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KLİNİK ARAŞTIRMA *Anesteziyoloji ve Reanimasyon*

The effect of intra-operative paracetamol on post operative pain, nausea and vomit in children who underwent adenotonsillectomy

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SUMMARY

Purpose: *The purpose of our study was to research the effect of paracetamol as a commonly used analgesic, on pain when administered as 30 mg/kg i.v. intra-operative dose to children who underwent tonsillectomy and adenotonsillectomy, during the post-operative period.*

Materials and Methods: *The study included 28 children between 6 and 12 years of age and ASA classification I and II, who were scheduled for tonsillectomy or adenotonsillectomy. Patients who were administered NSAIDs within 8 hours, any analgesics within 12 hours and corticosteroids during the last 7 days pre-op were excluded from the study. No narcotic analgesics were used as pre-medication and peroperatively on the subjects. Anesthesia was induced by Thiopental 5 mg/kg i.v. and muscle paralysis by Rocuronium 0.1 mg/kg i.v. Anesthetic permanence was achieved by Sevoflurane 1-2 % and N_2O/O_2 50 %/50 %. The subjects were randomized in two separate groups. Group P was administered (Paracetamol, n=14) paracetamol 30 mg/kg i.v. and Group S (Saline, n=14) was administered saline infusion in equivalent volume at minute 15 peroperatively. The nausea-vomit frequency was recorded post-operatively at 15 minute intervals using post-op nausea-vomit scoring while the pain score was recorded using the 7 point facial expression scale.*

Results: *No significant difference was found in the post-operative nausea and vomiting frequency between the groups. However, the post-operative pain score of the paracetamol group was found higher than the control group in post-extubation, 15^{th} min and 30^{th} min periods.*

Conclusion: *Paracetamol administered through the i.v. route was found to reduce pain in children who underwent tonsillectomy and adenotonsillectomy during the early post-operative period.*

Key words: *Tonsillectomy, paracetamol, post-operative pain*

ÖZET

Adenotonsillektomi yapılan çocuklarda intraoperatif parasetamolün postoperatif bulantı-kusma ve ağrıya etkisi

Amaç: *Çalışmamızda amaç, yaygın olarak kullanılan bir analjezik olan parasetamolün, tonsillektomi ve adenotonsillektomi uygulanan çocuklarda intraoperatif 30 mg/kg i.v. dozunda uygulandığında postoperatif dönemde ağrı üzerine etkisinin araştırılmasıdır.*

Gereç ve Yöntem: *Tonsillektomi veya adenotonsillektomi ameliyatı olacak, yaşları 6-12 arasında, ASA sınıflaması I ve II olan 28 çocuk çalışma kapsamına alındı. Preop son 8 saat içinde NSAİİ, son 12 saat içinde herhangi bir analjezik ilaç ve son 7 gün içinde kortikosteroid kullanmış olan hastalar çalışmaya dahil edilmedi. Tüm olgulara premedikasyonda ve peroperatif narkotik analjezik kullanılmadı. Anestezi indüksiyonu tiyopental 5 mg/kg i.v. ve kas paralizisi rokuronyum 0.1 mg/kg i.v. ile sağlandı. Anestezi idamesi sevofluran % 1-2 ve N_2O/O_2 % 50/% 50 ile sağlandı. Olgular rastgele iki gruba ayrıldı. Grup P'ye (Parasetamol, n=14) parasetamol 30 mg/kg i.v.; Grup S'ye (Serum fizyolojik, n=14) eşdeğer volümde serum fizyolojik infüzyonu peroperatif 15 dk.'da uygulandı. Postoperatif 15 dk. arayla bulantı-kusma sıklığı ve 7 puanlı yüz ifadesi skalası kullanılarak ağrı skoru kaydedildi.*

Bulgular: *Gruplar arasında postoperatif bulantı ve kusma sıklığında anlamlı bir fark bulunmadı. Ancak postoperatif ağrı skorunun, ekstübasyon sonrası, 15. dk. ve 30. dk.' larda parasetamol grubunda kontrol grubundan yüksek olduğu izlendi.*

Sonuç: *Sonuç olarak; i.v. uygulanan parasetamolün tonsillektomi ve adenotonsillektomi uygulanan çocuklarda erken postoperatif dönemde ağrıyı azalttığı gözlendi.*

