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# Bipolar cautery tonsillectomy using different energy doses: Pain and bleeding

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ABSTRACT

*Objective:* Tonsillectomies are the most frequently applied operations in the ENT practice. Even though different surgical tonsillectomy techniques have been used, bipolar cautery is the most frequently used one. Our aim was to compare postoperative bleeding rates, pain scores and recovery times in tonsillectomies performed by using bipolar cautery in Joules (1 Watt·sec or W s) calculated by multiplying Watts by the duration of cauterization.
*Methods:* Adenotonsillectomy and tonsillectomy patients, admitted to the Department of otorhinolaryngology of Izmir Ataturk Training and Research Hospital and Mardin State Hospital, between January 2007 and December 2012 constituted the study group prospectively. The patients divided into 4 groups due to the energy they exposed.
*Results:* Patients in Group 1 recovered most rapidly (mean recovery time, 13.9 ± 1.8 days). Statistically significant results were obtained between Groups 1 and 4 and also Groups 2 and 4 when recovery times of the patient groups were evaluated with Bonferroni correction test.
*Conclusion:* As a result, for hemostatic control, electrocauterization should be used at lower doses and short-term as possible so as to decrease frequency of bleeding episodes, alleviate postoperative pain and accelerate wound healing.

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## 1. Introduction

Tonsillectomies are the most frequently applied operations in the ENT practice. Even though different surgical tonsillectomy techniques have been used, determinative factor for the applicability of these methods is related to the shorter duration and ease of the operation and lower incidence of bleeding episodes during intraoperative period and postoperative short- and long-term. In various studies different rates for intra- and postoperative tonsillar bleeding have been reported based on the techniques used Generally, comparative literature studies investigating incidence rates for bleeding have been concentrated on surgical techniques, bipolar–monopolar cauterization, ligation and chemical substances (Ankaferd Blood Stopper and so on) Among these methods bipolar cautery is the most frequently used one. Though, many literature studies have compared incidences of bleeding with different cauterizing doses, limited number of studies compared applications as for energy transferred, into tissues, etc. Frequency of bleeding has been reportedly decreased with applications of lower Watts of transferred energy, however in cases where long-term and intensive use of cauterization has been applied, Watts transferred into tissues accumulate to higher levels leading to variable amounts of postoperative blood loss.

Herein, our aim was to compare postoperative bleeding rates in tonsillectomies performed by using bipolar cautery in Joules (one Watt·sec or W s) calculated by multiplying Watts by the duration of cauterization.

## 2. Materials and methods

### 2.1. Study design

This study was approved by the local Institutional Review Board. Written informed consent was obtained from all subjects, a legal surrogate, the parents or legal guardians. Adenotonsillectomy and tonsillectomy patients, admitted to the Department of otorhinolaryngology of Izmir Ataturk Training and Research Hospital and Mardin State Hospital, between January 2007 and December 2012 constituted the study group prospectively.

Cases with postoperative tonsillar bleeding were included in the study. Cases with known bleeding disorder, chronic disease or

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patients experiencing acute attacks of tonsillitis were excluded from the study. Use of aspirin was discontinued 10 days preoperatively. Informed consent forms were obtained from the patients, after they were informed about the type of the operation and its postoperative course. Preoperatively, as a routine procedure, whole blood counts, INR, prothrombin time (PTT) and activated thromboplastin time (aPTZ) were tested.

Operations were performed under general anesthesia using endotracheal intubation. All the patients were operated under general anesthesia. Each patient was premedicated with midazolam (1 mg/kg). For induction of anesthesia, before endotracheal intubation, 3–5 mg/kg sodium thiopental and 0.1 mg/kg recuronium bromide were used. After intubation general anesthesia was maintained at an inhaled dose of 1–2% sevofluorane. Before starting operation each patient received 1 mg/kg IV prednisolone.

### 2.2. Surgical technique

A time counter was connected to the foot pedal of the bipolar cauterization device (Martin ME401, HTP Medical S.R.L., Str. Italiana) to record duration of catheterization and related energy used in Joules (Joule = Watt × seconds). The patients were divided into four groups and included in the study according to the calculated energy consumption in Joules as follows: Group 1, 0–500 Joules ($n$ = 178); Group 2, 500–1000 Joules ($n$ = 183); Group 3, 1000–1500 Joules ($n$ = 198) and Group 4, >1500 Joules ($n$ = 128). The procedure was started with incision of the anterior plica. Then tonsil was retracted with one hand and the cautery was hold with the other hand to dissect the tonsillar capsule away from surrounding tissues. Any bleeding foci were cauterized using bipolar cautery. The patients were observed in the recovery room for half an hour, then transferred into the service. Patient and his/her intimates were informed about bleeding risks and required postoperative alimentation. Operative times of the patients were recorded. The patients were observed as for postoperative bleeding and switch to oral fluid intake. The patients received a single IV push dose of cefazolin sodium (30 mg/kg). At postoperative 2 h, oral paracetamol therapy (syrup, 20 mg/kg) was initiated and maintained four times a day for 7 days. Oral amoxycillin at daily doses of 50 mg/kg was prescribed for 7 days and the patients without any additional complication were discharged from the hospital on postoperative day 1. At the time of discharge, the patients received prepared forms containing directives for the management of pain, oral food intake and pain. Besides, information was given about completion of these forms in detail. In case of bleeding, they were requested to consult to the clinic.

