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Research Article/Özgün Araştırma

Comparison of bipolar cautery dissection and harmonic scalpel tonsillectomy in terms of postoperative bleeding and pain in children

Çocuklarda postoperatif kanama ve ağrı açısından bipolar koter ve harmonik bıçak tonsillektominin karşılaştırılması

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Abstract

Aim: To compare postoperative bleeding and pain in children after tonsillectomy with bipolar diathermy versus tonsillectomy with harmonic scalpel tonsillectomy.

Materias and Methods: Group A, 25 patients were treated by tonsillectomy with bipolar diathermy and group B, 25 patients underwent tonsillectomy with harmonic scalpel.

Results: Postoperative bleeding occurred in one patient in each group. The mean pain postoperative first day was 8.51±1.31 in the bipolar tonsillectomy group (BTG) and 6.02±0.84 in the harmonic scalpel group (HSG), 3th day 6.84±1.42 in the BTG and 4.98±1.03 in the HSG and at the postoperative 5th day were examined, it was 5.39±0.73 in the BTG and 3.95±0.74 in the HSG and this differences were significant statistically ($p< 0.05$).

Conclusion: Harmonic scalpel tonsillectomy technique is significantly less painful in postoperative early period compared to bipolar cautery technique.

Keywords: Bipolar diathermy; Harmonic scalpel; Tonsillectomy.

Öz

Amaç: Çocuklarda bipolar koter ile harmonik bıçak tonsillektomiyi postoperatif kanama ve ağrı açısından karşılaştırmak.

Gereç ve Yöntem: Grup A'daki 25 hastaya bipolar koterle ve grup B'deki 25 hastaya harmonik bıçakla tonsillektomi yapıldı. Postoperatif kanama ve ağrı açısından sonuçları değerlendirildi. Hastaların ağrılarının değerlendirilmesi görsel analog skala ile yapıldı.

Bulgular: Postoperatif kanama her grupta birer hastada meydana geldi. Postoperatif 1. gün ortalama ağrı bipolar tonsillektomi grubunda (BTG) 8.51±1.31, harmonik bıçak grubunda (HBG) 6.02±0.84, 3. gün BTG'de 6.84±1.42, HBG'de 4.98±1.03 ve postoperatif 5. günde BTG'de 5.39±0.73, HBG'de 3.95±0.74 idi ve bu farklar istatistiksel olarak anlamlıydı ($p<0.05$). Postoperatif 7. günün ağrı skorları incelendiğinde BTG'de 4.23±0.87, HBG'de 3.63±0.61, 10. günde BTG'de 3.21±0.92 ve 2.84±0.59 HBG'de ise bu farklar istatistiksel olarak anlamlı değildi ($p>0.05$).

Sonuç: Harmonik bıçak tonsillektomi tekniği erken postoperatif dönemde bipolar koter tekniğine kıyasla anlamlı derecede daha az ağrılıdır.

Anahtar Kelimeler: Bipolar koter; Harmonik bıçak; Tonsillektomi.

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Introduction

One of the most common surgical procedures in pediatric age group is tonsillectomy. Pain and hemorrhage after tonsillectomy are the most important factors affecting morbidity.[1] New technological methods are continuously developed to reduce such conditions that affect the surgeon, patients and their relatives. Bipolar cautery dissection method is used frequently because it provides simultaneous vascular coagulation in tonsillar dissection.[2] Harmonic scalpel surgical technique is one of the new techniques applied in tonsillectomy and it has been reported to have many advantages. The harmonic scalpel is an ultrasonic scalpel that converts electrical energy into mechanical energy by means of its ceramic piezoelectric connector, which produces 60 to 100 micrometer longitudinal cutting motion at 55.500 Hz. The harmonic scalpel produces mechanical vibration at a relatively low temperature compared to an electrocautery between 50 and 100 degrees, for coagulation and tissue cutting. Harmonic scalpel was first used in general surgery and gynecological laparoscopic operations and was widely accepted.[3,4] In this study, patients who underwent bipolar cautery tonsillectomy and harmonic scalpel tonsillectomy were compared in terms of pain and postoperative bleeding.