Anahtar kelimeler: *Tonsillektomi, parasetamol, postoperatif analjezi*

Adenotonsillectomy is among the most frequent interventions performed in the pediatric age group. Pain and nausea-vomit are common after adenotonsillectomy. The onset of pain, dysphagia and the general weakness secondary to this condition resulting from the inflammation of the exposed faringe-

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al muscles and nerve endings during the post-operative period are traumatizing on the patient to an extent which is unexpected for this otherwise trivial intervention [1]. The cure of the post-operative pain has been shown to reduce both the mortality and morbidity of the surgery, assisting increased recovery during the post-surgical stage [2]. Many studies have been performed and a wide variety of medicines with topical and systemic effectiveness have been tried for this purpose [2,3,5,10,13,15,16].

Various side effects including nausea, vomiting, itching, urine retention, respiratory depression, sedation and central nervous system depression restricts the use of narcotics frequently used in post-operative pain management [4,5]. The use of oral paracetamol in post-operative pain management as a single drug or in combination with another medicine has been demonstrated in numerous studies [3,5,10,11,12]. Intravenous route is preferred in the post-operative period in cases where oral administration is not possible or rapid analgesia is required. A paracetamol dosage form soluble in water and administered intravenously is a solution for infusion developed for intravenous administration in the management of pain or hyperthermia. Paracetamol has the least side effect potential compared to other analgesics [5,10,11]. Our study has researched the effects of paracetamol administered peroperatively to children who underwent tonsillectomy or adenotonsillectomy, on post-operative pain, nausea and vomiting.

MATERIALS and METHODS

The study was planned for 28 children between 6 and 12 years of age and ASA categories I and II, scheduled for elective tonsillectomy or adenotonsillectomy, upon written consent of the subjects/ their families and approval by the Ethical Committee. The research planned as a prospective, randomized and double-blind, placebo controlled study did not include patients allergic to analgesics, and those who had taken NSAIDs during the last 8 hours, any analgesics within 12 hours and corticosteroids during the last 7 days.

The age, gender and weight of the subjects were recorded. Subjects on the operating table The subjects were transferred to the operating table and vascular access was obtained using 22 G branule. Isotonic NaCl infusion was administered and continued at a rate of 6 ml/kg/s as crystalloid. spO_2 and non-invasive arterial blood pressure was monitored by ECG and pulse oximeter on the operating table. Heart rate (HR), tension arterial (TA) and spO_2 value were recoded prior to pre-medication and induction. No narcotic analgesics were used on any subject at the pre-medication and peroperative stage. HR, TA and spO_2 values at the minutes 1, 3 and 5 were recoded after induction of anesthesia by Thiopental Sodium 5 mg/kg and muscular paralysis by Rocuronium 0.1 mg/kg on the subjects. Anesthetic permanence was achieved by 1-2 % Sevoflurane and 50 %/50 % N_2O/O_2. Patients were randomized as 2 groups. Group P was categorized as (Paracetamol, n=14), and Group S as (Placebo-Saline, n=14).

Group P was administered 30 mg/kg i.v. infusion (n=14) and Group S isotonic serum of equivalent volume i.v. (n=14) peroperatively. The neuromuscular block was antagonized by Atropine 0,015 mg kg^{-1} and Prostigmine 0,05 mg kg^{-1} at the end of operation.

The patients were transferred to the recovery room following the surgery. The post-op nausea-vomiting and pain scores were recorded at minutes 15., 30., 45. and 60. using the numeric score and 7 point post-op facial expression scale respectively. The scores were presented in the form of average ± Standard Deviation. The data were evaluated using the "Kruskal-Wallis variance analysis" and the statistically significant data between two groups were compared using the Mann-Whitney U Comparison Test. The results for $p<0.05$ were found statistically significant.

FACIAL EXPRESSION SCALE

NUMERICAL POST-OP NAUSEA-VOMIT SCORING

0-No nausea or vomiting
1-Nausea but vomiting
2-One vomiting episode in 30 min
3-Two or more vomiting episodes in 30 min

RESULTS

28 patients enrolled in the study were compared on the basis of their demographic properties (Table 1).

No significant difference was found between the groups in terms of post-operative nausea-vomiting frequency (Table 2).

