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Continuous Epidural Anesthesia with Elastomeric Infusion Pump in Augmentation Mammoplasty

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ABSTRACT

Introduction: Continuous epidural anesthesia and analgesia, in addition to providing adequate control of postoperative pain, provide benefits such as decreased risk of thrombosis and intraoperative bleeding.

Objective: To describe the behavior and results of the application of continuous epidural anesthesia by means of an elastomeric infusion pump in patients undergoing augmentation mammoplasty.

Methods: An observational, descriptive, prospective, longitudinal study was conducted at Hermanos Ameijeiras Clinical Surgical Hospital, between February 2014 and February 2016.

Results: 72.8 % were patients 20-29 years old, 57.6 % were ASA I, and 78.3 % had normal weight. 50 % were operated for mammary hypoplasia. Heart rate, as well as systolic and diastolic blood pressure decreased 5 minutes after the technique was applied. The average pain was less than 3 in all the moments evaluated. The immediate complications were minimal and mild. 85.9% described the technique as good.

Conclusions: The behavior and results of the application of continuous epidural anesthesia using an elastomeric infusion pump in the augmentation mammoplasty was stable and safe. There were significant differences in the behavior of intraoperative hemodynamic variables and pain intensity, which was slight in all its measurements. The mediate complications were scarce and not complex. More than three quarters of the patients evaluated, based on the degree of satisfaction, the effectiveness of the anesthetic technique as good for this type of surgical procedure.

INTRODUCTION

The mammary gland is an important part of female morphology and its development constitutes one of the most outstanding characteristics of sexual differences. Throughout history, it is a source of attraction that repeatedly appears in art testimonies as an element loaded with religious, anthropological, cultural or aesthetic meaning. (1)

The aesthetic procedures of the breasts, both for their reduction and for augmentation, are not only aimed at achieving greater beautification of women, but respond to a concept closely linked to those of health-disease, since those patients who do not if they are satisfied with the size of their breasts, they may suffer serious psychological, sexual and social disorders. (2)

The increase in volume of the breast is achieved by implanting a prosthesis behind the patient's mammary gland (except in cases of reconstruction). As in other cosmetic surgical procedures, improvement may be very important, but it does not always meet the expectation of what the patient considers to be the "ideal" of aesthetic perfection, nor will it cause other people to think differently. (3-5)

Currently, as implants improve their quality and characteristics, new surgical techniques are being developed to minimize complications. (6-10)

The aesthetic surgical breast procedure is generally performed under general anesthesia, with the benefits that include the use of drugs that allow for rapid awakening and changes in anesthetic depth; however, it has the drawback of immediate postoperative pain, especially in procedures that include retropectoral mastoplasty. (8-12)

Considering the increasing demand for plastic surgery procedures, as well as the rise and resurgence of neuroaxial anesthesia in anesthetic practice, in some specialized centers continuous thoracic epidural anesthesia is used, by introducing a catheter into the Epidural space to perform reducing or augmentation mastoplasties. (1,3,5,13-23)

The objective of this article is to describe the behavior and results of the application of continuous epidural anesthesia using an elastomeric infusion pump in patients undergoing augmentation mammoplasty.

METHODS

A longitudinal prospective descriptive observational study was carried out, with the objective of describing the behavior and results of the application of continuous epidural anesthesia using an elastomeric infusion pump in patients undergoing augmentation mammoplasty, at the "Hermanos Ameijeiras" Surgical Clinical Hospital in the period from February 2014 to February 2016.

The universe was made up of all the patients who underwent augmentation mammoplasty at the "Hermanos Ameijeiras" Surgical Clinical Hospital.

The inclusion criteria included patients between 20 and 49 years old, ASA I-II, who underwent elective surgery and who voluntarily accept the signed informed consent. While the exclusion included patients undergoing general anesthesia, with congenital or acquired coagulopathy and platelet antiaggregation, a known allergy to local anesthetics.

