoma	3	0	3
Bilateral Removal by Patient Request	2	0	2
Removal 2nd to Extrusion	3	0	3
Replacement following Extrusion	1,1 (Same Pt)	0	2
TOTAL	50	6	56

Discussion

In terms of infiltration, the average amount of tumescent anesthesia used was less than 45mg/kg. The actual amount absorbed by the breast and associated tissue was estimated to be much less, since up to half of the infiltrated solution is lost as drainage once the inframammary incision is made and the pocket is created.

The anesthetic effect and pain control seen in our case series was excellent. No patient requested the termination of the surgery secondary to pain and no adjunctive use of analgesics or anxiolytics was necessary. Based on post-operative surveys in which only 2 of 504 surgery cases would have preferred General Anesthesia over Tumescent Anesthesia, it is the opinion of this author that if suboptimal anesthetic effects have been experienced by other surgeons in primary breast augmentation, as stated in commentary by critics of this technique, it may be that the infiltrated amount or location of tumescent solution was unsatisfactory for proper anesthetic effect.

This observation is unique to TABS since the patient is fully conscience during the procedure and able to make the final decision on implant size. A common misconception is that the patient is allowed to make a decision of implant size which could exceed the capacity of the pocket created. Despite the often cited concern by critics that patients are incapable of making an informed consent during surgery, we did not find this to be the case.^{12,13} During their post-operative interviews, only one patient (1/504) felt that decision making had been affected by the surgery. Even in this case, implant size did not exceed pocket capacity.

A limiting factor for both anesthetic effect and hemostasis appears to be due to decreased effect or penetration of tumescent anesthesia in scar tissue and specifically with thickened capsules. Due to these increased risks, we have since restricted the surgical correction of capsular contractures to capsulotomy and only in patients with Baker Grade III.

Observed complications using TABS compared to published data using General Anesthesia were similar except for a lower rate of capsular contracture observed with TABS.

Although the rate of extrusion appeared to be higher than in the published data, all cases of extrusion were associated with Baker Grade IV capsular contracture (4/1000 implants). It is, therefore, felt that the observed cases of extrusion were due to the prolonged period of capsular contracture leading to eventual tissue erosion and skin breakdown rather than any specific causative effect of tumescent anesthesia or surgical technique.

Conclusion

In this author's experience, TABS, in properly selected candidates, is safe and effective and offers an attractive alternative to General Anesthesia for both primary and secondary breast surgery in an office based surgical center.



Diagram 1

Age 24, 400cc Allergan Natrelle HP PreOp
Breast Size: 34A PostOp Breast Size 34C

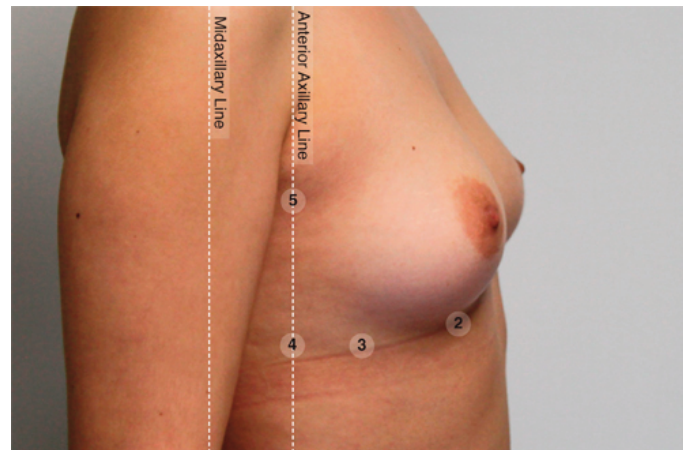
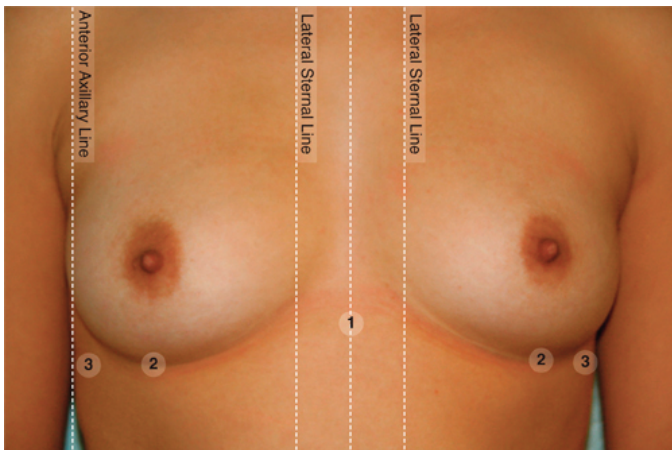


Diagram 2

Tumescent Anesthesia Infiltration Points 1-5

Point 1: Xiphoid process, midsternal to the second rib

Point 2: Inframammary crease at point of marked incision line

Point 3: Junction of perpendicular line drawn from the Inframammary crease and lateral edge of breast

Point 4: Junction of perpendicular line drawn from the Inframammary crease to Anterior Axillary Line

