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INTRAOPERATIVE DICLOFENAC FOR POST-ADENOIDECTOMY ANALGESIA IN SMALL CHILDREN

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ABSTRACT

We investigated the analgesic effect of intra-operative intravenous diclofenac in a randomized, double blind placebo-controlled paralled group study after adenoidectomy in 150 children aged 1-7 years.
A standard anaesthetic method was used and all children received oral diazepam as premedication. Anaesthesia was induced with thiopentone and maintained with halothane and nitrous oxide in oxygen with controlled ventilation.
Children in the diclofenac group received 1mg/kg i.v. after induction of anaesthesia followed by an infusion of diclofenac 1mg/kg over 2 hours. Children in the placebo group received 0.9% saline.
At the end of procedure the children were transferred to the recovery room for continuous monitoring of vital signs and assessment of pain.
Standard deviation, means, ranges and students't-test statistics were used for data analysis. Worst pain observed in the recovery room was lower in the diclofenac group both at rest and during swallowing.
It was therefore concluded that intravenous diclofenac given intra-operatively has analgesic effect in the immediate post-operative period and it is recommended for small children during adenoidectomy.

Key Words: Adenoidectomy, pain, post-operative, diclofenac.

INTRODUCTION

Adenoidectomy is one of the most common surgical procedures in childhood. Frequently it is carried out as a day-case operation and children should be pain free and alert when leaving hospital.

Opioids provide effective analgesia, but also have known side effects such as emesis, sedation and risk of respiratory depression. These adverse effects restrict the use of opioids after day-case surgery.
The use of non-steroidal anti-inflammatory drugs (NSAIDS) has been shown to reduce the need for opioids after operation in children[1].

Diclofenac is a non-steroidal anti-inflammatory drug with potent anti-inflammatory and antinociceptive activity. Antinociception by NSAIDS has traditionally been attributed to peripheral tissue cyclo oxygenase inhibition with inhibition of prostaglandin biosynthesis. However the antinociceptive effect seems to have a central nervous component observed after visceral noxious stimuli, which probably indirectly involves the opioid system, the N-methyl D- aspartate receptor, and the nitric oxide generating system, which is reduced by the descending 5-hydroxytryptamine modulation of nociceptive transmission at the spinal level[2-6]. In addition to its ability to block cyclooxygenase, diclofenac has a direct effect on hyperalgesia that seems to be independent of central or peripheral opioid effects[7].

The aim of this study was to investigate the analgesic effect of intravenous diclofenac after adenoidectomy in children aged 1-7 years. The significance of the study lies in the improvement in post-operative pain management in children after day-case adenoidectomy.

PATIENTS AND METHODS

The study was approved by the ethics committee of University of Nigeria Teaching Hospital Enugu and the parents gave written informed consent.
We studied 150 patients, ASA 1 or 11 (ASA = American Society of Anesthesiologists), aged 1-7 years undergoing adenoidectomy. Patients were excluded if they had a known allergy to diclofenac or other NSAID, asthma, kidney or liver dysfunction or haemorrhagic diathesis.
A randomized, double-blind, placebo-controlled, parallel group study design was used. Children were allocated randomly to either the diclofenac or placebo group. After induction of anaesthesia children in diclofenac group received diclofenac 1mg/kg dissolved in 10ml of normal saline injected intravenously over 10 minutes as a loading dose followed by an infusion of diclofenac 1mg/kg dissolved in 40ml of normal saline over 2 hours

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using a PerfusorF (B.BRAUN.GERMANY). Children in the placebo group received 10ml of normal saline over 10 minutes as a loading dose followed by an infusion of normal saline at the rate of 0.3-0.4ml/minute.

A standard anaesthetic technique was used in all the children. Each child was premedicated with diazepam 5mg/kg orally 30 minutes before induction of anaesthesia.

Anaesthesia was induced with thiopenthone 5mg/kg and tracheal intubation was facilitated with suxamethonium chloride 1mg/kg. Anaesthesia was maintained with halothane 0.5vol. percent and 30 percent nitrous oxide in 70% oxygen. Pancuronium 0.1mg/kg was used to provide muscle relaxation for controlled ventilation.

