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Research Article

Double Trigeminal Territory Block Ultrasound-Guided with blunt cannula for Dacryocystorhinostomy in a Day-Clinic Setting: Evaluation of Two Techniques with Propensity Score Analysis

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Abstract

Lower complete lacrimonasal duct obstruction is a multifactorial disorder that affects tear drainage, ranging from mild symptoms like epiphora to severe cases like dacryocystitis, abscesses, fistulas, or even meningoencephalitis. It typically peaks in early childhood and in the sixth decade of life, particularly in post-menopausal women. Surgical intervention, specifically external dacryocystorhinostomy (ED) with silicone intubation, is considered the gold standard for treatment due to its long-term effectiveness and low recurrence rate. Historically mentioned in the Hammurabi Code (2250 B.C.), the technique has evolved significantly since Toti's description in 1904, incorporating antibiotics and bicanalicular silicone tube intubation. General anesthesia with endotracheal intubation remains common, but loco-regional anesthesia (LRA) is gaining interest for its benefits, including shorter hospitalization, minimal post-operative analgesia, faster recovery, and reduced bleeding. The present study compares two LRA based techniques in a new protocol, named "Double Trigeminal Territory Block". In this retrospective bi-interventional work, 512 cases were enrolled, 218 for group A, and 294, for group B, with the following data retrieved: surgery date, gender, age, initial anesthetic volume bolus (IAV), final anesthetic volume (FAV), anesthetic difference (AD), supplementary sedation required (SS) and analgesic consumption before hospital discharge (AC1), until 24h after (AC2), after 24h until 07 days (AC3) and after 07 days, until 30 days (AC4), time to hospital discharge (HD) and possible adverse events. A logistic regression model was used to calculate the propensity scores, and the summary of the regression model showed that the variables age, FAV, AC1, and HD were significantly associated with the outcome. The odds ratios (OR) for the significant variables were calculated and indicated that increased age and FAV (marked by the technique change) had a higher probability of the outcome and lower results for AC1 and HD, being the significant variables in determining the outcome in the propensity score model. The analyses indicate the importance of these variables in predicting the results for the intervention groups and that the proposed technique changes, despite increasing the initial anesthetic volume, reduced associated morbidity rates, with a drastic reduction in the number and types of anesthetic or analgesic rescue interventions during surgery, associated with an assumed increase in overall comfort level and an average reduction in hospital discharge time. The authors concluded that both "Double Trigeminal Territory Block" protocols were effective, with the one utilized in group B associated with better outcomes and, thus, recommended for practice.

Keywords: *Dacryocystorhinostomy; Local-Anesthesia; Blunt Cannula; Ultrasound; Outpatient*

Abbreviations

ED: External Dacryocystorhinostomy; LRA: Local Regional Anesthesia; GA: General Anesthesia; US: Ultrasound

Introduction

Lower complete lacrimonasal duct obstruction is a multifactorial disorder that affects tear drainage, leading from mild common symptoms, such as epiphora, to more advanced scenarios, like dacryocystitis, abscesses, fistulas, or, in extreme cases, meningoencephalitis [1,2]. This condition may affect a wide population range, typically reaching two epidemiological peaks: first, during early childhood, when it appears congenitally in as many as 6% of all newborns, being a rather benign appearance, as it can resolve spontaneously during the first year, or, escalading, with massages in the lacrimal sac topographic area, to lacrimal pathway probing, and then, if necessary, surgery [3-5]. The second peak of incidence is in the sixth decade of life, especially in post-menopausal women, as a result of inflammatory response in the context of overall metabolic reduction of glandular secretory volume [6,7]. However, in these cases, the most successful option is surgical [13-16]. Among several techniques, external dacryocystorhinostomy (ED) with silicon intubation is still the gold standard, for its better long-term outcomes and lower recurrence rate [17-22].

