Bipolar radiofrequency tonsillotomy compared with traditional cold dissection tonsillectomy in adults with recurrent tonsillitis

Shadman Nemati, MD, Rahmatollah Banan, MD, and Abdorrahim Kousha, MD, Rasht, Guilan, Iran

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ABSTRACT

OBJECTIVE: To compare short- and long-term results of radiofrequency tonsillotomy and traditional cold dissection tonsillectomy in adult patients with recurrent tonsillitis.

STUDY DESIGN: A randomized clinical trial.

SETTING: A tertiary referral university hospital.

SUBJECTS AND METHODS: Of 62 adults with recurrent tonsillitis, 24 patients were treated with cold dissection tonsillectomy, while radiofrequency tonsillotomy (RF) by use of radiofrequency induced thermotherapy probes was performed in the remaining 38 patients. Duration of surgery, amount of intraoperative bleeding, recovery time, postsurgical pain (measured by use of visual analogue scale on days 1, 3, 5, and 10 after surgery), dysphagia, weight loss, and time of return to normal diet and activity were measured. All the patients were followed for 12 to 24 months for recurrence of tonsillitis episodes.

RESULTS: Comparing the radiofrequency tonsillotomy group to the cold dissection tonsillectomy group, mean duration of surgery was 16.89 versus 45.04 minutes, recovery time was 14.32 minutes versus 17.08 minutes, and amount of intraoperative bleeding was 15 to 20 cc versus 250 to 300 cc, respectively (P < 0.005). There was no difference between the two groups in the recurrence of tonsillitis episodes after 24 months.

CONCLUSION: Tonsillotomy with radiofrequency is a simple, rapid, and effective method in adult patients with recurrent tonsillitis.

Materials and Methods

A prospective randomized clinical trial on 62 adult patients (aged 15-65 years) with recurrent tonsillitis was performed in a tertiary referral university hospital from June 2007 to October 2008. From 80 adult cases referred for tonsillectomy (i.e., with more than 6 severe episodes of tonsillitis in the past year or more than 3 episodes in 2 consecutive years), those with hematologic disorders, asthma, asymmetrical tonsils with probability of malignancy, and history of febrile seizures or rheumatic heart diseases were excluded, and 64 cases were entered randomly into two study groups: radiofrequency group (RF) versus CD group.

We used the nonequal sample size formula for increasing accuracy of the study and considered 30 cases for RF tonsillectomy and 26 cases as controls (CD group). Our level of significance and power of the study were determined to be 0.05 and 90 percent, respectively. Because we were
introducing a new treatment method with long-term follow-up, we considered a 25 percent drop-out rate in the RF group, and therefore, our calculated sample size was actually 38 patients in the RF group, whereas the control group remained at 26 patients. We then allocated the patients using randomization blocks (using a combination of triple and quadruple randomization blocks) in the two groups (Fig 1).

All patients were provided with thorough explanations about both surgical techniques and signed a written informed consent form before entering the study. Both study groups were matched for age, sex, and grading of the tonsils (according to Brodsky, Moore, and Stanievic Scaling of tonsil size). Two patients from the control group were withdrawn from the study per the anesthesiologist’s recommendations.

Traditional tonsillectomy (by use of cold knife dissection and snare) and RF tonsillectomy or tonsillotomy by use of radiofrequency induced thermotherapy (RFITT) probes were performed with the patient under general anesthesia, in an identical setting, and by one surgeon (S.N.). Postoperative orders in both groups were identical; all of the patients were discharged after 24 hours and encouraged to return to a normal diet (except coarse, dry, and hot foods) as soon as possible and not consume any analgesic for five to seven days after the procedure. Duration of surgery, amount of intraoperative bleeding, recovery time, postsurgical pain (by use of visual analogue scale [VAS] on days 1, 3, 5, and 10 after surgery), time of return to normal diet and activity, dysphagia, and postsurgical weight loss were measured in all the cases and controls.
All patients were followed up for 12 to 24 months (until November 2009) for recurrence of tonsillitis/pharyngitis episodes by check-up, at regular three-month intervals, in the otolaryngology clinic, and also by regular telephone interviews, performed by an otolaryngology resident. At follow-up, patients were asked about significant and severe episodes of sore throat resembling those of preoperative period, but not similar episodes, such as common cold or other upper respiratory tract infections.

