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THE EFFECT OF LOCAL INJECTION OF BUPIVACAINE ON POST-TONSILLECTOMY PAIN

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ABSTRACT

Introduction: The pain is one of the most common complications of tonsillectomy that causing to take longer the recovering and hospitalization period. There are some common drugs and medications such as bupivacaine used to treat postoperative pain. This research aims to study the effect of bupivacaine injection on reducing the post-tonsillectomy pain. **Methodology**: This is a double-blind clinical trial consisted of 96 patients aged 5 to 12 selected to undergo tonsillectomy. At the beginning of the operation, patients in group A received an injection of 3cc of 0.5% bupivacaine and patients in group B were injected 3cc of normal saline in side and upper peritonsillar areas. After tracheal intubation,1, 2, 4, 8, 12, and 24 hours after the operation, pain was measured by VAS. The first request for analgesic and the total amount of analgesic consumption was also recorded. **Results**: Using VAS, it was found out that the amount of pain in the group receiving bupivacaine (group A) was significantly less than the group receiving normal saline and the bupivacaine group suffered less pain ($p<0.05$). It took longer time for the group receiving bupivacaine to request for analgesic. In general, demand for analgesic in 24 hours

after surgery was significantly less in group A than in the group received normal saline ($p<0.001$). **Conclusion**: It can be concluded that 0.5% bupivacaine locally relieves the post-tonsillectomy pain and significantly reduces the need to postoperative analgesic.

KEYWORDS: Pain, Tonsillectomy, Bupivacaine, Opioids.

INTRODUCTION

With or without adenoidectomy, tonsillectomy is one of the most common surgical procedures in children[1], that including recurrent tonsillitis, recurrent neck abscess, sleep apnea, and the removal indication tumor tissues.[2,3] These operations are followed by some complications such as nausea, vomiting, bleeding, and postoperative pain. One of the most common complications of tonsillectomy, especially in children, is pain. If it is not controlled, it will delay the improvement and discharging, disorder eating, and cause dehydration, resulting in longer hospitalization and receiving intravenous fluids.[4-6] On the other hand, as most patients undergoing tonsillectomy are children with low pain threshold, experiencing such ailment has negative psychological effects on them and their families.[7] In many research studies, different treatments such as opioids, NSAIDs, steroids, and acetaminophen have been offered for pain relief.[8] NSAIDs are usually used after tonsillectomy to create analgesia. However, as increases the platelet adhesion and bleeding, it is a controversial method.[9]

Steroids are prescribed like dexamethasone to control postoperative pain and nausea. However, it is limitedly offered because of its complications such as high blood pressure, hormone and gastrointestinal disorders.[2] Some studies have locally compared the effects of lidocaine, morphine and ketamine.[10,11] and studying the effect of honey on post-tonsillectomy pain is underway.[4] As the preventive method of reducing postoperative pains by blocking the pain impulses and preventing from their entrance into the central nerve systems, bupivacaine infiltration produces analgesia.[12] Some studies in some countries have reported the significant effect of this drug on relieving post-tonsillectomy pain.[13-16] Some others though do not consider it as an effective way to prevent from pain.[17-20] The way and time of bupivacaine prescription and its complications and dangers comparing with other methods of producing analgesia is still a subject of considerable debate. On the other hand, given the contradicting results about the pain-relieving effect of this drug, this research studies the effect of locally bupivacaine injection on the post-tonsillectomy pain.

METHODOLOGY

This doubles blind clinical prospective study was conducted on 96 patients, aged 5 to 12 years, with ASA physical status class I or II who were scheduled tonsillectomy from Imam Khomeini Hospital, Ahwaz, Iran.

After approval of ethics committee of Pain Research Center, Ahwaz Jondishapour University of Medical Sciences, Ahvaz, Iran and getting written informed consent from parents, patients were divided in to treatment and control group with simple random sampling.

The exclusion criteria included: coagulation disorder, heart diseases, difficult intubation, more than one hour operation, receiving anti-inflammatory drugs during the induction of anesthesia, drug allergy, unusual bleeding, acute pharyngitis, previous treatment with analgesics or sedatives, active respiratory infection or asthma, fever, and inability to answer questions.

After standard monitoring (blood pressure, heart rate, ECG, and arterial oxygen saturation (SpO2), both groups were put under similar anesthesia: 0.02 mg/kg atropine, 2 µg/kg fentanyl, 4-5 mg/kg thiopental sodium, and 0.5 mg/kg atracurium bisulfate, and nasotracheal intubation.