There are descriptions for treatments of nasolacrimal pathway obstructions in the Hammurabi code, at 2250 B.C., with countless studies even lost during the evolution of medicine [12]. However, since Toti's description of ED, in 1904, the major two modifications were the utilization of antibiotics in the post war period and the bicanalicular silicon tube intubation [8-11]. Although there were variations regarding the anesthetic choice, the most widespread for this surgery, since the modern age of anesthesia and monitorization, is general anesthesia (GA), with endotracheal intubation [14,22]. However, there is growing interest in the use of loco-regional anesthesia (LRA) techniques, even with superficially conscious or awake patients, under day-clinic setting, as the ideal treatment would require the shortest hospitalization time, minimum post-operative analgesic consumption, fast recovery and minimal bleeding rate, which can be better provided by this option [26-39].

The utilization of LRA for ED is well established in adult population and there were emerging studies regarding standardized techniques, which continuously brings answers to unsolved questions and issues that might arise during the research process [23-41]. Previously, the present group used to adopt a protocol that consisted in performing ultrasound (US) guided block, with blunt cannula of five nerve territories (nasocilliary, supra-trochlear, infra-trochlear, supra-orbitary and infra-orbitary) [38]. However, though the results were considered adequate, there was still room for improvement, particularly during the nasal phase of the surgery [38]. Therefore, it was proposed to add one more nerve block territory (great palatine nerve) and change some of the entrance sites of four of the original (supra-trochlear, infra-trochlear, supra-orbitary and infra-orbitary), in a new protocol, called "Double Trigeminal Territory Block".

Materials and Methods

This study was conducted in the archives section of Centro de Estudos e Pesquisas Oculistas Associados (CEPOA), Rio de Janeiro, RJ, Brazil. IRB from the institution stated that this work adhered to the tenets of the Declaration of Helsinki. In March 2024, research was performed in the archives of CEPOA and surgical records of individuals submitted to ED from December 2016 to February 2024 were selected. After verification of eligibility criteria, the cases were suited to evaluation and enrolled in the study, divided by two groups: group A, cases from December 2016 to June 2021 and group B, cases from July 2021 to February 2024. It was utilized as inclusion criteria: complete study records from individuals above 18 years of age, submitted to ED under both same standardized surgical and anesthesia technique, where it could be retrieved the following data: surgery date, gender (F/M), age (years), initial anesthetic volume bolus (IAV - fixed anesthetic volume, in milliliters, infused before testing), final anesthetic volume (FAV - total anesthetic volume infused, in milliliters, by the end of surgery), anesthetic difference (AD - FAV-IAV, in milliliters), supplementary sedation required (SS - YES or NO) and analgesic

consumption before hospital discharge (AC1 - YES or NO), until 24h after (AC2 - YES or NO), after 24h until 07 days (AC3 - YES or NO) and after 07 days, until 30 days (AC4 - YES or NO), time (minutes) to hospital discharge and possible adverse events (Table 1). As exclusion criteria it was utilized: patients under 18 years of age, documented previous allergic reactions to any substance in the protocol, incomplete data and/or individuals whose primary anesthetic choice was GA.

Variable	Group A	Group B
N	218	294
Gender (M/F %)	19/81	16/84
Age (years)	62	64
IAV (mL)	7	9
FAV (mL)	8,4	9
AD (mL)	1,4	0
SS (%)	6,4	0,7
AC1 (%)	1,3	0,7
AC2 (%)	0,4	0,3
AC3 (%)	0	0
AC4 (%)	0	0
HD (min)	35	28

Table 1: *Summarized data extracted from the records, in the first column, the variables, "N" (the number of cases for each group), "Gender (M/F %)" (percentage between the genders "M" = male and "F" = female, in the groups), "Age (years)" (mean age, in years, for the individual cases in each group), "IAV (mL)" (mean initial anesthetic volume bolus, in milliliters, infused before testing, fixed for each group), "FAV (mL)" (mean final anesthetic volume infused, in milliliters, by the end of surgery for each group), "AD (mL)" (mean anesthetic difference - FAV-IAV, in milliliters, for each group), "SS (%)" (percentage of cases where supplementary sedation was required in each group), "AC1 %", "AC2 %", "AC3 %" and "AC4 %" (percentage of cases where there was any analgesic consumption in those given times: AC1 - before hospital discharge, AC2 - until 24h after, AC3 - after 24h until 07 days and AC4 - after 07 days, until 30 days); "HD (min)" (mean time, in minutes, from anesthetic discharge to hospital discharge).*

A logistic regression model was used to calculate the propensity scores between groups A and B, considering the variables. Statistical analyses were performed using R® software (R Core Team, 2023), a language and environment for statistical computing.

