Impedance-controlled radiofrequency vs. cold dissection tonsillectomy

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Abstract. Impedance-controlled radiofrequency vs. cold dissection tonsillectomy. Objective: To compare the efficacy and safety of radiofrequency (RF) and cold dissection (CD) tonsillectomy.

Study design: Prospective, double-blind, controlled clinical study.

Patients and methods: One hundred and fourteen patients underwent tonsillectomy. The RF and CD techniques were used for the right and left tonsils, respectively; the patients and examining physicians were blinded to this information to avoid bias. We compared operation times, intraoperative bleeding, and postoperative pain associated with the respective techniques.

Results: The RF and CD techniques required similar operation times. Intraoperative bleeding was lower after RF dissection than after CD. The severity of pain did not differ between the two techniques on postoperative day 1, but was significantly lower for the CD technique than the RF technique on postoperative days 5 and 10.

Conclusion: The RF technique is superior to CD regarding intraoperative bleeding, but not regarding operation time or time to return to a painless dietary regimen.

Introduction

Tonsillectomy is one of the most common otorhinolaryngologic surgical procedures worldwide. This surgery can be safely performed as an outpatient procedure. Numerous tonsillectomy techniques are currently used, including the conventional cold dissection (CD) technique; more recent techniques are also employed, such as the electrocautery, laser harmonic scalpel, thermal welding system, radiofrequency (RF), and ultrasonic scalpel techniques. In all of these techniques, the tonsillar capsule is located and dissection is performed between the capsule and the surrounding pharyngeal muscles; the tonsils are then removed with meticulous hemostasis. In the United States and many developed countries, electrocautery is the most commonly used tonsillectomy method, while in other countries, such as Germany, the CD and bipolar diathermy technique is the most widely used. With advancements in technology, many studies have investigated new tonsillectomy techniques. All of these studies have aimed to reduce the amount of intraoperative bleeding, shorten the duration of surgery, reduce postoperative morbidity, and increase patient comfort.

RF tonsillectomy is one of the electrosurgical techniques currently in use. The fundamental principle of this technique is the transfer of electromagnetic energy through the tissue to create heat energy within the tissue. There are three types of tonsil-related surgical techniques, which are classified according to the RF device and probe used: tonsil ablation, tonsillotomy, and tonsillectomy. Bipolar RF dissection tonsillectomy was first reported in a 2005 study. Since then, many studies have examined this technique. In this study, we compared the CD technique and the RF dissection technique with regard to operation time, amount of bleeding, and postoperative pain.

Patients and methods

The present study involved 114 patients that underwent tonsillectomy under general anesthesia between September 2012 and December 2012 in the Otorhinolaryngology and Head Neck Surgery

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Department of the Haseki Research and Training Hospital. All patients and/or their parents were provided with adequate information about the surgical procedure and provided written informed consent. Patients with a history of hemorrhagic diathesis and peritonsillar abscess were excluded from the study. The indications for tonsillectomy were chronic tonsillitis in 90 patients and tonsillar hypertrophy causing upper airway obstruction in 24 patients. The same anaesthetic drugs were administered to all patients in the preoperative, early postoperative, and late postoperative periods via the same regimen. All patients were instructed to take paracetamol systemically. Ear, nose, and throat surgeons with similar levels of experience performed all surgical procedures. The right tonsil was removed using the RF technique, and the left tonsil was removed using the CD technique in all patients. The physicians that examined and evaluated the postoperative findings were blinded to which technique was used on which side to avoid bias. The patients and their parents were also blinded to which technique was used on which side. After intubation, each patient was placed in Rose position with a pillow under the shoulders to elevate them and hyperextend the head. Patients were stabilized with Draffin bipods after the insertion of a Davis mouth gag. The RF system consisted of a generator that provided an alternating RF current (Curis® RF generator, Sutter Medizintechnik, Germany; Figure 1), reusable forceps designed for tonsillar dissection, aspiration, and easy manipulation (SuperGliss® To-Bite forceps; Figure 2), and a dual-control foot pedal for cutting and coagulation. The device calibrates the power output by measuring the impedance in the tissue, and it emits an audible warning to the user and automatically cuts off the power output when tissue death is achieved. Thus, the state of the tissue is constantly monitored. The device was set to the bipolar AutoRF macro mode and 40 watts, and the tonsil was grasped at its upper pole and pulled medially. A mucosal incision was made from the upper pole to the lower pole along the groove between the tonsillar capsule and the pharyngeal muscles by pressing the left pedal to activate the cutting mode. Once the capsule was exposed, the dissection was continued between the capsule and the upper constrictor muscle by pressing the right pedal to activate the coagulation mode, and finally, the tonsil was removed. The forceps were used in the coagulating mode to control bleeding. The left tonsil was removed using the conventional CD technique. The incision and dissection were made with scissors. The tonsil was compressed at the lower pole with a wire snare and then removed. Bleeding was controlled with bipolar cautery using heat coagulation.