The visual pain score values of the paracetamol group at min 15., 30., 45. and 60. were found higher than the control group upon evaluation of the post-operative pain score using the facial expression scale. The difference between the groups in post-extubation, 15th and 30th minutes were found statistically significant (p<0.05), (Table 3, Graph 1).

Table 1. Comparison of the demographic data and anesthetic duration between the groups.

	Group P (n=14) (Avg.±SD)	Group S (n=14) (Avg.±SD)
Age (years)	7,5±1,16	7,43±1,39
Weight (kg)	25,36±3,62	25,57±4,76
Gender (F/M)	5/9	4/10
ASA status (I/II)	12/2	13/1
Operation Time (min.)	49±12,71	47,07±5,94

Table 2. Average nausea-vomit score between groups.

	Group P (n=14) (Avg.±SD)	Group S (n=14) (Avg.±SD)	p
Post-extubation Nausea-Vomit Score	1,14±0,53	1,21±0,57	0,716
15.min Nausea-Vomit Score	0,57±0,51	0,64±0,49	0,704
30.min Nausea-Vomit Score	0,21±0,42	0,28±0,46	0,668
45.min Nausea-Vomit Score	0,07±0,26	0,21±0,42	0,289
1.hour Nausea-Vomit Score	0	0	-

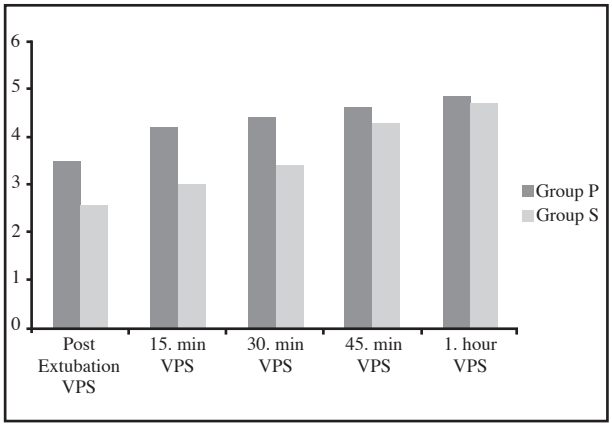
**p<0.05, Mann-Whitney U Test*

Table 3. Comparison of the Visual Pain Scores at post-extubation, 15th, 30th, 45th minutes and 1st hour between the Group P (Paracetamol) and Group S (Placebo).

	Group P (n=14) (Avg.±SD)	Group S (n=14) (Avg.±SD)	p
Post Extubation VPS	3,5±1,01	2,57±0,85	0,007*
15. min VPS	4,21±0,80	3,0±0,78	0,001*
30. min VPS	4,42±0,64	3,42±0,64	0,001*
45. min VPS	4,64±0,49	4,28±0,61	0,112
1. hour VPS	4,85±0,53	4,71±0,61	0,479

**p<0.05, Mann-Whitney U Test*

Graph 1. Comparison of the Visual Pain Scores at post-extubation minute 15, 30, 45 and hour 1 between the Group P (Paracetamol) and Group S (Placebo).



DISCUSSION

Pain control is an important part of post operative patient care. Non-steroid anti-inflammatory medication and paracetamol are agents used in post operative pain management. Many studies have reported oral paracetamol as an agent that is effective and well tolerated in different surgical procedures [8]. However, the post-operative use of oral paracetamol is limited. In addition, parenteral administration of paracetamol has been reported a more rapid onset of effect and longer activity compared to administration by the oral route. Intravenous administration of paracetamol is preferred in cases where the oral use is difficult or rapid analgesic activity is required [9].

Numerous studies have been conducted on the use of i.v. paracetamol in pain management. In our study, we compared the i.v. use of paracetamol versus placebo in post-operative pain management. We found that the administration of paracetamol in a 30 mg/kg i.v. dose was effective in the management of post-operative analgesia after adenotonsillectomy operations in the pediatric age group.

Moller et al. compared paracetamol, propacetamole and placebo in pain management during the post dental surgery period. Their study involved 175 subjects who were administered for post-op analgesia, 2 min bolus injection of 1 gr i.v., 15 min infusion, and 1 gr oral paracetamol versus placebo. Although paracetamol intravenous bolus and infusion had significant analgesic effect compared to placebo, the study found no significant difference in terms of analgesic activity between both drugs. In addition, the authors also reported that local reaction development was frequent in the route of administration in the use of i.v. bolus propacetamole [10].

