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A COMPARISON OF DIFFERENT DOSES OF SUFENTANIL COMBINED WITH FLURBIPROFEN AXETIL IN POSTOPERATIVE ANALGESIA FOR CHILDREN UNDERGOING INNOMINATE OSTEOTOMY IN CHINA

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Summary

To evaluate the analgesic efficacy of different doses of sufentanil combined with flurbiprofen axetil in children undergoing innominate osteotomy. Ninety children scheduled for elective innominate osteotomy under general anesthesia were enrolled and randomly divided into 3 groups. All the children received 1mg/kg flurbiprofen axetil intravenously before skin incision for pre-emptive analgesia. Patient Controlled Intravenous Analgesia (PCIA) was started at the end of the operation with the following composition: Sufentanil 1.5 g/kg and ondansetron 0.1 mg/kg in 0.9% NS 100ml (Group N1) sufentanil 2.0 g/kg and ondansetron 0.1 mg/kg in 0.9% NS 100ml (Group N2) and sufentanil 2.5 g/kg and ondansetron 0.1 mg/kg in 0.9% NS 100ml (Group N3). FLACC scores and Ramsay sedation scores were recorded at 2, 4 ,8 ,12 ,24 and 36h after the operation;the PCA button press number and side effects were observed and recorded. FLACC scores in group N1 were higher than group N2 and N3 (p<0.05).Ramsay scores in group N1 were lower than group N2 and N3 (p<0.05).There were no significant differences in FLACC scores and Ramsay scores between group N1 and N2 (p> 0.05).The incidence of side effects was significantly higher in group N3 compared with group N1 and N2 (p<0.05). Combined with 1mg/kg flurbiprofen axetil for preemptive analgesia , PCIA with sufentanil 2.0 g/kg and ondansetron 0.1 mg/kg in 0.9% NS 100ml may be an effective postoperative analgesia solution for children undergoing innominate osteotomy ,with less side effects.

Key words

Sufentanil; Flurbiprofen axetil; Innominate osteotomy; Children; Analgesia.

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Introduction

Pain is an internal, subjective experience that cannot be directly observed by others or by the use of physiological markers or bioassays. Therefore, pain assessment therefore relies largely upon the use of self-report. Much effort has been invested in testing and refining self-report methodology within the field of human pain research.

A fundamental understanding of different modes of pain control techniques along with limitation of each techniqes is the first vital step towards effective control of postoperative pain.close observation of potential side effeects of any drug is the next most important thing.we must move forward toward a more holistic,interdisciplinary ,multimodal approach to pain medicine.

Pain is an unpleasant emotional experience, accompanied by actual or potential tissue damage.Within 25 weeks of pregnant, fetal pain receptors have begun to develop [1]. Fetal peripheral pain receptors have been developed at birth, and the dorsal horn associated with the spinal cord, which has the ability to sense pain, and the formation of pain memory will lead to children with irreversible physiological and psychological damage. Therefore, to explore the appropriate postoperative analgesia program is necessary [2].

The aim of this study was to investigate the effect of sufentanil analgesia on analgesia with minimal side effects in the context of superfluous analgesia with flurbiprofen axetil.

Materials and methods

A retrospective study and review of record was carried out at the Anesthesia Department of Shandong Provincial Hospital of Jinan,Shandong Province,China in the period of January 2016 to June 2016.

We Select the patient from Pediatric Orthopedic Department with congenital dislocation of the hip, to be elective tracheal intubation under general anesthesia undergoing pelvic osteotomy .90 cases of children, aged 3-10 years, weight 10 ~ 45 kg, ASA I ~ II ($p > 0.05$). There were no significant differences in the operation type, age, weight and anesthesia between the three groups ($p > 0.05$).