Nitrous oxide and oxygen (50%-50%), and the isoflurane used for maintenance of anesthesia. After induction of anesthesia and stabilizing vital signs, patients in group A(treatment) received an injection of 3cc of 0.5% bupivacaine made by AstraZeneca, and patients in group B(control) received an injection of 3cc of normal saline in side and upper areas of peritonsillar. At the end of the surgery neuromuscular block was antagonized with neostigmine (0.05 mg/kg) and atropine (0.02 mg/kg). After tracheal extubation patients were transferred the post anesthesia care unit (PACU) as they were lying on left lateral side. Pain self-assessment was performed by the patients in validated 10 cm visual analog scale (VAS) as nursing instruction.[21] This pain scale ranged from ‘no pain’ 0 to ‘the worst pain imaginable’ 10. Pethidine was prescribed when VAS values were ≥ 3. Pain score are considered at immediately after extubation ,1, 4, 8, 12and 24 h after surgery. Primary outcomes included : demand for first analgesia (In case of VAS over 3, children were given 0.2 mg/kg intravenous pethidine), the time of drinking liquids and soft food. 8 hours after being NPO and based on patient's demand and endurance, drinking liquids and eating soft food started. In case of VAS over 5, after the beginning of oral feeding, 10-15 mg/kg

acetaminophen was taken as a painkiller (maximum 90 mg/kg/day). Demand for the first pethidine and acetaminophen and the total amount of analgesic were recorded.

The statistical software SPSS, version 19, was used for statistical analysis. Results were reported as means and standard deviation. Independent sample t-test was used to compare the intragroup means, and chi-squared test was used to compare ratios. A $p < 0.05$ was considered significant.

RESULTS

According to the demographic information, no significant difference was observed between two groups on age, height, weight, operation time, anesthesia duration, and the time of opening eyes ($p>0.05$). Groups were, in fact, correctly selected and uniformed (table 1).

Pain score, measured by VAS, immediately after extubation, 1, 2, 4, 8, 12, and 24 hours after surgery and in the group receiving bupivacaine (group A) was significantly less than the group receiving normal saline ($p<0.05$) (table 2).

For bupivacaine group, the average painless period was 390 minutes comparing to the 120 minutes for the normal saline group. Accordingly, patients receiving bupivacaine experienced longer painless period with longer delay in demanding for the first analgesic than the other group. On the whole, 24 hours after the operation, bupivacaine group's need to analgesic (5 mg versus 38 mg) was significantly less than group B ($p<0.001$) (table 3).

After the onset of oral feeding, demand for the first acetaminophen in the bupivacaine group was after 412 minutes comparing to the 429 minutes of the other groups and there was no significant difference between the groups($p>0.05$). However, 24 hours after the operation, bupivacaine group's acetaminophen consumption was 241 mg and the normal saline group consumed 503 mg. This shows higher pain for the group B and more drug consumption to relieve pain ($p<0.002$) (table 3).

In terms of complications, no significant side effect occurs in both groups and injection in the peritonsillar area causes no specific problem.

TABLE 1: ***Demographic Characteristics of the Patients (mean±SD)***

	Treatment	Control	P
Age (yr)	*7.83±1.85*	*8.38±2.05*	*0.17*
Sex (M/F)	*29/19*	*29/19*	*0.58*
Height (cm)	*125.10±13.85*	*124.85±22.21*	*0.94*
Weight (kg)	*26.77±7.10*	*27.00±9.24*	*0.89*
Duration of surgery (min)	*35.97±9.85*	*45.52±13.99*	*0.80*
Length of anesthesia (min)	*57.50±10.15*	*67.81±16.72*	*0.10*
Opening Eye time (min)	*30.77±20.14*	*29.16±9.74*	*0.43*

TABLE 2: ***VAS Scores of Pain in two Groups for the First 24 Hours after Surgery (mean ±SD)***

	Treatment	*Control*	*p*
After extubation	*1.12±0.48*	*6.31±3.68*	*0.001*
1 Hour	*1.43±1.04*	*6.85±3.40*	*0.02*
2 Hour	*2.04±1.87*	*7.54±2.50*	*0.01*
4 Hour	*3.12±2.14*	*6.43±2.34*	*0.004*
8 Hour	*4.25±2.62*	*5.83±2.94*	*0.04*
12 Hour	*2.89±2.55*	*4.91±3.00*	0.01
24 Hour	*1.62±1.48*	*3.50±2.46*	0.001