Standardized anesthesia techniques in figure 1 and 2. Before engaging in the surgery all submitted patients were asked to sign a consent form stating fully awareness of both anesthetic and surgical processes, with possible side effects and outcomes, along with authorization for publishing the results, with the due protection of their identities. Standardized anesthetic technique as follows: All patients were in supine position. It was utilized sterile 25 G × 38 mm blunt cannula and Mobissom® M4 wireless ultrasound 10 - 14 MHz, set to depth at 2 -5 cm, and a solution of Levobupivacaine 0.75% with hyaluronidase at 15 IU/mL. All patients had a 2% lidocaine and 1:200.000 adrenaline-soaked gauze positioned in the middle nasal meatus.

Double trigeminal block for group A

Nasociliary nerve (subcaruncular approach): Cannula insertion must be medial, above or below the caruncula, but not through, to avoid damage to its structure, and must be inserted with all range; positioning of USG probe is at ocular transversal nine hour (right eye) or three hour (left eye) cut; USG set with low gain image shows, from the most anterior to the most posterior image, ocular globe, rectus medialis sheet and orbitary medial wall. Cannula should be observed in parallel with USG surface, within the orbitary structures, close to eye globe. The anesthetic solution infusion can be observed as a rising hypoechoic structure pushing the surroundings from posterior and medial to the opposite direction. At this site, 2.5 to 4 mL can be infused. Supraorbitary nerve (infraciliary approach): arises from supraorbitary notch, identified by surface anatomy and marked with hydrophilic surgical marker. A small incision made with a 26G x 13,5 mm needle may be necessary to pass the cannula through the skin; USG probe positioning is against superior orbitary crest, with focus on previously made mark of assumed position of supraorbitary notch; USG image shows, from anterior to posterior, skin, subcutaneous tissue and frontal bone periosteum. Supraorbitary notch can be visualized as a continuity fail in the periosteum, where the supraorbitary nerve arises from. Anesthetic solution injection can be visualized as a rising hypoechogenic structure pushing the surroundings from posterior to anterior, and the cannula can be visualized as a hyperechogenic structure. The angulation that the cannula can be inserted may vary from 90 to 180 degrees, depending on hand angulation and USG visualization. At this site, 0.5 to 1.0 mL can be infused. Supratrochlear and infratrochlear nerves (infraciliary approach): after localization of the supero-medial orbitary angle, a small skin incision can be made with a 26G x 13,5 mm needle, and, thereafter, the cannula can be inserted towards the lacrimonasal crest, located profound to the medial cantal tendon; USG probe positioning is towards the medial cantal tendon; USG image, from anterior to posterior, shows skin, subcutaneous tissue, the medial cantal tendon and the caruncula, and periosteum adjacent to the tendon. The tip of the cannula must be located between the tendon and the periosteum. Anesthetic infusion must cause a tissue movement towards both superior and inferior directions from the structures around the medial cantal tendon. At this site, 2.5 to 3.5 mL of anesthetic solution can be infused. Infraorbitary nerve (maxillary transcutaneous approach): arises from infraorbitary foramen, located in the maxillary bone, circa 1 cm bellow the infraorbitary notch; identified by surface anatomy as a plateau and marked with hydrophilic pen. After a small skin incision, made with a 26Gx13,5mm needle, the cannula can be inserted oriented 90 degrees with the incision; USG probe positioning can be made focusing just above the incision, with the tip of the probe slightly turned towards the incision; USG image shows, from anterior to posterior, skin, subcutaneous tissue and maxillary bone periosteum. The infraorbitary foramen can be visualized as a continuity failure in the periosteum, where the infraorbitary nerve arises from. Anesthetic solution injection can be visualized as a rising hypoechogenic structure pushing the surroundings from posterior to anterior, and the cannula can be visualized as a hyperechogenic structure. The angulation that the cannula can be inserted at this point may vary from 90 to 180 degrees, depending on hand angulation and USG visualization, in order to acquire adequate visualization. At this site, 0.5 to 1.5 mL can be infused (Figure 1).

