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Original Research Article

To Evaluate the Efficacy of Dexamethasone as an Adjuvant in USG Guided Bilateral Superficial Cervical Plexus Block Using 0.25% Bupivacaine in PatientsUndergoing Thyroid Surgery

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Conflict of interest: Nil

Abstract:

Introduction: During thyroidectomy we want to maintain intraoperative hemodynamic stability, postoperative analgesia and reduce postoperative complications. To serve the purpose we can use opioids, NSAIDs, paracetamol, Tramadol and local anaesthetic infiltration with or without adjuvant in fascial planes of the neck. Ultrasound-guided block remains as a reliable tool for performing a cervical plexus block, provides faster onset and longer duration of the block, reduces the performance time, and reduces the complications in addition to reduced local anaesthesia requirement. Perineural use of Dexamethasone prolongs analgesic duration of peripheral nerve blocks, reduces postoperative nausea and/or vomiting (PONV) and reduces general anaesthetics, shorten the hospital stayas well as reduce the severity of pain in the first day postoperatively. The present study was conducted to compare the effect of dexamethasone in the superficial cervical plexus block in thyroid surgeries by its effect on nausea, pain scores, vomiting, and hospital stay.

Methods: The present interventional study was conducted in a tertiary care center involving cases of ASA grade I and II patients undergoing thyroidectomy from December 2022 to June 2024. The patients were randomly divided into 2 groups using computer generated random numbers. One group received 1ml dexamethasone (4mg) + 19ml 0.25% Bupivacaine in BSCPB (A Group), and the other group received 1ml Normal saline + 19ml 0.25% Bupivacaine in BSCPB (B Group). After the induction of general anaesthesia, superficial cervical plexus blocks was administered bilaterally before the surgical incision.

Results: Mean heart rate and mean Spo2 at preoperative baseline, after induction,after block 0 to 180 min. did not differ between two groups. Mean systolic blood pressure, mean diastolic blood pressure and mean arterial blood pressure at preoperative baseline,after induction, after block 0 to 180 min. differed significantly between two groups with more marked rise in group B. The mean VAS score differed significantly between group A and group B ($p>0.05$) with high VAS scores in group B. Mean duration of post operative analgesia (12.3 + 1.9 hrs. in group A vs 8.4 + 1.1 hrs. in group B) differed significantly between these two groups with longer duration of post operative analgesia in group A ($p=0.01$). Two groups did not differ significantly in postoperative complications.

Conclusions: We conclude that the hemodynamic parameters are more stable with group A (Dexamethasone adjuvant group). Addition of dexamethasone prolonged duration of analgesia, reduced pain intensity, duration, and requirement of rescue analgesia without significantincrease in post operative complications.

Keys words: Thyroidectomy, dexamethasone, adjuvant, cervical plexus block, VAS score.

Introduction

Thyroid disease is one of the major public health problems in India for that thyroidectomy done which is a common and painful procedure demanding analgesia. [1] The prevalence of self-reported Goitre or thyroid disorder in National Family Health Survey V [NFHS V (2019-2020) was 2.9%. [2] It is important to maintain intraoperative hemodynamic stability, postoperative analgesia and reduce postoperative complications. To serve the purpose many good examples of analgesia are pre-

sent such as use of opioids, NSAIDs, paracetamol, Tramadol and local anaesthetic infiltration with or without adjuvant in fascial planes of the neck. As thyroid being highly vascular organ; NSAID's may not provide adequate analgesia increasing risk of postoperative bleeding. [3]

Ultrasound-guided block remains as a reliable tool for performing a cervical plexus block, provides faster onset and longer duration of the block, reduces the performance time, and reduces the complications in addition to reduced local anaesthesia requirement. [4]

Dexamethasone is a systemic glucocorticoid commonly used to reduce postoperative nausea, vomiting and pain and to improve the quality of recovery after surgery. [5] Recently, several studies have examined the use of perineural dexamethasone to prolong analgesic duration of peripheral nerve blocks, which is thought to be mediated by attenuating the release of inflammatory mediators, reducing nerve root oedema, reducing ectopic neuronal discharge, and inhibiting potassium channel-mediated discharge of nociceptive C-fibres. [6] For the purpose of increasing the duration of peripheral single-shot nerve blocks, dexamethasone might be an excellent choice. [7]

