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Research Article

### COMPARISON OF THE EFFICACY OF INTRA-ARTICULAR DEXAMETHASONE, DEXMEDETOMIDINE AND ROPIVACAINE IN POST-OPERATIVE PAIN CONTROL IN PATIENTS UNDERGOING ARTHROSCOPIC SURGERIES OF THE KNEE JOINT

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**Abstract:**

**Objective:** An effective analgesia helps decrease the surgical stress response and expedites recovery. The aim of our study was to compare the effectiveness of three drugs namely dexamethasone, dexmedetomidine and ropivacaine in controlling post-op pain.

**Methodology:** Prospective double blinded study of 75 individuals undergoing arthroscopic knee restorative operation from July 2018 to June 2019, at Services Hospital Lahore, Pakistan randomly divided into three groups. Group 1 received only ropivacaine, Group 2 received ropivacaine and dexmedetomidine and the third group received dexamethasone with ropivacaine. The amount of analgesics administered in the first post-surgical day as well as the time till the first post-op administration was recorded.

**Results:** The time till first postoperative request of analgesia was longest in Group III ( $1370.56 \pm 198.26$  min) compared with Group 2 ( $436.4 \pm 56$ . min) and Group 1 ( $52.49 \pm 64.71$  min) ( $p = 0.04$ ). The mean post-op analgesia given during the first post-operative day was least in group 3 ( $40.4 \pm 29.85$  mg) when compared group 1 ( $241.27 \pm 58.96$  mg) and group 2 ( $157.91 \pm 53.7$  mg) ( $p 0.03$ ).

**Conclusion:** Dexamethasone 317  $\mu$ l/kg (at one point is written 317 and at other 310) is just as safe and reaction-free, but offers improved post-surgical pain control as compared to dexmedetomidine.

**KEY WORDS:** Dexamethasone, Knee, Arthroscopy, Dexmedetomidine, Ropivacaine.

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## INTRODUCTION:

A number of studies have supported the role of dexmedetomidine, magnesium sulphate [1], clonidine [2], morphine [3] and dexamethasone [10] in arthroscopic knee surgeries in reducing post-operative pain and consequently the analgesia needed after the operation. Dexamethasone is a synthetic glucocorticoid that has 30 times higher anti-inflammatory properties as compared to the standard steroid hydrocortisone and zero mineralocorticoid activity. [11] A study suggests that the analgesic effect of steroid is due to blockage of the neuronal impulses in the unmyelinated type C nerve fibres. [4] Dexmedetomidine is a highly specific alpha 2 adrenergic agonist with analgesic and anaesthetic properties through effect on the receptors in brain and spinal cord.

This study aims to compare the efficacy of intra-articular dexamethasone and dexmedetomidine as adjuncts to local anesthetic agent ropivacaine in reducing pain in patients undergoing arthroscopic knee surgeries. [12]

## METHODOLOGY:

Prospective double blindfolded study of seventy five patients undergoing arthroscopic knee restorative procedure from July 2018 to June 2019, at Services Hospital Lahore, Pakistan separated into three groups; Group A (22 ml 0.4% ropivacaine), Group B (18 ml of 0.4% ropivacaine + dexmedetomidine-1µg/kg diluted to four ml) and Group C (dexamethasone 317 µl/kg with 0.4% ropivacaine up to 23 ml). The pain free time duration along with the time of request of a supplementary pain killer were noted. The patients were also observed for any side effects. The research was conducted after an approval by the ethics committee of the said hospital.

Seventy-five ASA I-II individuals of both sexes, aged 19-67 years undergoing knee arthroscopy under spinal anesthesia were randomly assigned to one of the three sets via a computer software.

Patients who did not consent to the research, and those having hypersensitivities to the involved drugs along with pregnant females, lactating mothers, patients below the age of 19 years, liquor addicts,

and those who had taken long pain relieving treatment, had spinal deformities, bleeding diathesis, overlying skin infections and those who had hypertension managed with a-methyl dopa, clonidine or b-adrenergic blockers, or had taken narcotic or non-narcotic analgesics within the previous 1 day were not included in the study. Patients of Group A received intraarticular 22 ml (0.4%) ropivacaine, those in Group B got ropivacaine 0.4% 18 ml in addition to dexmedetomidine 1µg/kg diluted to 4ml, and Group C got dexamethasone 317 µl/kg and ropivacaine 0.4% up to 23 ml. On preoperative rounds, patients were instructed to translate the visual analog scale (VAS) (evaluated from 0=no pain to 14=maximum pain). The injections were labelled by a code; the anaesthetist and surgeon were unaware of the contents of the injections. At the end of the surgery, the drugs were injected into the joint cavity, tourniquet was removed 13 minutes after the injection and a clean pressure dressing was applied. After the surgery, the patients were observed for 24 hours by resident doctors. Diclofenac 75mg IM was given if the VAS was more than 4 and repeated at 8 hour intervals. Tramadol 100mg IV was given if the patient complained of pain even after injection of diclofenac sodium. The time at which first shot of diclofenac was administered as well as the total diclofenac administered during the first 24 hours was noted. The numerical values were expressed as mean ± standard deviation (SD). The p value of 0.05 was considered significant. SSPS version 23 was used for data analysis.