The exit criteria were based on failure of the anesthetic technique, incomplete block (hemiblock, checkerboard block), and intraoperative complications that required conversion to general anesthesia.

The sample was made up of 92 patients who underwent augmentation mammoplasty with continuous thoracic epidural technique using an elastomeric infusion pump, at the "Hermanos Ameijeiras" Surgical Clinical Hospital from February 2014 to February 2016.

In general terms, the technique does not differ from that described for lumbar epidural block, except that less resistance is found to advance the needle to the yellow ligament, which in turn offers less resistance than in the lumbar space. For the location of the epidural space, the technique of loss of resistance syringe or the "hanging drop" technique can be used interchangeably. The latter seems especially useful in the case of high dorsal punctures (D1 to D4), since it provides greater control in the advancement of the needle when using both hands and, at this level, the greater negative pressure of the epidural space grants greater reliability to technique.

The patients included in the investigation were previously checked, they underwent an adequate preoperative evaluation, which included an anamnesis, physical examination and paraclinical examination check to determine their functional status and classify them according to the ASA scale.

On the day of the surgical procedure, they were transferred to the preoperative room and the vital signs were checked and recorded: systolic, diastolic and mean blood pressure, heart and respiratory rates. Subsequently, a peripheral vein with a 14 or 16 G intravenous cannula was canalized in the left arm and preoperative hydration was administered with 0.9% saline at the rate of 10 mL / kg of weight. Subsequently, pre-anesthetic medication was administered with midazolam at a rate of 0.04 mg / Kg, ondasetron 4 mg, and the indicated antimicrobial prophylaxis, all by slow intravenous route and diluted. They were then transferred to the operating room where the surveillance and monitoring devices were placed on the operating table. Basic monitoring of the patients was performed, which included heart rate (HR), hemoglobin oxygen saturation (SpO2), non-invasive blood pressure (NIBP) and electrocardiography (EKG), for which a Nihon Kodhen BSM model monitor was used. 2303K.

All patients underwent an epidural block in a sitting position, with the chin touching the chest with the hands on the legs, with a slight flexion of the trunk, and with an assistant in front, then asepsis and antisepsis were performed with washing. with soap and water, after disinfection with povidone iodine and alcohol at 76 %, after this, the intervertebral space T4 was identified by the line that joins both spines of the scapulae and 2 mL of lidocaine 1% was infiltrated subcutaneously , with a 50 mm long 20 G gauge needle, forming a wheal at the puncture site, followed by infiltration into the supra and interspinous ligaments. Once the blockade had been achieved, a 100 mm long Nº 18 Huber tip Tuohy needle was inserted halfway to the interspinous ligament, which was confirmed by the needle's firmness, the mandrel was removed and the needle was advanced to locate the epidural space by the technique of loss of resistance with water/ air. When the epidural space was located, an epidural catheter No. 18 was inserted, and 3 cm was left in that space, the test dose consisting of 3 mL of 2% lidocaine with epinephrine 1:200.000 was administered to rule out intravascular or subarachnoid injection.

The patient was placed in the supine position and the local anesthetic dose (8 mL of 0.5% bupivacaine plus 100 µg fentanyl) was administered through the epidural catheter, with the aim of blocking the T2 to T8 metameric .

The injection of the dose was made at a rate of 1 mL / sec. If the necessary dermatomes were not reached after the latency period, a new dose equivalent to 25 % of the initial dose was administered.

After the latency period 5 to 10 min, the anesthetic level reached was explored, first exploring the thermal sensation, and then pain. A maintenance infusion of 0.125 % bupivacaine plus 2 µg / mL fentanyl was started at a rate of 5 mL / h through a Baxter elastomeric infusion pump, model 2C1811K.

Ephedrine was used at an initial dose of 5 mg and if necessary, the dose was raised to 10 mg EV when significant arterial hypotension appeared (TAS <90 mmHg). In the case of bradycardia (HR <50 beats / min), a bolus of 1 mg EV of atropine was administered.

