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Research Article

# INTRA-ARTICULAR ROPIVACAINE & CLONIDINE VERSES ROPIVACAINE & DEXMEDETOMEDINE FOR DAY CARE KNEE ARTHROSCOPY, A CLINICAL OBSERVATIONAL STUDY

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## ABSTRACT

Local anaesthesia for day care knee arthroscopy is a well documented procedure that offers several potential advantages over other types of anaesthesia. A combination of local anaesthetics with other adjuvants are practiced. Alpha-2-adrenergic agonists have been used along with local anaesthetics intra-articularly to increase analgesic duration and decrease the need for post-operative analgesics. Dexmedetomidine & Clonidine are two alpha-2-adrenergic agonists in current use. A comparative study between the two compounds in 60 patients was conducted and found that Dexmedetomidine had more efficacy than clonidine in combination with ropivacaine for day care arthroscopy.

**Keywords:** Arthroscopy, Clonidine, Dexmedetomidine, Intra-articular Ropivacaine.

## INTRODUCTION

Knee arthroscopy is a common ambulatory orthopedic procedure performed in day care. The need to adapt to ambulatory surgeries has led to significant changes in anaesthetic techniques & choice of anaesthesia<sup>1</sup>. In day care anaesthetic procedures several issues are considered such as patient safety, procedure time, early ambulation, post-operative analgesia & cost effectiveness.

Local anaesthesia for knee arthroscopy is a well documented procedure that offers several potential advantages over other types of anaesthesia like easy to perform the procedure in day care setup, cost effectiveness, no anaesthesia associated complications. This is confirmed in many controlled studies<sup>2,3</sup>. Alpha-2-adrenergic agonists have been used along with local anaesthetics intra-articularly to increase analgesic duration and decrease the need for post-operative parenteral analgesics.

### AIMS

To compare the combination of inj ropivacaine & clonidine with inj ropivacaine & dexmedetomidine given intra-articularly for

- Good operative conditions
- Reduction in VAS scores
- Duration of analgesia in the immediate post-operative period

## METHODOLOGY

After approval from institutional ethical committee & written informed consent, Sixty patients (45 males & 15 females) with mean age of 33yrs (range 19-50yrs) & ASA I- II physical status were selected for day care knee arthroscopy and randomly allocated to two groups.

Patients with history of sensitivity to local anaesthetics or pre-operative intake of analgesics in preceding 48hrs were excluded from the study.

Surgical interventions included in the study are as follows

- Diagnostic arthroscopy
- Partial menisectomy (both medial & lateral)
- Removal of loose body & osteophyte
- Debridement
- Synovectomy
- Articular trimming.

Patients were randomly allocated to Group A & B respectively.

- **GROUP A:** Inj Ropivacaine 0.75% 30ml + inj Clonidine 1mcg/kg
- **GROUP B:** Inj Ropivacaine 0.75% 30ml + inj Dexmedetomidine 1mcg/kg
- Assessment of pain done pre-operatively before the procedure by visual analogue scale (VAS) & technique of the procedure explained to the patient.

- Under strict aseptic precautions area around the operative site is painted with povidine -iodine.& draped.
- Skin infiltration with 3ml of 0.75% ropivacaine done at two entry sites of intra -articular injections.
- 30ml of intra-articular injections were given according to the group assigned.
- 30 minutes after the injection surgeon was allowed to passively mobilise the limb.
- VAS scores were recorded intra-operatively every hourly for 24 hours
- VAS scores >5 or for break through pain, parenteral analgesics inj diclophenec sodium 75mgs IM recommended.
- Average operating time =29.2mts (range-12-75mts).

**THE FOLLOWING TECHNIQUAL TIPS WERE EMPLOYED FOR A SUCCESSFUL BLOCK**

- **Injection of local anaesthetic:** During injection of local anaesthetic to portal sites precautions were taken to inject majority of the drug into the sub-cutaneous layer instead of sub-capsular layer, otherwise the fat pad will be pushed into the joint making initial visualisation difficult.
- **HAEMOSTASIS:** Tourniquet is not necessary for experienced surgeon, but if bleeding makes visualisation difficult inj adrenaline 1;10,000-10ml mixed into 3 liters of irrigation fluid usually the first bag was used to secure haemostasis.
- **PATIENT COMFORT :** pain experienced at the time of injection of local anaesthetic was more severe than pain experienced during the surgical procedure.To minimize this pain the portal sites were infiltrated with local anaesthetic before intra-articular injections were made.

**RESULTS**

Both the groups provided satisfactory surgical operative field. All the patients of both groups had a VAS score less than their pre-operative scores following intra-articular injection (except a case of medial miniscal tear which required general anaesthesia). Group B had a statistically significant lower VAS score (0.32) than Group A (1.6) following intra-articular injection. Group B showed a gradual increase in VAS scores hourly where as Group A showed a steep increase in VAS scores (as shown in the graph) which suggests more effective analgesia in Group B patients.