Double trigeminal block for group B

Major palatine nerve (intraoral approach): With the patient's mouth open, a 26G x 13,5 mm sharp needle is inserted through the palatine mucosa in the greater palatine foramen, 5 mm above the superior second molar (or region where it should exist if missing) ipsilateralis to the surgery. At this site, 2 mL of anesthetic solution can be injected; Nasociliary nerve (subcaruncular approach): cannula insertion must be medial, above or below the caruncula, but not through, to avoid damage to its structure, and must be inserted with all range; positioning of USG probe is at ocular transversal nine hour (right eye) or three hour (left eye) cut; USG set with low gain

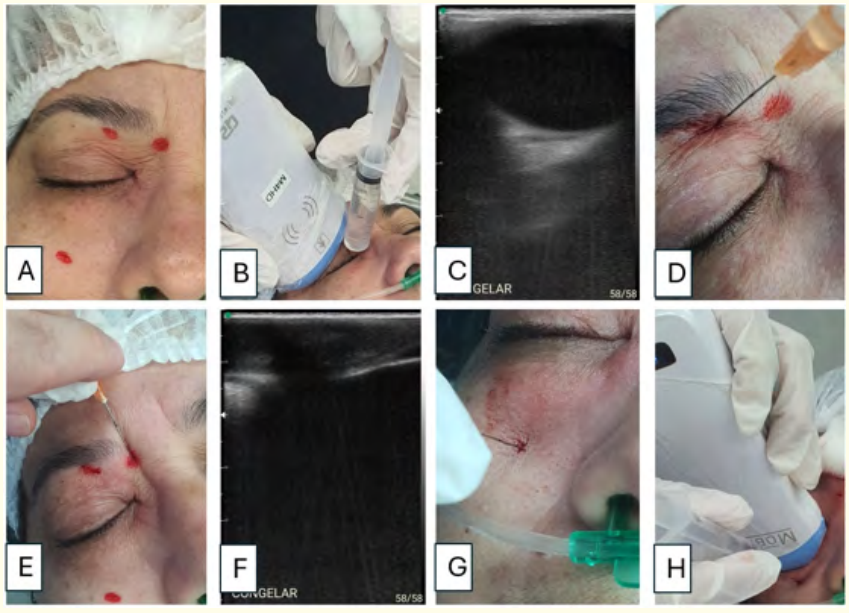

Figure 1: *A: Right eye 03 entrance points marked by hydrophilic red marker; B: USG transducer placed horizontally, positioning at 9 hour transversal cut, for nasociliary block via transcaruncular approach; C: USG view for right eye, transducer placed horizontally, with 9 hour transversal cut. From superior to inferior, right eye globe, immediately below the sclera, anesthetic infusion forming the specific hypoechogenic signal, limited superiorly by medial posterior sclera and inferiorly by the medial rectus muscle sheet. The cannula can be observed as a hyperechogenic horizontal line, near posterior sclera; D: Cannula positioned at entrance point for supraorbital nerve block, via infraciliary approach; E: Cannula positioned at entrance point for both supratrochlear and infratrochlear nerve blocks, via infraciliary approach; USG view, transducer placed vertically over the nasal bone, with the center of crystal over the medial cantus. From superior to inferior, skin, subcutaneous tissue, with hypoechogenic specific signal and bone; G: Cannula positioned at entrance point for infraorbital nerve block, via transcutaneous approach; H: USG transducer placed horizontally over the maxillary bone, at the topography of the infraorbital foramen, and center of the crystal at the inferior orbital margin.*

