Comparison of Tonsillectomy Techniques and their histopathological Healing Patterns

B. Gurpinar

One hundred and eighty adult male patients complaining of recurrent tonsillitis were enrolled in the study. The participants were randomly assigned to one of the following techniques: cold steel CLST (n=30), electrocautery ELCTR (n=30), Sutter To-BiTE™ bipolar clamp and radiofrequency SRF (n=30), Plasmacision PLCS (n=30), Coblation CBL (n=30), and thermal Welding THRWL (n=30). The SRF group had the least operative time. Histopathologically, necrosis was least in CBL while vascular proliferation was least in SRF. Radiofrequency techniques seem to cause less postoperative pain, have lower blood loss, and lower tissue reactions.

Fig. 1: To-BiTE™ non-stick, bipolar tonsillectomy clamp **(70 09 60SG)**

Fig. 2: CURIS® 4 MHz radiofrequency generator.

Introduction: Tonsillectomy continues to be one of the most common surgical procedures in otolaryngology.[1] Although not a routine procedure in adults, it is a frequently performed surgical procedure in the pediatric population. Adult tonsillectomy may cause substantial postoperative pain and morbidity. It is often associated with greater blood loss than pediatric tonsillectomy. Traditional tonsillectomy techniques include cold knife tonsillectomy (CLST) and electrocautery (ELCTR). Advances in technology have added cryosurgery, Harmonic scalpel, Coblation (CBL), PlasmaKnife (PLCS), microdebrider, Sutter (SRF), and thermal welding (THRWL) to the surgical practices in otolaryngology. Most of the above techniques demand the use of radiofrequency producing tissue ablation and coagulation at relatively low temperatures (60°C - 70°C) and thus avoiding thermal injury as compared to electrocautery (150°C - 400°C).[2,3,6] This study aims to identify the tonsillectomy method offering the lowest postoperative morbidity, the least complications, and the best healing pattern.

Patients: A total of 180 adult male patients complaining of recurrent tonsillitis were enrolled in the study between April 2011 and January 2016. The participants were randomly assigned to one of the techniques, including CLST (n=30), ELCTR (n=30), SRF (n=30), PLCS (n=30), CBL (n=30), and THRWL (n=30). Exclusion criteria included the history of peritonsillar abscess, severe unilateral tonsil enlargement and obstructive sleep apnea.

Methods: ELCTR (Valleylab Inc., CA) is the standard method for performing tonsillectomy at our institution. It was performed using an electrosurgical handpiece at a setting of 15W in the coagulation mode. The PLCS (Gyrus ENT, Bartlett, TN) setting was 80/20 as the coagulation-to-cutting ratio with a Gyrus ENT workstation as the power source. SRF (Sutter Freiburg, Germany) with To-BiTE™ non-stick bipolar clamp was set to 6 in the precise mode using a BM-780 II radiofrequency generator as the power source. CBL (ArthroCare Corp., Sunnydale, CA) with a bipolar radiofrequency-based plasma device Evac 70 Wand and a Coblator as the power source was set at 6/4 as the coagulation-to-cutting ratio. A welding system and disposable forceps were used for the THRWL (Starion, Sunnyvale, CA) and the device was set to 8/3 as the coagulation-to-cut ratio while CLST was performed with a No. 12 scalpel. The following details were always recorded: age of the patient, operative time, bleeding control time, need for additional cautery, amount of blood loss, the degree of difficulty of the technique, postoperative pain on the 1st, 3rd and the 5th day, and postoperative complications. For each patient, blood loss was measured using separate suction canisters. Irrigation volume was standardized and subtracted from the canister to ensure that blood within the suction tube was accurately measured. All subjects were asked to clarify the level of pain on the 1st, 3rd and the 5th day, postoperatively using a visual analog scale from 1 to 10. On the postoperative 6th day, a standard tissue sample of 0.2 x 0.2cm was taken from the upper portion of the left palatopharyngeal arch. Tissue necrosis, leukocyte, lymphocyte or histocyte migration, tissue edema, and the degree of vascular proliferation were analyzed.[4,5]

