PRE-EMPTIVE EFFECT OF INTRAVENOUS PARACETAMOL VERSUS INTRAVENOUS KETOROLAC ON POST-OPERATIVE PAIN AND SHIVERING AFTER SEPTOPLASTY UNDER GENERAL ANESTHESIA: A COMPARATIVE STUDY

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ABSTRACT

Objective: To observe the pre-emptive effect of intravenous paracetamol versus intravenous ketorolac in preventing post-operative shivering and pain after septoplasty in postoperative care unit.

Study Design: Prospective comparative study.

Place and Duration of Study: Main Operation Theatre of Frontier Corps Hospital Quetta, from Sep to Dec 2019.

Methodology: After ethical committee approval, 90 American Society of Anaesthesiologist (ASA-I patients, aged between 18-45 years, scheduled for septoplasty, were recruited and divided into three equal groups, Paracetamol (PA), Ketorolac (KE) and Placebo (PL) as per computer generated table. The paracetamol (PA) group (n=30) received 1gm intravenous paracetamol, ketorolac (KE) group (n=30) received 30mg intravenous ketorolac and group placebo (PL) received 100ml normal saline, 20 minutes before completion of surgery. Postoperative shivering and pain was assessed via four-point scale and visual analogue scale (VAS) respectively, in post-anesthesia care unit at 10 and 30 minutes post-extubation.

Results: Mean visual analog scale (VAS) score in paracetamol group was 2.7 ± 1.41, ketorolac group was 2.3 ± 1.24 and in placebo group was 3.6 ± 1.44, with a p-value of 0.002. Mean four point shivering score in paracetamol group was 0.3 ± 0.55, ketorolac was 0.7 ± 0.78 and placebo group was 1.4 ± 1.00, with a p-value of <0.001.

Conclusion: The effect of paracetamol is better than ketorolac in preventing pain and shivering after septoplasty under general anesthesia.

Keywords: Ketorolac, Pain, Paracetamol, Pre-emptive, Shivering.

INTRODUCTION

Pain and shivering are one of the most common complications after surgeries under general anesthesia. Effective postoperative pain management is an essential component of enhance recovery after surgery. Persistent uncontrolled pain and shivering may adversely affect the body's endocrine, cardiovascular, immune, neurologic and musculo-skeletal systems. Poorly controlled acute postoperative pain and shivering are associated with increased morbidity, functional and quality-of-life impairment, delayed recovery time, prolonged duration of opioid use, and higher healthcare costs.

Septoplasty is one of the commonly performed ENT procedure. Post-operative pain or tenderness occurs on the front of the nose due to stuffiness and swelling. It is associated usually with mild to moderate post-operative pain. Multimodal analgesia is an effective method, to improve peri-operative analgesia with reduced dosage and limited side effects.

There is a wide range of analgesic agents used to control post-septoplasty pain e.g. Non steroidal anti-inflammatory drugs (NSAIDS), opioids, intravenous paracetamol, dexametomidine. Among all, paracetamol and ketorolac have been widely used for mild to moderate pain post-operatively. Ketorolac is an NSAID (non-steroidal anti-inflammatory drug), commonly use in peri-operative pain management but should be avoided in bleeding diathesis and renal dysfunction. The analgesic effect of ketorolac is comparable to other analgesic drugs like pethidine, morphine, or pentazocine in previous studies for postoperative pain management.

Intravenous paracetamol (acetaminophen) is commonly used for peri-operative pain management. Phenacetin is an active metabolite of paracetamol and has central analgesic action is via inhibiting cyclooxygenases, doesn’t effect coagulation or renal functions like NSAIDs and its side effects are extremely rare (<1/10,000).

The rationale of this study was to compare the pre-emptive effect of intravenous paracetamol versus intravenous ketorolac in preventing postoperative pain and shivering after septoplasty.

METHODOLOGY

It was a prospective comparative study, conducted at Main Operation Theater of Frontier Corps
Hospital Quetta, from September to December 2019, 90 ASA-I patients were selected via non-probability consecutive sampling. Inclusion criteria included patients of American Society of Anesthesiology Score (ASA-1), of either gender with age between 18-45 years, scheduled for septoplasty. Patients with ASA Score more than 1, history of allergy to the study drugs and not given consent were excluded from the study.

After approval of ethics committee, 90 patients (for sample size, data from previous similar studies were taken into consideration), sample of 90 patients were divided into three equal groups by random allocation. The paracetamol (PA) group (n=30) received 1gm intravenous paracetamol, ketorolac (KE) group (n=30) received 30mg intravenous ketorolac and group placebo (PL) received 100ml normal saline 20 minutes before completion of surgery. All drugs were issued by hospital pharmacy in a sealed box and handed over to anesthetist, who was unaware of the drug formulation. The anaesthesia was induced with propofol 2mg kg−1, nalbuphine 0.1 mg/kg and atracurium 0.5mg/kg. It was maintained with isoflurane 1.5% and air 50% in oxygen. Axillary temperature was measured immediately 10 min after induction. An investigator, blinded to the treatment group, graded postoperative shivering using a 4-point scale (table-I) and postoperative pain using a visual analogue scale (VAS) (figure) ranging between 0-10, at 10 and 30 minutes post-extubation in post-anesthesia care unit.