Materials and Methods

The study was approved by the ethics committee of Harran University Faculty of Medicine (18/09/2019-E.39372). Patients randomly selected from patients who underwent tonsillectomy at Health of Sciences University Sanliurfa Mehmet Akif Inan Training and Research Hospital between May 2017-March 2019 were included in the study. Patients were divided into two groups according to the surgical method used. Group A, 25 children (10 boys, 15 girls; mean age 8.1 years; age range 5 to 13 years) had bipolar cautery tonsillectomy and 25 children in group B (11 boys, 14 girls; mean age 7.8 years,age range 6 to 14 years) the harmonic scalpel surgical technique tonsillectomy was performed. Preoperative routine blood count, prothrombin/partial thromboplastin time were measured. All operations were performed under general anesthesia. Bipolar cautery dissection tonsillectomy was started with cauterization of 30 Watt and anterior pulp cauterization. Tissue scissors were used to find only the tonsil capsule. Harmonic scalpel tonsillectomy was used with the 5 mm curved sharp scalpel harmonic scalpel tip (Ethicon Endo Surgery Inc., Cincinnati, OH) used by general surgery (Figure 1-2). All patients were hospitalized one night after surgery. Oral antibiotic suspension and paracetamol suspension were started as treatment. Pain relief of the patients was performed by visual analog scoring by evaluating the pain with the scores given on the 1st, 3rd, 7th and 10th days postoperatively. The patients were followed up for three weeks after operation.

Statistical Analysis

Chi-square test was used for comparisons between the groups in terms of categorical variables. Categorical variables were represented by number. Two-way analysis of variance was used for repeated measures in comparison of pain scores in three measurements between two groups. Numerical variables were shown with arithmetic mean±standard deviation. $p<0.05$ was considered statistically significant. Calculations were performed using IBM SPSS 22.0 version statistical software program (IBM Corp. Armonk, NY, USA).

Results

In our follow-ups, postoperative bleeding occurred in two patients in the bipolar cautery group (BPG) on the 7th postoperative day and in the harmonic scalpel group (HSG) on the 6th day. Both patients were hospitalized and followed under general anesthesia and bleeding control was performed with bipolar cautery. These two patients were excluded from the postoperative pain assessment group. When the postoperative pain scores of the patients were examined, the mean postoperative first day was 8.51±1.31 (min:6, max:10) in the BPG and 6.02±0.84 in the HSG (min:5, max:8), postoperative day 3 were examined, it was found to be 6.84±1.42 (min:5 max:8) in the BPG and 4.98±1.03 (min:4 max:6) in the HSG and at the postoperative 5th day were examined, it was

Figure 1. The 5 mm curved sharp scalpel harmonic scalpel tip (Ethicon Endo Surgery Inc., Cincinnati, OH)

5.39±0.73 (min:3 max:6) in the BPG and 3.95±0.74 (min:3 max:5) in the HSG and this differences were significant statistically (p<0.05). When the pain scores of the postoperative 7th day were examined, it was 4.23±0.87 (min:3 max:6) in the BPG and 3.63±0,61 (min:3 max:5) in the HSG and at the 10th day it was 3.21±0.92 (min:2 max:5) in the BPG and 2.84±0.59 (min:2 max:4) in the HSG this differences were not significant statistically (p>0.05) (Table 1) (Graphic 1).

