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ORIGINAL ARTICLE

Surgery

Efficacy of interscalene regional block in shoulder surgery. A single-center observational study.

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Abstract

Introduction: Interscalene block (IEB) is a regional block that provides anesthesia and analgesia for shoulder surgery. This study aimed to determine the usefulness and efficiency of IEB in treating postoperative pain after shoulder surgery.

Methods: The present observational study was conducted at the Alcívar Hospital in Guayaquil, Ecuador, from January to September 2022 with patients undergoing shoulder surgery, classified as Group 1: general anesthesia + EIB and Group 2: without EIB. The variables recorded were age, pain with a subjective rating scale (SRS), and subjective satisfaction (SS). The means were compared with Student's t-test, and the proportions were compared with the chi-square test.

Results: The study included 20 patients in each group. The analysis of postoperative pain at rest in 24 hours was EVS percentile 75 of Group 1: 1; in Group 2, it was 2. Pain in movement was EVS of 2.25 in Group 1 and 3 for Group 2 (P<0.05). The need for rescue occurred in 2 cases (5%) in Group 1 and 5 cases (12.5%) in Group 2 (P<0.05). Nausea and vomiting did not occur in group 1, and 8 patients (20%) did not occur in group 2 (P <0.05). The surgical time in Group 1 was 125 min, and in Group 2, it was 116 min (P>0.05). The length of stay was 36 hours in Group 1 and 60 hours in Group 2 (P<0.05).

Conclusions: IEB produces better anesthesia, better shoulder movement in the postoperative period, and a shorter hospital stay.

Keywords:

MeSS: Shoulder; Arthroplasty, Replacement, Shoulder; Pain, Postoperative; Anesthesia, Local

Abbreviations

IEB: interscalene block.
NSAID: nonsteroidal anti-inflammatory.

Supplementary information

No supplementary materials are declared.

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Not declared.

Author contributions

Carlos Luis García Santana: Conceptualization, data curation, formal analysis, fundraising, research, writing - original draft.
Nelson Antonio Procel Macías: Conceptualization, data curation, formal analysis, data analysis, writing - corrections.
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Availability of data and materials

Not declared.

Introduction

Interscalene block (IEB) is a regional block used to provide anesthesia and analgesia for shoulder surgery [1-3]. IEB is performed by injecting a local anesthetic into the interscalene space between the sternocleidomastoid and interscalene muscles where the suprascapular, subclavian nerves, branches of the long thoracic nerve, intercostobrachial nerves, which innervate the shoulder pass [4]. EIB provides high-quality anesthesia for shoulder surgeries associated with moderate-severe postoperative pain, especially within 24-48 hours [5-8].

The interscalene block can be used for shoulder surgeries, including shoulder arthroscopy, rotator cuff repair, shoulder instability surgery, and shoulder replacement, where the goal of treatment is rapid joint mobilization and early rehabilitation [9, 10]. The block can also be used to treat postoperative pain after shoulder surgery since immobility of the shoulder in the postoperative period is associated with a high incidence of adhesive capsulitis in up to 10% of cases [11, 12].

This study aimed to determine the usefulness and efficiency of EIB in treating postoperative pain after shoulder surgery.

Materials and methods

Study design

The present study is observational. The source is prospective.

Scenery

The study was carried out in the surgery service of the Alcívar Hospital in Guayaquil, Ecuador. The study period was from January 1, 2022, to October 30, 2022.

Participants

Patients between 18 and 65 years of age with shoulder pathology, who required scheduled surgery, classified as ASA 1 and 2 surgical risk, were included. Patients with a body mass index greater than 40 kg/m², patients who refused to receive EIB, with allergy or intolerance to the drugs used in the study, and patients who have a contraindication for locoregional technique.

Study groups

Due to the variability of preoperative institutional prescriptions, the study groups were naturally divided into the following groups:

Group 1: patients who underwent IEB + general anesthesia.

Group 2: patients in whom IEB was not performed received only general anesthesia.

The assignment to each group was not random; it depended on the knowledge, attitudes, and practices of the institutional anesthesiologists. A simple classification was made based on the anesthetic technique used.

Variables

The variables were age, perception of pain with a subjective assessment scale (SVS), anesthetic time, hospitalization time, and perception of satisfaction.

Data sources/measurements

The source was direct; An electronic form was filled out from the data collected during the study period. The information was treated confidentially; Personal data that would allow the identification of the study subjects was not included.

Procedures

In all cases, the patient's informed consent for the anesthetic technique was obtained in writing. The procedure begins with a puncture and placement of a peripheral venous line and infusion of 1000 ml of 0.9% saline solution; blood pressure levels, oxygen saturation, and electrocardiographic tracing are monitored.

All the patients who were going to undergo an interscalene block, combined or not with general anesthesia, received fentanyl 2 µg/kg/dose before the anesthetic technique. In addition, the patient was placed in a supine position with the head lateralized toward the opposite side that should be blocked; The area was sterilized with chlorhexidine, then using a longitudinal approach guided by neurostimulation, and after local anesthesia of the site to infiltrate, a 21 G × 40 mm-50 mm neuro stimulating needle was inserted.

