

# Radiofrequency Tonsillectomy Compared With Cold Steel Dissection Tonsillectomy in Pediatric Patients: A Randomized Clinical Study

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## **ABSTRACT**

**Background:** Tonsillectomy is one of the most common surgical procedures in the world, various other techniques have been attempted over the previous decades to lower morbidity of this operation, and one of these new techniques is the bipolar radiofrequency dissection to remove the tonsils.

**Objectives:** This study is to compare the radiofrequency tonsillectomy with traditional cold steel dissection tonsillectomy prospectively regarding intraoperative time and blood loss, and postoperative pain and complications in children.

**Methods:** 194 children suffering from recurrent tonsillitis are included in this study, their age range from 3-16 years, they are divided randomly into two equal groups, each group 97 children, and one group sustained bipolar radiofrequency tonsillectomy while the second group sustained traditional cold dissection tonsillectomy. In all operations we record blood loss amount and operative time and they are followed for 10 days after operation during which we record degree of pain and incidence of postoperative complications.

**Results:** The radiofrequency tonsillectomy patients got less intraoperative blood loss (mean 10ml) and shorter operation time (mean 9 minutes), when compared with cold steel dissection tonsillectomy ( mean blood loss 80ml,mean time 16 minutes). The postoperative pain was significantly less in the radiofrequency patients than in the cold steel dissection tonsillectomy patients. In addition, no postoperative hemorrhage occurred after radiofrequency tonsillectomy in our study but it happened in 2 of cold steel dissection tonsillectomy group of patients.

**Conclusions:** Radiofrequency tonsillectomy is better than cold dissection tonsillectomy in terms of lower blood loss and operation time, with less postoperative pain and complications, so we recommend it as an ideal technique for tonsillectomy.

**Keywords:** Radiofrequency tonsillectomy, Cold steel, dissection, tonsillectomy.

## 1. INTRODUCTION:

Cold steel dissection tonsillectomy is considered the standard approach to remove tonsils for years, subsequently many techniques have been developed for tonsillectomy to decrease morbidity associated with this operation, like electrosurgical radiofrequency laser and coblation tonsillectomy<sup>(1) (2)</sup> Radiofrequency machine is principally an electrosurgical machine but it generate a current of higher frequency of 4 MHZ than ordinary Cautery machine which has a current frequency of only 500 KHZ, this feature makes radiofrequency energy has lower thermal damage. More superficial effect and subsequently less pain and faster healing of operated tissue<sup>(3) (4)</sup>. The aim of this prospective randomized study is to compare between the bipolar radiofrequency tonsillectomy and traditional cold steel dissection tonsillectomy regarding intraoperative blood loss, operation time, and postoperative pain and complications in pediatric age group.

## 2. METHODS:

This study was performed from January 2018 to January 2020, totally 194 children were included in the study (81 male, 113 female) whose ages were from 3-16 years, all patients had recurrent attacks of acute tonsillitis, 3 – 4 attacks/ year for two successive years as an indication for tonsillectomy. The patients were randomized to 2 equal groups, each consists of 97 patients, the first group is the radiofrequency dissection group and the second group is cold dissection group.

History taken from children and parents, and full clinical examination performed and necessary laboratory investigations done, after which they are prepared for operation. All operations were done in Al -Kindy teaching hospital in Baghdad under general anesthesia with a cuffed endotracheal tube with the patient in supine position and head tilted 10 degrees downwards.

The radiofrequency machine model used is Easten Magical RF-D120, 4MHZ (Beijing Dongfang Shenjian Medical Equipments Co. Ltd.), bipolar mode is used to get cut and coagulation effect, the power range is 10-15 watts. Bipolar Bayonet insulated forceps was used for dissection and coagulation. Figure (1) shows both the radiofrequency machine and bipolar forceps.



**Figure 1: Easten Magical RF-D120 radiofrequency machine with bipolar forceps**

The cold steel dissection tonsillectomy was performed by blunt dissector, and hemostasis was secured by ligatures. The time of operation was calculated from time of insertion of mouth gag till its removal and blood loss calculated and recorded in each operation. All patients received paracetamole as analgesic postoperatively in 6 hourly doses after operation. Any postoperative complication was recorded, and managed accordingly. The postoperative pain was assessed daily for first 10 days using Wong Baker (FACES) pain rating scale (Figure 2).