The proposal of the research was reviewed and approved by the Guilan University of Medical Sciences Research Office Review Board and Ethics Committee. Statistical analysis was performed by use of SPSS version 16 software (SPSS, Inc., Chicago, IL) and $\chi^2$ and Mann-Whitney $U$ tests.

**Technique of RF Tonsillotomy**

With the patient under general anesthesia and in the Rose position, the oropharynx was exposed by use of a Davis gag, and bipolar-linear RFITT probe (Celon AG Medical Instruments, Teltow/Berlin, Germany) was introduced into the crypts of the tonsils. The RF generator working frequency was 470 kHz, which was set at 7 W during the procedure. The power was constantly controlled by the system, terminating the energy application automatically once the thermal lesion was created. Five points (i.e., tonsillar crypts, including crypts of inferior and superior poles) for grades 1 and 2 tonsils, seven points for grade 3, and nine points for grade 4 tonsils were probed (Fig 2). In our experience, these points must not be selected in one line in order to avoid the remnants of tonsil tissue being walled off after the procedure. After termination of the procedure in both sides, the probable bleeding sites were controlled, and the patient extubated.

**Results**

Traditional CD tonsillectomy in 24 cases (12 male, 12 female; mean age: 22.27 ± 8.31 years) and RF tonsillotomy in 38 cases (20 male, 18 female; mean age: 25.05 ± 7.27 years) were performed. Before intervention, the mean grade of tonsils was 2.84 ± 0.73 in the CD group and 2.81 ± 0.71 in the RF group ($P > 0.523$), and the mean rate of tonsillitis episodes in the two groups was 4.83 ± 0.56 and 4.93 ± 0.44 per year, respectively ($P > 0.5$).

The mean duration of operation was 16.89 ± 6.04 minutes in the RF group and 46.07 ± 10.63 minutes in the CD group ($P < 0.005$) (Fig 3). The mean amount of intraoperative bleeding in the RF group was 21.00 ± 3.7 cc (always less than 50 cc) and 346.04 ± 7.43 cc in the CD group ($P < 0.005$). Mean recovery time was 14.32 ± 3.36 minutes in the RF group and 17.08 ± 2.91 minutes in the CD group ($P < 0.005$).

The mean postoperative pain on first day after surgery was 4.00 ± 2.17 in RF group and 6.83 ± 2.50 in CD group, according to the VAS ($P < 0.001$) (Fig 4). Also, on the third postoperative day, there was a significant difference in posttonsillectomy pain between the two groups, but on the fifth and tenth days, this difference was not statistically significant, despite the lower rate in the RF group.

The time required for restarting normal, routine diet in the cases (RF group) was significantly less than for the controls (CD group): 1.80 ± 0.66 days versus 3.61 ± 0.47 days, respectively ($P < 0.004$). Severe to moderate postsurgical dysphagia was detected in 10 percent of the cases and 23 percent of controls, all in the first three days, but there was no significant difference between the two groups in this regard or in postsurgical weight loss (Fig 5).

We did not encounter any postsurgical complications in the controls; however, in one case in the RF group (a

![Figure 2](image2.png)

**Figure 2** Seven points (i.e., crypts) on the tonsil of grade 3 determined for probing with RFITT radiofrequency device.

![Figure 3](image3.png)

**Figure 3** Error bar chart of time of surgery in traditional cold dissection versus RF tonsillectomy. The left and right error bars represent mean duration of operation time in cold dissection tonsillectomy (46.07 ± 10.63 min) and radiofrequency tonsillectomy group (16.89 ± 6.04 min), respectively ($P < 0.005$).
33-year-old woman), the patient noticed dysphagia, foreign body sensation in the throat, and bloody secretions two days after being discharged from the hospital. Upon clinical examination in the emergency setting, she was found to have some tonsillar tissue walled off from the remaining tonsil. The patient was promptly admitted and prepared for surgery, but before entering the operation room, the tissue was sloughed spontaneously without any intervention or further problem (i.e., bleeding or other complications).

The tonsil size in the RF group began to decrease after two weeks, with the peak of the changes seen three months after the procedure, and the mean tonsil grade in this group was 1.43 ± 0.21 nine months after intervention (Fig 6). Fortunately, there was only one case that we were not able to visit after six months (because of immigration). We were able to contact him by telephone after 13 months and ask about any symptoms of sore throat recurrence.