Patients are divided into two groups based on the anesthetic technique used.

In Group 1 of patients who underwent echo-directed interscalene block plus general anesthesia

1) For interscalene block, 40 ml of volume was administered, which included 20 ml of 0.5% roxicaine, 20 ml of 0.125% plain bupivacaine

2) Next, balanced general anesthesia was induced with remifentanil 0.25 µg/kg/min, propofol 2 mg/kg/dose, and rocuronium 0.4-0.6 mg/kg/dose. After orotracheal intubation and the start of mechanical ventilation, the patient was placed in a beach chair. Adjuvant intraoperative intravenous analgesia was administered.

In Group 2, the cases were under general anesthesia, with oro-tracheal intubation and mechanical ventilation. As an intraoperative analgesic, remifentanil was used at a dose of 0.25 ug/kg/min.

Once the patients spent their postoperative period in the PostSurgical Recovery Area, continuous infusion of tramadol 300 mg and metoclopramide 20 mg diluted in 250 ml of 0.9% saline solution was started in all groups and administered by a 10 ml infusion pump./h; then, the first evaluation of postoperative analgesia was made: no pain, mild pain, moderate pain, or intense pain.

Follow-up is then carried out at 3, 6, 9, 12, 18, and 24 postoperative hours with a clinical visit and evaluation by researchers, who determined the postoperative analgesic management; In the cases in which the patients were discharged in the first 24 hours, a telephone consultation was carried out to assess these variables.

Biases
To avoid interviewer, information, and memory biases, the principal investigator always kept the data with a guide and records approved in the research protocol. Observation and selection bias was avoided by applying the participant selection criteria. Two researchers independently analyzed each record in duplicate, and the variables were recorded in the database once their concordance was verified.

Study size
The sample was nonprobabilistic, of the census type, where all possible cases of the study period were included.

Quantitative variables
Descriptive statistics were used. The results are expressed in frequencies (categorical variables) and medians in numerical variables. Categorical data are presented in proportions.

Statistic analysis
Inferential statistics are used, using proportions and frequencies. The ratios are compared with Chi-square. The means are compared with T-student. The statistical package used was SPSS 27.0 (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp).

Results

Participants
The study included 40 patients, 20 in the IEB Group and 20 in the control group.

Study group characteristics
The patients were between 18 and 65 years old, with a mean of 44 ± 16 years (Table 1). On average, weight was 70.8 ± 11.6 kg and height 164.6 ± 10.3 cm.

Main results
The analysis of postoperative pain in the first 24 hours revealed that the VAS at rest in Group 1 was 1 for the 75th percentile, while in Group 2, it was 2 (Table 1).

Pain in movement obtained a VAS of 2 ± 0.25 for Group 1 and 3 for Group 2 (P <0.05). In Group 1, nausea or vomiting did not occur; in Group 2, it happened in 8 cases (20%) (P <0.05) (Table 1).

The average anesthetic-surgical time for Group 1 was 125 min, and 116 min for Group 2 (P >0.05).

No data on perioperative complications were obtained, and no side effects were observed from the combined technique: phrenic nerve palsy, stellate ganglion block (Horner's syndrome), central extension, or intravascular injection.

Analyzing the time elapsed from surgery to patient discharge, we observed that in Group 1, the average length of stay was 36 h, compared to the average of 60 h in Group 2 (P<0.05) (Table 1).

The patient's subjective satisfaction in Group 1 was 90%, and in Group 2, 50% (P>0.05).

Table 1. Age and variables of the study groups.

Variable	Group 1 (IEB) n=20	Group 2 (without IEB) n=20	*P*
18-25 years	3 (15.0%)	3 (15.0%)	0.93
26-35 years	2 (10.0%)	3 (15.0%)	0.671
36-45 years	9 (45.0%)	7 (35.0%)	0.59
46-55 years	3 (15.0%)	5 (25.0%)	0.423
56-65 years	3 (15.0%)	2 (10.0%)	0.731
Pain at rest and movement			
Without pain	16 (80.0%)	8 (40.0%)	0.0098
Pain on movement	3 (15.0%)	2 (10.0%)	0.632
Pain at rest	1 (5.0%)	3 (15.0%)	0.292
Need for opioid rescue			
Without pain	18 (90%)	15 (75%)	0.219
Rescue need	2 (10%)	5 (15%)	
Side effects			
Nausea and vomiting	0 (0%)	8 (40%)	0.001
Anesthetic-surgical time			
Minutes	125	116	0.059
Hospital stay (hours)	36	60	0.023
Subjective satisfaction (SS)			
SS of the patient	90%	fifty%	>0.05
SS of the traumatologist	80%	60%	>0.05

IEB: interscalene block. SS: Subjective satisfaction.