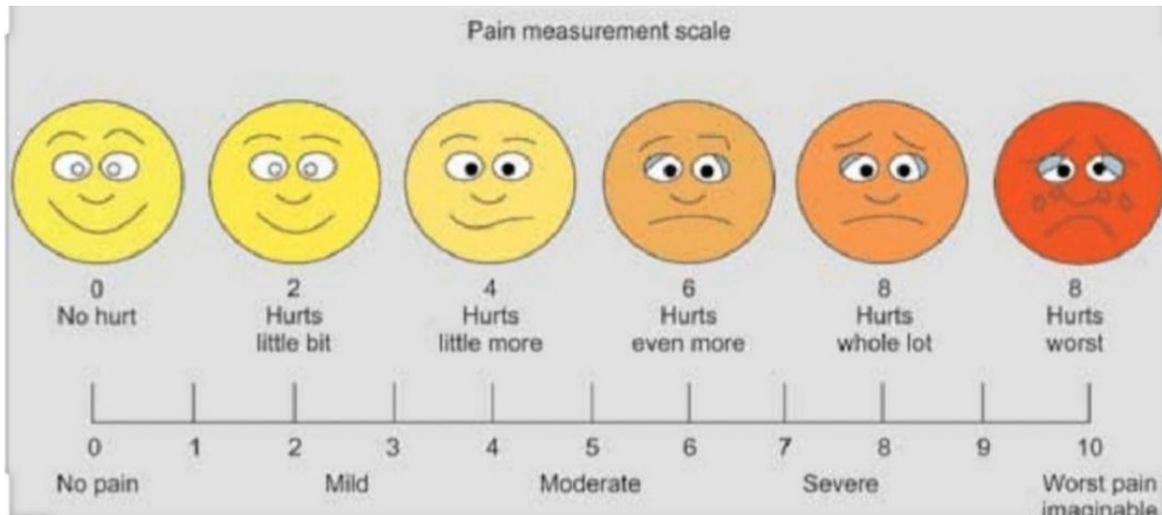


Figure (2): Wong Baker (FACES) pain rating scale

### 3. RESULTS:

Regarding intraoperative blood loss, those patients who sustained radiofrequency tonsillectomy had statistically significant ( $p < 0.001$ ) lower blood loss with a mean of 10 (+/- 1.4) ml. and range (3-65 ml.), While patients in cold steel dissection tonsillectomy group lost a mean of 80 (+/- 4.8) ml of blood and the range was (40-220 ml) (Figure 3).

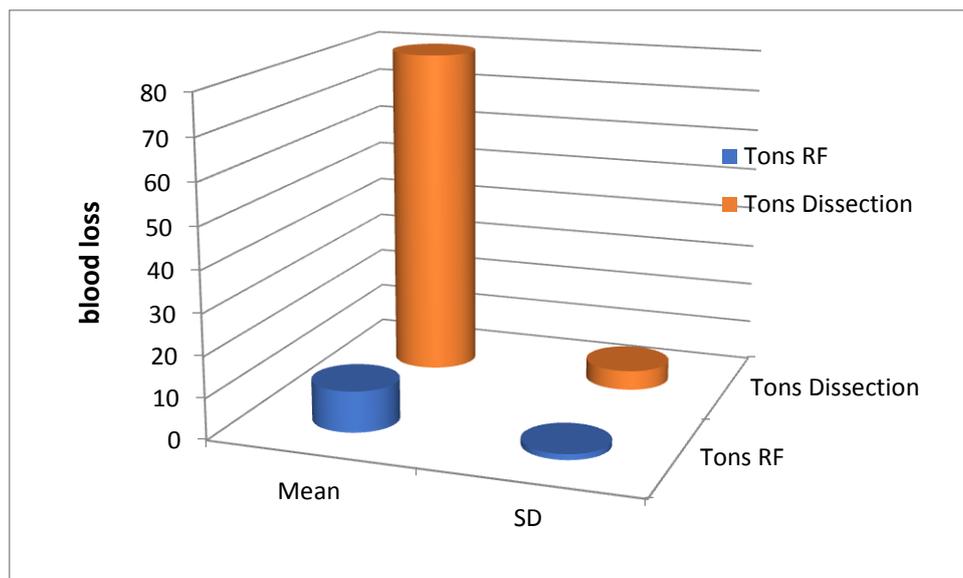


Figure (3): Intra-operative blood loss

The operation time was also statistically significant lower in the radiofrequency tonsillectomy patients ( $p < 0.001$ ) in which the mean was 9 (+/- 1.3) minutes the range was (7 – 17 minutes). While in the cold steel dissection tonsillectomy group, operation time mean was 16 (+/- 2.5) minutes and the range was (12- 29 minutes) (Figure 4).