| Score | Definition | Table-I: Post-operative 4 point shivering scale. |
|-------|------------|-----------------------------------------------|
| 0     | None: no shivering noted on palpation of the masseter, neck, or chest wall |
| 1     | Mild: shivering localized to the neck and/or thorax only |
| 2     | Moderate: Shivering involves gross movement of the upper extremities (in addition to neck and thorax) |
| 3     | Severe: Shivering involves gross movements of the trunk and lower extremities |

Table-II: Comparison of mean age, shivering score and visual analog scale score among groups.

| Group  | Age | Shivering | p-value | Pain (VAS) | p-value |
|--------|-----|-----------|---------|------------|---------|
| Paracetamol | Mean ± SD | 25.53 ± 3.46 | 0.36 ± 0.55 | <0.001 | 2.73 ± 1.41 | 0.002 |
| n | 30 | 30 | 30 |
| Ketorolac | Mean ± SD | 25.90 ± 4.12 | 0.73 ± 0.78 | 2.36 ± 1.24 | 30 |
| n | 30 | 30 | 30 |
| Placebo | Mean ± SD | 31.96 ± 3.48 | 1.46 ± 1.00 | 3.60 ± 1.42 | 30 |
| n | 30 | 30 | 30 |

Data was recorded on a pre-designed structured Performa which were analyzed by using SPSS-16 for may be prevented or treated by different techniques such as intravenous pethidine, clonidine, tramadol, do-

Figure: Visual analog scale (VAS) for Pain.
Ketorolac is a potent nonsteroidal anti-inflammatory drug (NSAID), when administered for acute and chronic pain management. NSAIDS are cyclooxygenase inhibitor and they effectively reduced postoperative pain. They provide preemptive analgesia, like lornoxicam is used effectively in the management of post-septoplasty pain. Maximum plasma concentrations are achieved in 45-50 minutes with peak analgesic effects in 1-2 hours following intramuscular injection. The efficacy of ketorolac, in emergency management, has been demonstrated and it has no sedative effect as it is a non-opioid medication, which is a main concern in management of emergency department. The mechanism to prevent shivering in NSAIDs is either through reduction of perioperative pain or by inhibiting the release of vasoconstrictor and pyrogenic cytokines. Unlike opioids, ketorolac neither has respiratory depressant effect nor it has other side-effects such as nausea, pruritis and constipation etc. According to Khezri et al, there was no significant difference between meperidine and ketorolac groups in terms of prevalence of shivering, although both groups were different from the placebo group ($p<0.04$). Among recent randomized controlled trials, 12 out of 14 were in favor of using intravenous paracetamol for perioperative analgesia. Its routes of administration can be oral, rectal, intramuscular and intravenous. Mode of excretion occurs through liver via conjugation. Its peak of action is achieved at 1 hour and duration of action is of 4-6 hours.

Kela et al, compared paracetamol and tramadol and found comparable results i.e. 10.0% of paracetamol group and 13.3% out of total cases in tramadol group suffered nausea and vomiting. Aghamir et al, compared tramadol and propacetamol in open urological procedures and found propacetamol effective in mild to moderate pain but not adequate for severe pain while Akcali et al, on extracorporeal shockwave lithotripsy patients, compared the efficacy of tramadol, paracetamol and lornoxicam and found same efficacy in all three drugs. Cattabriga et al, in study on postoperative median sternotomies, compared tramadol and paracetamol and found paracetamol, more effective than tramadol.

Kossick et al, reviewed multiple studies and concluded that for pediatric surgical patients 15 years of age and younger, ketorolac was not found to improve discharge times, decrease the incidence of unplanned hospital admissions, or cut down on total opioid consumption. In the study Heo et al, compared the analgesic efficacy of 8 g of propacetamol and 180 mg of ketorolac as a PCA dose. Despite the relatively low dose of propacetamol, as compared to that of ketorolac, the analgesic efficacy of the propacetamol group was comparable to that of the ketorolac group in postoperative patients using patient-controlled analgesia with fentanyl. This suggests that propacetamol is effective when used for the management of postoperative pain and combined with fentanyl PCA.

**CONCLUSION**

The effect of paracetamol is better than ketorolac in preventing pain and shivering after septoplasty under general anesthesia.

**CONFLICT OF INTEREST**

The study has no conflict of interest to be declared by any author.

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**Table-III: Comparison of shivering score and visual analog scale score among groups.**

| Four Point Shivering Score | Paracetamol | Ketorolac | Placebo | $p$-value |
|----------------------------|-------------|-----------|---------|-----------|
| No Shivering               | 30 (22.2)   | 14 (15.6) | 6 (6.7) | <0.001    |
| Mild                       | 9 (10)      | 10 (11.1) | 9 (10)  |           |
| Moderate                   | 1 (1.1)     | 6 (6.7)   | 10 (11.1)|           |
| Severe                     | -           | -         | 5 (5.6) |           |
| Mean ± SD                  | 0.3 ± 0.55  | 0.7 ± 0.78| 1.4 ± 1.0|           |

| Visual Analog Scale        |             |           |         |           |
|----------------------------|-------------|-----------|---------|-----------|
| Mild                       | 26 (28.9)   | 25 (27.8) | 15 (16.7)| 0.002     |
| Moderate                   | 3 (3.3)     | 5 (5.6)   | 14 (15.6)|           |
| Severe                     | 1 (1.1)     | -         | 1 (1.1) |           |
| Mean ± SD                  | 2.7 ± 1.41  | 2.3 ± 1.24| 3.6 ± 1.44|           |
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