

A comparative evaluation of per rectal diclofenac sodium and paracetamol for postoperative analgesia in case of hydrocephalus

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Abstract

Background: Hydrocephalus is one of the most painful conditions, especially in pediatric population. Analgesia after neurosurgery requires good communication and close cooperation between members of the perioperative team. Diclofenac is a nonsteroidal anti-inflammatory drug with pronounced antirheumatic, anti-inflammatory, analgesic, and antipyretic properties. Diclofenac inhibits prostaglandin synthesis, which contributes to inflammation, pain, and fever. Paracetamol produces analgesia and antipyresis by a mechanism similar to that of salicylate, which involves inhibition of prostaglandin synthesis.

Objectives: To compare the analgesic efficacy of rectally administered diclofenac sodium and paracetamol postoperatively in patients with hydrocephalus for postoperative pain relief. Also, to compare side effects of both the drugs.

Materials and Methods: Fifty patients aged 1–8 years scheduled for ventriculoperitoneal shunt under general anesthesia were selected for the study. All the patients were divided into two groups, Group D and Group P. At the end of surgery, 15 min before extubation, patients of Group D were rectally administered with inj. diclofenac 1 mg/kg whereas those of Group P with inj. paracetamol 15 mg/kg. Pain was assessed using Wong–Bakr Faces Pain Rating Scale (WBFPS). When the score was 4 or more, then inj. paracetamol 15 mg/kg was administered intravenously as rescue analgesia. Patients were also observed for duration and analgesia. We have also compared hemodynamic parameters and complications in both the groups postoperatively.

Results: Heart rate and SpO₂ were stable in after the operation. Pain score on WBFPS was statistically nonsignificant between both the groups. Duration of analgesia was significantly longer in Group D than in Group P. Incidence of side effects and complications were also comparable in both the groups.

Conclusion: We conclude that both paracetamol and diclofenac are very well tolerated by rectal route with prolonged duration of analgesia with diclofenac for postoperative pain relief in pediatric patients with hydrocephalus.

KEY WORDS: Diclofenac, paracetamol, perrectal, ventriculoperitoneal shunt

Introduction

Hydrocephalus is defined as the disturbance of formation, flow, or absorption of cerebrospinal fluid (CSF) that leads to an increase in volume occupied by this fluid in the central nervous system. It can be acute, subacute, or chronic. Pain after any pediatric surgery is a very challenging issue for both the

pediatrician and the anesthetist. Hydrocephalus is one of the most painful conditions, especially in pediatric population. Analgesia after neurosurgery requires good communication and close cooperation between members of the perioperative team.^[1,2]

Nausea, vomiting, and respiratory depression are the important side effects commonly associated with opioids, which is very much distressing for both parents and doctors. Addition of nonsteroidal anti-inflammatory drugs (NSAIDs) for moderate to severe postoperative analgesia instead of using opioids may reduce the incidence of side effects and provide better quality of analgesia.^[1]

Diclofenac is an NSAID with pronounced antirheumatic, anti-inflammatory, analgesic, and antipyretic properties. Diclofenac inhibits prostaglandin synthesis, which contributes to inflammation, pain, and fever. Paracetamol produces analgesia and antipyresis by a mechanism similar to that of salicylate, which involves inhibition of prostaglandin synthesis.^[3]

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The purpose of this study was to compare the analgesic efficacy of rectally administered diclofenac sodium and paracetamol postoperatively in patients with hydrocephalus for postoperative pain relief. We also wanted to compare side effects of both the drugs.

Materials and Methods

After institutional ethical committee approval and written informed consent, 50 patients aged 1–8 years scheduled for ventriculoperitoneal (VP) shunt under general anesthesia of ASA I and II grade were selected for the study. All the patients were divided into two groups, Group D and Group P, through computerized randomization.

All the patients were premedicated with inj. ondansetron 0.08 mg/kg, inj. glycopyrrolate 0.004 mg/kg, and inj. midazolam 0.02 mg/kg intravenously (i.v.). They were preoxygenated followed by induction with inj. thiopentone 3–5 mg/kg and inj. succinylcholine 1–1.5 mg/kg followed by oral intubation by performing direct laryngoscopy. All the patients were maintained on O₂ + N₂O 50–50% with sevoflurane 1–2% with inj. atracurium 0.5 mg/kg bolus followed by maintenance with 0.1 mg/kg i.v. At the end of surgery, 15 min before extubation, patients in Group D were rectally administered with inj. diclofenac 1 mg/kg whereas those in Group P with inj. paracetamol 15 mg/kg. Then the patients were reversed with inj. neostigmine 0.05 mg/kg and inj. glycopyrrolate 0.008 mg/kg. All the patients were then shifted to recovery room. Pain was assessed using Wong–Baker Faces Pain Rating Scale (WBFPS). When the score was 4 or more, then inj. paracetamol 15 mg/kg was administered i.v. as rescue analgesia. Patients were also observed for duration and analgesia. We have also compared hemodynamic parameters and complications in both the groups postoperatively.

Statistical Analysis

Data were analyzed using GraphPad Prism, version 6.0, and data were represented in terms of mean ± SD and percentage.

Results

Fifty patients recruited for the study were compared in terms of age, weight, sex, ASA grade, and duration of surgery, which was statistically not significant between two groups ($P > 0.05$) [Table 1].