Operative time for the SRF group was the lowest at three to 20 minutes (average 10.4 ± 4.28 min.) THRWL had the longest OR time ranging from 17-28 minutes (average 22.66 ± 4.36 min.) ($p<0.00001$). We did not use extra cautery for SRF and for six cases of CBL, but needed bipolar cautery for all the other techniques ($p<0.00001$). The easiest technique to apply was SRF while the most difficult procedure was PLCS. The other applied techniques were found to be similar ($p<0.00001$). Postoperative pain on the 1st day was not found to be statistically significant among the implemented techniques ($p=0.055$). CLST showed the least, while PLCS was characterized by the most pain on the 3rd postoperative day ($p=0.0026$). Histopathologically, necrosis was least in CBL and most in PLCS ($p<0.00001$). Vascular proliferation was least in SRF and most in CBL ($p<0.00001$). Lymphocyte and histocyte migration was least in CBL and highest in PLCS ($p<0.00001$).

Conclusion: Although inexpensive, CLST is accompanied by a significant amount of intraoperative blood loss and operative time. The SRF, CBL and THRWL techniques seem to be accompanied by reasonable postoperative pain, lower amounts of blood loss and lower tissue reactions.

B. Gurpinar, MD
Dept. of Otolaryngology, Okmeydani Training and Research Hospital
Istanbul, Turkey

References: 1. Silveira H, Soares JS, Lima HA. Tonsillectomy: Cold dissection versus bipolar electrodissection. Int J Pediatr Otorhinolaryngol 2003; 67: 345-351. **2.** Clenney T., Schroeder A, Bondy P, et al. Postoperative Pain After Adult Tonsillectomy With Plasmaknife Compared to Monopolar Electrocautery. Laryngoscope 2011; 121: 1416-1421. **3.** Noordzij JP, Affleck BD. Coblation versus unipolar electrocautery tonsillectomy: a prospective, randomized, single-blind study in adult patients. Laryngoscope 2006; 116: 1303–1309. **4.** Sultana J, Molla MR, Kamal M et al. Histological differences in wound healing in maxillofacial region in patients with or without risk factors. Bangladesh J Pathol 2009; 24: 3-8. **5.** Gal P, Kilik R, Mokry M et al. Simple method of open skin wound healing model in corticosteroid-treated and diabetic rats: standardization of semi-quantitative and quantitative histological assessements. Vet Med 2008; 53: 652-659. **6.** Wilson Y.L, Mere D.M., Moscatello A.L. Comparison of Three Common Tonsillectomy Techniques. A Prospective Randomized, Double-Blinded Clinical Study. Laryngoscope 2009; 119: 162-170.

Please turn over the page for detailed information on the Sutter products.

Featured Products

Qty.	REF	Description
1	**70 09 60SG**	**To-BiTE™ non-stick**, bipolar tonsillectomy clamp
1	**37 01 54R**	Bipolar (CURIS®) **cable for To-BiTE™**, length: 3 m

[REF 87 00 10] CURIS® 4 MHz radiofrequency generator
basic set with single-use patient plates

Qty.	REF	Description
1	**36 01 00-01**	**CURIS®** 4 MHz radiofrequency generator (incl. main cord, user manual and test protocol)
1	**36 01 10**	Footswitch two pedals for CURIS® (cut & coag), 4 m cable
1	**37 01 54L**	Bipolar cable for CURIS®, length 3 m
1	**36 07 04**	Monopolar handpiece (pencil) cut & coag, shaft 2.4 mm, cable 3 m
1	**36 02 38**	Cable for single-use patient plates, length 3 m
1 (x50)	**36 02 22**	Safety patient plates, single-use, packing 5 x 10 pcs. (not shown)

Unit settings / Other accessories*
CURIS® 4 MHz radiofrequency generator **To-BiTE™ non-stick**: Bipolar Macro Power adjustment: 30-40 watts
Valid for the CURIS® with the orange label.
CURIS® 4 MHz radiofrequency generator **To-BiTE™ non-stick**: Bipolar Macro Power adjustment: 30-40 watts

* Please consider that this information is not meant to serve as a detailed treatment guide. Always adjust according to patient and application.

SUTTER MEDIZINTECHNIK GMBH
TULLASTRASSE 87 · 79108 FREIBURG/GERMANY · TEL. +49(0)761-51551-0 · FAX +49(0)761-51551-30
WWW.SUTTER-MED.COM · INFO@SUTTER-MED.DE