### 2.3. Outcome parameters

All patients were asked to attend control visits on 7, 10, 21 and 28 postoperative days and their operative times, days of bleeding episodes, time interval up to the disappearance of pseudomembranes, initiation of oral nutrition and month(s) of bleeding episodes (if any) and their allocated groups were recorded.

Patients' complaints of pain at postoperative 2 h and 10 days were ranked using pain scale (graded from 0 to 10 pts) introduced by Lassaletta et al. Increase in pain scale scores indicated increased severity of pain.

At postoperative follow-up visits, routine blood cell counts, PTT and aPTT were tested in patients presented with bleeding episodes. In case of need, patients received blood products and IV fluid therapy. Then hemostatic control was achieved by gargling with iced water, local compression with lidocaine plus adrenaline impregnated sponge and if all these failed, bleeding was controlled under general anesthesia using cauterization, surgical ligation, suturing of both plicas interposed with Surgicell® hemostatic cellulose. Parents were asked about postoperative long-term complications. Fluid and solid food intake were recorded.

### 2.4. Statistical analyses

Data were analyzed using the Statistical Package for Social Sciences 16.0 for Windows (SPSS Inc., Chicago, IL). Parametric tests were applied to data of normal distribution and non-parametric tests were applied to data of questionably normal distribution. One-way ANOVA test was used to compare groups of independent

**Table 1**
Comparison of the four groups in demographic characteristics, preoperative and postoperative diagnoses – events using all patients ($n$ = 687).

| Variables | Group 1 ($n$ = 178) | Group 2 ($n$ = 183) | Group 3 ($n$ = 198) | Group 4 (n = 128) | $p$ Value |
|---|---|---|---|---|---|
| Age (mean ± SD) | 10.8 ± 5.2 | 9.8 ± 4.8 | 9.6 ± 4.4 | 7.9 ± 2.9 | 0.645 |
| Gender | | | | | |
| Female | 102 | 84 | 105 | 44 | 0.484 |
| Male | 76 | 99 | 93 | 84 | |
| Preoperative obstruction | | | | | |
| Present | 145 | 155 | 166 | 88 | 0.129 |
| Absent | 33 | 28 | 32 | 40 | |
| Preoperative infection | | | | | |
| Present | 55 | 46 | 64 | 29 | 0.426 |
| Absent | 133 | 137 | 134 | 99 | |
| Pre-operative other | | | | | |
| Present | 9 | 11 | 14 | 6 | 0.322 |
| Absent | 169 | 172 | 184 | 122 | |
| Operation duration (min.) (mean ± SD) | 23.6 ± 8.8 | 23.5 ± 6.4 | 22.6 ± 9.9 | 25.2 ± 9.4 | 0.726 |
| Cigarette smoking | | | | | |
| Present | 142 | 91 | 63 | 43 | 0.314 |
| Absent | 36 | 93 | 135 | 85 | |
| Yearly annual income | | | | | |
| 0–10,000$ | 64 | 104 | 66 | 74 | 0.156 |
| 10,001–20,000$ | 45 | 43 | 50 | 15 | |
| 20,001–30,000$ | 45 | 26 | 44 | 23 | |
| 30,001$< | 24 | 10 | 28 | 16 | |
| Recovery time (days) | 13.9 ± 1.8 | 14.6 ± 2.9 | 17.8 ± 5.5 | 20.9 ± 5.6 | 0.563 |
| Duration until oral intake (days) | 6.8 ± 1.3 | 7.9 ± 1.6 | 7.3 ± 2.1 | 12.6 ± 2.5 | 0.145 |
| Postoperative 2nd hour pain scale | 2.1 ± 1.1 | 2.8 ± 1.4 | 3.1 ± 1.1 | 3.8 ± 1.8 | 0.032 |
| Postoperative 10th day pain scale | 4.5 ± 2.1 | 4.8 ± 2.6 | 6.4 ± 1.9 | 7.3 ± 2.8 | 0.044 |

* Results from $\chi^2$ tests or exact tests for categorical measures and one-way ANOVAs for numeric measures.

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