

### **An Improved Method for Tonsillectomy Using Thermal Welding Technology**

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#### **Clinical Background**

Tonsillectomy is one of the most common procedures performed by otolaryngologists. Several different techniques are used by the otolaryngologist to perform this operation. The resulting morbidity includes intraoperative blood loss, primary and secondary hemorrhage, as well as postoperative pain and dehydration. Frequently, this post operative pain and dehydration necessitate patients be readmitted or receive emergency room care.

#### **Technical Background**

The Starion Cautery Forceps (Starion Instruments, Corp., Saratoga, CA) uses an innovative technology called Thermal Welding that combines heat and pressure to simultaneously coagulate and divide tissue. Thermal Welding provides minimal collateral thermal damage to surrounding tissue while providing a hemostatic surgical field.

#### **Tonsillectomy Technique**

The patient is positioned on his back in the supine position. General anesthesia through endotracheal intubation is then achieved. A Davis Tonsil Mouth Gag is then placed into the patient's mouth and suspended from a mayo stand. The size of the tongue retractor that is to be used depends on the age and the size of the patient. A fiberoptic headlight, with a xenon or halogen light source, is worn by the surgeon for optimum illumination of the posterior oropharynx and tonsil beds. The tonsils are then grasped with a straight Allis Clamp and gently retracted medially towards the midline in order to expose the lateral extent of the tonsils. The settings for the Starion Thermal Welding system are set at "1" for sealing and "8" for cutting.

The operation is begun by creating a small cavity in the superior-lateral aspect of the tonsil which will separate the superior tonsil capsule from the surrounding soft tissue. This is performed by placing the Cautery

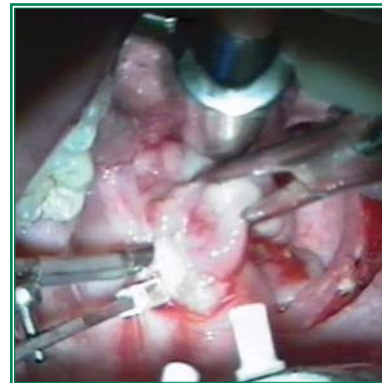


Figure 1. Initial incision.

tips of the Cautery Forceps and sealed with a power setting of "1". The dissection of the tonsil from its bed is now performed by placing one tip of the Cautery Forceps into the small cavity, next to the tonsil capsule, and the other tip on the surface of the tonsil bed (Figure 2). The soft tissue between the tips of the forceps is first sealed for 2-3 seconds using the "1" setting, and then divided using the "8" setting. This is repeated in a similar fashion from the superior aspect of the tonsil to its most inferior aspect, and from anterior to posterior. The tips of the forceps are used to further dissect the tonsil capsule from the surrounding soft tissue. Intact blood vessels and small bleeders are grasped with the forceps and sealed using the "1" setting (Figure 3). The tonsils are removed bilaterally utilizing the same technique. Particularly large vessels may, on occasion, require cauterization or suture ligation. The tonsil beds are irrigated with a small



Figure 2. Dissecting tonsil.



Figure 3. Final dissection prior to removal.

amount of saline and inspected. Absolute hemostasis is noted. The Davis Tonsil Mouth Gag is then removed and the patient is extubated. The patient is then sent to the Recovery Room for observation.

### **Clinical Experience**

We have performed tonsillectomy using several commonly used techniques including: Cold Dissection, Electrocautery Dissection, and the Ultrasonic Harmonic Scalpel. Due to poor visualization from operative bleeding, the technique of Cold Dissection has the potential for massive intraoperative blood loss due to the risk of injuring a major aberrant blood vessel. When using this technique, cauterization and sutures are usually required to obtain adequate hemostasis. The operative time is prolonged and postoperative pain is significant due to the use of electrocautery for hemostasis. The readmission rate for pain control, dehydration and late postoperative bleeding is only slightly less than for the Electrocautery Dissection technique. In Electrocautery Dissection, the electrocautery is used for cutting, coagulation and dissection. This technique is both simple and quick, but generally results in a significant level of thermal injury to the surrounding soft tissue. Using a small Colorado Needle with lower power settings will slightly decrease the level of soft tissue thermal injury, but not significantly. The Electrocautery Dissection technique often results in an increased requirement for postoperative pain medication and a significant number of patients will require an overnight stay at the hospital for IV pain control and hydration. A small percentage of these patients will also require readmission, at 3-6 days postoperatively, for pain control and dehydration. The risk of late postoperative bleeding is greater for this technique than for any other. The routine suturing of the tonsil beds is the only thing that will reduce the risk of late postoperative hemorrhage when using the Electrocautery Dissection technique. The use of the Harmonic Scalpel, in tonsillectomy, is a relatively new innovation. It generally produces less thermal injury than the electrocautery and is relatively simple to use, particularly in children and uncomplicated tonsillectomies. In adults, or where there is significant scar tissue or large blood vessels present, the dissection becomes extremely difficult and bloody. While the Harmonic Scalpel can seal capillaries and coagulate tiny

vessels, it has far more problems with small blood vessels, and is unable to handle the intermediate or larger blood vessels. In this situation, extensive use of electrocautery is then required to obtain hemostasis. This further increases the level of thermal injury with a consequent increase in operative time, postoperative hospitalization, pain and postoperative morbidity. The risk of late postoperative bleeding is similar for the Cold Dissection, Electrocautery Dissection and Harmonic Scalpel.

The Thermal Welding Technology virtually eliminates the use of electrocautery and sutures. On rare occasions cautery is used. The heat transfer outside the forceps is so minimal that the thermal damage is extremely small and localized, even when compared to the Harmonic Scalpel. The time of dissection is approximately 4-5 minutes per side with the more difficult cases being 6-8 minutes. None of the patients receiving the Thermal Welding Technique experienced primary or later postoperative bleeding. The recovery room nurses have noticed and commented on the significant reduction in postoperative pain with this technique as compared to all others. None of our patients have remained in the hospital for longer than 3-hours postoperatively prior to being discharged having a good oral intake. The average time is between 1-2 hours in children and approximately 1.5 - 2.5 hours in adults. We have had no readmissions or emergency room visits for pain control or dehydration. The healing time with the Thermal Welding Technology is typically 1-week and there is generally no eschar present after 7-days. In contrast, the healing time for the Electrocautery Dissection Technique and the Harmonic Scalpel are usually 14-16 days, with the eschar remaining present for up to 3-weeks after surgery.

### **Conclusion**

Tonsillectomy performed with Thermal Welding Technology can be accomplished in a virtually bloodless manner. The minimal amount of thermal damage to the surrounding tissue allows for fast healing of the surgical site. We have not experienced any incidence of early or late postoperative hemorrhage and none of our patients have required readmission or visited the emergency room for pain control or dehydration. This is now our preferred technique for tonsillectomy.