image shows, from the most anterior to the most posterior image, ocular globe, rectus medialis sheet and orbitary medial wall. Cannula should be observed in parallel with USG surface, within the orbitary structures, close to eye globe. The anesthetic solution infusion can be observed as a rising hypoechoic structure pushing the surroundings from posterior and medial to the opposite direction. At this site, 2.5 to 4 mL can be infused. Supratrochlear and infratrochlear nerves (supraciliary approach): after identification of angle formed with the depressor supercilii muscle and the procerus muscle (USG transducer is placed in the horizontal plane on the middle third of the eyebrow. The depressor supercilii is observed lateral to the procerus muscle beneath the superficial musculo-aponeurotic system), marked with hydrophilic surgical marker, then, a small skin incision can be made with an 26G x 13,5 mm needle, and, thereafter, the cannula can be inserted profound to the muscle, towards the lacrimonasal crest, located profound to the medial cantal tendon; USG probe positioning is towards the medial cantal tendon; USG image, from anterior to posterior, shows skin, subcutaneous tissue, the medial cantal tendon and the caruncula, and periosteum adjacent to the tendon. The tip of the cannula must be located between the tendon and the periosteum. Anesthetic infusion must cause a tissue movement towards both superior and inferior directions from the structures around the medial cantal tendon. At this site, 2.5 to 3.5 mL of anesthetic solution can be infused. Supraorbitary nerve (supraciliary approach): arises from supraorbitary notch, identified by surface anatomy and marked with hydrophilic surgical marker. After performing supra e infratrochlear blocks, the cannula is pulled back to the angle formed with the depressor supercilii muscle and the procerus muscle, and, then, reoriented and reinserted 1 cm parallel to the eyebrow, at the level of the superficial musculo-aponeurotic system; USG probe

positioning is against superior orbitary crest, with focus on previously made mark of assumed position of supraorbitary notch; USG image shows, from anterior to posterior, skin, subcutaneous tissue and frontal bone periosteum. Supraorbitary notch can be visualized as a continuity fail in the periosteum, where the supraorbitary nerve arises from. Anesthetic solution injection can be visualized as a rising hypoechogenic structure pushing the surroundings from posterior to anterior, and the cannula can be visualized as a hyperechogenic structure. At this site, 0.5 to 1.0 mL can be infused. Infraorbitary nerve (intraoral approach): arises from infraorbitary foramen, located in the maxillary bone, circa 1 cm below the infraorbitary notch. With gentle labial exposure of the superior canine (or region where it should exist if missing) ipsilateralis to the surgery, the cannula is inserted directly through the gingival mucosa at the point where there is a division between the maxillary mucosa and the interior site of the labial mucosa, pointed superiorly and 15 to 30° laterally, profound to the orbicularis oris muscle, oriented to the center of maxillary plateau triangle, formed by the levator labii superioris alaeque nasi muscle medially, levator labii superioris muscle laterally and the inferior aspect of the orbicularis oculi muscle superiorly; USG probe positioning can be made focusing on the plateau, parallel to the long axis of the levator labii superioris alaeque nasi muscle, with the cannula with a in plane position; USG image shows, from anterior to posterior, skin, subcutaneous tissue, maxillary bone periosteum, and the inferior aspect of the orbicularis oculi muscle superiorly. The infraorbitary foramen can be visualized as a continuity failure in the periosteum, where the infraorbitary nerve arises from. Anesthetic solution injection can be visualized as a rising hypoechogenic structure pushing the surroundings from posterior to anterior, and the cannula can be visualized as a hyperechogenic structure. The anesthetic solution may push structures superiorly, profound to the orbicularis oculi muscle. At this site, 0.5 to 1.5 mL can be infused (Figure 2).

