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**Research Article**

# REDUCTION IN POSTOPERATIVE PAIN LEVEL AND DISCOMFORT AFTER ADOPTING BLOODLESS ATRAUMATIC TICTECHNIQUE (BAT): EXPERIENCE OF 405 BREAST AUGMENTATIONS OVER 5 YEARS

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**ABSTRACT**

**Introduction:** Breast Augmentation is the second most common cosmetic surgical procedure in Italy. This procedure is still gaining in interest and certainly represents a large portion of aesthetic surgery practice with more than 33.000 procedures. However, this operation is associated with significant pain and discomfort in the immediate postoperative period and may cause unwanted side effects. In this study we examine our single accredited outpatient surgery center experience transitioning from the use of classical breast augmentation technique to the use of BAT breast surgery.

**Methods:** We performed a retrospective analysis of all breast augmentations cases performed over a 5-year period from January 2012 to July 2017 by multiple surgeons in the practice. Postoperative follow-up length and side effects as level of pain and discomfort, bruising and swelling were noted. Also complications including hematoma, infection, seroma, hypertrophic scar, need for revision surgery, and pulmonary embolism/deep venous thrombosis (PE/DVT) were observed.

**Results:** Four of the most interesting findings were a significantly decreased pain level and discomfort, bruising, swelling and hematoma in the BAT group (310 patients) where no pain occurred in 17.7%, light pain in 77.4%, moderate pain in 4.8%, intense or serious pain in 0%. Whereas serious pain occurred in the TBA group (95 patients) in 13.6%, intense pain in 73.6%, moderate pain in 6.3%, light or no pain in 0%.

**Discussion:** Pain level and discomfort in the Bloodless Atraumatic Technique Breast Augmentation Group were much lighter than that in the Traditional Breast Augmentation Group, which demonstrated that BAT significantly reduced postoperative pain and discomfort, without complications for the patients who received silicone prostheses implanted into subpectoral space for cosmetic breast augmentation.

**Conclusions:** The use of Bloodless Atraumatic Technique significantly decreased the pain level and discomfort in our practice. Bloodless Atraumatic Technique Breast Augmentation offers objective improvements in recovery, complications, reoperation rates, and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon.



## INTRODUCTION

Breast Augmentation is the second most common cosmetic surgical procedure in Italy, according to statistics released by the Italian Association of Aesthetic Plastic Surgery in 2016[1]. This procedure is still gaining in interest and certainly represents a large portion of aesthetic surgery practice with more than 33.000 procedures. However, this operation is associated with significant pain and discomfort in the immediate postoperative period and may cause unwanted side effects, including headache, nausea, vomiting, constipation, altered mental status, sleep disturbance, and respiratory depression[2]. Severe breast pain occurs in most of patients and may continue for at least 1 to 3 weeks. Operative trauma, with blood diffusion into tissues, injury and spasm of the pectoralis major muscle, and intercostal nerve lesions have been alluded to as important cause of pain and discomfort in patients who have received silicone prostheses implanted into the subpectoral space[3].

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Many Authors[4-5-6] in the literature have published about the level of pain and discomfort in breast augmentation in their experience. Despite mounting evidence that classical technique in breast augmentation may actually have higher level of pain and discomfort rates, many surgeons are reluctant to change their practice to adopting a procedure that can lower or totally eliminate these negative side effects.

In November 2015, after more than a decade of work revisiting all of the processes, instruments, materials and techniques of cosmetic surgery, the senior Author presented one lecture, in one of the most innovative professional congress in cosmetic medicine and surgery of the United Arab Emirates, the Abu Dhabi International Conference & Exhibition in Dermatology & Aesthetics. This lecture represented the Bloodless Atraumatic Technique (BAT), one confirmed methodology that enabled 95% of 310 consecutive patients to resume full normal activities within 48hours of their breast augmentation with evident reduction in postoperative pain level and discomfort. The Authors first reported in the literature the use of the Bloodless Atraumatic Technique (BAT)[7], since then many have been interested in comparisons and outcomes with this technique. Tebbetts have noted consistent decreased pain level rates after converting from classical breast augmentation to atraumatic technique[8-9].