After thyroid surgery, higher incidences of postoperative nausea and/or vomiting (PONV) are common problems reported that occurred after general anaesthesia. [8] The possible reasons for PONV after thyroid surgery are oedema and inflammation of the surrounding tissues transmitted to the vomiting center by means of three nerves: vagus, recurrent laryngeal, and glossopharyngeal nerves. [9] In comparison BSCPB for thyroid surgeries has been shown to reduce general anaesthetics, shorten the hospital stay as well as reduce the severity of pain in the first day postoperatively. [10]

The present study was conducted to compare the effect of dexamethasone in the superficial cervical plexus block in thyroid surgeries by its effect on nausea, pain scores, vomiting, and hospital stay.

Materials and Methods:

The present interventional study was conducted in a tertiary care center involving cases of ASA grade I and II patients undergoing thyroidectomy from December 2022 to June 2024.

Inclusion criteria: Patients willing to participate, ASA grade 1 & 2 patient and 50 to 70 kg weight patients of both the sexes.

Exclusion Criteria: Patient refusal to give consent, ASA grade 3&4 patient, patients allergic to drugs to be used in study & local anaesthetic, patients with coagulopathy, Altered anatomical landmarks and patient taking adrenergic or psychotropic drugs

Methods of Measurement:

After thorough pre-anaesthetic evaluation, the visual analogue scale (VAS) score was explained to the patients. The patients were randomly divided into 2 groups using computer generated random numbers. One group received 1ml dexamethasone (4mg) + 19ml 0.25% Bupivacaine in BSCPB (A Group), and the other group received 1ml Normal saline + 19ml 0.25% Bupivacaine in BSCPB (B Group). Standard general anaesthesia protocols were followed. After the induction of general anaesthesia, superficial cervical plexus blocks was administered bilaterally before the surgical incision. After giving Rose position, under all aseptic precautions painting & draping done. Under USG guidance (SonoSite) branches of superficial cervical plexus identified. A 22-gauge needle was inserted at the midpoint of the lateral border of the sternocleidomastoid muscle under USG guidance. 20 mL Dexamethasone 4 mg (1ml) + 0.25% bupivacaine (19ml) was administered bilaterally to block the branches of the plexus (10 ml on each side) to A group and 20 ml Normal saline (1ml) + 0.25% Bupivacaine (19ml) (10 ml on each side) to B Group.

We monitored patient's hemodynamic status at preoperative baseline, after induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min using variables like HR, SpO2, SBP, DBP, and MABP. We had given injection fentanyl (1 mcg.kg−1) iv. bolus if there was increase in SBP / HR of more than 20% of basal value. At the end of surgery, after signs of recovery from neuromuscular blockade, residual paralysis was reversed with injection neostigmine (0.05 mg.kg−1) and injection glycopyrrolate (0.008 mg.kg−1). Incidences of postoperative pain (including VAS scores), nausea and vomiting, hematoma were recorded. If a patient's pain on the VAS (where 0 meant no pain and 10 means the worst imaginable pain) higher than 4, additional analgesia was administered intravenously (1000 mg Paracetamol). If the patients' VAS values still higher than 4, tramadol hydrochloride (1 mg.kg−1) was administered. If a patient

experienced nausea or vomiting, ondansetron (0.1 mg.kg−1) was administered. The patients' VAS scores were evaluated at 1, 2, 3, 4, 8, 12, 16, 20, 24 hours postoperatively. The total Paracetamol and tramadol hydrochloride consumption were recorded for each patient. Duration of patient's analgesia was monitored. The requirement of rescue analgesia was noted. Any complication was noted, rec-

orded and treated accordingly. Data collected was analysed statistically and results were recorded. Data was collected in pre-structured proforma which was pilot tested and after ensuring it's validity. The data collected was then analysed by appropriate test of significance.

Sampling Technique – Simple Random Sampling without Replacement (SRSWOR). STATISTICAL ANALYSIS: Quantitative data was tested by Mean and Standard Deviation, difference between two means tested by 'Z' test. Qualitative data was compared by Chi square test, Fisher's exact test. P value <0.05 was considered significant.

Results:

There was no attrition during the study hence finally we could analyse all cases, important results of which are presented below.

Table 1: Comparison of mean arterial pressure among the two groups.

