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Original Research Article

A comparative study of 0.5% ropivacaine versus 0.5% ropivacaine with dexamethasone on postoperative pain in interscalene brachial plexus block for shoulder surgery

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ABSTRACT

Background: Post-operative pain after any shoulder surgery is very common. Pain management after shoulder surgeries pose a challenge to anesthesiologists.

Aim and Objectives: The study aims to assess the effect of dexamethasone as an adjuvant to 0.5% ropivacaine in ultrasound guided single shot interscalene brachial plexus block in elective shoulder surgeries.

Materials and Methods: The prospective randomized comparative study was conducted at the Department of Anaesthesiology, Apollo Hospitals, Chennai, from March 2018 to December 2019. The study involved 52 patients scheduled for elective shoulder surgeries, who were randomly assigned to two groups: one receiving 0.5% ropivacaine alone and the other receiving 0.5% ropivacaine with dexamethasone, administered via ultrasound-guided interscalene brachial plexus block. Patient's perception of pain was assessed using VAS score (0-10).

Results: The mean duration of analgesia was significantly longer in the ropivacaine with dexamethasone group (909.5 ± 238.122 minutes) compared to the ropivacaine alone group (509.31 ± 102.771 minutes), with a mean difference of 400.192 minutes. Visual Analog Scale (VAS) scores for pain were comparable between the groups in the early postoperative period but were significantly lower in the dexamethasone group at 8, 10, and 12 hours post-surgery, indicating better pain control. The dexamethasone group also required significantly fewer additional analgesics.

Conclusion: The study concluded that the addition of dexamethasone to ropivacaine for interscalene brachial plexus block prolongs the duration of analgesia and reduces post-operative pain, without significant complications. The use of dexamethasone as an adjuvant to local anesthetics for nerve blocks is recommended due to its safety profile, cost-effectiveness, and improved quality of pain relief.

1. Introduction

Severe postoperative pain is frequently observed after shoulder surgeries. Pain management after shoulder surgeries pose a challenge to anaesthesiologists.[1] Adequate pain management in this clinical setting is important not only to improve the patient's well-being and rehabilitation, but also to reduce hospital stay and facilitate an early return to normal life.

These days, regional blocks, also known as peripheral nerve blocks, are frequently used in addition to general anaesthesia for elective shoulder surgeries. They offer the best possible operating conditions, including complete muscle relaxation, stable intraoperative hemodynamics, the associated sympathetic block, postoperative analgesia, and early recovery.[2] Regional anaesthesia, administered via an

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interscalene approach to the brachial plexus, is frequently used in conjunction with general anaesthesia to enhance analgesia and expedite mobilization.[3] The interscalene brachial plexus block is a great way to get the best possible operating environment for shoulder surgery.

To administer the blocks, a variety of local anaesthetics (LAs) have been employed, including lignocaine and bupivacaine.[4,5] A relatively newer LA called ropivacaine is being used more frequently these days for peripheral nerve blocks at various concentrations. When compared to bupivacaine, it has a higher safety margin and fewer cardiac toxicity.[6] It results in less motor block and differential neural blockade, making it well-tolerated for postoperative analgesia. Although ropivacaine offers good intraoperative anaesthesia, we have lately begun utilizing it for single shot interscalene block for shoulder procedures. However, the duration of post-operative analgesia is limited. Peripheral nerve blocks can be kept longer with a number of additions, including clonidine, fentanyl, and adrenaline.[7–10] Unwanted side effects are possible with these agents. Thus, the search for an adjuvant which significantly prolongs analgesia and has favorable side effect profile continued till some clinicians evaluated glucocorticoids. Dexamethasone being an, easily available over the counter, cheap, and safe drug having significant analgesic properties attracts attention. When used with local anaesthetics, dexamethasone prolongs the effects of peripheral nerve block.[11] By inhibiting ectopic neuronal discharge and preventing the transmission of nociceptive myelinated c-fibers, steroids prolong nerve block.[12]

Dexamethasone is a safe addition to local anaesthetics, according to numerous research.[13,14] The effects of ropivacaine with dexamethasone are the subject of very little published research. Because dexamethasone has been shown to extend the duration of action of local anaesthetics without causing respiratory depression, it was chosen as an adjuvant to ropivacaine in our investigation. Because of the reduction in acute postoperative pain, more patients are now eligible for Post anaesthetic care unit(PACU) bypass when an interscalene block is used.[14] However, the block has not been demonstrated to reduce pain beyond more than 24 hours following surgery. Thus, the analgesic effect is just temporary.