Given the mounting evidence that the use of BAT is predictable, safe and could reduce our pain level and discomfort rate, we decided to implement the procedure in all breast augmentations in our private practice in Milan, Italy. In this study we examine our single accredited outpatient surgery center experience transitioning from the use of classical breast augmentation technique to the use of BAT breast surgery.

## METHODS

We performed a retrospective analysis of all breast augmentations cases performed over a 5-year period from January 2012 to July 2017 by multiple surgeons in the practice. Monolateral and Secondary breast augmentations, were excluded from this study. It should be noted that during the study surgeons adopted the BAT technique; however, one continued the use of classical techniques. During the 5-year period, there were 411 breast augmentations performed by three attending surgeons. There was a gradual transition from the two techniques beginning in 2011 when one of the surgeons began utilizing the BAT technique. Over the course of the next three years, the overwhelming majority of the breast augmentations being performed in the practice were utilizing the BAT. In the final study a total of 405 patients were included. Overall, there were 310 patients with BAT and 95 with Traditional Breast Augmentation (TBA). Six patients from the conventional breast augmentation group were removed from the statistical analysis after their charts were found to lack data about follow up or postoperative care.

Patient demographic information was obtained from the chart, including age, and body mass index (BMI). The operative report was used to determine whether BAT was utilized vs TBA technique. Postoperative follow-up length and side effects as level of pain and discomfort, bruising and swelling were noted. Also complications including hematoma, infection, seroma, hypertrophic scar, need for revision surgery, and pulmonary embolism/deep venous thrombosis (PE/DVT) were observed.

The study was conducted in accordance with the guidelines of the Declaration of Helsinki and prior written consent was obtained from all of the patients who participated in this study.

### *How to achieve a BAT Breast Augmentation*

In a consistent manner delivering BAT breast augmentation results need that surgeons read with attention, practice cautiously, and implement carefully all of the procedures that have been described and identified[10-11]. Many surgeons implement and adopt only some of the methods, but prefer not to follow the entire process described. Evidence shows that not implementing all of the identified processes results in a failure to deliver this low level of pain and discomfort rate.

### *Patients, Surgeons and Surgical Staff*

Patients play an important role in achieving BAT Breast Augmentation recovery. We always provide detailed educational material. Patients must understand the entire method, and what their role and responsibilities are toward making it happen. The surgeon must control all the surgical theatre and operate in a facility where is assured that he can uniformly and repeatedly expect to work with the same personnel. The surgical staff including anesthesiologists, nurses and all recovery personnel, must follow prescribed and precise protocols in a severe manner. Of paramount importance the constant and permanent training of the surgeon alone and with his personal team. Each member of the surgical staff has his own specific role and defined movements in order to reach the most efficient surgical method.

### *Surgical processes and instrumentations*

Surgical techniques and instrumentations have been refined and selected to reduce all kind of trauma to tissues, and to potentially eliminate bleeding and blood diffusion into tissues, causing pain, swelling and inflammation and increasing risks of complications. Implementing detailed surgical methods and instrumentations allow to reach a real and concrete hemostasis. The surgeon has the possibility to create the pocket while preventing over 95% of bleeding that would normally occur with traditional strategies[12] (No Blood Technique).

The 4.0 MHz generators (Radiofrequency Electrosurgical Systems - Ellman International Hicksville, NY - USA), at a frequency 7-10 times higher than standard generators, provide surgical precision and controlled hemostasis. This advanced technology produces minimal lateral thermal spread, reducing the injury to surrounding tissue. The clinical benefits are minimal post-operative pain, low inflammation rate, enhanced healing and long lasting swelling rate, all highly desirable features for cosmetic surgery. By preventing bleeding before it ever occurs using the 4.0 MHz generator and specially designed electrocautery forceps (micro monopolar forceps, Ellman International Hicksville, NY - USA) to create the pocket, blood does not diffuse into adjacent tissues and cause less pain and inflammation that are common with older techniques. Implementing detailed surgical techniques and instrumentation allow dramatic reduction of mechanical and thermal trauma to tissues, with lower pain level and discomfort

and swelling (No Touch Technique) as described by Tebbetts in his papers. Specific surgical instruments (blunt retractor - ASSI - Accurate Surgical & Scientific Instrument - Westbury, NY - USA) and equipments (shadow less head lamp - Dr. Kim - #213, Ace Gwangmyeong Tower, 108 Haanro, Gwangmyeongsi, Gyeonggido, 423-798 Korea) allow surgeons to obtain optimal visualization while minimizing pressure and trauma to tissues, and to create the pocket with much less trauma compared to blunt or sharp dissection techniques used by many surgeons, in traditional breast surgery, that rip and tear gland, muscles and subcutaneous tissues with a finger, a blunt instrument, a lancet or a scissor and cause much more bleeding[13].