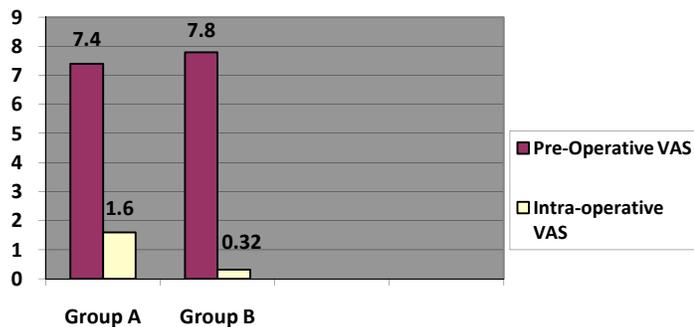


Figure 1: Comparison of mean VAS values of the groups intra-operatively

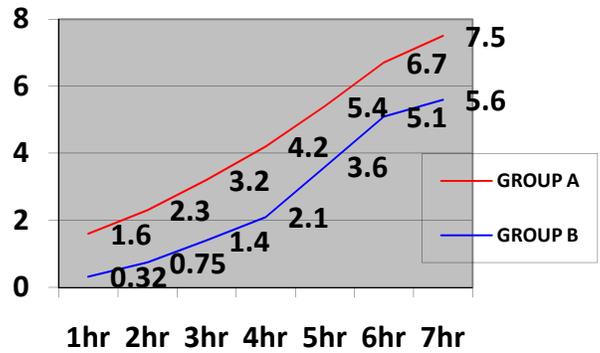


Figure 2: Comparison of mean VAS values of the groups hourly

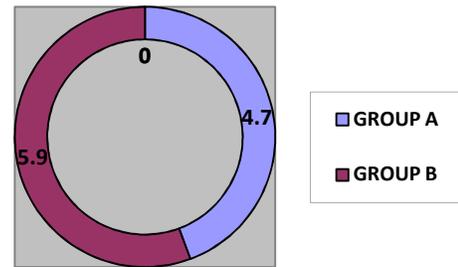
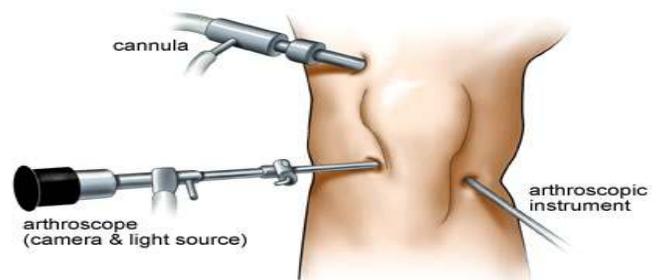


Figure 3: Duration of analgesia (hrs)



**DISCUSSION**

In an attempt to improve the recovery & early rehabilitation after day care knee surgery research has been directed towards developing newer techniques for providing anaesthesia & analgesia . Arthroscopic knee surgery is the commonest day care surgical procedure done & many of the procedures can be performed successfully by intra-articular injections<sup>4</sup>. Local anaesthetics like Lidocaine , Bupivacaine ,& opioids like morphine, alpha-2 adrenoreceptor agonists like Clonidine & magnesium sulfate have been used intra-articularly alone or in combination to provide effective pain relief. In the present study inj Ropivacaine in combination with inj Clonidine or Dexmedetomidine is injected intra-articularly to provide anaesthesia & analgesia. Ropivacaine is a new amide local anaesthetic that blocks peripheral afferents by acting on voltage dependent Na+

channels. It has similar pharmacokinetic properties as bupivacaine but different pharmacodynamic & toxicity profile. By virtue of its molecular weight being lower than bupivacaine (rop 262 vs bupi 288) ropivacaine can be used in higher concentrations to achieve higher clinical efficacy.<sup>5</sup>

Plasma concentration of ropivacaine has been studied by Convery et al<sup>6</sup> and they found that for all patients & all doses (100-200mg) are below the estimated toxic thresholds & therefore can be safely administered intra-articularly.

Clonidine alpha<sub>2</sub> adrenoceptor agonist acts on alpha<sub>2</sub> adrenergic pre-synaptic receptor and inhibits the release of nor-epinephrine at peripheral afferent nociceptors. & also inhibits conduction of nerve signals through C & A-delta fibres. It also stimulates the release of enkephalin like substances at peripheral sites. The analgesic effect of clonidine is mediated via modulation of opioid-analgesic pathway.<sup>7</sup>

Dexmedetomidine, a highly selective alpha<sub>2</sub> adrenoceptor agonist binds eight times more avidly than clonidine. Mechanism of action is the same as clonidine.<sup>8</sup>

Study conducted by S Paul & associates showed that total consumption of parenteral analgesics (inj fentanyl citrate) in the post-operative period was significantly less in group RD (ropivacaine + dexmedetomidine combination) compared with group R (only ropivacaine). The authors concluded that dexmedetomidine added as adjunct to ropivacaine in patients undergoing arthroscopic knee surgery improved the quality & duration of post-operative analgesia.<sup>4</sup>

Adverse effects such as nausea & vomiting was seen in only two patients, which was adequately treated by inj ondansetron 4mg & one patient developed bradycardia during the procedure treated with inj atropine 0.6mg. No significant difference among incidence of adverse effects in both the groups.<sup>9</sup>

## CONCLUSION

Dexmedetomidine administered as adjunct to local anaesthetic ropivacaine improves the quality of anaesthesia & duration of post-operative analgesia when compared with ropivacaine & clonidine combination. Requirement of parenteral analgesics in the immediate post-operative period was reduced.

This method is a safe, reliable, inexpensive & practical alternative to other types of anaesthesia for day care knee arthroscopy.

Considering the benefits with local anaesthetic + adjuvant combination, we suggest anesthesiologists & surgeons to re-examine their current clinical practice for day care knee arthroscopy.

## LIMITATION OF OUR STUDY

Sample size not large enough to provide new information on the incidence of less common side effects due to intra-articular injections.

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