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ORIGINAL ARTICLE

A study of the Complications of Bipolar Electrocautery Tonsillectomy in Patients Admitted to Vali-e-Asr Hospital of Birjand

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Abstract

Introduction: Tonsillectomy is one of the most common surgeries all over the world and is performed by various methods. This study aimed to investigate the complications of bipolar electrocautery method of tonsillectomy.

Methods: This cross-sectional study was performed on 234 patients, 114 female and 120 male individuals. The mean age of the patients was 12.2±8.3 (min=3 and max=58.2) years. Some parameters including duration of surgery, intraoperative blood loss, postoperative hemorrhage, severity of pain were measured 4 and 24 hours after operation. The data were analyzed by SPSS software (Version 15) using Mann-Whitney, Kruskal-Wallis and Spearman tests. P values less than 0.05 were considered significant.

Results: In our study, the mean duration of surgery was 12.7±4.5 minutes, mean intraoperative blood loss was 36.6±10.8 ml, and postoperative hemorrhage was observed in 3.4 % of patients. The mean pain scores 4 hours after operation were 2.1±0.7 and 2.7±0.8 for age groups below and over 10 years old respectively, while these scores were 2.4±0.8 and 3.2±1 after 24 hours of operation for them respectively with the difference being significant ($p < 0.05$). Furthermore, duration of surgery correlated significantly with intraoperative blood loss ($r=0.1$ and $P=0.01$) and pain 4 hours after operation ($r=0.1$ and $p=0.004$).

Conclusions: In our study, mean intraoperative blood loss, postoperative hemorrhage, and duration of surgery were greater than what has been reported in the majority of previous studies.

Key Words: Tonsillectomy; bipolar; complication

Introduction

Tonsillectomy is one of the most common surgeries all over the world [1], and children are the most common group undergoing this surgery [2]. The most common indications for tonsillectomy are air pathway obstruction, chronic tonsillitis, and obstructive sleep apnea [3]. The side effects of tonsillectomy are various including pain, postoperative bleeding, airway obstruction,

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pulmonary edema after surgery, velopharyngeal insufficiency, nasopharyngeal stenosis, complications of cervical spine injury, and finally death [4]. The most common fatal side effects involve bleeding of the tonsil bed and anesthetic effects [5]. After surgery, throat pain and otalgia are among further side effects [6]. Tonsillectomy is performed by various methods including laser, classical cold dissection, and monopolar and bipolar electrocautery [5]. In electrocautery method, cutting and control of bleeding is done by electricity. It makes it possible to have simultaneous coagulation and cutting. It also prevents the scattering of patient's cells to the surrounding tissues.

In some studies in which bipolar electrocautery and cold dissection methods have been compared to each other, less pain has been reported in bipolar electrocautery than in the cold dissection [7, 8, 1], while in other studies more pain has been reported in the electrocautery method [9]. Some studies show that in electrocautery method, intraoperative bleeding was less than what was in cold dissection [8, 10] and in some others, there was no difference in the amount of blood loss between the two methods [11]. Application of sutures was found to cause less post-operative bleeding but had no significant effect on intra-operative bleeding [4].

Since a large number of patients refer to ear, nose and throat (ENT) clinics for tonsillectomy and this surgery can be conducted by different methods, hence, we decided to study the complications of bipolar electrocautery on admitted patients in Vali-e-Asr Hospital in Birjand city.

Methods

In this cross-sectional study, 250 patients were initially enrolled. However, 14 cases were excluded according to exclusion criteria. Therefore, the final sample comprised of 234 patients, including 114 female and 120 male from February 2014 to February 2015. The mean age of the patients was 12.2±8.3 years. Participation was by consent, and all patients who underwent tonsillectomy in Vali-e-Asr Hospital affiliated to Birjand University of Medical Sciences (BUMS) took part in this study. This study was confirmed by the Ethics Committee of BUMS and the ethical code is 1393-09-01.Indications for tonsillectomy included tonsillar hypertrophy, infection accompanied by obstruction, obstruction alone, and recurrent tonsillitis. Exclusion criteria consisted of any kind of active infection of the upper respiratory tract and upper digestive system, rhinosinusitis, acute otitis media, any active infection of middle ear, hidden cleft palate, and a history of suspected malignant lymphoma, peritonsillar abscess, and coagulation disorders.