***Protocols for patient recovery***

Defined protocols have been created for patient recovery both in the surgery facility and after returning home. The favorable reduction in tissue trauma and bleeding using the processes, the techniques and the instruments described results in decrease in pain, swelling and bruising, and return to normal activities within 48 hours. Patients do not have to tolerate the inconvenience of many commonly used postoperative devices, compressive bandages, drain, pain pumps, and rigid instructions to remain immobile and restrict activities[4-6].

***Anesthesia protocols***

Only rigid adherence to fixed and defined technique of local anesthesia, employing materials and instruments selected appositely and developed to reduce mechanical trauma (i.e. cannula instead of needle), sedation and post-anesthesia recovery protocols that minimize the amount of medicines a patient receive and reduce the possibility of venous thromboembolism, allow BAT breast augmentation[14]. These protocols require the anesthesiologists to strictly follow the guidelines and surgeons to be able to perform breast augmentations in 60 minutes or less eliminating useless, unproductive, time-wasting steps and decision making in the operating theatre[11].

Local anesthetic injection with percutaneous blunt cannulae is likely one of the most important development in local anesthesia injection technique. Fine 22 gauge cannulae (lenght 10 cm) introduced through skin perforation created by 21 gauge special needles (Softfil - France) allow to infiltrate the entire area of the breast through three needle holes in the inframammary crease with the greatly added benefits of minimal pain and more important less bruising. The negligible downsides of blunt cannulae are the higher cost of cannulae versus sharp needles and the technical maneuver of getting the cannula in a needle hole[15-16-17].

***Surgical technique***

The breast augmentations were performed as an outpatient procedure with the patient under local anesthesia and minimal sedation. Before the infiltration the patients were marked, both in the BAT and TBA, delimiting the perfect extent of the submuscular dual plane pocket: two centimeters from the midline, inframammary crease, anterior pillar of the armpit, superior border the same distance from the nipple as from the inframammary crease. A total of 10 mg of diazepam has been given intramuscularly before preparation and draping. This provided a comfortable relaxation, with low diminished consciousness. Infiltration with local anesthesia has been provided with a 22-gauge blunt spinal needle in BAT and with a 22-gauge sharp spinal needle in traditional breast augmentation, by using a diluted solution (500 ml sodium chloride) of 2%lidocaine (30 ml), 0,5mg adrenaline, and 5 ml of sodium bicarbonate 10mEq (Table 1).

**Table 1** Anesthetic Infiltration Solution

| Anesthetic Infiltration Solution |
|---|
| 30 ml of 2% lidocaine solution |
| 500 ml of 0.9% sodium chloride solution |
| 0.5 mg of adrenalin |
| 5ml of sodium bicarbonate 10mEq |

An average of 200 ml of this infiltration solution has been used on each breast. At least 15 minutes was allowed for adequate blanching of the infiltrated area, and in both traditional and BAT breast augmentation an inferior periareolar incision has been always performed, using a scalpel in the TBA and a Radiofrequency Electrosurgical System (4.0 MHz generators - Ellman International Hicksville, NY - USA) in the BAT. After dissecting cautiously the gland in the lower pole of the breast with the needlepoint electrocautery pencil in an inferior oblique way and having reached the muscle the dual plane pocket was created. Only in the BAT the pocket has been performed for the first 3 centimeters with the needlepoint electrocautery pencil; for the rest of the pocket has been performed with micro monopolar forceps in order to reduce any trauma and any bleeding[8-9]. In the traditional technique the pocket has been created with blunt or sharp dissection, with a finger, a blunt instrument, a lancet or a scissor, with ripping and tearing of the gland and muscular tissues and consequently more trauma and more bleeding.