There is frequent overnight hospitalization of patients undergoing shoulder procedures with single- injection interscalene blocks due to inadequate pain relief after resolution of their blocks. For the benefit of both patients and caregivers, brachial plexus block as a method of prolonging analgesia without the extra cost and difficulties of indwelling catheters can be considered. Using an adjuvant to a local anaesthetic is a reliable technique to prolong block duration. Perineural catheters for continuous brachial plexus analgesia has been evaluated in multiple studies for both inpatients and outpatients.[15] These catheters are left in place for several days to provide a continuous supply of local anaesthetic. But they can cause difficulties such as disconnection, equipment troubleshooting, secondary block and indwelling peripheral nerve catheters in outpatients are associated with infections.[16] Additionally, the cost of continuous catheter approaches versus single-injection blocks varies significantly. Hence, this study aims to assess the effect of dexamethasone as an adjuvant to 0.5% ropivacaine in ultrasound guided single shot interscalene brachial plexus block in elective shoulder surgeries.

2. Materials and Methods

2.1. Study design and population

The present study was carried out at the Department of Anaesthesiology, Apollo Hospitals, Greams lane, off Greams road, Chennai. Patients admitted in Apollo Hospitals, Chennai, for elective shoulder surgeries, satisfying the inclusion criteria and exclusion criteria and who were willing to participate in the study. The study was a prospective randomized comparative study. Study was conducted between March 2018 to December 2019. During that period, either one of Clinical Trial registration or ethical approval was only required (EC Reg. No.: ECR/37/Inst/TN/2013/RR-16), hence the study has got ethical approval and hence clinical trial registration for the study was not done.

2.2. Sample size calculation

Since the primary objective of the study was to compare the duration of postoperative analgesia between 0.5% ropivacaine and 0.5% ropivacaine with dexamethasone, we had taken the mean duration of analgesia in ropivacaine group as 551.54 minutes and 1103.72 minutes in ropivacaine with dexamethasone group for the workup of sample size calculation.[11] With two-tailed distribution, mean duration of analgesia in 0.5% ropivacaine group being 551.54 minutes, mean duration of analgesia in 0.5% ropivacaine with dexamethasone group being 1103.72 minutes, effect size of 0.8, level of significance at 5%, power of 80% and allocation ratio of 1:1, the required sample size was 26 cases in each arm.

2.3. Inclusion and exclusion criteria

Inclusion criteria for the study encompass adult patients of either gender aged 18 to 60 years, classified as ASA grade 1 or ASA grade 2. These patients should be scheduled for elective shoulder surgeries and have a BMI ranging from 18 to 25 kg/m^2. Exclusion criteria include patients with a known allergy to local anaesthetic agents, bleeding disorders or those on anticoagulant therapy, and respiratory disorders. Additionally, patients with a skin infection at the

injection site, a BMI less than 18 or greater than 25 kg/m^2, and those undergoing emergency shoulder surgeries are excluded. The criteria also exclude patients if the surgical time exceeds 120 minutes or if they have cardiac, hepatic, or renal disorders. Finally, patients classified as ASA grade 3 or ASA grade 4 are also excluded from the study.

2.4. Randomization technique

Randomization was done by block randomization technique. A planned enrollment of 60 patients were selected of which 8 were excluded as 6 didn't meet inclusion criteria and 2 didn't consent to participate in the study as explained in consort diagram (Diagram 1), 26 per study arm, were randomly assigned to the two intervention arms. Block randomization technique was adopted to recruit the patients. 26 random sequences were generated using computer with a block size of 2. Hence 52 patients were selected on this background.

In that way balanced assignment of group was taken. A planned enrollment of 52 patients, 26 per arm was randomly assigned. Sequentially numbered opaque sealed envelopes were used to accommodate these sequences. Blocks were randomly chosen to determine the patient assignment into the group. For patients getting sequence 'R' were allocated to ropivacaine alone. For patients getting sequence 'RD' were allocated to mixture of ropivacaine with dexamethasone. This procedure was followed till the number was achieved.