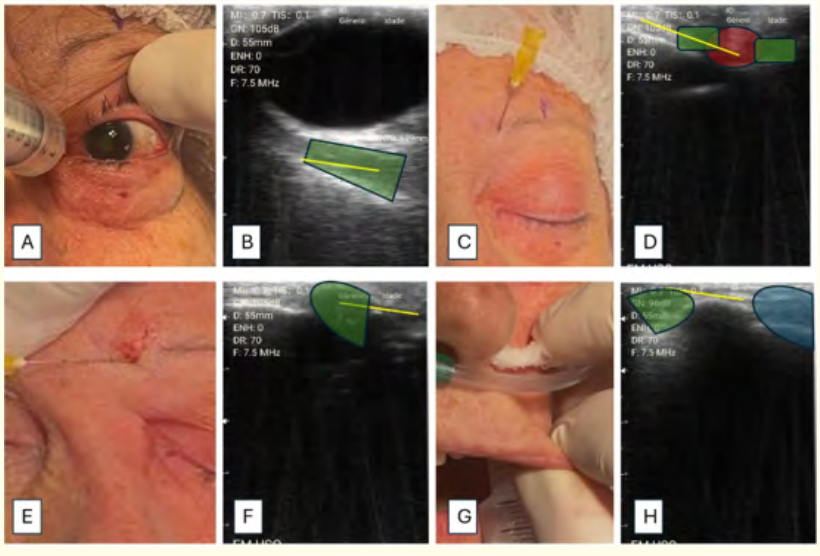

Figure 2: *A: Left nasociliary block subcaruncular approach; B: USG view, transducer placed horizontally, with 3 hour transversal cut. From superior to inferior, left eye globe, immediately below the sclera, in green, anesthetic infusion forming the specific hypoechogenic signal, limited superiorly by medial posterior sclera and inferiorly by the medial rectus muscle sheet. In yellow, the cannula; C: Left infra and supra trochlear nerves via supraciliary approach. Note the tip of the cannula below the medial cantus tendon; D: USG view, transducer placed vertically over the nasal bone, with the center of crystal over the medial cantus. In red, the medial cantus tendon, in green, anesthetic infusion forming the specific hypoechogenic signal, at left being inferior trochlear division, at right being superior trochlear division, in yellow, the cannula below the tendon; E: Left supraorbital nerve block, supraciliary approach; F: USG view, transducer placed horizontally over the frontal bone, at the supraorbital notch topography. In green, anesthetic infusion forming the specific hypoechogenic signal, in yellow, the cannula; G: Left infraorbital nerve block, intraoral approach. Entrance site at the topography of ipsilateral superior canine. H: USG view, transducer placed vertically over the maxillary bone, at the topography of the infraorbital foramen, and center of the crystal at the inferior orbital margin. In green, anesthetic infusion forming the specific hypoechogenic signal, in yellow, the cannula, in blue, left eye globe, in a oblique cut.*

Patients were kept in Richmond Agitation-Sedation Score (RASS) 0 during the procedure. Additional propofol bolus was administrated in case of RASS > 0, and sufentanyl or anesthetic solution in case of pain complaints. Cephalothin 2g and omeprazole 40 mg were administrated intravenously 15 minutes prior to main incision. Post-operative nausea and vomiting (PONV) prophylaxis was given with ondansetron and dexamethasone, and the main hydration regimen was 500 mL crystalloids. Analgesic prescription for postoperative period as "if necessary" was oral ketorolac 10 mg single dose. Hospitalar discharge happened when the patients were fully alert, hemodynamically stable with post-anesthetic scale score of 09 or above.