At the end of the procedure neuromuscular blockade was antagonized with neostigmine 0.06mg/kg and atropine 0.02mg/kg. The children were then transferred to the recovery room for continuous monitoring of vital signs and assessment of pain.

Post-operative pain was assessed by the maunuksela score[8]. The maunuksela score is an observer assessment based on mimic, vocalization, movement or rigidity of the limbs and body, response to handling and irritability, together with measured cardiorespiratory variables. In the modified score 0 = "no pain", 1-3 = "slight pain", 4-6 = "moderate pain", 7-9 = "severe pain", and 10 = "worst possible pain".

One of the authors assessed the pain experienced by the child at rest and during swallowing. When leaving hospital, pain was assessed by nurses using an observer-dependent children's and infants post-operative pain score (CHIPPS)[9] which resembles the Maunuksela score.

RESULTS

The results of the findings are presented in tables as means, standard deviations and ranges.

There were no differences between the two groups in sex distribution, age, weight and American Society of Anesthesiologists (ASA) status (table 1).

There were no differences between the two groups in Maunuksela pain scores 1 hour after operation in the recovery room (table 2). Two hours after surgery pain scores during swallowing in the diclofenac group (0.8 (1.7) were lower compared with the placebo group (2.0 (2.6), ($p = 0.065$).

At rest the difference between the groups was not significant ($p = 0.065$).

At discharge there was no difference in pain scores between the groups.

Table 1: **Patient Data for the Two Groups (Means (SD) and (Ranges)**

	Diclofenac (n=74)	*Placebo (n=76)*
Sex (M/F)	50/24	51/25
Weight (kg)	16(5) (10-32)	16(5) (931)
Height (cm)	97(16) (75-140)	97(16) (75-135)
Age (months)	38(12-111)	40(10-95)
ASA (1/11)	**70/4**	**72/4**

Table 2: **Maunuksela Pain Score in the Recovery Room (Means) (SD) (Range)**

	Diclofenac	*Placebo*
After 1h	1.2 (2.4) (0-9)	0.437
At rest	2.8 (2.9) (0-9)	0.923
Swallowing		
After 2h		
At rest	0.4 (1.5) (0-9)	0.065
Swallowing	0.8 (1.7) (0-7)	0.006
At Discharge		
At rest	0.2 (0.5) (0-3)	0.399
Swallowing	0.4 (0.8) (0-3)	0.432

DISCUSSION

In day-case surgery in children it is important that parents feel safe to leave the hospital with their children. Therefore, a child should be as free from pain as possible. In this study we have shown that intraoperative diclofenac i.v. followed by constant (0.3 0.5 ml/min.) infusion over 2 hours reduced post operative pain in the recovery room.

Two hours after adenoidectomy children in the diclofenac group has significantly less pain than children in the placebo group during swallowing. At rest the diclofenac group also has less pain, but the difference was not seen one hour after operation. These results indicate a relatively slow onset of the analgesic effect of intravenous diclofenac. This has been shown also with other analgesics which act via inhibition of prostaglandin biosynthesis[10].

The results of this study agree with the results of other workers who documented the analgesic efficacy of NSAIDA[11-15].

Splinter and colleagues showed that preoperative use of ketorolac 1mg/kg increased intra-operative bleeding in children with tonisllectomy[16]. In our study of children with adenoidectomy there was no difference in blood loss in the two groups. In all the children haemostasis was maintained with nasopharyngeal packs. None of the children experience post-operative bleeding, which would have required intervention or delay in discharge from hospital.

Diclofenac administration may theoretically increase post-operative bleeding risk[17,18].

Prospective studies, however, have not shown an increase in the risk of post-operative haemorrhage with treatments lasting less than five days started during or after operation.[11,19]

We found no evidence of side effects from the short-term administration of diclofenac. We excluded patients with a known contraindication to NSAIDS, such as allergy to NSAIDS, asthma, kidney or liver dysfunction or haemorrhagic diathesis.

In conclusion, this work has demonstrated that diclofenac given intravenously during operation can reduce post-operative pain in the recovery room.

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