Thermal welding versus cold knife tonsillectomy: A prospective randomized study

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Abstract This is a prospective randomized study conducted in a group of children who underwent two methods of tonsillectomy: thermal welding or cold knife tonsillectomy. Parameters, such as postoperative pain scores, intraoperative blood loss, operation time, and postoperative bleeding rates, were analyzed to find out which technique is better. Ninety-one children (aged between 2 years and 13 years) with recurrent tonsillitis, obstructive sleep apnea syndrome, or both were included in the study. According to the type of tonsillectomy procedure, the patients were divided into two groups: cold knife and thermal welding procedure. The two groups were compared on the basis of postoperative pain scores, intraoperative blood loss, operation time, and postoperative bleeding. Fifty-seven patients underwent thermal welding tonsillectomy and 34 had cold knife tonsillectomy. The mean pain score in thermal welding group was significantly lower (p < 0.001). There was no remarkable blood loss intraoperatively in the thermal welding procedure. The operation time was not significantly different between two groups. No postoperative bleeding was encountered in the thermal welding group. Compared with the cold knife technique, thermal welding was found to be a relatively new and safe technique for tonsillectomy as it results in significantly less postoperative pain and no remarkable blood loss.

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Introduction

Tonsillectomy is one of the most common otolaryngological operations performed in the pediatric population. The major indications of pediatric tonsillectomy are obstructive sleep apnea syndrome (OSAS) and recurrent tonsillitis. Numerous tonsillectomy techniques have been described, such as cold knife dissection, monopolar or bipolar electrocautery, potassium titanyl phosphate laser, harmonic ultrasonic scalpel, radiofrequency ablation, and thermal welding [1]. Although the electrocautery has decreased the duration of operation and blood loss, postoperative pain is still a significant morbidity [2]. Despite the longer operation
time and more blood loss, postoperative pain is less with cold knife technique. Recently, a new technique called thermal welding has been introduced, an option to decrease intraoperative hemorrhage, operation time, and postoperative pain. In this prospective study, cold knife and thermal welding tonsillectomies were performed in pediatric patients and were compared with reference to postoperative pain, intraoperative blood loss, operation time, and postoperative bleeding.

Materials and methods

This prospective randomized study was performed between October 2006 and June 2009 in the Otolaryngology Department of the University Hospital. Approval was taken from the Ethical Committee of the University. An informed consent was taken from the parents of the children. The indications for tonsillectomy were recurrent tonsillitis, OSAS, or both. The operations were performed by the faculty staffs and residents randomly. All operations were performed under general endotracheal anesthesia. The Starion Thermal Welding System (CA, USA) (Fig. 1) was used. Unlike the cold knife technique, no mucosal incision was performed in thermal welding procedure. Power setting was held on “1” for sealing and “8” for cutting, and the mode was set to 3.5 [3]. In the cold knife group, bipolar electrocautery was used for intraoperative hemorrhage control.

Patients were kept in the hospital for 24 hours after the surgery. All the patients were treated with oral paracetamol for pain control postoperatively. During the 24-hour hospital stay, the pain experienced by the children was scored by the parents or children using a visual analog scale (VAS) and graded from 0 (no pain) to 10 (maximum pain). The VAS scores of both groups were compared using independent samples t test.

Results

Ninety-one children (51 boys and 40 girls) participated in the study. Of these 91 patients, 34 had cold knife and 57 had thermal welding tonsillectomy. The age of the children ranged from 2 years to 13 years (mean 5.2 years) for the cold knife group and from 2 years to 13 years (mean 5.7 years) for the thermal welding group (p > 0.05). The indications for surgery were recurrent tonsillitis in 53 (58.2%) and OSAS in 36 (39.6%) patients. Only in two patients, the surgical indications were both OSAS and recurrent tonsillitis. The mean VAS score was 4.341 ± 1.56 in the cold knife group and 2.783 ± 1.22 in the thermal welding group (p < 0.001) (Table 1). There was no remarkable bleeding during surgery in the thermal welding group. The mean intraoperative blood loss was 25 mL (range: 18–56 mL) in the cold knife group. The mean operation time was 24 minutes (range: 15–32 minutes) for thermal welding and 27 minutes (range: 22–38 minutes) for the cold knife group.

In the thermal welding group, there was no postoperative bleeding; six (10.5%) patients had mild edema in the uvula and two patients were hospitalized for difficulty in dietary oral intake. In the cold knife group, one patient (2.9%) needed a surgical intervention for postoperative bleeding. Otherwise, no major complications were seen in the either groups.

Discussion

Several tonsillectomy techniques have been described so far [1]. Thermal welding is a variant of bipolar electrocautery and scissors. It uses direct thermal energy rather than electrical energy to coagulate and divide blood vessels and soft tissue [4]. Stavroulaki et al. [5] compared cold knife tonsillectomy with thermal welding tonsillectomy in adult patients and reported that the thermal welding group experienced significantly less postoperative pain. However, Chimona et al. [6] compared cold knife, radiofrequency, and thermal welding tonsillectomy in children and suggested that although thermal welding and radiofrequency groups were superior to cold knife group in terms of operation time and intraoperative blood loss, pain scores were better in cold knife group. Although a partial tonsillectomy with radiofrequency for pediatric OSAS results in a decrease in the postoperative pain, there is still a high regrowth rate.
of the tonsils with this technique [7]. In this study, we achieved a better postoperative pain control with thermal welding than cold knife as well as than that reported by other reports in the literature [5]. This may be attributed to the use of bipolar electrocautery for intraoperative bleeding control in cold knife group. The operation times of the groups were not significantly different because bipolar electrocautery was used for intraoperative bleeding control in the cold knife group. No remarkable blood loss was encountered in the thermal welding group. The mean intraoperative blood loss was 25 mL in the cold knife group, thanks to bipolar electrocautery, and it is lower than that in the other reports in the literature [5]. Because postoperative pain is most severe within the first 24 hours, pain evaluation was performed during this period in our study in contrast to other trials in which pain was evaluated after 1-week follow-up [4]. There was no postoperative bleeding in the thermal welding group. However, postoperative bleeding occurred in one (2.9%) patient in the cold knife group, which is an acceptable posttonsillectomy bleeding rate [8].

In conclusion, the findings of this study show that thermal welding tonsillectomy is a new, safe, and reliable technique. It is quite helpful in the prevention of postoperative pain, which has been an important issue, especially in children. Thermal welding facilitates intraoperative hemostasis and minimizes postoperative hemorrhage as well.

References