In the cases that needed analgesic after operation, a dose of acetaminophen was prescribed amounting to 625 mg every 6 hours for adults and 15 mg / kg for children. In those who needed more analgesic, an equivalent of petedin 0.7 mg / kg was administered intramuscularly.

The surgery was done under general anesthesia and all cases operated by the same surgeon. The patients were lying in supine position on the operating table and a Boyle-Davis mouth gag was inserted in their oral cavity. Thereafter, the Bayonet bipolar forceps and Kart Storz bipolar coagulator (set at 40 W) were used for operation. During surgery, first, the inferior pole of the tonsil was dissected and continued upward until the tonsil was completely removed and then the vessels encountered were cauterized. Any further hemosthasis of the tonsillar fossa was secured by point hemosthasis with the bipolar forceps.

In this study, parameters such as duration of surgery, intraoperative blood loss, presence of postoperative hemorrhage, postoperative pain and otalgia, need for more analgesic drugs, postoperative oral temperature, nausea and vomiting after surgery, time of starting fluid, and speaking status a week after operation were investigated.

Intraoperative blood loss was measured by a scaled glass bottle termed Measure installed in the route of the suction and by calculating the weights of used gazes before and after operation.

The severity of pain 4 and 24 hours after operation were measured by visual analogue scale (VAS) for adults and face scale for children (less than 10 years)[7](Fig 1). Furthermore, the relationship between indications of surgeries and sex, between age and pain after 4 and 24 hours from surgery, and between duration of surgery and intraoperative blood loss with severity of pain 4 and 24 hours after operation were assessed. All the obtained data were recorded in the related checklist and analyzed by SPSS software (ver-15). Descriptive statistics (mean, standard deviation, and percentage) were used for descriptive parameters. First, normal frequency of the collected data was tested with one-sample Kolmogrov-smirnov test. As the distribution was not normal, non-parametric tests including Mann-Whitney, Kruskal-Wallis and Spearman correlation tests were used to compare the

groups. P values less than 0.05 were considered significant.

Results

This cross-sectional study was conducted on 234 patients, including 114 (48.7%) females and 120 (51.3%) males. The mean age of the patients was 12.2±8.3 years (minimum 3 years, maximum 52 years, and median 9 years). The frequency of different indications for surgery were infectious plus obstructive=37%, only infectious=35%, obstructive=24%, and miscellaneous=4%.

The mean±SD values of duration of surgery, intraoperative blood loss, and the other different quantitative variables are shown in Table 1. Frequency and percentage of some qualitative variables such as post-operative bleeding, otalgia, nausea and vomiting, etc. are described in Table 2.

Comparison of the means of intraoperative blood loss and severity of pain 4 and 24 hours after operation according to gender, age and indications of surgery are summarized in Tables 3 and 4.

Table 1 :The Mean±SD of quantitative variables which were tested in the study

Variables		$\bar{X}\pm SD$	Minimum	Maximum
Duration of surgery (min)		4.5±12.7	6	35
Intraoperative bleeding volume (cc)		10.8±36.6	20	80
Postoperative pain	4hours	0.8±2.3	1	5.5
	24hours	0.9±2.9	1	7
Body temperature after surgery	4hours	0.2±37.4	36	38
	24hours	0.2±37.4	37	38.4
Time to start drinking liquids (h)		0.45±2.9	2	4

Table2: The frequency and percent of qualitative variables which were tested in the study

Variables			N (%)
Postoperative bleeding		yes	8 (3.4)
		no	226 (96.6)
Otalgia	4h	yes	32 (13.7)
		no	202 (86.3)
	24h	yes	67 (28.6)
		no	167 (71.4)
The need for more analgesics		yes	25 (10.7)
		no	209 (89.3)
Nausea and vomiting		yes	43 (18.4)
		no	191 (81.6)
Speech state		Hypernasal	32 (13.7)
		normal	202 (86.3)

Table 3: Comparison of the means of intraoperative blood loss according to gender, age and indications of surgery