2.5. Data collection

Following approval by the Institutional Ethics Committee(ECR/37/TN), 52 patients who met the physical status I and II criteria of the American Society of Anaesthesiologists (ASA) and were between the ages of 18 and 60 scheduled for elective shoulder surgeries (such as shoulder arthroplasty, rotator cuff repair, bankart's repair, arthrolysis, and acromioplasty) were chosen for the study. Prior to surgery, patients received counseling and familiarization with the use of the visual analog scale (VAS) pain score for perioperative pain. All participants were given a clear explanation of the study's purpose and nature in a language that was easy for them to understand, and signed informed consent was obtained. Patients who meet the exclusion criteria will be excluded from the study.

A standard pre-anaesthetic assessment was part of an extensive pre-anaesthetic evaluation that was carried out. This examination assessed the patient's overall health, the airway using Mallampati grading and the 1-2-3 rule, and comprehensive evaluations of the respiratory and cardiovascular systems. Every patient underwent a number of investigations in addition to the physical evaluations. Hemoglobin estimate, a conventional 12- lead ECG, a chest X-ray, blood sugar levels (including fasting and postprandial blood sugar), blood urea and serum creatinine assays were among the procedures conducted.

All the patients included in the study were premedicated with tablet alprazolam 0.5 mg and tablet ranitidine 150 mg orally at bedtime the previous night before surgery. They were kept nil orally 8 hours prior to the surgery. Upon the patient's arrival in the operating room, a 500 ml Ringer lactate infusion was initiated and an 18-gauge intravenous cannula was placed on the surgical arm opposite the incision. After positioning the patient on operating table with the head turned to opposite side, interscalene groove was identified by rolling the finger posterior to sternocleidomastoid muscle between the belly of the anterior and middle scalene muscle at the level of cricoid cartilage. The procedure was done with the perfomer on the same side of the block with the ultrasound machine placed on the opposite side of the patient trolley, so that the eye, needle, probe, and screen were all aligned in same line.

Under aseptic precautions, 2% lignocaine was injected into the skin surrounding the insertion site. In every patient, interscalene block was done using ultrasound technology. On the disinfected skin the transducer was positioned in the transverse plane to identify the carotid artery. Once the artery was identified, the transducer was moved slightly laterally across the neck. The goal was to identify the scalene muscles and the brachial plexus that was sandwiched between the anterior and middle scalene muscles.

After carefully aspirating to rule out an intravascular needle placement, 1 to 2 mL of local anaesthetic was injected to document the proper needle placement. Injecting several milliliters of local anaesthetic often displaces the brachial plexus away from the needle. An additional advancement of the needle 1 to 2 mm toward the brachial plexus may be beneficial to assure a proper spread of the local anaesthetic. Whenever the needle was further advanced, it was assured that high resistance to injection was absent to reduce the risk of an intrafascicular injection. When injection of the local anaesthetic did not appear to result in a spread around the brachial plexus, additional needle repositions, and injections were necessary. About 25 mL of local anaesthetic was usually adequate for successful and rapid onset of blockade.

Using ultrasound, patients in Group RD received 25 milliliters of 0.5% ropivacaine mixed with 2 milliliters (8 mg) of dexamethasone, and patients in Group R received 25 milliliters of 0.5% ropivacaine mixed with 2 milliliters of normal saline. After the performance of Interscalene brachial plexus block and initial assessment, patients were given general anaesthesia using a standardized protocol, consisting fentanyl 1 mcg/kg, propofol 2 mg/kg, and tracheal intubation was facilitated with atracurium 0.5 mg/kg and maintained with 1 MAC sevoflurane. At the end of surgery, reversal of muscle relaxant (glycopyrrolate/

neostigmine) was given in standard dosages and the patients were extubated.