In the BAT breast augmentation was spent more time intraoperatively on hemostasis than in classical technique. While it may seem obvious, the greater the diligence in intraoperative hemostasis, the lower the postoperative pain level and discomfort, as the hematoma rate. As stressed before in the BAT breast augmentation surgical technique and instrumentations have been refined and selected to reduce all kind of trauma to tissues, and to potentially eliminate bleeding and blood diffusion into tissues. Implementing detailed surgical methods and instrumentations allowed to reach a real and concrete hemostasis (No Blood Technique). Of paramount importance in the BAT the constant rinsing of the surgical field with saline water in order to eliminate blood traces, microorganisms and to reduce the local temperature after performing hemostasis, thus decreasing the possibility of inflammation and long lasting swelling. After inserting the implant in the standard fashion, the gland and the skin were sutured with no difference between the BAT and classical technique with three stitches in the gland, three stitches in the deep dermis with 3-0 Monocril and a uninterrupted intradermal sutures of 4-0 Monocril. Sometimes a littleskin eversion appeared along the inferior periareolar incision in order to reduce the tension of the skin edges. The patients were informed preoperatively about the possibility of these small defects and about their spontaneous disappearance within 2 months. Ice cooling was always applied for 2 hours after the procedure, and no compressive dressing was given to the patients only in the BAT breast augmentation. The patients could leave the office 4 hours after surgery. The dressings of

the TBA group were removed after two days, and the patients could shower and wash from then on. In the BAT group the patients could shower the same day of the surgery. Oral antibiotics and common pain medication (paracetamol 1000 mg twice a day) were prescribed.

## RESULTS

The demographics (Table 1) of the groups showed similar age with a mean BAT patient age of 28.5 years (range 19-54 years) and a mean TBA patient of 30.5 years (range 20-49 years). There were also similarities in mean BMI BAT 21 (range 19-23) and in mean BMI TBA 21.5 (range 20-23).

Average follow-up time BAT was 24 months (range 12 to 60 months) and TBA was 22 months (range 12 to 54 months).

**Table 2** Patient Demographics

| | BAT | TBA |
|---|---|---|
| Number of Patients | 310 | 95 |
| Mean Age (years) | 28.5 years (range 19-54 years) | 30.5 years (range 20-49 years) |
| Mean BMI (Kg/m$^2$) | 21 (range 19-23) | 21.5 (range 20-23) |
| Average follow-up time | 24 months (range 12-60) | 22 (range 12-54) |

Nine main end points were examined in the BAT vs TBA groups. These included pain level and discomfort, bruising, swelling, rate of hematoma, infection, seroma, hypertrophic scar, need for revision surgery, and pulmonary embolism/deep venous thrombosis (Table 2).

The patient's assessment of breast pain was graded on a five-point scale as follows: serious pain, intense pain, moderate pain, light pain and no pain.

Four of the most interesting findings were a significantly decreased pain level and discomfort, bruising, swelling and hematoma in the BAT group (310 patients) where no pain occurred in 17.7%, light pain in 77.4%, moderate pain in 4.8%, intense or serious pain in 0%. Whereas serious pain occurred in the TBA group (95 patients) in 13.6%, intense pain in 73.6%, moderate pain in 6.3%, light or no pain in 0%.

**Table 3** Pain Level Rates

| | BAT | TBA |
|---|---|---|
| Number of Patients | 310 | 102 |
| No Pain | 55 (17.7%) | 0 (0%) |
| Light Pain | 240 (77.4%) | 0 (0%) |
| Moderate Pain | 15 (4.8%) | 6 (6.3%) |
| Intense Pain | 0 (0%) | 70 (73.6%) |
| Serious Pain | 0 (0%) | 13 (13.6%) |

We found in the BAT group that bruising occurred in 10.6% vs 93.6% in the TBA group, swelling in 12.5% vs 89.4%, and hematoma in 0% vs 10.5%.