## RESULTS:

As far as the age, gender and body weight are concerned, the patients in the three groups were similar. (Table 1) The patients also underwent similar operative procedures and there was also no significant variation in the duration of the surgery. The time to request of post-operative supplementary analgesia was longest in Group C (1370.56 ± 198.26 min) as compared to Group B (436.4 ± 56 min) and Group A (52.49 ± 64.71 min) (p = 0.04). The total amount of analgesics administered was least in Group C (40.4 ± 29.85 mg), while it was higher for group A (241.27 ± 58.96 mg) and Group B (157.91 ± 53.7 mg) (p 0.03). No notable adverse reactions were observed on the first post-operative day. None of patients in any group required inj tramadol.

**Table 1: Some variables of the patients expressed as Mean ± Standard Deviation.**

Variables	Set 1	Set 2	Set 3	P-value
Age (Years)	43.9 ± 14.41	35.5 ± 10.19	35.9 ± 13.76	0.028
Gender(M/F)	13 / 7	14 / 6	15 / 5	0.039
Mass (Kgs)	65.42 ± 14.81	60.66 ± 6.92	63.6 ± 5.44	0.020
Length of Operation	84.1 ± 30.97	86.32 ± 36.49	96.1 ± 25.03	0.049

**Table 2: Kinds of Arthroscopic Surgeries performed on the three Sets**

Surgical Procedure	Set 1 (n=25)	Set 2 (n=25)	Set 3 (n=25)
ACL reconstruction	1	2	1
PCL Renovation	4	3	4
Medial Meniscectomy	3	4	4
Adjacent Meniscectomy	2	-	1
ACL Reconstruction + Medial Meniscectomy	2	2	3
ACL Reconstruction + Lateral Meniscectomy	1	1	1
ACL Single Bundle Reconstruction	-	1	1
ACL+ PCL Reconstruction	3	2	2
ACL + Adjacent also Medial Meniscectomy	-	2	1
PCL + Adjacent Meniscectomy	2	1	1
Analytical Arthroscopy	1	-	1
ACL Bony Avulsion	2	3	2
PCL Bony Avulsion	-	1	1

**Table 3:**

	Group 1	Group 2	Group 3	P
Time till 1st Post-Operative Analgesia Injection (minutes) (Mean $\pm$ SD)	233.75 $\pm$ 51.5	138.2 $\pm$ 27.83	221.25 $\pm$ 56.93	0.008
Overall Analgesia in 1 day (milligram) (Mean $\pm$ SD)	556.2 $\pm$ 161.10	413.8 $\pm$ 61.50	271.2 $\pm$ 54.3	0.005
Any notable side effects	Nil	Nil	Nil	

**DISCUSSION:**

A single dose of intraarticular dexamethasone during the operation improves the postoperative pain control following arthroscopic knee joint restoration surgery. There was consistently a broader time span until the patient required additional analgesia after the operation limiting the use of the postoperative analgesia[6]. Dexamethasone is therefore safe and acceptable for use in post-knee arthroscopic procedures. Intra-articular dexmedetomidine also proved useful in limiting post-op pain[7]. Studies have exhibited beneficial effects of intraarticular clonidine after in arthroscopic surgeries. To date, no study has found any undesirable effects of intraarticular dexamethasone at a dosage of 310  $\mu$ l/kg in the operations of the knee[8]. Dexamethasone, a potent synthetic glucocorticoid, was previously selected for its essentially lack of mineralocorticoid activity, all in all it gradually looked safe and without untoward side effects.[9]. The effective and longer duration of analgesia with dexamethasone is a direct result of synergistic effect with local anesthetic ropivacaine on the nerve fibers.

**CONCLUSION:**

Dexamethasone 317  $\mu$ l/kg is as safe as dexmedetomidine, but offers improved post-surgical pain control. Consequently, researchers

suggest administration of dexamethasone 317  $\mu$ l/kg intraarticularly in knee arthroscopic procedures.

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