Post operative analgesic effect was assessed using VAS score at 2,4,6,8,10,12 and at 24 hours. Additional analgesics required were assessed. Duration of analgesia was defined as the time between administrations of the drug in brachial plexus to observation of VAS score ≥ 3. Analgesics include tramadol 1 mg/kg iv and if required diclofenac 1 mg/kg. Opiods were planned to be used if above drugs fail to reduce pain or if they are contraindicated. Ondansetron 0.1 mg/kg iv was given 5 minutes prior to administration of tramadol. Adverse events were noted, including bradycardia (heart rate below 60 beats per minute), hypotension (20% drop from baseline), and hypoxemia (SpO2 ≤ 90%). Using the VAS score, the patient's experience of pain was evaluated. (0-10)

2.6. Statistical analysis plan

All continuous variables were expressed as mean + SD. Other categorical and qualitative variables were expressed as frequency with percentage (%). Comparison of continuous variables was done by independent sample t test. Comparison of categorical variables was done by Chisquare test or Fisher's exact test. Data entry was done in MS Excel spreadsheet. Data analysis was done by SPSS version 25.0. All 'p' values <0.05 were considered as statistically significant.

3. Results

The mean age of patients in 0.5% ropivacaine group was 48.77 ± 7.617 years whereas the mean age in 0.5% ropivacaine with dexamethasone group was 46.88 ± 8.387 years with p value of 0.4. Hence, the two groups did not differ significantly with respect to their age. Out of 26 patients in 0.5% ropivacaine group, 15 were male and 11 were female. Out of 26 parents in 0.5% ropivacaine with dexamethasone group, 15 were male and 11 were female. The mean height of patients in 0.5% ropivacaine group was 165.73 ± 7.702 cm, whereas, in 0.5% ropivacaine with dexamethasone group, it was 166.19 ± 7.526 cm (p=0.828).The mean weight of patients in 0.5% ropivacaine group was 64.77 ± 7.799 kg, whereas, in 0.5% ropivacaine with dexamethasone group, it was 63.65 ± 6.229 kg with a p-value of 0.571.

The mean BMI of patients in 0.5% ropivacaine group was 23.500 ± 1.0973 kg/m2, whereas, in 0.5% ropivacaine with dexamethasone group, it was 23.008 ± 1.0961 kg/m2 (p=0.112).

The BMI of all the patients was within the range of 18-25 kg/m2. The groups were comparable with respect to height, weight and BMI with no significant difference between the groups. Out of 52 patients enrolled in our study, 29 were ASA I patients, 23 were ASA II patients. There were 14 ASA I (53.8%) and 12 ASA II (46.2%) patients in 0.5% ropivacaine group. And there were 15 ASA I (57.7%) and 11 ASA II (42.3%) patients in 0.5% ropivacaine with dexamethasone group (p = 0.780). There was no statistical difference between the groups with respect to ASA grading. (Table 1)

The difference between the duration of analgesia between 0.5% ropivacaine group and 0.5% ropivacaine with dexamethasone group was measured and found to be statistically significant, with p value of 0.0001.The mean duration of analgesia in 0.5% ropivacaine group was 509.31 ± 102.771 minutes and the mean duration of analgesia in 0.5% ropivacaine with dexamethasone group was 909.5 ± 238.122 minutes. The mean difference between the two groups is 400.192 minutes which was significant. (Figure 1)

The difference of VAS scores between two groups at different time points was measured. VAS score in 2, 4, and 6 hours was comparable, which was not statistically significant. The above results show that the two groups are comparable with respect to post-operative analgesia measured by VAS scores at 2, 4 and 6 hours. At 8, 10 and 12 hours VAS score was lower in 0.5% ropivacaine with dexamethasone group compared to 0.5% ropivacaine group which was statistically significant (p value = 0.003, 0.0001 and 0.0001 respectively). Again at 24 hours, the VAS score was comparable between 2 groups and was statistically insignificant (p = 0.08). (Table 2)

The (Figure 1) shows that the additional analgesics required was significantly higher in 0.5% ropivacaine group compared to 0.5% ropivacaine with dexamethasone group (p = 0.001). In 0.5% ropivacaine group, 6 patients (23.1%) required additional analgesic once and in 0.5% ropivacaine with dexamethasone group, 19 patients (73.1%) required additional analgesic once. Additional analgesic requirement of two times was observed in 8 patients (30.8%) in 0.5% ropivacaine group and for 5 patients (19.2%) in 0.5% ropivacaine with dexamethasone group. A total of 3 times additional analgesic was required in 12 patients (46.2%) in 0.5% ropivacaine group and for 2 patients (7.7%) in 0.5% ropivacaine with dexamethasone group. In our study, additional analgesic requirement was compared between the 2 groups at different time points and we observed that, in 0.5% ropivacaine group almost all patients required additional analgesic by the end of 12 hours and in 0.5% ropivacaine with dexamethasone group almost all patients required additional analgesic by the end of 24 hours. (Figure 2)

