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THE ROLE OF ROPIVACAINE AND DEXAMETHASONE ON POSTOPERATIVE ANALGESIA USING ANKLE BLOCK FOR FOOT SURGERIES

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ABSTRACT **Background:** Regional anaesthesia denotes interruption of pain by physiological blockade along their pathway of transmission. Ankle block can be used for all types of foot surgery and is safe and reliable with high success rate.

Aim: This study was conducted to evaluate the role of Ropivacaine and Dexamethasone in providing post operative analgesia using ankle block for foot surgeries in patients receiving general anaesthesia.

Study Design: Prospective Randomized controlled clinical trial.

Patients and Methods: The study was conducted for a period of 1 year. After obtaining approval from the institutional ethical committee and obtaining written informed consent, 40 patients of American Society of Anaesthesiologists physical Status I and II, of either sex, aged 20 to 60 years, scheduled for elective foot surgery under general anaesthesia were enrolled. General anaesthesia was induced in the usual manner, laryngeal mask airway was inserted in a spontaneously breathing patient, and anaesthesia was maintained using inhalational anaesthetic. Ankle block was performed using 20 ml solution containing 18 ml of Ropivacaine 0.75% plus 2 ml of normal saline in Group I and 20 ml solution containing 18ml of ropivacaine 0.75% plus 2 ml of Dexamethasone(8mg) in Group II. The motor block was evaluated by performing the electric nerve stimulation of both the posterior tibial nerves and the deep peroneal nerves and response noted. The success of block was indicated by the absence of motor response. Surgery was started in 30 mins after the block. After recovery from anaesthesia, visual analog score at 1, 4, 6, 12, and 24 h, the time to the first rescue analgesic, and any side effects were noted.

RESULTS: Both the groups were comparable with regards to age, sex, weight, ASA grade, duration of surgery. Pain intensity was significantly lower in dexamethasone group ($P < 0.05$). The time to first rescue analgesic was increased in dexamethasone group (115 ± 5.2 min vs. 76 ± 6.8 min; $P < 0.05$). There were no major complications in both groups.

CONCLUSION: The addition of dexamethasone to ropivacaine decreased postoperative pain intensity with minimal postoperative complication.

KEYWORDS : Ankle block, dexamethasone, foot surgeries, ropivacaine

INTRODUCTION

Local anaesthesia provide longer and localised pain relief when performed under monitored anaesthetic care or general anaesthesia. It is better in terms of patients safety and analgesia, controls intraoperative and postoperative pain, and decrease demand of intravenous sedation(1). The main disadvantage of local anaesthesia is their short duration of action and delayed onset. To overcome this, adjuvants like opioids, clonidine, steroids, alkalinizing agents were tried.(2-4)

Anaesthesia block of peripheral nerves in the foot and ankle is a relatively safe method of providing postoperative analgesia in foot surgeries. The advantages of ankle block are quick patient ambulation, absence of systemic side effects due to medications like opioids and NSAIDS.

A preliminary human studies investigating the analgesic efficacy of dexamethasone added to local anaesthetic agent has been encouraging(5,6). In this study, we hypothesized that the addition of dexamethasone 8 mg to ropivacaine would prolong the duration of analgesia providing better pain relief.

Aims and objectives

To evaluate the role of Ropivacaine and Dexamethasone in providing post operative analgesia using ankle block for foot surgeries in patients receiving general anesthaesia.

Settings and design

Prospective Randomised Controlled Clinical Trial

MATERIALAND METHODS

The study was conducted in Govt. Medical College Jammu for a period of 1 year. After obtaining approval from the institutional ethical committee and obtaining written informed consent 40 patients of ASA 1 and 2, aged 20 to 60 years, of either sex, scheduled for foot surgeries were enrolled for this study.

EXCLUSION CRITERIA

1. Patient's refusal
2. History of bleeding disorder
3. Patient with known allergy to local anaesthetic drug
4. Infection at puncture site
5. Liver and renal disease

The patients were subjected to detailed general physical as well as systemic examination. Basic demographic characteristics like age, weight, sex were noted. The basic investigations were done.

Patients were randomly divided into two groups of twenty patients each. Group assignment was performed by a nurse who did not share in the study.

Group I (ropivacaine group) received local injection of 20 ml of ropivacaine 0.75% (18 ml) and 2 ml normal saline
Group II (dexamethasone group) received local injection of 18 ml of ropivacaine 0.75% plus 2 ml of 8 mg dexamethasone.

All patients were kept fasting overnight(8 hours) prior to surgery. On arrival to the operating room, an intravenous line (20G) was inserted, intravenous Ringer solution was started, and routine monitors were applied in the form of pulse oximetry, electrocardiogram, and non invasive blood pressure. All patients received the same technique of general anaesthesia. Laryngeal mask airway was inserted under the deeper plane of anaesthesia without the use of muscle relaxant with patients breathing spontaneously. Anaesthesia was maintained using inhalational anaesthetic. The entire foot was cleaned with disinfectant and properly draped. The block was done as following:

1. Deep peroneal nerve block: A finger was positioned in the groove between tendons of extensor hallucis longus and extensor digitorum longus. The needle was inserted under the skin and advanced until stopped by bone, at this point, the needle was withdrawn back and 3–4 ml of solution was injected.
2. The posterior tibial nerve was anesthetized by injection just behind the medial malleolus. The needle was inserted and advanced until contacted the bone, then withdrawn and 3–4 ml of solution was injected.
3. The three superficial nerves (superficial peroneal, sural, and saphenous nerves) were blocked using simple circumferential injection of solution subcutaneously. To block the saphenous nerve, a 1.5 inch, 25-gauge needle was inserted at the level of medial malleolus and a "ring" of local anaesthetic is raised from the point of needle entry to the Achilles tendon and anteriorly to the tibial ridge. This was performed with one or two needles insertion; 4 ml of local anaesthetic suffices. To block the superficial peroneal nerve, the needle was inserted at the tibial ridge and extended toward the lateral malleolus. 4 ml of local

anaesthetic were injected subcutaneously. To block the sural nerve, the needle was inserted at the level of the lateral malleolus, and the local anaesthetic was injected toward the Achilles tendon. 4 ml of local anaesthetic was deposited in a circular fashion to raise a skin "wheal."(6,7)