90 patients in the room before the establishment of intravenous access in the ward, after routine electrocardiogram, blood pressure, heart rate monitoring, intravenous injection of long Toning (Penehyclidine hydrochloride) 0.01 mg / kg, propofol 2.5 mg / Kg, cisatracurium 0.15 mg / kg, sufentanil 0.5g / kg induction anesthesia, tracheal intubation. Preemptive analgesia was performed with flurbiprofen axetil 1 mg/kg before skin incision. Intraoperative intravenous infusion of sufentanil 0.05 - 0.1 g/kg and continuous infusion of propofol 4 - 6 mg / (kg / h) to maintain anesthesia, 5 minutes before the end of the operation to stop the pump. Surgery to be clear in children, vital signs, consistent with extubation. Intravenous access to analgesia after surgery with electronic analgesia pump. analgesic pump formula: N1 group sufentanil 1.5 g/kg + ondansetron 0.1 mg/kg + saline to 100 ml, N2 group sufentanil 2 Kg / + ondansetron 0.1 mg / kg + normal saline to 100 ml, N3 group sufentanil 2.5 g / kg + ondansetron 0.1 mg / kg + saline to 100 ml. The background dose was 2 ml / h, the PCA was 0.5 ml and the locking time was 15 min.

Monitoring and recording after 2, 4, 8, 12, 24, 48 hours time points FLACC score, Ramsay score, PCA compression frequency and respiratory depression, nausea, vomiting and other adverse reactions in children .PCA remains a popular and reasonably viable option, however it has certain flaws [3].

The chance of overmedication with potential side effects such as nausea, vomiting, respiratory depression, ileus, urinary retention, pruritis, hypotension. bradycardiahyperanalgesia and cognitive changes may occur.

i) FLACC score shown in table I.

ii) Ramsay sedation score: 1 points awake, anxiety, restlessness, irritability, 2 points awake, quiet cooperation, good orientation.

iii) Drowsiness, only response to the command

iv) Sleep, wake up, agility.

v) Points is difficult to wake up, the slow response to strong stimuli.

vi) Deep sleep, no response to strong sound stimulation.

Table I : FLACC score

Item (eye)	0 minute	1 minute	2 minute
Face	Smiling or expressionless	Occasional pain expression,frown	Frequent jaw bite or jaw tremor
Leg	Relax or posture as usual	Restless, nervous, posture uncomfortable	Kick or leg swing
Activity	Quiet lying or easy activities	Twisted over and over again	Body cramps, stiff
Crying	Do not cry	Moaning, sobbing, occasionaly complaining of pain	Crying, screming
Comfort	satisfy	Need occasioanl stroke, embrace	Not comfortable

Statistical Package for Social Sciences (SPSS) statistical software for statistical analysis, measurement data to mean ± standard deviation, count data were compared using χ^2 test, $p < 0.05$ for the difference was statistically significant.

Results

The analgesic score: The three groups of 90 patients at each time point after the FLACC score comparison, N1 group higher than the N2 group and N3 group ($p < 0.05$), and N2 group and N3 group was no statistically significant difference ($p > 0.05$) (Table II).

Sedation score: The three groups of children after the time points Ramsay score comparison, N1 group was lower than the N2 group and N3 group, the difference was statistically significant ($p < 0.05$) the time point N2 group and N3 group difference Statistical significance ($p > 0.05$) (Table III).

Adverse reactions: 90 cases of children with stable hemodynamics, no children with respiratory depression, but N1 group PCA compression frequency (12) was significantly more than N2 group (2) and N3 group (0) nausea. The incidence of vomiting was significantly higher in N3 group (8) than that in N1 group (1 case) and N2 group (4 cases) ($p < 0.05$).