Orthopedists also reported subjective satisfaction with the combined technique of 80% versus 60% for the general anesthesia group (P>0.05). Opinions of better surgical vision were presented due to decreased bleeding and faster recovery of patients.

Discussion
The present study demonstrates that general anesthesia combined with brachial plexus block (interscalenic as a single or combined technique) is more effective in controlling perioperative pain, both at rest and with movement, than general anesthesia with intravenous analgesics in the first 24 hours after shoulder surgery (P< 0.05).

In addition, the incidence of undesirable effects, the need for rescue analgesia, and the length of hospital stay were lower in the group of patients operated on with the combined technique, which leads us to believe that locoregional anesthesia of the brachial plexus in this type Surgery is more efficient than intravenous analgesia, since by significantly reducing hospital stay by 40%, the demand for analgesics and the undesirable effects related to them, could cut the costs derived from their application.

These data are consistent with those obtained previously [13-16], who observed that using locoregional anesthesia of the brachial plexus for rotator cuff surgery decreased recovery time. However, we have not obtained conclusive data regarding operating room occupancy time in favor of any group. Since no perioperative complications (Horner's syndrome, hemidiaphragmatic palsy, intravascular injection) of locoregional anesthesia were observed, we can state that it is a safe technique for the patient, carried out in expert hands, and the benefits for the patient are more significant than the risks derived from it [3]. We think that this absence of side effects could be due to the application of neurostimulation and, in its respective case, ultrasound in performing the interscalene block (which is associated with a more significant number of complications) since with the neurostimulator, we observe a reaction in the area we wish to work on. With ultrasound, we can see where we are injecting the local anesthetic.

Other analgesic techniques are used to control pain after shoulder surgery, such as intravenous analgesia (NSAIDs and opioids), intra-articular injection of local anesthetics (single or continuous dose with a catheter), and regional anesthesia. of the brachial plexus.

Although all of them are useful for controlling postoperative pain, when we analyzed each group, we found specific disadvantages that limit their use. For example, high doses of opioids can increase the incidence of postoperative nausea and vomiting, respiratory depression, sedation, or constipation.

On the other hand, NSAIDs are associated with peptic ulcers, alteration of platelet aggregation, urinary retention, and arterial hypertension, among others.

Using preoperative single-dose intra-articular local anesthetics injected between the glenohumeral joint and the subacromial space, according to Bartholdy et al. [6], decreases nociceptive impulses and reduces postoperative pain.

The use of a continuous intra-articular infusion of bupivacaine through a catheter placed under direct vision by surgeons intraoperatively for postoperative analgesia has been proposed [8]. However, a recent randomized, double-blind study [7] found no statistically significant difference in favor of the infusion of intra-articular local anesthetics.

Studies that compare the efficacy of single-dose interscalene block [4] versus infiltration of local anesthetic in the intra-articular area (single dose or continuous infusion) obtain better results in terms of postoperative pain in the first 24 h, with interscalene block, but leveling off at 48 hours.

On the other hand, perineural dexamethasone has favorable results as an analgesic strategy. A recent meta-analysis, which included 2,138 patients, concluded that using perineural dexamethasone 4 mg can prolong postoperative analgesia time by 6 to 8 hours, depending on the local anesthetic used [4].

Among the limitations of our study in our center, one of the most striking is that not all specialists perform it or not all trauma professionals accept it, thus not being able to affirm that brachial plexus block combined with general anesthesia is more effective than general anesthesia with intravenous analgesics, for shoulder surgery and prospective and randomized studies would be needed to confirm it [9], however, the differences found to support its use for the effective control of postoperative pain; In addition to this, we found in our study that it lacks an adequate sample size calculation, randomization to treatment group, and blind evaluation of the data; considering this as a significant limitation in the level of evidence.

The interscalene block has become the most crucial technique for shoulder surgery due to advances in the method of regional anesthesia.

The efficacy of analgesia has allowed a surgical act in good condition. Postoperative analgesia was of good quality and most satisfied the patient. This technique offers excellent postoperative pain relief and a low incidence of side effects, showing greater efficacy in perioperative pain control, both at rest and with movement, than general anesthesia with intravenous analgesia. In addition, the incidence of undesirable effects, the need for rescue, and the time spent in the hospital were lower in the group of patients operated on with the combined technique without significant repercussions on operating room occupancy time.

Conclusions

In the present work, 70% of the cases did not present any postoperative pain. This well-being allows the patient to get up early, sometimes on the same day of the intervention, without discomfort. This advantage is explained by the long analgesic action of bupivacaine, which in some cases has produced radial paresthesia that has wholly disappeared 36 hours after the interscalene block.

Good postoperative analgesia for 48 hours is assured, and some cases even evolve without pain, which significantly improves the postoperative course since the side effects of morphine drugs are avoided. IEB produces better anesthesia, better shoulder movement in the postoperative period, and decreases hospital stay.

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Statements

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Not required for observational studies.

Publication Consent

Not required for not publishing images, X-rays, or figures of patients.

Conflicts of interest

The authors declare they have no conflicts of interest.

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