	Group A	Group B	P
Preoperative Baseline	91.8 ± 2.4	91.1 ± 5.8	0.51
After induction	90.2 ± 2.6	91.5 ± 5.3	0.14
After block – 0 min	89.5 ± 2.0	89.9 ± 4.9	0.65
15 min	90.8 ± 2.7	90.4 ± 5.1	0.66
30 min	90.4 ± 2.2	97.9 ± 4.4	**0.01**
45 min	91.2 ± 2.3	97.9 ± 5.8	**0.01**
60 min	89.6 ± 1.7	93.8 ± 5.8	**0.01**
75 min	89.2 ± 2.0	99.3 ± 5.7	**0.01**
90 min	89.2 ± 2.1	97.0 ± 5.6	**0.01**
105 min	88.9 ± 2.1	94.0 ± 4.3	**0.01**
120 min	88.7 ± 2.4	95.6 ± 5.2	**0.01**
135 min	88.6 ± 2.4	94.9 ± 4.9	**0.01**
150 min	88.3 ± 2.2	95.1 ± 5.0	**0.01**
165 min	87.9 ± 2.3	98.6 ± 5.0	**0.01**
180 min	87.9 ± 2.3	98.4 ± 5.5	**0.01**

Table no.1 shows that the, mean arterial blood pressure at preoperative baseline,after induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min differed significantly betweengroup A and group B (p<0.05) with markedly high MAP in group B.

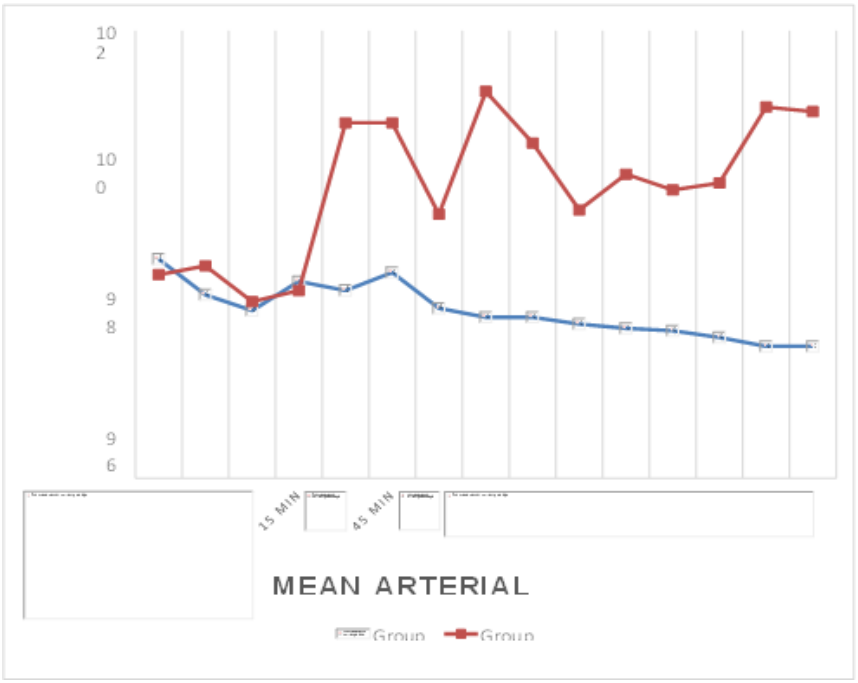

Chart 1: Comparison of MAP among the two groups.

Table 2: Comparison of mean VAS among the two groups.

VAS Score	**Group A**	**Group B**	**p**
1	1.1 ± 0.4	0.3 ± 0.4	**0.001**
2	1.2 ± 0.4	0.4 ± 0.6	**0.001**
3	1.2 ± 0.4	1.6 ± 0.6	**0.001**
4	1.2 ± 0.4	1.5 ± 0.5	**0.004**
8	1.3 ± 0.5	3 ± 0.7	**0.001**
12	1.9 ± 0.7	3.9 ± 0.5	**0.001**
16	3.2 ± 0.8	5.2 ± 0.5	**0.001**
20	3.7 ± 0.5	6 ± 0.5	**0.001**
24	4.3 ± 0.5	6.7 ± 0.8	**0.001**

Table no.2 shows that the, mean VAS score at 1, 2, 3, 4, 8, 12, 16, 20 & 24 hours differed significantly between group A and group B (p>0.05) with high VAS scores ingroup B.