Results and Discussion

During the research, 588 case files were catalogued, with 76 not matching inclusion criteria, lasting 512 suitable cases, 218 categorized for group A and 294 for group B. Statistical analyses were performed using R software (R Core Team, 2023), a language and environment for statistical computing. IAV was the same for all patients in each group, 7 mL for group A and 9 mL for B. The anesthetic change from group A to B, with a different approach to the blocks, thus lead to a higher final anesthetic volume, however, with lower anesthetic difference, resulting in an understanding of better block efficiency. This, in turn, reduced the rate of supplementary sedation, the average postoperative analgesic consumption, and the average time between discharge at Aldrete 10 and hospital discharge. Therefore, for the purposes of statistical calculations, the outcome (positive) was considered to be the lower incidence of associated morbidity (considered associated morbidity: the combination of factors such as the need for rescue measures like supplemental anesthesia or analgesia due to intraoperative discomfort and increased time to discharge). In table 3, below is a comparison between the two parts of the casuistic. A logistic regression model was used to calculate the propensity scores, considering the variables: gender, age, final anesthetic volume (FAV), analgesic consumption until hospital discharge (AC1), analgesic consumption within 24 hours post-surgery (AC2), and hospital discharge time (HD). The variable initial anesthetic volume (IAV), as it was fixed for each group, caused convergence errors, as did the anesthetic difference (AD), due to the high incidence of results = 0; the variables AC3 and AC4 also caused convergence errors because, despite being dichotomous variables, they showed the same result for all cases; therefore, all four were excluded from the PSA calculation. The summary of the regression model showed that the variables age (coefficient: 0.12530, $p < 0.001$), final anesthetic volume (FAV, coefficient: 0.49368, $p < 0.001$), analgesic consumption until surgical discharge (AC1, coefficient: 5.56008, $p = 0.0119$), and hospital discharge time (HD, coefficient: -0.46892, $p < 0.001$) were significantly associated with the outcome. The variables gender (Gender M, coefficient: -0.40152, $p = 0.2401$) and analgesic consumption within 24 hours post-surgery (AC2, coefficient: 5.34063, $p = 0.9952$) were not statistically significant. The deviance analysis indicated that the variables age ($p = 0.03257$), final anesthetic volume (FAV, $p < 0.001$), analgesic consumption within 24 hours post-surgery (AC2, $p = 0.04561$), and hospital discharge time (HD, $p < 0.001$) are significant in the model. The variables gender ($p = 0.48265$) and analgesic consumption until surgical discharge (AC1, $p = 0.12364$) were not statistically significant. The odds ratios (OR) for the significant variables were calculated. Age had an OR of 1.133 (95% CI: 1.100 - 1.171), indicating that an increase in age is associated with an increased probability of the outcome. Final anesthetic volume (FAV) had an OR of 1.638 (95% CI: 1.365 - 2.013), suggesting that the change in technique, which led to a greater anesthetic volume, is associated with an increased probability of the outcome. Analgesic consumption until surgical discharge (AC1) had an OR of 259.842 (95% CI: 5.978 - 17216.690), and hospital discharge time (HD) had an OR of 0.626 (95% CI: 0.575 - 0.675), indicating that a longer hospital discharge time is associated with a decreased probability of the outcome. In summary, age, final anesthetic volume, analgesic consumption until surgical discharge, and hospital discharge time were significant variables in determining the outcome in the propensity score model. The analyses indicate the importance of these variables in predicting the results for the intervention groups and that the proposed technique changes, despite increasing the initial anesthetic volume, reduced associated morbidity rates, with a drastic reduction in the number and types of anesthetic or analgesic rescue interventions during surgery, associated with an assumed increase in overall comfort level and an average reduction in hospital discharge time. It was also considered that the level of operative discomfort was inversely proportional to age in both groups (Table 2-4).

Variable	Coef.	p value
Age	0,1233	< 0,001
FAV	0,49368	< 0,001
AC1	5,56008	0,0119
HD	-0,46892	< 0,001
Gender (M)	0,40152	0,2401
AC2	5,34063	0,9952

Table 2: *Summary of the propensity score analysis. Statistical analysis performed using R® software (R Core Team, 2023), a language and environment for statistical computing.*

Variable	p value
Age	0,03257
FAV	<0,001
AC2	0,04561
HD	<0,001
Gender	0,48265
AC1	0,12364

Table 3: *ANOVA test for deviance analysis. Statistical analysis performed using R® software (R Core Team, 2023), a language and environment for statistical computing.*

Variable	OR	IC 95%
Age	1,133	1,100 - 1,171
FAV	1,1638	1,365 - 2,013
AC1	259,842	5,978 - 17216,690
HD	0,626	0,575 - 0,675

Table 4: *Odds ratio. Statistical analysis performed using R® software (R Core Team, 2023), a language and environment for statistical computing.*