4. Discussion

Our prospective study included 52 ASA physical status I and II patients scheduled for shoulder surgeries who were randomly divided into two groups (Group R and Group RD). Group R(n=26) received ultrasound guided interscalene

Table 1: Distribution of patient characteristics among both groups in the study (n=52)

Variable (Category)	0.5% Ropivacaine (26) N(%)	0.5% Ropivacaine with Dexamethasone (26) N(%)	p-value
Age (in years) Mean+SD	48.7+7.6	46.8+8.4	0.4
Female (F)	11 (42.3)	11 (42.3)	0.99
Male (M)	15 (57.7)	15 (57.7)	
Height Mean+SD	165.7+7.7	166.9+7.9	0.83
Weight in Kg Mean+SD	64.8+7.8	63.7+6.3	0.58
Body Mass Index(BMI) Mean+SD	23.5+1.1	23.1+1.10	0.21
ASA* I	14 (53.8)	15 (57.7)	0.78
ASA* II	12 (46.2)	11 (42.3)	
Duration of analgesia (min) Mean+SD	509.3+102.7	909.5+238.1	<0.001

*ASA - American Society of Anesthesiologists (ASA) physical status classification

Table 2: Comparison of VAS score among the two groups in the study

VAS	Group	N	Mean	Std. Deviation	p value
POP VAS 4 hours	0.5% Ropivacaine	26	0.12	0.588	0.322
	0.5% Ropivacaine with Dexamethasone	26	0	0	
POP VAS 6 hours	0.5% Ropivacaine	26	0.38	0.898	0.207
	0.5% Ropivacaine with Dexamethasone	26	0.12	0.588	
POP VAS 8 hours	0.5% Ropivacaine	26	1.69	2.074	**0.003**
	0.5% Ropivacaine with Dexamethasone	26	0.27	1.041	
POP VAS 10 hours	0.5% Ropivacaine	26	3.12	2.065	**<0.001**
	0.5% Ropivacaine with Dexamethasone	26	0.38	1.098	
POP VAS 12 hours	0.5% Ropivacaine	26	4.58	0.504	**<0.001**
	0.5% Ropivacaine with Dexamethasone	26	1.62	2.002	
POP VAS 24 hours	0.5% Ropivacaine	26	2.62	1.098	0.080
	0.5% Ropivacaine with Dexamethasone	26	3.00	00	

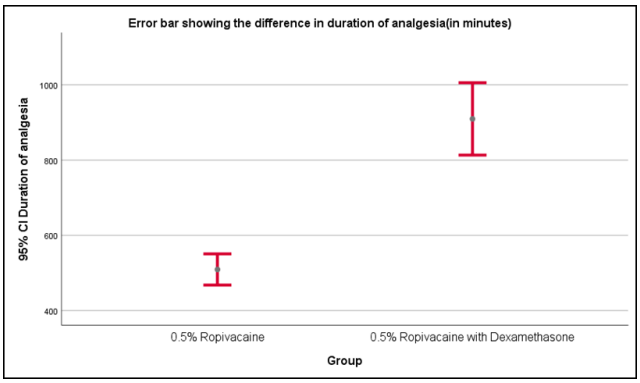

Figure 1: Difference in duration of anaesthesia between the groups AA - Additional analgesics