Point 5: 4-5cm above Point 4, along the Anterior Axillary Line

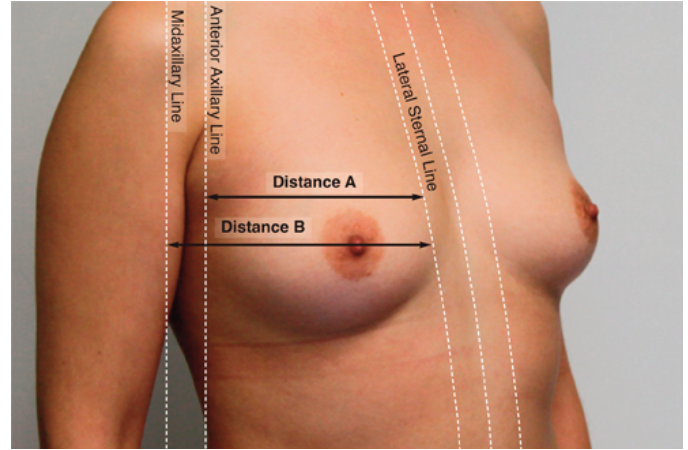
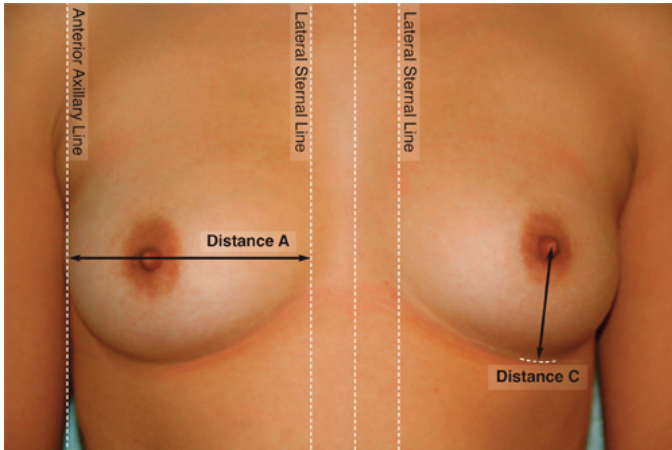


Diagram 3

Distance A, B, and C

Distance A: Distance from Lateral Sternal Line to Anterior Axillary Line

Distance B: Distance from Lateral Sternal Line to Midaxillary Line

Distance C: Distance from Nipple to Inframammary crease plus 1cm

References

1. Klein, Jeffrey, M.D. The Two Standards of Care for Tumescent Liposuction American Society for Dermatologic Surgery. 1997, volume 23, pages 1194-5.
2. Klein, Jeffrey, M.D. The Tumescent Technique for Liposuction Surgery. American Journal of Cosmetic Surgery. 1987, volume 4, pages 263-267.
3. Klein, Jeffrey, M.D. Tumescent Technique, Tumescent Anesthesia & Microcannular Liposuction. St. Louis, Missouri, Mosby, Inc., 2000.
4. N Fanous, C Tawil , VJ Brousseau. Minimal inframammary incision for breast augmentation. Can J Plast Surg 2008;16(1):14-17.
5. Jaspars, JJ, et al. The Cutaneous Innervation of the Female Breast and Nipple-Areola Complex: Implications for Surgery. British Journal Plastic Surgery. 1997 Jun;50(4):249-59.
6. Sarhadi, NS, et al. Nerve Supply of the Breast with Special Reference to the Nipple and Areola: Sir Astley Cooper Revisited. Clinical Anatomy. 1997; 10(4):283-8.
7. Netter, Frank, M.D. Atlas of Human Anatomy. Ciba-Geigy Corporation. Summit, New Jersey, 1989, plate 174.
8. Maxwell GP, Gabriel A. Breast Reconstruction. In: Aston SJ, Steinbrech DS, Walden JL. Aesthetic Plastic Surgery. Philadelphia, Pa: Elsevier; 2009:chap 57.
9. Texas Medical Board. Office Based Anesthesia FAQ. <http://www.tmb.state.tx.us/professionals/physicians/licensed/oba.php>
10. A95/R95: 5-Year Cumulative First Occurrence Kaplan-Meier Risk Rates, By Patient. Natrelle Saline- Filled Breast Implants, Directions For Use (DFU). Table 1, Complications. Page 18. Allergan, Inc, 2011.
11. 7-Year Complication Rates for Primary Augmentation Patients. Natrelle Silicone-Filled Breast Implants, Directions For Use (DFU). Table 1, Page 27. Allergan, Inc, 2009.
12. Bernstein G, Hanke CW. Safety of Liposuction: A Review of 9478 cases Performed by Dermatologists. Journal of Dermatologic Surgery & Oncology. Oct 1988, volume 14(10). Pages.1112-4.
13. Coldiron B, Office Surgery Incidents: What Seven Years of Florida Data Show Us, 2008 American Society for Dermatologic Surgery, Inc., 2008

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Instructional videos regarding TABS is currently available on the internet on YouTube.com for Dr. Gandhi and Dr. Novoa.