Once the surgical act was completed, the patients were transferred to the post-anesthesia care room where they continued with the analgesic infusion to control postoperative pain for 24 hours.

During the intraoperative period, the variables HR, SBP and DBP at baseline were measured every 5 min until 15 min, and from this moment every 15 min until the end of the surgical procedure.

The presence and type of complications were evaluated until discharge from the hospital (24 h), except for post-dural puncture headache (PDPH), which was reported by the surgeon and verified by the anesthesiologist.

The Verbal Numerical Scale (VNS) was used to assess the intensity of postoperative pain, which was explained to the patients in the pre-anesthetic consultation and where 0 meant absence of pain and 10 the maximum pain imaginable by the patient. It was measured on arrival at the recovery room, at 3, 6 and 12 h and at the discharge of the patients.

The quality of anesthesia was evaluated by the presence of complications and moderate to severe postoperative pain, and it was classified as: good, when the patient did not present complications or moderate to severe postoperative pain; Regular, when the patient presented complications or moderate to severe postoperative pain and poor, when the patient presented complications and moderate to severe postoperative pain.

No intermediate statistical analyzes were performed, only the one corresponding to the end of the treatment. Descriptive statistics such as the arithmetic mean and standard deviation were used to summarize the information of the study sample for all the continuous and discrete quantitative variables that were analyzed.

For all the qualitative variables, the percentages of each group were calculated and pie and multiple or composite bar graphs were made.

The proportions of responses at the end of the treatment were estimated and compared using the Chi-squared test to assess the significant difference between the qualitative variables and the Student's t-test to assess significant differences in the quantitative variables. The level of significance that was used was 5 % (α = 0.05).

RESULTS

Regarding the sociodemographic variables of the studied patients, 72.8 % (n = 67) were between 20 and 29 years old, 20.7 % (n = 19) between 30 and 39 years old, and 6.5 % (n = 6) between 40 and 49 years, for an average of 26.11 (8.60) years and a range between 21 and 43 years. According to the physical state of the ASA, 53 cases were ASA I (57.6 %) and 39 (42.4 %) ASA II. Nutritional assessment showed that 72 (78.3 %) women were normal weight and 20 (21.7 %) overweight, with a mean of 23.46 (6.7) Kg / m2, according to BMI with a range between 21 , 4 and 28.9 Kg / m2.

Surgical diagnosis was anisomastia in 32 patients, which represented 34.8 %, breast hypoplasia in 46 for 50 %, and breast ptosis in the remaining 14 (15.2 %).

The highest value of the average heart rate was recorded before applying the anesthetic technique (88.89 ± 7.26 beats / min) and a drop in this parameter was observed 5 min after performing the procedure (74.61 ± 8.32 beats / min). From that moment on, the average values of heart rate remained relatively stable in the rest of the intraoperative period. There were significant differences between all the heart rate values (p <0.05).

The highest mean systolic blood pressure value was recorded before applying the anesthetic technique (130.39 ± 13.64 mmHg) and a drop in this parameter was observed 5 min after performing the procedure (117.87 ± 12 , 54 mmHg). Then the mean values of the systolic blood pressure remained relatively stable in the rest of the intraoperative period. There were significant differences between all the systolic blood pressure values (p <0.05).

The highest value of the average diastolic blood pressure was recorded before applying the anesthetic technique (80.50 ± 7.00 mmHg) and a drop in this parameter was observed 5 min after performing the procedure (71.86 ± 8 0.05 mmHg). Then the mean values of the diastolic blood pressure remained relatively stable in the rest of the intraoperative period. There were significant differences between all the diastolic blood pressure values (p <0.05).