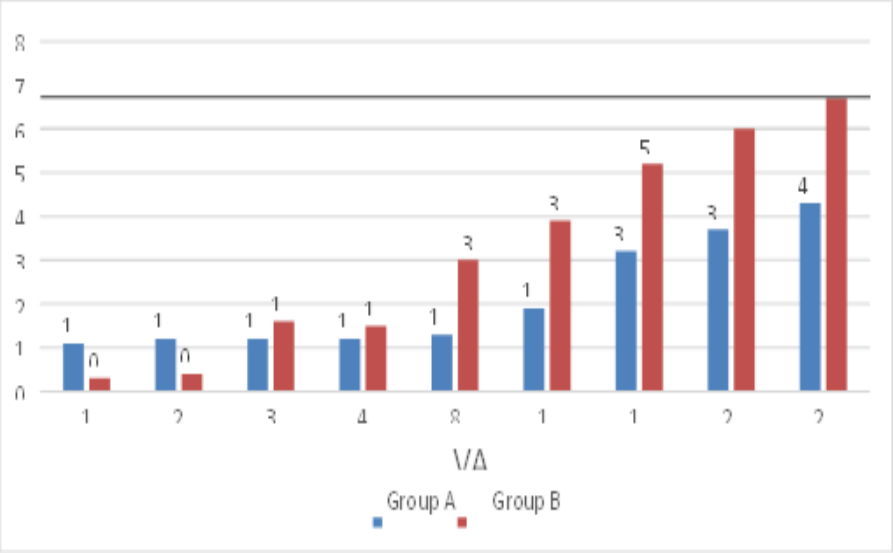

Chart 2. Visual analogue scale score

Table 3. Comparison of duration of post operative analgesia among the two groups

Duration of post operative analgesia (hrs.)	**Group A**	**Group B**	**P**
	No. (%)	**No. (%)**	
≤10	10 (25)	38 (95)	**0.01**
>10	30 (75)	02 (5)	
Total	40 (100)	40 (100)	
Mean ± SD	12.3 ± 1.9	8.4 ± 1.1	**0.01**

Table no.3 shows that the, duration of post operative analgesia was longer i.e. >10hours among majority, 75% cases in group A while it was shorter i.e ≤10 hours among most, 95% in group B. Mean duration of post operative analgesia (12.3 ± 1.9 hrs. in group A vs 8.4 ± 1.1 hrs. in group B) differed significantly between these two groups with longer duration of post operative analgesia in group A (p=0.01).

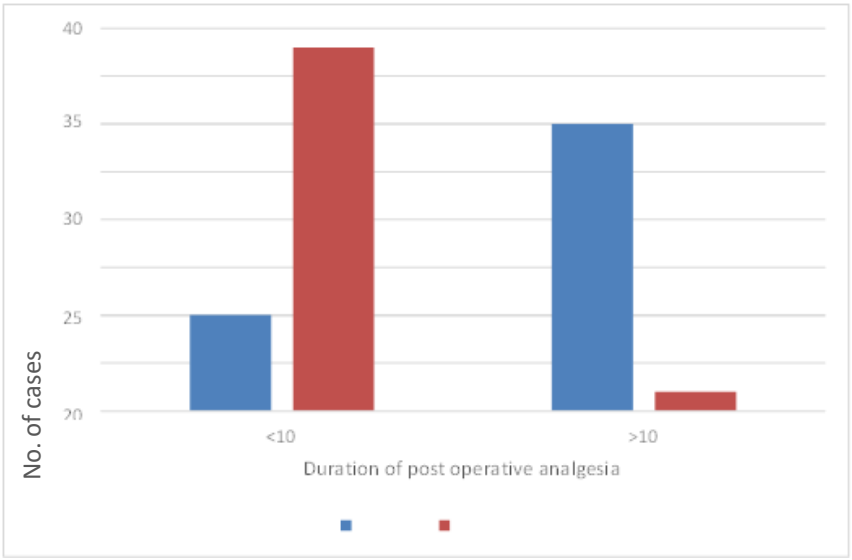

Chart 3: Duration of post operative analgesia wise distribution of cases.

Among majority of the cases in group A duration of post operative analgesiawas > 10 hours while in group B it was < 10 hours in majority cases.