Discussion

Complications of tonsillectomy include anesthesia related complications, various drug reactions, carotid artery injury, bleeding, dehydration, tonsillectomy infection.[5] One of the most important complications of these complications is postoperative hemorrhage. Hemorrhage after tonsillectomy is classified as primary (before 24 hours) and secondary (after 24 hours) bleeding. Primary hemorrhage are more related to the surgical technique, whereas secondary hemorrhage are caused by solid food traumas, tonsil bed infections, postoperative nonsteroidal antiinflammatory use or idiopathic causes.[6-8] Leapar et al.[9] compared the harmonic scalpel tonsillectomy with bipolar tonsillectomy and postoperative bleeding rates were similar. In their study, Roth JA et al.[10] compared harmonic scalpel tonsillectomy with monopolar tonsillectomy and reported no significant difference in postoperative bleeding rates. Potts et al.[1] In a study of 605 patients, the patients were divided into two according to age groups under seven and over seven years of age. Although the frequency of bleeding was less in the harmonic scalpel group than in the age group, no significant difference was observed when compared with the age groups. Similarly in our study, postoperative bleeding occurred in one patient in both groups. The risk of bleeding after tonsillectomy was the same in both methods.

Postoperative pain is one of the most important causes of morbidity which limits oral intake after tonsillectomy and causes dehydration and daily activity limitation.[11]