Table II : Three groups of children at various time points after surgery FLACC score

Group	Example no.	2h	4h	8h	12h	24h	48h
N1	30	4.5±0.5	6.6±0.5	5.2±0.8	4.6±0.5	3.7±0.5	3.5±0.5
N2	30	4.4±0.5	5.5±0.5	4.5±0.6	3.4±0.5	2.3±0.6	2.0±0.6
N3	30	4.4±0.5	5.3±0.5	4.2±0.4	3.5±0.5	2.2±0.6	1.9±0.4

Table III : Three groups of children at various time points after surgery Ramsay score

Group	Example no	2h	4h	8h	12h	24h	48h
N1	30	2.2±0.5	2.4±0.5	2.5±0.5	2.3±0.6	2.4±0.5	2.3±0.5
N2	30	2.5±0.6	2.5±0.5	2.4±0.5	2.6±0.5	2.3±0.5	2.4±0.5
N3	30	3.3±0.5	3.2±0.4	3.0±0.2	2.8±0.4	2.9±0.3	2.7±0.4

Discussion

At present our hospital lead to carry out hip dislocation in children with orthopedic surgery, some of them over the age of three years children underwent pelvic osteotomy. This surgical trauma, postoperative pain in children with a strong stress response, leading to increased secretion of endogenous catecholamines, is not conducive to the recovery of children with physiological function.The frequency of anesthesia related symptoms during the first 24 hours following surgery is as follows: [4]

i) Vomiting - 10-20%
ii) Nausea - 10-40%
iii) Sore throat - 25%
iv) Incisional pain - 30%

Multimodal analgesia is mainly combined with non-steroidal anti-inflammatory analgesic drugs, regional block and opioid.Usually analgesic effect is good with mild side effects, widely used in adults. It is necessary to explore the application in pediatric patients. It is a multidisciplinary approach to pain mangement that takes advantage of synergistic effect of various analgesic with different mechanism of action to achieve maximum control of pain with minimal side effects [5].

A multimodal pain protocol consist of patient education,pre-emptive oral pain medications peoperatively, preference to regional anesthesia, peripheral nerve block,and intraoperative modalities likeperiarticular infiltration of a cocktail of drugs and finally a standardized postoperative rehabilitation programme.Because many of the negative effects of analgesic therapy are related to parenteral opoids limiting their use is a major principle of multimodal analgesia [6,7].

How to correctly assess the pain in children is the current difficulties. The FLACC score was used in this study in children between 3 and 10 years of age. To observe the children's facial expressions, leg posture, activity, crying, comforting five aspects, to assess the degree of pain in children, the evaluation method is more objective [8].

Flurbiprofen axetil is a non-steroidal anti-inflammatory drugs, by inhibiting cyclooxygenase, reduce the spinal cord and peripheral prostaglandin synthesis, can increase the pain threshold, reduce postoperative pain, intravenous dose 1.0-2.0mg / kg, plasma half-life of 4-5h, no effect on respiratory function, does not affect the recovery of anesthesia [9-10]. Preemptive analgesia is given before the nociceptive analgesic, to prevent central sensitization, and thus prevent the occurrence of postoperative pain [11]. Therefore, flurbiprofen axetil 1 mg / kg was given to the children prior to incision in order to exert an analgesic effect and reduce the opioid dose.

Opioid μ receptor, including μ1 and μ2 two subtypes, μ1 receptor binding to produce analgesic effect, while binding to the μ 2 receptor, such as respiratory depression and other side effects. Sufentanil is highly selective for μ 1 receptors, so sufentanil has a strong analgesic effect and a weak respiratory inhibition and is widely used in perioperative analgesia [12]. In addition opioid side effects are nausea, vomiting and so on. The incidence of nausea and vomiting can be as high as 40% in intravenous infusion of morphine [13]. Fentanyl for postoperative analgesia in children, nausea, vomiting incidence of 9.1% [14]. In this study, three doses of sufentanil were administered to postoperative analgesia in three groups of children, with no respiratory depression, but with nausea and vomiting, and with an increased dose, the incidence increased. N3 group had more nausea and vomiting than N1 group and N2 group.

Conclusion

In this study we found flurbiprofen ester 1 mg / kg pre-emptive analgesia with sufentanil 2g/kg+ ondansetron 0.1 mg / kg+100 mL normal saline used in postoperative analgesia pump for 3-10 year-old pelvic osteotomy orthopedic children, with good analgesic effect with less side effects.

Disclosure

All the authors declared no competing interest.

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