Table 4: Comparison of total doses of analgesic required in 24 hours among thetwo groups

Total doses of paracetamol/ tramadol required in 24 hours	Group A	Group B	p
Single	33 (82.5)	07 (17.5)	**0.001**
Double	07 (17.5)	22 (55)	
Triple	00 (00)	11 (27.5)	
Total	40 (100)	40 (100)	
Mean ± SD	1.2 ± 0.4	2.1 ± 0.7	**0.001**

Table no.4 shows that the, majority, 33 (82.5%) of the cases in group A required single dose of analgesic in 24 hours while most, 22 (55%) cases in group B requireddouble dose of analgesic followed by 11 (27.5%) needed triple dose in 24 hours. Mean no. doses of analgesic required in 24 hours (1.2 ± 0.4 in group A vs 2.1 ± 0.7 in group B) differed significantly between these two groups with greater no. of dosesneeded in group B (p=0.001).

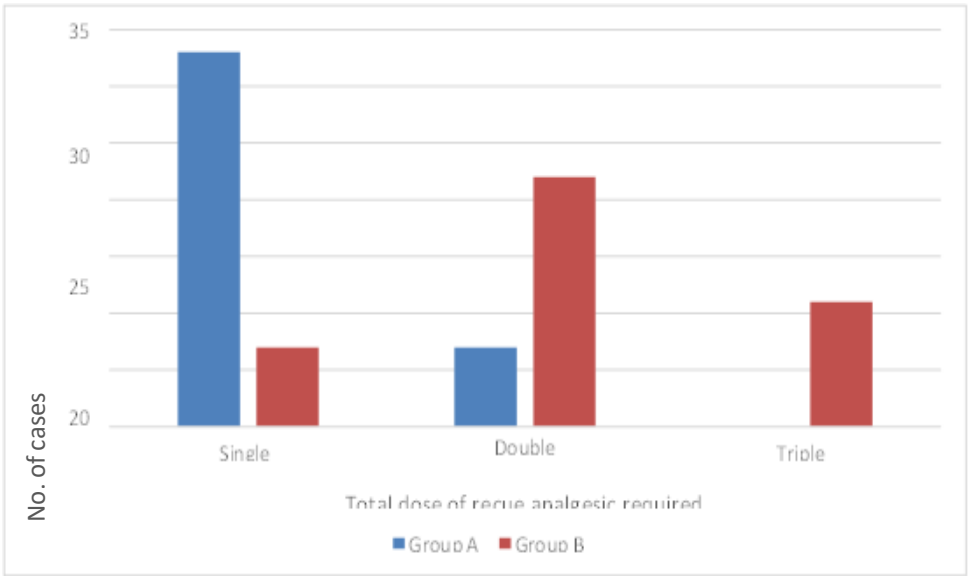

Chart 4: Total doses of analgesic required in 24 hours wise distribution of cases.

Majority cases in group A required single dose of analgesic in 24 hours while most cases in group B needed double dose in 24 hours.

Table 6: Comparison of post operative complications among the two groups.

Post operative complications	Group A (n=40)	Group B (n=40)	P
PONV	06 (15)	11 (27.5)	0.1
Hematoma	01 (2.5)	02 (05)	0.6

Table no.6 shows that the, majority, (15% in group A vs 27.5% in group B) of the cases had postoperative nausea and vomiting followed by hematoma (2.5% in groupA vs 5% in group B). Two groups did not differ significantly in postoperative complications (p>0.05).