While following the cases for at least 12 months (3 cases), and for 15 to 24 months in most cases, from a total of two to three episodes of upper respiratory tract infections in the RF group and two episodes in the CD group, only one episode of sore throat equivalent in severity to that of the preoperative level was detected—in a 28-year-old woman in the RF group. This episode was without high fever and relieved after one to two days without antibiotics. There was no significant difference between the two procedures in controlling recurrent tonsillitis.

**Figure 4** Mean severity of pain in the first and third postoperative day according to VAS scores in traditional cold dissection versus RF tonsillectomy.

**Figure 5** Error bar chart of postoperative weight loss after cold dissection tonsillectomy versus RF tonsillotomy. In upper row, dark and light error bars represent preoperation and postoperative weight of the patients, and in the lower row, error bars represent postsurgical weight changes in cold dissection tonsillectomy (left side) and RF tonsillotomy (right side), respectively ($P > 0.05$).

**Figure 6** Tonsils of a 32-year-old woman with recurrent tonsillitis four months after RF tonsillotomy. Previous tonsil grade was 3, according to Brodsky, Moore, and Stanievich system.
Discusstion

Tonsillectomy is one of the most commonly performed surgical procedures worldwide. In contrast to pediatric tonsillectomy, there is an ongoing discussion on indications for adult tonsillectomy, especially in chronic recurrent tonsillitis. In spite of this, chronic tonsillitis and recurrent tonsillitis are the most common indications for adult tonsillectomy, although tonsillectomy is not a guarantee for complete elimination of throat infections. Indeed, one of the most important considerations in case selection for surgery in these patients is frequency and severity of the episodes, and it is emphasized in the more recent reports that the effectiveness of tonsillectomy has to be weighed against its potential harm.

Conventional tonsillectomy techniques have well-known risks and complications, and all result in prolonged severe postoperative pain and morbidity, especially in infective tonsils and in adult patients. Some new techniques, such as intracapsular powered tonsillectomy and other forms of “partial” tonsillectomy performed with an endoscopic microdebrider or CO2 laser, are based on the principle of preserving the tonsillar capsule as a barrier to exposure of the pharyngeal musculature and preventing their injury. These techniques are accompanied with less postoperative pain, but their efficacy in relieving recurrent tonsillitis is being investigated.

RF treatment for enlarged tonsils—RF tonsillectomy or temperature-controlled RF tonsil resection—is one of the newest techniques applied recently, especially for obstructive tonsils and in pediatric cases. There is little evidence in the literature concerning its efficacy in controlling recurrent tonsillitis in adult patients.

To our knowledge, this is the first study in which RF tonsillectomy has been applied in an adult population with recurrent tonsillitis. RF has been used in gynecology, plastic surgery, and dermatology practices for more than 30 years. In otolaryngology, it has been used in palatal, turbinate, and tonsillar reduction, taking advantage of its ablative properties.

Nelson, in 2000 and 2001, published two studies investigating this technique’s efficacy in tonsil reduction, with no episodes of hemorrhage and maintenance of tonsil size reduction after one year. However, only five patients were followed up, and the effect of tonsil ablation on infection reduction was not proved. Back et al. conducted a “pilot” study on RF tonsillectomy morbidity end points compared with traditional CD (18 cases vs 19 control subjects with infective or obstructive problems, aged 18 to 65 years). There was no difference in postoperative morbidity between the two techniques, as opposed to other studies. The study by Back et al. may be the first study concerning RF utility in adults but not concerning its efficacy on recurrent tonsillitis.

In a nonrandomized retrospective review of tonsil reductions between 2000 and 2002, Friedman et al studied 150 patients in three groups: 50 patients in a tonsil “ablation” with RF group (as in our study), 50 individuals in a tonsil “coblation” with RF group (this usually works by energizing protons of a saline solution that ablates tissue totally or partially and is hemostatic for small vessels), and 50 patients in a CD group. Each group consisted of two subcategories of children (age range, 1-12 years) and adults (age range, 12-60 years) with chronic tonsillar hypertrophy. Tonsil ablation and coblation had less morbidity compared with standard tonsillectomy, but tonsil coblation was more efficient in tissue reduction. Unlike our study, this study was a retrospective one, performed only on obstructive tonsils, and not exclusively in adults.