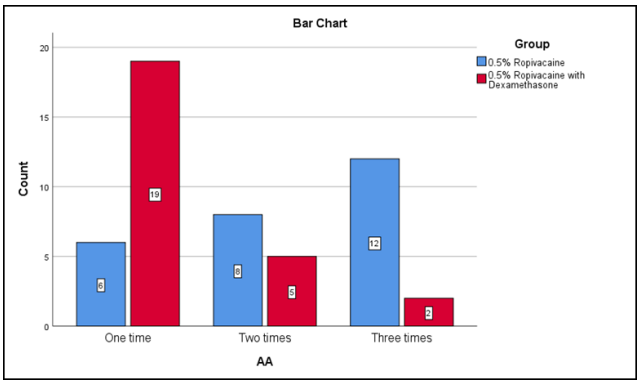

Figure 2: Requirement of additional analgesics among the two groups in the study

brachial plexus block with 25 ml of 0.5% ropivacaine with 2 ml normal saline and Group RD (n=26) received 25 ml of 0.5% ropivacaine with 8 mg of dexamethasone (2ml). The efficacy of addition of dexamethasone was evaluated. The mean age, sex and BMI between the two groups were comparable with no significant difference between the demographic parameters. Ropivacaine is used in various concentrations like 0.25%, 0.5% and 0.75%. Earlier studies have shown that 0.25% can result in inadequate analgesia and 0.75% can cause prolonged motor blockade. We have chosen 0.5% concentration because ropivacaine is optimally effective at the concentration of 0.5% with least side effects. Ropivacaine prevents transmission of nerve impulses by inhibiting passage of sodium ions through ion-selective sodium channels in the nerve membrane providing a conduction blockade. The current investigation showed

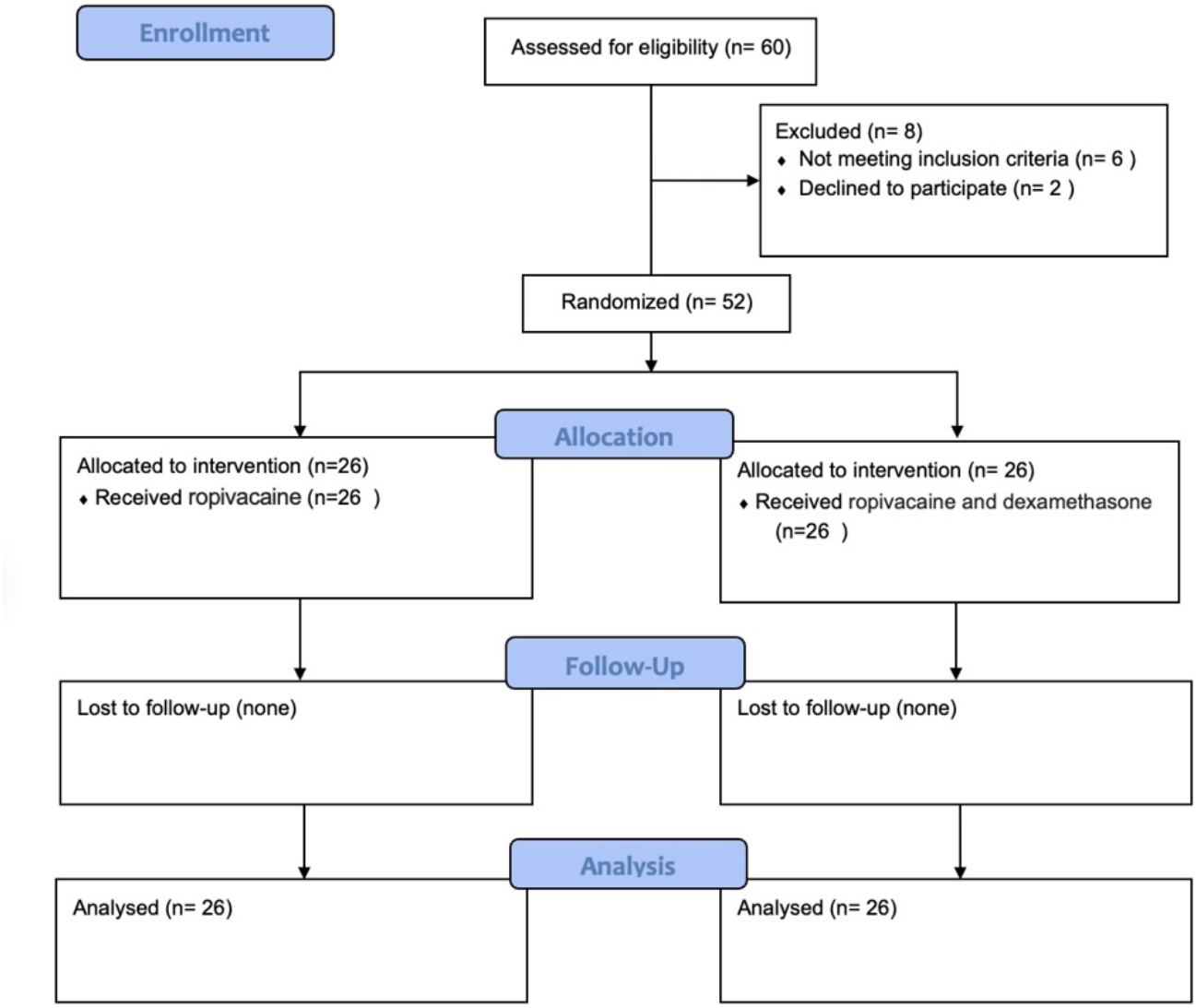

Diagram 1: Consort diagram

that dexamethasone considerably extended the time that ropivacaine provided analgesia in an interscalene brachial plexus block.