TABLE 3: ***Time to First Request for (*****pethidine** ***or*** **Acetaminophen*****) and the Total Amount of*** **pethidine** ***or*** **Acetaminophen** ***after surgery (mean±SD)***

	Treatment	*Control*	*p*
First Request for pethidine(min)	*390.00±153.82*	*120.86±123.34*	*0.001*
First Request for Acetaminophen(min)	*412.29±86.45*	*429.76±110.24*	*0.4*
Total amount of pethidine(mg)	*5.23±3.72*	*38.28±23.19*	*0.001*
Total amount of Acetaminophen(mg)	*241.87±256.49*	*503.12±412.16*	*0.005*

DISCUSSION

Pain is a mental sign which is difficult to be accurately measured. It depends on several factors including age, social and ethnic status, anxiety, personal experience, and ability to express it. Controlling pain in patients undergoing tonsillectomy is one of the important challenges of surgery team. This is especially important among children having lower pain threshold and it is difficult to measure their pain level.[12]

This paper studied the effect of locally injecting bupivacaine on post-tonsillectomy pain. Findings revealed that 0.5% bupivacaine could significantly lower patients' pain in different time after tonsillectomy comparing with the control group ($p<0.05$). In a similar study by Ihvan et al bupivacaine was effective in controlling pain several hours after the operation, but 24 hours later, it was not as much effective.[14] In our research though, the pain difference between two groups continued by 24 hours after the operation. Such inconsistency may be because of injecting less and or due to the different area of injection.

In another study, Ozmen et al examined the long-term effect of 0.25% bupivacaine and 0.5% bupivacaine on post-tonsillectomy pain. They concluded that using this drug reduced postoperative pain even within one week.[15] Although the local effect of using anesthesia medications such as bupivacaine continues about 6 to 9 hours, such long effect in this study (about 24 hours) may arise from the extreme anesthetizing effect of this drug leading to a long painless period. Another explanation for this long-term effect is that the neural block prevents from sending painful impulses to the central nerve system immediately after the operation and prevents from the high excitability resisting against treatment and being responsible for long post-operative pain. The local anesthesia medications having effect on the neural membrane proteins in tissues and prevent the release and function of inflammatory materials such as prostaglandins, lysozyme enzymes, and etc.

In some other studies, the impact of anesthesia medications with long- and medium-term effect has been investigated. Ozkiris et al used lidocaine and bupivacainein Turkey accompanied by epinephrinein order to reduce the post-tonsillectomy pain. They observed that both drugs relief pain comparing with the control group, with bupivacaine even better created a longer painless period.[13]

On the other hand, in some studies, no positive effect was found in using bupivacaine for reducing patients' pain. Kountakis et al studied the effect of bupivacaine and placebo in postoperative pain relief over 34 patients. No significant difference was though observed between different groups on the intensity of patients' pain. This may be because of the few numbers of patients (36 people) while we studied 96 patients and the pain difference was significant.[17] In other studies such as those conducted by Nordhal et al.[18] schoem et al[19] and strub et al[20], no positive result was found on using bupivacaine to reduce pain. This may be also because of studying a small sample and we in present study by increasing the number of patients, the effectiveness of the drug in pain relief was obvious.

In case of complications, no especial side effect was observed in using bupivacaine in peritonsillar area. But, Bean-Lijewski found two cases of obstruction in the upper airway.[22] They explained that this had been as a result of very deep injection and the blockage of the dendrites of the recurrent laryngeal nerve. The complication did not associate with the type of injected drug (bupivacaine), and if any other drug was injected, this phenomenon would occur. Here, given the pain intensity, the amount of consumed analgesic two groups within 24 after operation was compared. The need to pethidine by the time of starting drinking liquids was significantly less than in bupivacaine group versus the other group. As the postoperative pain was milder in bupivacaine group, less acetaminophen was prescribed. Yusuf Unal et al. found similar results on less consumption of analgesic after the operation in case of using bupivacaine.[23] Fradis et al. used bupivacaine accompanied by epinephrine. They reported a brain or epidural abscess and an ischemic brain attack. Epinephrine has probably caused such traumas.[24] We did not used bupivacaine accompanied by epinephrine and in this study no complication occurred.

CONCLUSION

It can be concluded that locally using 0.5% bupivacaine to reduce children's postoperative pain can be effective and significantly reduce the need to analgesic.

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