Conclusion

The studies about the morbid states caused by lower complete lacrimonasal obstructions date from ancient populations [8-12]. However, the comprehension of correct physiology and anatomy only arose in the XVIII century, with concurrent evolution of the management of the disease's processes, which lead to Toti's modern description of External Dacryocystorhinostomy (ED), in 1904 [8]. During the XX century, despite having only two major improvements in the surgical management of ED (antibiotic utilization in the post war period and bicanalicular silicone tube intubation, in the early 1960's), the scientific evolution of anesthesia's machines, drugs, techniques and management had significant impact on the way those patients were treated, which lead to opposite trends over the period, regarding the technique with best outcomes [14,30].

This study brings a comparison of two standardized LRA-based techniques for ED, both in a day-clinic setting, with mild sedation. Both techniques proved to have a safe profile, with high success rates, as there were no cases where it was necessary to switch to GA, and few side effects. This comes to align with the studies, such as Sarda's, in 1961 and Mailer's, in 1982, that long proposed the feasibility of this technique [10,23]. In 1990 and 1991, Dresner's and Benger's studies also provided crucial evidence for the day-clinic setting practices, with Benger's work also bringing a description of blocking the anterior ethmoidal and infraorbitary nerves, with local infiltration in surgical field [41,43]. In 1994, Kratky., *et al*. explored the elderly's frailty context, that could be associated with high risk for GA at that time, and proposed, successfully, that LRA-based technique could be harmless than GA for this population [25]. Similarly, the present study showed that higher age was associated with lower anesthetic requirements.

Regarding the blocking protocol, there were few studies that focused on describing, as Fanning's "medial compartment, lacrimal canal and intranasal anesthesia", Chaume's infraorbitary, infratrochlear, supratrochlear and nasociliary blocks, along with this author previous study, with nasociliary (subacuncular, intraconal approach), supraorbitary, supratrochlear and infratrochlear (both approaches via infraciliary approach) and infraorbitary (transcutaneous) [26,33,38]. Those studies showed similar results regarding feasibility and patient's comfort. Other studies such as McNabb's, Caesar's, Ciftci's, Maheshwari's, Knezevic's and Tawfik's based their protocol on surgical field infiltration [27-29,31,34,35]. Sharp needle was the main instrument for nerve blockage in all studies besides this author's, which was associated with more hemorrhagic events (benign, not statistically significant) as there was no study with ultrasound associated nerve block for this procedure, however, that is positive evidence that the utilization of blunt cannulas alone or with the combination of ultrasonographical guidance is associated with positive outcomes [38,44-53].

The search for one ideal technique which could be universally spread might be utopic, as patients have individual nuances and populational characteristics that interfere with both surgical and anesthetic approach [39]. In some studies, such as Knezevic's, there was no sedation protocol associated, which, in result, all individuals referred mild to moderate pain or discomfort during anesthesia proceedings and during osteotomy [34]. The positive outcome of this study was due to a close collaboration between the surgical and anesthesiologic teams, who worked together to adapt to the patients' needs [34]. Consistent performance by experienced surgeons, even in challenging cases, was achieved through an extensive study and revisitation of anatomy and surgical steps [32]. Correspondingly, the consistency in anesthesia was based on recognizing the surgical timings and adapting to patient requirements [39-43]. Thus, as for some patients, a more awake state during surgery was preferable, less experienced surgeons would benefit from techniques that provided better airway protection, through deeper levels of anesthesia during critical moments with potential blood in the airways, as the procedure could last longer [38,39]. Ulteriorly, though this protocol's success relied on the experience and collaboration of both the surgeon and the anesthesiologist, its feasibility also showed that could be replicable if those aspects were respected, which could also provide shorter hospitalization times, if monitoring scores systems for fast recovery are utilized [54,55]. The retrospective aspect of this analysis, besides not being the higher state of evidence, could bring light to important questions regarding this topic. Larger studies are necessary to improve the understanding of the processes.

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Conflict of Interest

The authors declare no financial interest or any conflict of interest.

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