Pain intensity had a mean score according to the verbal numerical scale (ENV) of 0.26 points when patients arrived at the post-anesthesia care unit (UCPA), 2.01 points at 3 h, 2.34 points at 6 a.m., 2.17 points at 12 p.m. and 1.71 points at discharge (table 1)

Postoperative pain	X +/- SD	Median	Minimum	Maximum
PACU	0.26	0.00	0	1
3 hours	2.01	2.00	0	3
6 hours	2.34	2.00	1	4
12 hours	2.17	2.00	1	3
Hospital discharge	1.71	1.00	0	3

Table 1. Distribution of Patients According to Post-operative Pain Intensity.

X= mean, SD= standard derivation; PACU: post-anesthesia care unit. p= 0.463

A total of 39 immediate complications occurred, of which 12 (13 %) were hypotension, 4 (4.3 %) hypertension and nausea, respectively, 9 (9.8%) bradycardia, 3 (3.3 %) tachycardia, 6 (6.5 %) tremors and 1 (1 %) vomiting (Table 2).

Complications *	Frequencies Nº	Frequencies %
Hypotension	12	13.0
Hypertension	4	4.3
Bradycardia	9	9.8
Tachycardia	3	3.3
Tremors	6	6.5
Nausea	4	4.3
Vomiting	1	1.0
High anesthetic level	-	-

Table 2. immediate complications presented by patients.

* more than one complication was in the same patient.

Table 3 presents a total of six mediate complications. These were five (5.4 %) back pain and one (1 %) post-dural puncture headache (PDPH)

Complications	Frequencies Nº	Frequencies %
post-dural puncture headache (PDPH)	1	1.0
Back pain	5	5.4
Urinary retention	-	-
Cateter migration	-	-
Epidural hematoma	-	-

Table 3. Mediated complications presented by the patients.

A total of 79 patients, representing 85.9%, evaluated anesthesia as good, the remaining 13 (14.1 %) rated it as acceptable. It should be noted that in no case was the quality of anesthesia poor (Table 4).

Quality of anesthesia	Frequencies Nº	Frequencies %
Good	79	85.9
Acceptable	13	14.1
Poor	-	-
Total	92	100

Table 4. distribution of patients according to quality of anesthesia.

DISCUSSION

Currently, cosmetic surgical breast procedures are widely accepted by the general population, a situation that requires updating and bringing changes in anesthetic conduction in these patients, (24-30) although the evidence published in the literature has not defined the impact on the Morbidity and mortality compared to other techniques, economic cost, analgesic quality, and patient satisfaction. (31-35) Thoracic epidural anesthesia is considered an excellent alternative and contributes to providing adequate quality of care. (31-35)

In the sociodemographic variables of the studied sample, the age group between 20 and 29 years prevailed with a mean of 26.11 years (8.60) and a range between 21 and 43 years. This could be explained because they are the ages that correspond, in many of

them, with the consequent increase in their concern for the care of their physical appearance, reasons for which they agree to aesthetic surgical interventions of all kinds. More than half of the patients were ASA I. In terms of nutritional assessment, normal-weight women predominated, which are the patients who mostly perform this procedure.

Parets Correa and Gonzalez Calcines, (27) Colque and Eisemann, (28) Sperhacke and others, (29) Maxwell and Gabriel (30) and others (32-40) showed results similar to those of this series in terms of age, weight, fitness is concerned.

Thoracic epidural anesthesia has been used as an anesthetic technique in cosmetic surgery for both breast augmentation and reduction, which is why in the literature the different studies change in relation to this variable. (31-36) In this investigation, the most frequent surgical diagnosis was breast hypoplasia with 50% of cases.

The decrease in heart rate was as expected and constitutes a physiological cardiovascular effect. Normally, during the neuroaxis block, the heart rate can decrease at any time from thoracic epidural anesthesia, its mechanisms are multi-causal and several its predisposing factors; However, the most frequent is that this decrease occurs as a consequence of the inhibition of the cardio-accelerator fibers that arise from T1 to T4. Barash (31) stated that the heart rate suffers a significant decrease of 10 to 15 % of the patients treated with neuroaxial block.