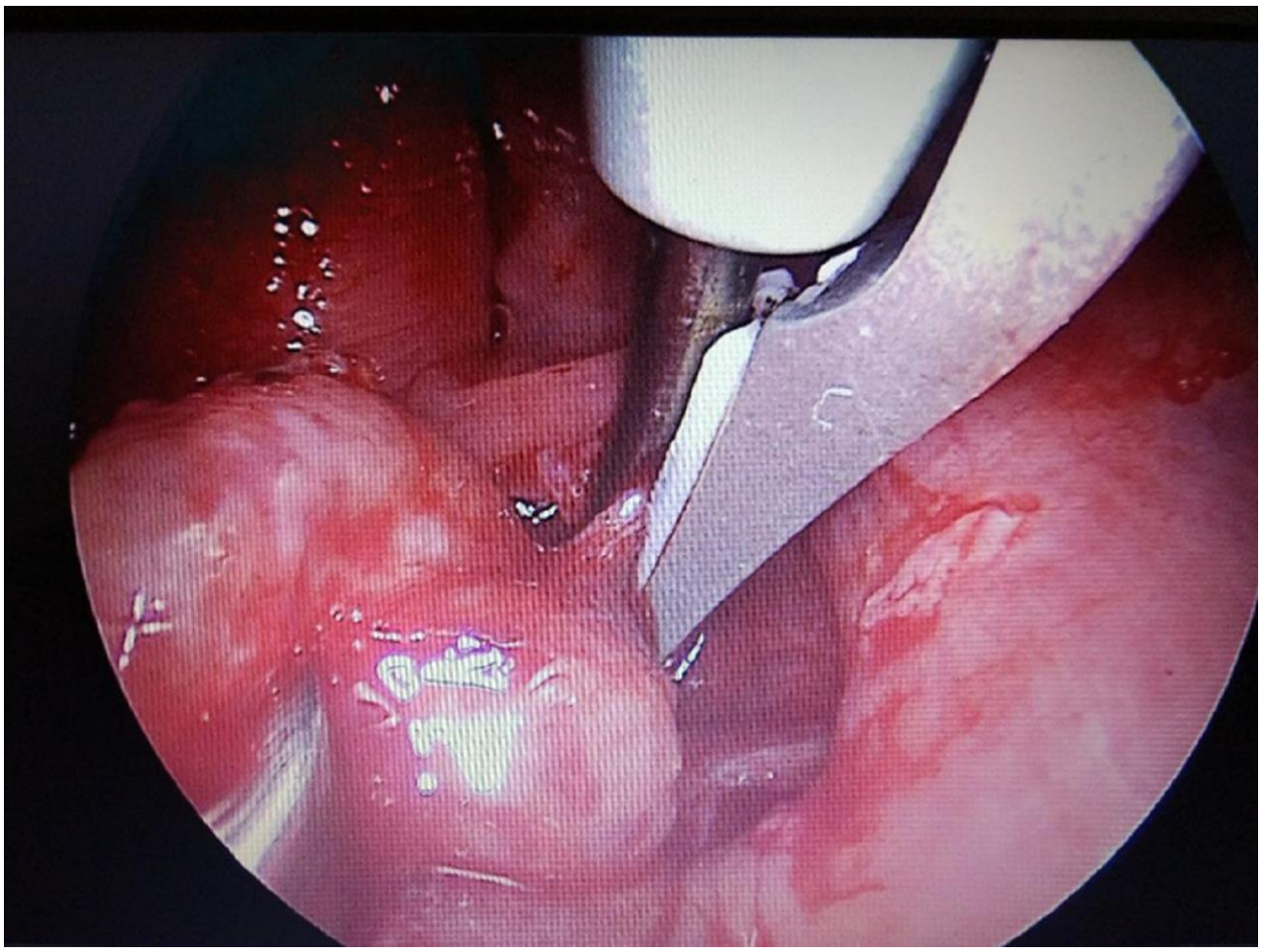


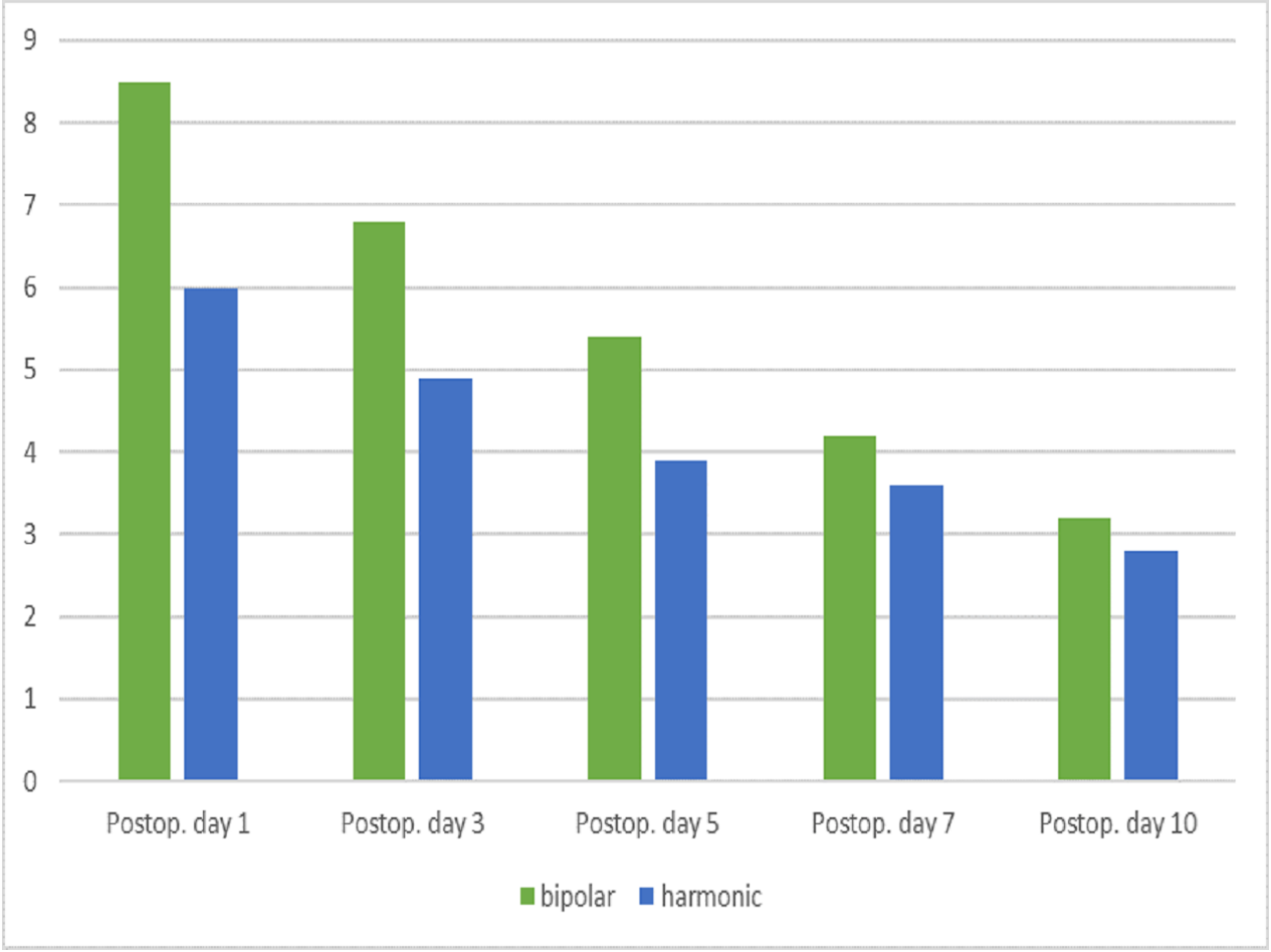
Figure 2. Harmonic scalpel tonsillectomy.