The mean duration of analgesia in our study was 509.31 ± 102.771 minutes in 0.5% ropivacaine group and 909.5 ± 238.122 minutes in 0.5% ropivacaine with dexamethasone group. These findings were similar to a study done by Ashok Jadon et al. who compared the efficacy of dexamethasone added to 0.5% ropivacaine in interscalene brachial block and observed a significantly prolonged duration of analgesia of 1103.72 ± 296.027 minutes in dexamethasone group compared to 551.54 ± 166.92 minutes in the control group.[11]

A 1.9-fold increase in the length of interscalene brachial plexus block was noted by Cummings et al. when dexamethasone was mixed with local anaesthetic in interscalene block, which is consistent with our study.[1] Huynh et al. in their systematic review with meta-analysis of randomized controlled trials to evaluate the effect of combining dexamethasone with local anaesthetic, found that dexamethasone significantly increased the duration of analgesia to about 351 min ($P < 0.001$).[17] This result remained statistically significant and is in accordance with our study.

Similarly, S.Choi et al. did a systematic review and meta-analysis to assess the contemporary literature and to quantify the effects of dexamethasone on brachial plexus block and observed that the overall estimate of the effects of dexamethasone on the prolongation of analgesic duration is 410 min ($P<0.00001$) from a baseline of 479 min

without dexamethasone which is also in accordance with our study.[18] Christopher D. Noss et al. also did a systematic review looking for randomized clinical trials examining the dexamethasone as an adjuvant in brachial plexus blocks. Significant prolongation of analgesia (1.5 to 4.0 times) were observed in trials and our study also is in accordance with this.[19] Vieira PA et al. and Desmet M et al. also found that dexamethasone significantly increased the duration of block in their studies.[20,21] Dexamethasone is a very potent and highly selective and long-acting glucocorticoid; its potency is about 40 times that of hydrocortisone. The mechanism of prolonged regional anaesthesia and analgesia produced by corticosteroids is not fully understood. Steroids induce vasoconstriction, thus reduce local anaesthetic absorption.[22]

Furthermore, they increase the activity of inhibitory potassium channels on nociceptive C- fiber and they mediate anti-inflammatory or immunosuppressive effects. These three mechanisms are known to prolong analgesia.[12] There was no statistical significance between the 2 groups in the early postoperative VAS score for upto 6 hrs($p>0.05$). However, the difference in postoperative score was statistically significant at 8 hrs($p=0.003$), 10 hrs($p=0.0001$) and 12 hrs($p=0.0001$). Again at 24 hours, VAS score was comparable between 2 groups($p=0.08$).

These results are in accordance with Feroz Ahmed Dar et al. who evaluated the effect of dexamethasone when added to ropivacaine in supraclavicular brachial plexus block and found that the VAS score was statistically insignificant between the two groups (P-value > 0.05) in the early postoperative period. However, from the 6th hr, patients who received dexamethasone showed a significantly lower VAS score than the patients who received ropivacaine only.[23] Our results are also similar to Ashok Jadon et al. VAS scores were similar in the first four hours ($P>0.05$) and significantly higher in the control group at the end of eight, twelve, sixteen, and twenty hours ($P<0.05$) when compared to the dexamethasone group. Patients in the dexamethasone group had significantly lower VAS scores ($P<0.05$) than those in the control group and demonstrated excellent pain control for up to 24 hours.[11]

This is in accordance with the study done by Deepraj Singh Bais et al. in which effectiveness of addition of dexamethasone to 0.5% ropivacaine for supraclavicular brachial plexus block was evaluated. Verbal rating scale (VRS) was used to assess pain and observed that the scores for the two groups were found to be significantly different between 6 to 12 hrs with low scores recorded in dexamethasone group.[24] Biradar et al. in their prospective, randomized study evaluated the effect of dexamethasone added to lidocaine in supraclavicular brachial plexus block and observed that the VAS scores were significantly lower in the dexamethasone group than in the control group ($P<0.05$).[25] From our study, we observed that the first six hours following surgery, there was no significant difference in the pain scores between the two groups. But pain score was less in the dexamethasone group at 8, 10, and 12 hours proving that dexamethasone helps in alleviating pain for a prolonged period. At 24 hours, the difference in pain score between the 2 groups was statistically insignificant.