Several authors (39.40) described decreases in blood pressure, while others (41-43) reported no significant difference. The clinical question is what level of decrease in blood pressure is accepted after the block.

Ochoa Pell, (26) Sperhacke et al., (28) Álvarez Corredor, (36) Abusabaa et al., (38) and Gultekin et al. (39) used thoracic epidural anesthesia in a group of patients who underwent mammoplasty alone or associated with other surgical procedures, in which the behavior of the hemodynamic variables showed that the values of heart rate and blood pressure (systolic, diastolic and mean) were maintained, decreased during the first hour and the first 15 min after the establishment of the block. respectively to show adequate stability from then until the end of the intervention, results that behaved similarly to those in this study.

Thoracic epidural anesthesia provides superior postoperative analgesia in thoracic or abdominal surgical procedures when compared to parenteral opioids. (40-48) Block and others (42) performed a meta-analysis that included 100 randomized controlled articles that measured efficacy. of epidural analgesia compared to analgesia with parenteral opioids (PO). The authors found that patients in whom epidural anesthesia was administered had significantly better control of postoperative pain in the different groups studied regardless of the surgical site, the place of epidural catheterization and the solution used (local anesthetics with or without opioids. , or opioids alone).

the results are controversial. Aguilar Sanchez (6) published that three patients (3.2 %) underwent surgery with thoracic epidural anesthesia rated the analgesia as regular (satisfactory pain relief) and two of them felt discomfort in the T2 dermatome. Similar results were found by Sundarathiti et al., (43) Manion and Brennan. (47)

In the women who underwent breast surgery under thoracic epidural anesthesia from the Belzarena group (45), when evaluating postoperative pain, no patient presented pain in the recovery room; at 6 h, 17 patients were still without pain and only 3 reported moderate pain. 12 h 18 had no pain and only 2 exhibited moderate pain and at 24 h, pain was absent in the 20 cases of this group, results that resemble those of this study.

Singh et al. (46) evaluated the intensity of radical postmastectomy pain in patients undergoing surgery with thoracic epidural anesthesia. The mean VAS values in the first 24 hours remained below three points and the mean time for the first extra administration of local anesthetic was 8.53 h, results that are consistent with those of this series.

Patient safety is an ever-present concern in all anesthetic procedures performed. (48,49) This, together with the refusal of some patients against the proposal of general anesthesia, (49) suggests a safe procedure to offer to replace this technique.

The complications associated with continuous thoracic epidural published by Sánchez (6) were vomiting, orthostatic hypotension, pruritus, severe pain nausea and inflammation at the puncture site and radicular pain. Similar results were findings by Sperhacke and others, (28) Maxwell and Gabriel, (29) Bolin and others, (32) Block and others, (42) Shah and others, (48) and Sargal and Wason. (49)

The satisfaction of the patients with the anesthetic procedure was evaluated by Soni et al. (37) in a range between 0 and 100 points, the patients operated on under thoracic epidural anesthesia exhibited an average score of 85.83 ± 12.72, which represents a high degree of satisfaction and in most cases agrees with the results of this investigation. The results of Sundarathiti et al., (43) Lahiry et al., (44) Belzarena, (45) and Shah et al. (48) showed satisfaction on the part of the patients with the thoracic epidural technique, mainly given by the relief of postoperative pain. that it produces. These results were superior to those found in this series.

It is concluded that the behavior and results of the application of continuous epidural anesthesia using an elastomeric infusion pump, in patients undergoing augmentation mammoplasty, was stable and safe. There were no significant differences between the anesthetic technique and the sociodemographic variables. There were significant differences in the behavior of intraoperative hemodynamic variables in the studied sample. Pain intensity had a mean score on the mild numerical verbal scale from arrival in the anesthetic recovery room to discharge. Immediate and mediate complications were few and not complex. More than three quarters of the patients evaluated the effectiveness of the anesthetic technique for this type of surgical procedure according to degree of satisfaction as good.

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