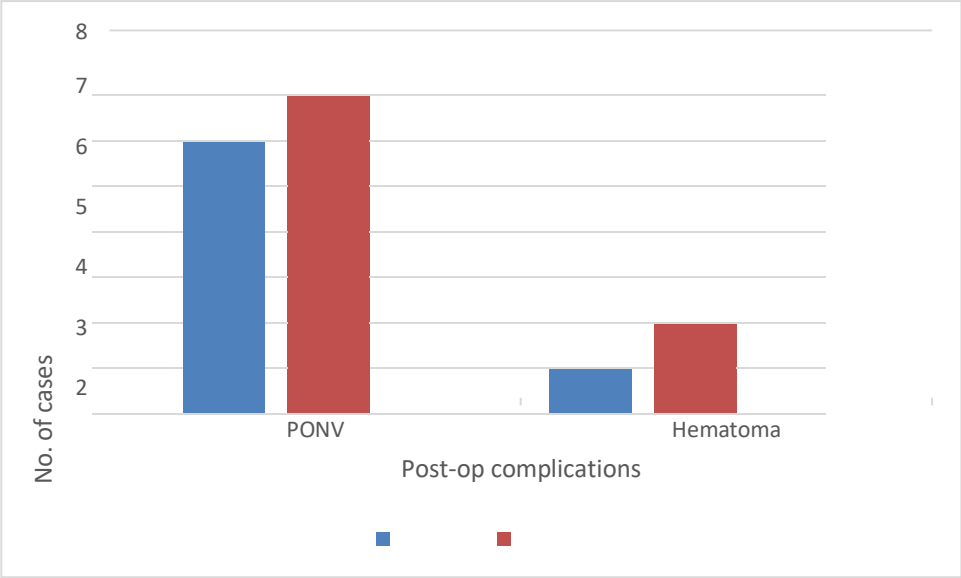

Chart 6. Postoperative complications wise distribution of cases.

Majority of the cases had postoperative nausea and vomiting among both thegroups.

Discussion

The present facility based interventional study, was done on cases of ASA grade I and II undergoing thyroidectomy to evaluate the efficacy of dexamethasone as an adjuvant in USG guided bilateral superficial cervical plexus block using 0.25%Bupivacaine, important results of which are discussed below.

The present study revealed the analgesic efficacy of USG guided bilateral superficial cervical plexus block dexamethasone in patients undergoing thyroidectomy. In this study, majority, (42.5% in group A vs 47.5% in group B) of cases among both the groups were from the age group of 30-39 years with the mean age of patients in group A was 38.4 + 12.1 vs 36.7 + 10.1 years in group B. Two groups were comparable with respect to age (p>0.05). Majority, 87.5% in group A & 90% in group B females. Two groups were comparable with respect to gender (p>0.05). Consistently, Sivaporn Termpornlert et al [11] & Francisco Javier Quesada-Bravo et al [12] noted comparable age and gender in their study.

In the present study, majority, (97.5% in group A vs 95% in group B) of casesin both the groups had normal BMI i.e. 18-24.99 kg/m^2. Mean BMI of the patients in group A was 22.8 $\pm$ 1.4 kg/m^2 vs 22.4 $\pm$ 1.8 kg/m^2 in group B and the two groups did not differ significantly according to BMI (p>0.05).

In the present study, majority, (72.5% in group A vs 57.5% in group B) of cases in both the groups had ASA grade I followed by the ASA grade II (27.5% in group A vs 42.5% in group B). ASA grades did not differ between the two groups (p>0.05).

In the present study, mean time to perform block was 6-8 minutes among most (82.5% in group A vs 77.5% in group B) of the subject in both the groups. Mean time to perform block (7.5 $\pm$ 1 in group A vs 7.7 $\pm$ 1 in group B) did not differ significantly between these two groups (p>0.05).

In the present study, mean heart rate at preoperative baseline, after induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min did not differ between group A and group B (p>0.05). Mean Spo2 at preoperative baseline, after

induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min did not differ between group A and group B ($p>0.05$). Mean systolic blood pressure, mean diastolic blood pressure and mean arterial pressure at preoperative baseline, after induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min differedsignificantly between group A and group B ($p<0.05$) with more marked rise in group B. In agreement with our study, Neena Jain et al [13] also reported more stable hemodynamics with dexamethasone group.

In the present study, mean VAS score at 1, 2, 3, 4, 8, 12, 16, 20 & 24 hours differed significantly between group A and group B ($p>0.05$) with high VAS scores in group B. This is in lie with Jeong-Min Hong et al101 who found that epidural dexamethasone was effective for reducing postoperative pain.

In the present study, majority, (32.5% in group A vs 17.5% in group B) of cases in both the groups had duration of surgery of 141-150 minutes with the mean duration of 147.6 + 13.3 min. vs 146.5 + 17.6. Two did not differ between the mean duration of surgery ($p>0.05$). Khaled Elbahrawy et al [14] also found comparable duration of surgery between the groups.