Table 1: Demographic profile

	Group D	Group P	P-value
Age (years)	3.8 ± 0.12	3.7 ± 0.23	>0.05
Weight (kg)	13.3 ± 0.7	13.9 ± 1.1	>0.05
Sex (M/F)	18/7	17/8	>0.05
ASA grade (I/II)	14/11	15/10	>0.05
Duration of surgery (min)	96.7 ± 12.4	97.9 ± 11.9	>0.05

We have not observed any significant difference in heart rate and SpO₂ in both the groups ($P > 0.05$) [Figure 1]. We have also compared pain score as per WBFPS and it was statistically nonsignificant whereas duration of analgesia was significantly better with diclofenac than with paracetamol [Table 2].

Side effects and complications were also comparable in both the groups [Figure 2].

Discussion

Hydrocephalus is usually the result of obstruction to CSF flow. The etiology may be congenital as in Arnold–Chiari malformation, or acquired as in brain tumors or intraventricular hemorrhage.^[3] Incidence of congenital hydrocephalus is about

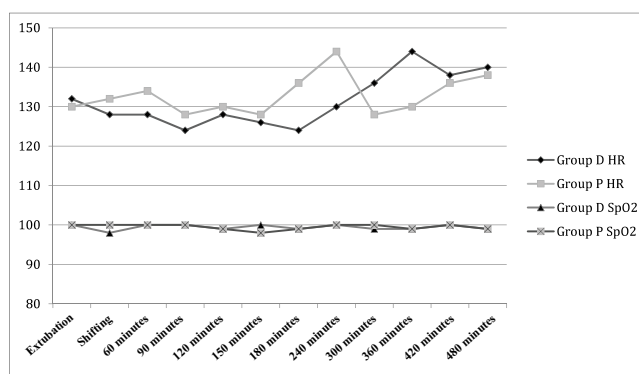


Figure 1: Hemodynamic parameters (heart rate and SpO₂).

Table 2: Pain profile

	Group D	Group P	P-Value
Pain on WBFPS	3.9 ± 0.82	3.76 ± 0.76	>0.05
Duration of analgesia	5.3 ± 0.162	3.9 ± 0.178	<0.05

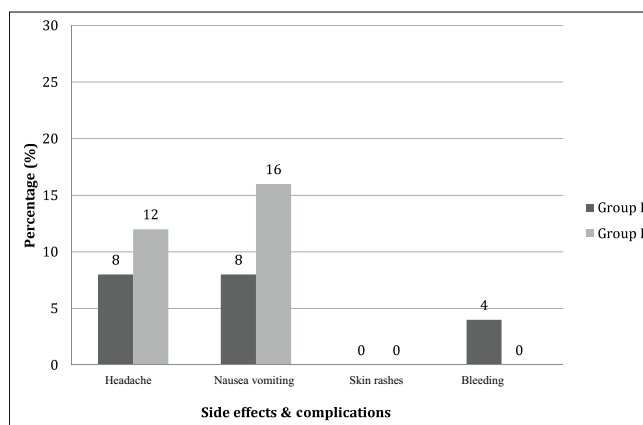


Figure 2: Side effects and complications.

0.2–0.5/1000 live births.^[2] A higher incidence has been reported in elderly primi mothers. It can be associated with a variety of physiological and pathological conditions.^[4,5] Obstruction at any point along the CSF pathway may result in hydrocephalus. Traditionally, the obstruction may be within the ventricular system, resulting in noncommunicating hydrocephalus or the impairment of circulation is through the subarachnoid space or defective absorption in the venous system, resulting in communicating hydrocephalus. So our aim to provide analgesia in the pediatric patients planned for VP shunt with perrectal diclofenac versus perrectal paracetamol.

With advanced studies in perioperative pain, emphasis is on combined pharmacological approaches (multimodal therapy). Simultaneous use of centrally acting and peripherally acting analgesics has better response in pain management than in either class of drug used alone.^[6] In previous studies, not much research was done in postoperative analgesia with earlier-mentioned drugs and routes. No study was performed yet regarding postoperative analgesia in patients with hydrocephalus. Thus, we have compared these two drugs through rectal route for postoperative analgesia in patients with hydrocephalus. It has been shown in some studies that topical application of NSAIDs modifies the inflammatory response of ultraviolet irradiation^[7,8] and reduces local edema and erythema after burn injuries.^[9] Postoperative pain is associated with grave psychological trauma, resulting in a restless and uncooperative patient.^[9] We preferred the prior use of NSAIDs so as to prevent the onset of pain, contributing to psychological well-being, comfort, and improvement in the general condition of the patient. Mean duration of postoperative analgesia was comparable between both the groups.

Baer et al.^[10] compared the effects of rectally administered diclofenac sodium with those of paracetamol and concluded that diclofenac for pain relief after adenoidectomy is safe and effective. Tawalbeh et al.^[11] also compared rectally administered diclofenac and paracetamol for postoperative pain relief in patients who underwent adenotonsillectomy. They concluded that both diclofenac and paracetamol provide better pain relief with fewer side effects, especially diclofenac. Bhagat et al.^[12] also compared perrectal diclofenac in comparison with control group, and they concluded that the use of preoperative rectal diclofenac has substantial effect as an adjunct intraoperative analgesic. It considerably delays the onset of postoperative pain and is adequate as a sole analgesic for early postoperative period.

Incidence of nausea and vomiting was also comparable between two groups. Standing et al.^[13] concluded that paracetamol is very well tolerated by younger population, such as patients below the age of 2 years, as compared to diclofenac. We have also observed similar results in our study.

Conclusion

We conclude that both paracetamol and diclofenac are very well tolerated by rectal route with prolonged duration of analgesia with diclofenac for postoperative pain relief in pediatric patients with hydrocephalus.

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