Variables	Groups	Mean±SD	P-value
Gender	Male (n=120)	37.11±10.64	0.219
	Female(n=114)	36.17±11.05	
Age	Less than 10 (n=125)	35.98±9.95	0.432
	Over than 10 (n=109)	37.41±11.76	
Indications of surgery	Infectious (n=81)	36.25±11.51	0.347
	Obstructive (n=57)	38.47±11.49	
	Infect+Obst (n=87)	35.61±8.88	
	Miscellaneous (n=9)	36.11±15.16	

Table 4: Comparison of the means of severity of pain 4 and 24 hours after operation according to gender, age and indications of surgery

Variables		Time			
		Pain 4 hour after operation		Pain 24 hour after operation	
		Mean±SD	P-value	Mean±SD	P-value
Gender	Male (n=120)	2.31±0.9	0.786	2.9±0.59	0.380
	Female (n=114)	5.8±0.85		2.85±1	
Age	Less than 10 (n=125)	2.1±0.7	0.016★	2.4±0.8	0.001★
	Over than 10 (n=109)	2.7±0.8		3.2±1	
Indications of surgery	Infectious (n=81)	2.25±0/45	0.459	2.95±1.05	0.779
	Obstructive (n=57)	2.4±0.4		2.9±0.9	
	Infect+Obst (n=87)	2.15±0.9		2.8±1	
	Miscellaneous (n=9)	2.1±0.5		3±0.75	

* shows the level of significance

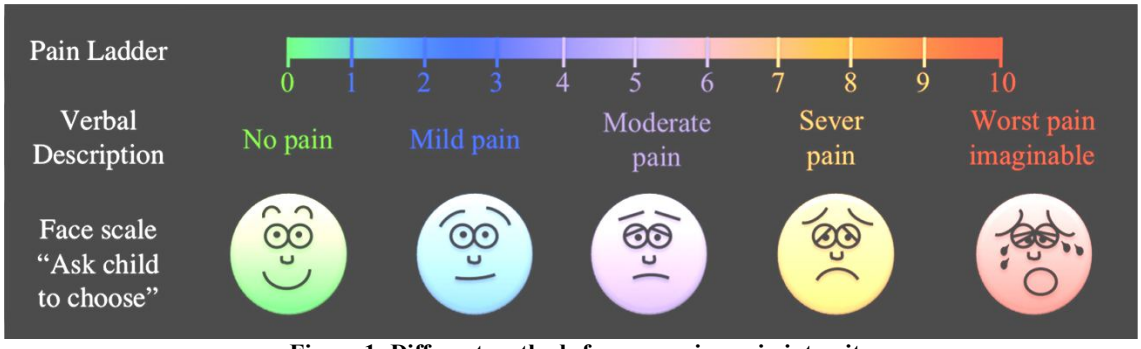

Figure 1: Different methods for measuring pain intensity

Discussion

Tonsillectomy has numerous side effects, the most common fatal of which are bleeding from the tonsil bed and anesthetic effects (5). One of the side effects is bleeding that may occur during surgery, immediately after surgery (within 24 hours) or later (after 24 hours). Intraoperative bleeding is associated with underlying bleeding disorders or significant damage to the arteries [4].

In previous studies, we investigated the complications of cold dissection tonsillectomy, and in the present study, the ones following

electrocautery technique [12, 13]. In this study, the mean intraoperative blood loss during bipolar electrocautery tonsillectomy was 36.6±10.8 cc, while in a study by Kousha et al. (2007), it was 41.2±2.46cc (1) and in an investigation by Silveira et al. (2003), it was 37.41 cc [14], which were both more than our study. This parameter were reported by Hashemi et al. (2001), Gurgain et al. (2010), and Stavroulaki et al. (2007) as 4.5±3.1, 7.38 cc, and 9.4±5.2 cc respectively, which were less than the mean blood loss in our study [5, 8, 15].

The observed differences may be due to the number of studied cases, surgeon's skill, duration of operation, speed of operation, sizes of incisions, ecological conditions, etc.

Postoperative bleeding is one of the most common and serious side effects after tonsillectomy. Rates of postoperative bleeding range from 0.5 to 10 percent in different people [4]. It is important economically to use suture to a lesser extent. On the other hand, stitching the lower bridge of tonsils may cause uncontrollable and dangerous bleeding [5]. Several factors influence the postoperative bleeding including coagulation disorders, surgical techniques, postoperative care, medications, etc. [4].