In the present study, time to rescue analgesia was >10 hours among majority, 75% cases in group A while it was needed earlier i.e. <10 hours among most, 95% in group B. Mean time to rescue analgesia (12.3 + 1.9 hrs. in group A vs 8.4 + 1.1 hrs. in group B) differed significantly between these two groups with earlier requirement of analgesia in group B ($p=0.01$). In this study, duration of post operative analgesia was longer i.e. >10 hours among majority, 75% cases in group A while it was shorter i.e. <10 hours among most, 95% in group B. Mean duration of post operative analgesia (12.3 + 1.9 hrs. in group A vs 8.4 + 1.1 hrs. in group B) differed significantly between these two groups with longer duration of post operative analgesia in group A ($p=0.01$). This agrees with Mahamoud Ali Ahmed El- Shourbagy et al [15] who observed pain free period in the study group was 434.3 + 43.8 minutes in dexamethasone added group while in the control group it was 215.3+ 40.3minutes. Also, the motor block duration in the study group was significantly prolonged in dexamethasone added group when compared with control group ($p<0.01$).

Although the potential mechanism of action of perineural steroids is still not clearly understood, it seems to be associated with the anti-inflammatory action, oedema reduction, and shrinkage of connective tissue. Also, local corticosteroid application blocks transmission in nociceptive C-fibers. [16] Thus, corticosteroids might have a local anaesthetic effect on nerves due to direct membrane action. Another possible mechanism involves the effect of epidural steroids on intraspinal prostaglandin formation. Acute noxious stimulation at peripheral tissues during surgery leads to activation of phospholipase A2 and up-regulation of the expression of cyclo-oxygenase-2 in the spinal cord, causing prostaglandin synthesis resulting in a hyperalgesia. Preoperative steroids may reduce these responses and suppress the hyperalgesia by inhibiting both phospholipase A2 and cyclo-oxygenase-2 enzymes. [17] Dexamethasone has several beneficial effects on the management of not only surgical pain but postoperative nausea and vomiting (PONV).

In the present study, majority, 33 (82.5%) of the cases in group A required single dose of analgesic in 24 hours while most, 22 (55%) cases in group B required double dose of analgesic followed by 11 (27.5%) needed triple dose in 24 hours. Mean no. doses of analgesic required in 24 hours (1.2 + 0.4 in group A vs 2.1 + 0.7 in group B) differed significantly between these two groups with greater no. of doses needed in group B ($p=0.001$). Similarly, Jeong-Min Hong et al [18] observed lower consumption of analgesics among dexamethasone group. Sivaporn Termpornlert et al [19] also observed that the time to first analgesic requirement was longer in group D i.e. Dexamethasone + Bupivacaine group than the Normal saline + Bupivacaine group, pain scores were also significantly lower in group D and lower doses of analgesic required. Khaled Elbahrawy et al [14] reported consistently that patients in dexamethasone group needed less postoperative rescue analgesic than in the control group. Pain scores were statistically significantly less in group dexamethasone than in control groups at 6 and 8 h postoperatively. Maha Abd el Fattah Metawie Badran et al [19] reported higher Ketolac consumption in group C (control) than in group D (Dexamethasone). Amani H. Abdel-Wahab et al20 noted that the Dexa group had significantly longer duration of both sensory block ($P=0.01$) and motor block ($P<0.001$). The Dexa group had significantly longer duration until the first postoperative analgesic request ($P<0.001$) and a lower incidence of side effects compared to the control group.

In the present study, majority, (15% in group A vs 27.5% in group B) of the cases had postoperative nausea and vomiting followed by hematoma (2.5% in group A vs 5% in group B). Two groups did not differ significantly in postoperative complications ($p>0.05$). This is in line with Jeong-Min Hong et al18 who reported no difference in adverse effect such as hypotension, bradycardia, PONV, pruritis, and urinary retention among groups with & without dexamethasone. Sivaporn Termpornlert et al [11] also noted similar incidences of PONV between the

groups. Khaled Elbahrawy et al [14] noted that the occurrence of nausea and/or vomiting is statistically significantly less frequent in dexamethasone group when compared with the control group postoperatively.

Conclusion

In this study, we found that hemodynamic parameters are more stable with group A (Dexamethasone adjuvant group). Addition of dexamethasone prolonged duration of analgesia, reduced painintensity, duration, and requirement of rescue analgesia without significantincrease in post operative complications.

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