In our study, Inj.Tramadol 1 mg per kg was the main drug used as rescue analgesic. We observed that the additional analgesics required was significantly higher in 0.5% ropivacaine group compared to 0.5% ropivacaine with dexamethasone group. Similar results is seen in work done by Ashok Jadon et al. in which they observed that the rescue analgesic consumption was significantly lower in the dexamethasone group in comparison to control (($P < 0.001$) in the first 24 hr post-operatively.[11] This is also in accordance with Deepraj Singh Bais et al. in their study of dexamethasone on brachial plexus block where due to an increase in discomfort, rescue analgesics were added to the ropivacaine group after 7 hours, and to the ropivacaine plus dexamthasone group after 20 hours.[24] This was similar to the study conducted by Santosh Kumar et al. who evaluated the postoperative analgesic effect of addition of dexamthasone to ropivacaine in supraclavicular brachial plexus. In their study, in ropivacaine group, patients required first rescue analgesia at 557 ± 58.99 min while in dexamethasone group, patients required first rescue analgesia at 1179.4 ± 108.60 min, which was statistically significant. And ropivacaine group patients received larger amount of rescue analgesia compared to dexamethasone, which was again statistically significant.[26]

Interscalene nerve block is one of the most clinically applicable nerve block techniques. With proper training, equipment, and monitoring precautions the technique results in a predictable success rate, excellent anaesthesia, and good postoperative analgesia. The safety profile and excellent analgesic action of dexamethasone makes it a potent adjuvant to be used with local anaesthetics for nerve blocks. Usage of ultrasound guidance in performing an interscalene brachial plexus block reduces the incidences of complications. More studies with large number of patients and blinded method is required to assess efficacy of dexamethasone in interscalene brachial plexus block.

The new findings from the study highlight that the combination of dexamethasone with ropivacaine not only provides prolonged postoperative analgesia but also reduces the need for additional analgesics compared to ropivacaine alone. Clinicians should consider using dexamethasone as an adjuvant to 0.5% ropivacaine in interscalene brachial plexus blocks for patients undergoing shoulder surgeries. The study showed that adding dexamethasone significantly prolongs the duration of postoperative analgesia, providing effective pain relief for up to 24 hours. This approach reduces the need for additional analgesics, thereby minimizing the risk of opioid-related side effects and enhancing patient comfort in the early postoperative period.

There are certain limitations in our study. The small sample size in this study might also limit the ability to control for confounding variables. In randomized studies, larger samples are generally better at ensuring that any differences between the groups are due to the treatment rather than other factors. However, even with a small sample, randomization has achieved equal distribution of parameters between the groups which are given along with p-values. Although toxicity profile of dexamethasone appears to be well tolerated till date, the postoperative follow-up period was limited to 24 h only, to find out any conclusive complication. Prolongation of motor block was an unwanted effect that prevents the early recognition of iatrogenic nerve injury and early ambulation. Our study didn't exclude the systemic action of steroid following absorption from the injection site.

5. Conclusion

Our research leads us to the conclusion that the duration of analgesia is extended when dexamethasone is added as an adjuvant to ropivacaine (0.5%) for an interscalene brachial plexus block administered once. Significant difference in the VAS pain scores was found. Decreased need of additional analgesics was observed. Thus, dexamethasone improved the quality of pain relief post-operatively. This finding is consistent with previous studies. No patient had any serious complications. The safety profile of dexamethasone is promising. Dexamethasone was found to be well tolerated and cost-effective. Ultrasound guidance has improved the safety and accuracy and decreased the side effects of interscalene brachial plexus block. More studies with large number of patients and blinded method is required to assess efficacy of dexamethasone in interscalene brachial plexus block.

6. Source of Funding

None.

7. Conflict of Interest

None.

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