In the present study, postoperative bleeding was observed in 3.4% of patients, while in the studies by Hashemi et al. (2001), Stavroulaki et al. (2007), and Mohammadi and Jabbari Moghaddam (2007), there were no cases of postoperative bleeding [5, 8, 16]. Additionally, in studies conducted by Mirzayi (2005) and Iranfar et al. (2011), this parameter was observed in 0.9% and 2.2% of cases respectively both of which are lower than the rate obtained in our study [4, 17].

Reduced duration of surgery causes less pressure of Davis blade on the tongue, leading to decreased tongue injuries. On the other hand, reduced anesthesia duration will result in decreased recovery time and economical use of anesthetics and better service to patients [5].

In our study, the mean duration of surgery was 12.7±4.5 minutes, while in the studies by Guragain et al. (2010) and Yilmaz et al. (2012), they were 14.88 and 24 minutes respectively (15, 18), which were higher than our study. On the other hand, in the studies by Mirzayi (2005), Hashemi et al. (2001) and Bukhari and Al-Ammar (2007), the values were 5±2.1, 7.3±2.76 and 3.51 minutes respectively, which are less than our study [4, 5, 10].

Pharyngeal muscle spasms or neuritis of sensory branches of glossopharyngeal nerve can lead to a recurrent delayed otitis. By early chewing, however, muscle spasm is removed and otalgia is reduced. Furthermore, with corticosteroid injection in the tonsil bed at the end of operation, we can reduce nerve neuritis and otalgia [5].

In this study, the incidence of otalgia in the first 4 hours was 13.7%, and it was 28.6% after 24 hours. In the study by Kousha et al (2007), it was 15%, which is less than that of our study [1] and in the study of Hashemi et al. (2001), it was 26% [5] which was more than the incidence of our study. Presence of odynophagia is enough to limit oral intake and patients may need to receive intravenous fluids due to dehydration [19].

The time of fluid intake in our study was 2.9±0.45 hours which is 3.4 hours less than what was reported in the study by Hashemi et al. (2001) [5].

The incidence of postoperative nausea and vomiting in our study was 18%, while in the study by Stavroulaki et al. (2007), it was 25% and more than that of our study [8].

In this investigation, 84.2% of the patients were cured within a week, while in the study by Adoga (2011), less than 25% recovery was observed on the seventh day [9].

Intensity and duration of pain depends on homeostasis technique and the ability to tolerate pain [17]. In the present study, the mean pain scores 4 hours and 24 hours after surgery were 2.31±0.9 and 2.9±0.95 respectively. For male and female patients, these scores were 2.33±0.83 and 2.29±0.83 after 4 hours and 2.99±0.95 and 2.91±0.97 after 24 hours respectively. Nonetheless, the intensity of postoperative pain in the study by Hashemi et al. (2001) was 5.8 [5], in the study by Stavroulaki et al. (2007) it was 6.31 on the first day, 5.8 on the second day, and 4.8 on the fourth day [8]. Therefore, the level of pain severity was less in our study. In the study by Silveira et al. (2003), the intensity of pain was 2 on the first day and 2.5 on the second day which were lower than the values in the current study [14].

In our study, the mean temperatures 4 and 24 hours after surgery were 37.4±0.2 °C and 37.4±0.2 °C respectively. This parameter was not measured in similar studies.

In the present study, the comparison between the means of intraoperative blood loss according to sex, age and different indications of surgery showed no significant differences statistically. The comparison between the means of the pain intensity according to sex and different indications of surgery also showed no significant differences. The reported pain severity 4 hours after operation showed significant difference between different aging groups (p=0.016) such that the older patients

(over 10 years old) stated more severity pain than younger group (less than 10 years old). This finding was similar for the pain 24 hours after operation. However, the severity of pain in the older group was significantly more than the younger group (p=0.001). Furthermore, a significant correlation was observed between duration of surgery and intraoperative blood loss (r=0.1 and P=0.01).

Conclusions

According to the findings of this study, it can be concluded that while the majority of the studied variables were comparable in amount with similar investigations, but the means of intraoperative blood loss, postoperative hemorrhage and the duration of the surgery were greater than what has been reported in most previous studies. An extensive study with more cases and comparison between different methods of tonsillectomy is suggested.

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