Evaluation of the nerve block under anaesthesia was done by eliciting the motor response to electric nerve stimulation of the posterior tibial nerve and the deep peroneal nerves. The tibial nerve is located posterior to the posterior tibial artery at the level of the medial malleolus. The artery was palpated, and the needle was inserted posterior to the artery. The deep peroneal nerve runs lateral to the dorsalis pedis artery at the level of the foot, the needle was inserted lateral to the artery and nerve stimulation was performed with an electric current of 0.5 mA of 2 Hz frequency and 100 ms pulse width. The absence of all motor responses to electric nerve stimulation indicated success of the block. Surgery was started 30 mins after the block. After recovery from anaesthesia, patient was shifted to the recovery room. No other analgesics were given. The following were measured Visual analog score at 1h, 2h, 4h and 12h

The time to first rescue analgesic (inj. Diclofenac 1.5mg/kg)
Side effects (nausea, vomiting, numbness, tingling, and bruising) were recorded.

STATISTICALANALYSIS

It was performed using (SPSS, version 15, SPSS Inc., Chicago, USA). Data were presented as means and standard deviations. Mann–Whitney U-test were used for continuous data. Student's t-test are used for normal distributed data. In all cases, $P < 0.05$ was considered statistically significant.

RESULTS

Patient's demographics were similar between both groups and differences were not statistically significant. Duration of surgery was almost similar in both groups, and difference was statistically not significant ($P > 0.05$) [Table 1].The pain score was significantly lower in dexamethasone group compared to ropivacaine group at 1, 4, 6, and 12 h during follow-up period[Table 2]. The time of first rescue analgesic dose was significantly prolonged in dexamethasone group (115 ± 5.2 min) compared with ropivacaine group (76 ± 6.8 min; $P < 0.05$)[Table 3]. Postoperatively, a nonsignificant more number of patients in ropivacaine group (four patients) experienced nausea in the first 12 h compared to dexamethasone group (three patients). In addition, vomiting was more in ropivacaine group than dexamethasone (four patients to three patients). Other reported complications were numbness and bruising, and there was no significant difference between groups ($P > 0.05$)[Table 4].

Table 1: Patients characteristics and surgery duration in both group

	Group I (N=20)	Group II (N=20)	P value
Age(years)	34±11	36±11	0.37
Male/Female	8/12	11/9	0.34
Surgery duration(mins)	55±15	57±20	0.6
Weight (kgs)	62±5.2	64±7.3	0.19

Data is presented as mean and standard deviation or number of patients. Group I=Ropivacaine group, Group II=Dexamethasone group,

Table 2: pain score during follow up period

Time (h)	Group I	Group II	P value
1	4.1±5.0	2.5±7.8	<0.05
4	7.3±5.0	4±1.1	<0.05
6	6.5±2.8	4.5±1.5	<0.05
12	5.6±2.2	4.3±1.2	<0.05

*Significance ($P < 0.05$). Group I=Ropivacaine group, Group II=Dexamethasone group.

Table 3: Time to the first rescue analgesic (min)

	Group I	Group II	P value
Time (min)	76 ± 6.8	115 ± 5.2	<0.05

*Significance ($P < 0.05$). Group I=Ropivacaine group, Group II=Dexamethasone group.

Table 5: Postprocedure side effects

	Group I	Group II	P value
Nausea	4	3	0.67
Vomiting	4	3	0.67
Numbness	3	2	0.63
Bruising	2	1	0.54

Data is presented as number of patients. Group I=Ropivacaine group, Group II=Dexamethasone group.

DISCUSSION

Ankle block is a safe and widely used method for providing anaesthesia as well as analgesia for foot surgeries. In order to provide better and prolonged post operative analgesia various adjuvants are added to local anaesthetic solution. The results of this study demonstrated that the addition of dexamethasone to ropivacaine gave a longer duration of analgesia and decreased intensity of pain in postoperative period. The duration of pain relief and pain intensity was markedly prolonged in dexamethasone group. There are several theories to explain this effect, one such theory is upregulation of K+ channels in excitable cell and local action on nociceptor C-fiber mediated by glucocorticoid receptor. This may also be attributed to the anti-inflammatory action of dexamethasone and blocking transmission on nociceptive fiber.(8,9) The results of this study were similar and in agreement with Thi Mum Huynh et al., who reported that addition of dexamethasone for peripheral nerve block prolongs the duration of analgesia without any unwanted effects(13). Another study done by Choi et al., showed that the addition of dexamethasone to local anesthetic increased the duration of analgesia(14). The present study showed that the addition of dexamethasone to ropivacaine reduced overall pain scores and analgesic requirement in postoperative period without any serious adverse effects. Short-term use of dexamethasone is safe as adverse effects with a single dose of dexamethasone are rare and minor in nature. (10,11,12) Dexamethasone is also known to reduce postoperative nausea and vomiting, and its antiemetic is due to anti-inflammatory property of dexamethasone. In our study, a nonsignificant incidence of side effects was observed in the two studied groups.

CONCLUSION

The addition of dexamethasone to ropivacaine in LA infiltration prolonged the postoperative analgesia, decreased post operative pain intensity with minimal complications and side effects.

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