The operation time and blood loss were measured for both techniques. The operation time was defined as the period between the first incision and the achievement of hemostasis. The amount of bleeding during this period was measured using a separate aspirator and aspirator bottle for each technique. All patients received optimal doses of the same anaesthetic drugs. Paracetamol was administered parenterally to the patients during their stay in hospital. We recommended oral paracetamol as an analgesic and cefuroxime axetil as a prophylactic antibiotic for 10 days after the patients were
discharged on the first posttonsillectomy morning. At the time of discharge, patients were given a visual analogue scale (VAS) form, which could be used to subjectively rank the degree of pain from one (least severe pain) to ten (most severe pain). Patients (and guardians for patients younger than 18 years) were provided with detailed information and instructed to separately score the severity of pain on the right and left sides on the 1st, 5th, and 10th days after discharge. We also asked patients and/or their parents on which day the patients had no pain while swallowing after the operation (separately for each side), and that day was recorded as the date of return to a painless dietary regimen for each side. The VAS forms were collected from the patients and/or their parents on the 15th day after discharge. Patients that took analgesics other than those prescribed by us were excluded from the study. Postoperative bleeding occurred in two patients that visited our clinic before the 10th day after discharge.

Statistical analysis of the results was performed using the Statistical Package for Social Sciences (SPSS) for Windows 19.0 (Chicago, IL, USA). The paired-samples t-test and independent-samples t-test were used. Both techniques were compared with respect to postoperative pain, intraoperative bleeding, operation time, and postoperative bleeding.

Results

The mean age of the patients was 17.97±8.760 years (range, 8–50 years); 52.6% of patients were female, and 47.4% were male. The mean operation time did not differ significantly between the RF (9.53±3.014 min) and CD techniques (10.63±5.096 min, p=0.170). The amount of intraoperative bleeding was significantly lower with the RF technique (11.35±5.090 ml) than the CD technique (74.35±34.321 ml, p=0.000; Figure 3). On the first day, the mean pain scores were similar for the RF (5.85±3.283) and CD techniques (5.42±3.062, p=0.399). However, on the fifth day, the mean pain score was significantly higher for the RF technique (6.50±2.608) than for the CD technique (4.63±2.094, p=0.014). This trend continued; on the 10th day, the mean pain score remained significantly higher for the RF technique (6.28±3.006) than for the CD technique (3.94±2.508, p=0.009; Figure 4). Patient age, sex, and indication for surgery had no effect on the amount of bleeding, operation time, or level of postoperative pain. Return to a painless dietary regimen took an average of 10 days after CD and 14 days after RF tonsillectomy. One case of postoperative bleeding occurred for each technique.

Discussion

Tonsillectomy is one of the oldest and most common surgical procedures in otorhinolaryngological practice. In modern times, the use of antibiotics has reduced the incidence of chronic tonsillitis, which is the most common indication for tonsillectomy. Post-tonsillectomy pain is the most important cause of morbidity after tonsillectomy, as it reduces oral intake, induces dehydration, and prolongs the return to daily activities. From Celsus, who first performed a tonsillectomy by finger dissection without any instruments in the first century AD, to the present, in line with technological developments, different devices and techniques for tonsillectomy have been gradually introduced. The main aim of all tonsillectomy techniques is to remove the tonsil while causing the least possible pain and morbidity. Hot dissection techniques were developed for this purpose, and are associated with shorter operation times, less bleeding, and less severe postoperative pain than CD techniques.
Our study demonstrated that postoperative pain is significantly more severe after the RF technique than after the CD technique. Moreover, the time required for the patient to return to a painless dietary regimen was prolonged after the RF technique.

We found that the operation time did not differ between the RF and CD techniques, because the surgical manipulations were similar in both techniques. Ligation was used for hemostasis in most studies on CD techniques, which accounts for the increased the operation time for these techniques in comparison with hot dissection techniques.5,7 We used bipolar cautery for hemostasis after CD, and therefore did not require a long time for hemostasis. Studies in adults have found similarly short operative times for hot and cold tonsillectomy methods.17

The RF technique has advantages (e.g., less intraoperative bleeding) and disadvantages (e.g., greater postoperative pain). Thus, whether the RF technique is the optimal technique for tonsillectomy is debatable.

Conclusion

The outcomes of tonsillectomy techniques are controversial, and more studies are required. In the present study, the RF technique was superior to the CD technique regarding intra-operative bleeding; the two techniques were equal with respect to operation duration and post-operative bleeding; and the CD technique was superior to the RF technique regarding return to a painless dietary regimen. Therefore, we conclude that the CD technique is preferable to the RF technique overall.

References

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