Table 1. Comparison of pain in Bipolar and harmonic scalpel tonsillectomy

	Bipolar tonsillectomy group	Harmonic scalpel tonsillectomy group	*p* value*
Postop. day 1	8.51±1.31	6.02±0.84	0.01
Postop. day 3	6.84±1.42	4.98±1.03	0.04
Postop. day 5	5.39±0.73	3.95±0.74	0.03
Postop. day 7	4.23±0.87	3.63±0.61	0.37
Postop. day 10	3.21±0.92	2.84±0.59	0.45

*Chi-square test

50% of children after tonsillectomy complained of severe pain at eight and above levels. Moreover, this pain continues not only during swallowing but also at rest.[12] Because of the pain, the oral intake of children decreases and the risk of dehydration increases. Pain after tonsillectomy has been reported to be more severe in patients who are usually using electrodissection or electrocoagulation methods.[13] In their study, leaper et al.[9] Compared the harmonic scalpel tonsillectomy with bipolar tonsillectomy, reported severe postoperative pain for the first 6 days, and the pain was slightly more severe in bipolar tonsillectomy compared to the harmonic scalpel technique. Similarly, we found that patients who received harmonic scalpel for the first 5 days postoperatively had significantly less pain. Ali NS et al.[14] compared electrocautery tonsillectomy and harmonic scalpel tonsillectomy and found pain significantly lower on days 1, 2 and 3. similary in our study, postoperative pain was significantly higher in the bipolar group at the



Graphic 1. Postoperative pain graph.

postoperative day 1, 3 and 5 between group 1 and group 2. In the early postoperative period, the use of harmonic scalpel causes less pain and the patient can be fed orally with an appropriate diet. Thus, the chronic cycle breaks quickly. As the patients who have more pain reject the feeding, the pain decreases later and the healing process is prolonged.

No special training is required to use the harmonic scalpel system, but especially in pediatric patients it is difficult to use because the surgical field is narrow. Smaller forceps suitable for tonsillectomy will provide more frequent use of this system. Our clinical experience shows that patients who are operated with a harmonic scalpel have a shorter surgery time. And because of the less postoperative pain, they do not have any feeding problems.

Study Limitations

The use of not specially produced forceps for tonsillectomy and the number of patients are potential limitations.

Conclusion

As a result, with the developing technology, many new surgical instruments are used which have some advantages and disadvantages in medicine. Harmonic scalpel has been recently used in tonsillectomy. In pediatric patient bipolar cautery technique causes more postoperative pain than harmonic scalpel technique. Harmonic scalpel tonsillectomy technique is significantly less painful in early postoperative period compared to bipolar cautery technique and decreases morbidity. But existing forceps are not very suitable for tonsillectomy, new forceps should be developed for narrow and deep surgical sites.

Ethics Committee Aproval

The study was approved by the ethics committee of Harran University Faculty of Medicine (18/09/2019-E.39372).

Informed Consent

All patients signed the Informed Consent Form and their consent was obtained.

Author Contributions

Conception, design, supervision, data collection and/or interpretation, literature review, writer and critical review were done by Kaplama ME.

Conflict of interest statement

In the preparation and publication of this manuscript there was no conflict of interest.

Financial Disclosure

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