**Table 4** Complication Rates for the Different Groups

| | BAT | TBA |
|---|---|---|
| Number of Patients | 310 | 95 |
| Bruising | 33 (10.6%) | 89 (93.6%) |
| Swelling | 39 (12.5%) | 85 (89.4%) |
| Hematoma | 0 (0%) | 10 (10.5%) |
| Seroma | 0 (0%) | 3 (3.15%) |
| Infection | 0 (0%) | 0 (0%) |
| Hypertrophic Scar | 0 (0%) | 0 (0%) |
| Need for Revision Surgery | 1 (0.32%) | 1 (1.52%) |
| Pulmonary Embolism/DVT | 0 (0%) | 0 (0%) |

Other sensitive element was the decrease rate of seroma with 0% in the BAT patients and 3.15% in the TBA group.

Infection, hypertrophic scar, need for revision surgery and pulmonary embolism were similar between groups and were not significant

## DISCUSSION

Pain level and discomfort in the Bloodless Atraumatic Technique Breast Augmentation Group were much lighter than that in the Traditional Breast Augmentation Group, which demonstrated that BAT significantly reduced postoperative pain and discomfort, without complications for the patients who received silicone prostheses implanted into subpectoral space for cosmetic breast augmentation.

Several key articles have presented support for the Bloodless Atraumatic Technique, including the Tebbetts and Gryskiewiz papers. We have also reported a dramatic decrease in the rate of hematoma from 7.24% to 0% with the use of BAT in our study of 2016.

Pain and discomfort may be linked to several factors in breast augmentation[2-4-18-19]. Operative trauma, bleeding and blood diffusion into tissues, injury and spasm of the pectoralis major muscle, causing swelling, bruising and inflammation, have been alluded to as important causes of pain and discomfort in patients who have received silicone prostheses implanted into the subpectoral space[20]. Implementing itemized surgical methods and instrumentations, as realized in BAT, allow to reach not only a real and concrete hemostasis, it means the surgeon has the possibility to create the pocket for the implants while preventing bleeding before it ever occurs (No Blood Technique) but it allows dramatic reduction of mechanical and thermal lesions to tissues (No Touch Technique). Specific surgical instruments and equipments permit surgeons to obtain optimal visualization while minimizing pressure and trauma to tissues, and to create the plane of dissection with much less trauma compared to blunt or sharp dissection techniques that rip and tear skin, glandular and muscular tissues with a finger, a blunt instrument, a lancet or a scissor and cause much more bleeding[13]. Another contributing factor may be the time We spent intraoperatively on hemostasis, longer in the Bloodless Atraumatic Technique than in Traditional Breast Augmentation. As we have highlighted before while it may seem obvious, the greater the diligence in intraoperative hemostasis, the lower the postoperative pain level and discomfort, as the hematoma rate.

Bloodless Atraumatic Technique breast augmentation offers also objective improvements in complications, reoperation rates, recovery and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon.

Obvious limitations in our study include the retrospective nature as well as having multiple surgeons involved. Since it is retrospective there could have been bias in the one surgeon who transitioned from TBA to BAT in choosing low risk patients at the beginning of his experience and thus skewing the results in favor of the BAT. However, having multiple surgeons adds variables which we did not examine but it did

also add some constants as 2 surgeons treated every patient with BAT and one surgeon treated every patient with TBA. In addition, apart from the subpectoral space, the retromammary space is another place where silicone prostheses have been implanted for cosmetic breast augmentation. Because all of the patients included in this study had received silicone prostheses implanted into the subpectoral space, these findings cannot ascertain whether BAT reduced breast pain for the patients who had silicone prostheses implanted into the retromammary space.

## CONCLUSIONS

The use of Bloodless Atraumatic Technique significantly decreased the pain level and discomfort in our practice. Unfortunately, there is no level one evidence that proves that the use of BAT has a lower pain rate than using Traditional Breast Augmentation procedure. A well powered, thus likely a multicenter, randomized controlled study is needed in order to definitively lay this question to rest. However, our experience adds to the mounting evidence that surgeons should consider using the BAT and reduce classical technique.

Bloodless Atraumatic Technique Breast Augmentation offers objective improvements in recovery, complications, reoperation rates, and the overall patient experience, but do not happenin a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon. Offering this redelineated level of patient journey needs that surgeons study all the entire method and strictly follow the processes and techniques.

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