In a study by Ericsson et al on 92 children with mainly obstructive symptoms, 49 cases underwent RF tonsillectomy compared with blunt dissection tonsillectomy in another group. The authors concluded that removing only the protruding parts of the tonsils by RF technique had the same beneficial long-term effects on obstructive symptoms and “recurrent throat infections” as complete CD tonsillectomy in the majority of cases after one to three years follow-up. This study is unique because of long-term follow-up of the cases, which was done by questionnaires sent by e-mail to the patients, and in contrast to our study, it was not performed exclusively on adults with recurrent tonsillitis.

In another study, Ericsson et al compared RF tonsillectomy with CD tonsillectomy in improving quality of life in young adults (16-25 years old) with obstructive or infectious tonsil problems. Only the protruding parts of the tonsils were removed in the RF group (31 cases). Both techniques demonstrated significant improvements on health-related quality of life, infections, and obstructive problems one year after surgery, indicating that the surgical methods are equally effective. The authors declared that RF tonsillectomy should be considered the method of choice.

Pfaar et al conducted a prospective clinical trial on 137 patients with chronic tonsil enlargement (98 children) and compared standard tonsillectomy with interstitial RF ablation of the tonsils. Duration of surgery, postoperative pain, swallowing difficulties, and perioperative blood loss were significantly lower in the RF group ($P < 0.05$). Preservation of the treatment results on reduction of tonsil size was monitored until six months, but the authors did not provide any statements regarding efficiency of these procedures in controlling infections in the cases.

Our study is among the first studies performed exclusively in adults with recurrent tonsillitis to compare RF tonsillectomy with CD tonsillectomy, which is considered by many authors as a standard treatment in these cases.

Perhaps the main outcome of our study is demonstrating the efficiency of RF tonsillectomy in reducing and eliminating recurrence of tonsillitis episodes in adults for a considerable period. It is noticeable that we are comparing tonsillectomy (i.e., partial tonsillectomy) with tonsillectomy, in which there is no tonsil tissue left in the tonsillar fossa. Obviously, the remaining tonsillar tissues in the tonsillectomy method are susceptible to infection, but why and how did the frequency of the infection episodes decrease? Are
the remaining tonsillar tissues functioning, or have the normal microbial flora of this tissue changed? We believe that histopathologic studies need to be conducted to shed light on the cellular activity of the tonsillar tissue that remains after RF tonsillotomy.

In our study, additional advantages that were shown in the RF group as compared to the CD group were much lower intraoperative bleeding, operation time, and postoperative pain and dysphagia, all of which are reasons for us to offer this new technique as the procedure of choice in cases of recurrent tonsillitis. This may be more obvious if we consider that, despite our study method, in which all the procedures were performed with the patient under general anesthesia, RF tonsillotomy is an office-based procedure, and in many settings, it can be performed without anesthesia or even sedation and without the need to hospitalize the patient, which is found to be more necessary in adult tonsillectomy as compared to pediatric tonsillectomy. Also, in our experience, the simplicity of RF tonsillotomy from the viewpoint of the surgeon was very noticeable compared to CD tonsillectomy.

As we know, one person may have two or even three episodes of tonsillitis per year without the need for tonsillectomy. Even if we consider that a fraction of our patients would have episodes of tonsillitis/pharyngitis in the future, there are some other important considerations, such as the number of episodes per year and the severity of each episode. Finally, those cases that have “severe-frequent” episodes requiring surgical intervention may be offered a further session of office-based RF tonsillotomy.

In conclusion, tonsillotomy with RF is a simple, rapid, and safe method in adult patients with recurrent tonsillitis. The efficiency of this method in controlling recurrence of the infection is comparable to traditional CD tonsillectomy.

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Author Information

From the Otolaryngology–Head and Neck Surgery Department and Research Center, Guilan University of Medical Sciences, Amiralmomenin Hospital, Rasht, Guilan, Iran.

Corresponding author: Rahmatollah Banan, MD, Otolaryngology–Head and Neck Surgery Department and Research Center, Amiralmomenin Hospital, 17 Shahrivar Ave., Postal code: 41396-37459, Rasht, Guilan, Iran.

E-mail address: drbanan@yahoo.com.

Author Contributions

Shadman Nemati, proposal preparing, case selection and performing operations, preparing the manuscript; Rahmatollah Banan, proposal preparing, case selection and follow-up; Abdorrahim Kousha, proposal preparation, case selection and follow-up.

Disclosures

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