In their study, Granry et al. researched the analgesic effects of injectable acetaminophen on 87 children following orthopedic surgery and concluded that 30 mg/kg i.v. dose of propacetamole was effective versus placebo in post-op pain management [11].

Sinatra et al. have compared acetaminophen 1gr i.v., propacetamole 2 gr oral application and placebo for pain management at 6 hourly intervals during the initial 24 hours following major orthopedic surgery. They concluded that administration of acetaminophen 1 gr i.v. was fast and effective [12]. Our study found that the i.v. administration of paracetamol reduced pain during the early post-operative period in children who underwent tonsillectomy and adenotonsillectomy. No development of local reaction in the area of infusion was observed in any patient.

In their study performed on 131 patients who referred to the clinic for peripheral trauma, Hoogewijs et al. divided the patients in 3 groups and administered paracetamol 20 mg/kg i.v. to the first, piritramide 0.25 mg/kg i.m. to the second and tramadol 1 mg/kg i.v. to the third group. The study in which the authors compared the analgesic effects did not result any difference between the groups [13].

In their study conducted on 50 children scheduled for tonsillectomy, Pendeville et al. administered paracetamol 30 mg/kg i.v. and tramadol 3 mg/kg i.v. to the respective groups prior to surgical incision. During this study, the patients were subject to the same anesthetic protocol. Tramadol drop 3 times/day oral or acetaminophen 1 gr rectal was used on hours 6 and 12, and for 3 days post-op. It was concluded that tramadol was more effective than paracetamol in pain management [14].

Aghamir et al. randomized 40 patients scheduled for operation under general anesthesia in 2 groups. Both groups were subject to the same anesthetic protocol. The groups were administered tramadol 100 mg i.v., and paracetamol 2 gr. i.v. at post-op hour 0, respectively. Additional tramadol 50 mg i.v. and paracetamol 1.5 gr i.v. was administered to the tramadol and paracetamol groups respectively, unless sufficient analgesia could be achieved at post-op hours 6., 12., 18 and 24. It was concluded that although paracetamol was a reliable alternative in post operative pain management, it was insufficient in the control of pain compared to tramadol [15].

Palazon et al. randomized 42 patients scheduled for spinal fusion surgery, and divided the subjects in two groups which one was administered placebo i.v., and the other propacetamole 2 gr i.v. at 6 hourly intervals for post-op 3 days. PCA and morphine were used as supplemental analgesics. Levels of pain were evaluated using the VPS scoring during a 72-hourly period. The patients' need for additional morphine was identified with the use of PCA. The additional morphine requirement in the Propacetamole group was 60.3±20.5 mg while that

in the placebo group was 112.2±39.1 mg. The pain scores in the propacetamole group were reported to be remarkably low [16].

In their study, Binhas et al. randomized and divided in two groups as placebo and paracetamol 36 adult female patients planned for mammoplasty. Remifentanil based anesthesia was induced on all patients, while the groups were administered placebo i.v. abd paracetamol 2 gr i.v. prior to termination of anesthetics, respectively. Morphine was used as supplemental analgesic. The paracetamol group was found to require less morphine than the placebo group, and while the pain scores immediately after tracheal extubation were found similar in both groups, the evaluation performed one hour after extubation demonstrated that the pain scores in the propacetamole group were lower [17].

The study performed by Verchere et al. compared paracetamol (P), paracetamol-tramadol (PT) and paracetamol-nalbufine (PN) administered as analgesics after supratentorial craniotomy performed under propofol-remifentanil anesthesia. All subjects were administered propacetamole 30 mg/kg i.v. one hour prior to the completion of the surgery and continued as one 30 mg/kg once in 6 hours. The PT group was administered 1.5 mg/kg tramadol i.v. 1 hour prior to the end of the surgery. As a result of this study, it was reported that paracetamol alone was insufficient in relieving the pain in craniotomy, while co-administration of paracetamol, tramadol and nalbufine achieved adequate analgesia [18].

In conclusion, it can be asserted that intravenous paracetamol is a rapid, effective and well tolerated agent in post-operative pain management after tonsillectomy operations of patients in the pediatric age groups.

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