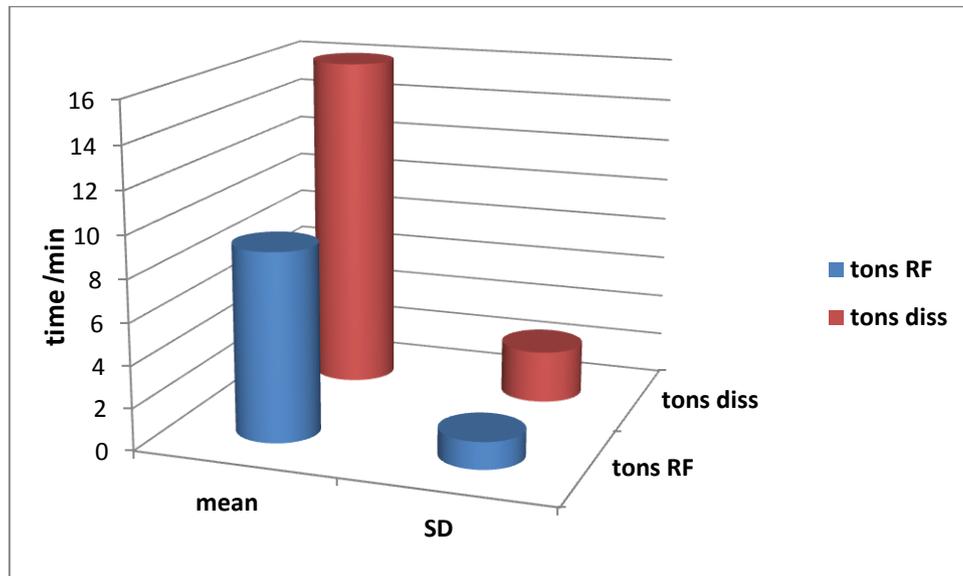


Figure (4): Time of operation

Regarding postoperative pain, there is a statistically significant difference between the 2 groups ( $P < 0.01$ ) in favor of the radiofrequency tonsillectomy patients who complain of moderate degree of pain in day 1 and 2 then turns into mild pain in day 3 and 4 and disappeared from day 5 onwards, while in the cold dissection tonsillectomy patients, they complained from moderate to severe pain in first 5 days which only became mild from day 6 onwards till day 10 when it disappeared (Figure 5). Postoperative complications happened only in the cold dissection tonsillectomy group of patients in which 2 of them sustained postoperative hemorrhage, one of them got reactionary hemorrhage which needed surgical intervention while the second one developed secondary hemorrhage and managed conservatively. No complication reported in radiofrequency tonsillectomy patients in our study.

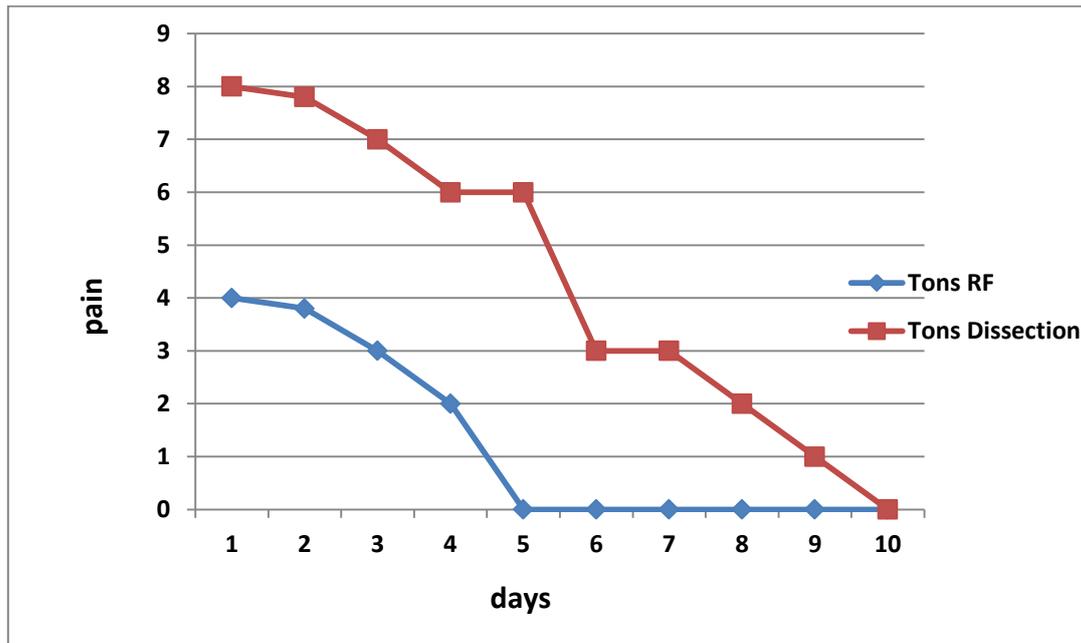


Figure (5): Trend of pain for 10 days post-operatively.

#### 4. DISCUSSION:

Cold steel dissection tonsillectomy is considered for years as the gold standard technique for removing palatine tonsils, new techniques has been advocated to improve the pre and postoperative morbidity of tonsillectomy <sup>(2) (5)</sup>, that includes: intraoperative blood loss, operation time, postoperative pain and complications. Radiofrequency tonsillectomy is an alternative technique that has more than one advantage, it is hemostatic, bacteria free method, with faster healing than cautery, in addition to low cost <sup>(3) (4)</sup>.

Regarding intraoperative blood loss, our study showed significantly lower blood loss in radiofrequency tonsillectomy patients (mean 10 ml.) while in cold dissection tonsillectomy (mean 80 ml.), this corresponds with Friedman et al who observed 20 ml. blood loss in radiofrequency tonsillectomy group <sup>(6)</sup>. While Nelson LM found that blood loss is only 1 ml in his study <sup>(7)</sup>. Pfaar et al. also reported that intraoperative blood loss is significantly lower in radiofrequency tonsillectomy than cold dissection tonsillectomy group <sup>(8)</sup>.

The operative time was found in our study to be significantly lower in the radiofrequency tonsillectomy patients (mean 9 minutes) than cold dissection tonsillectomy (mean 16 minutes), this agrees with Ardehali et al. who found that the mean operation time was 7. 81 minutes <sup>(9)</sup>, Sameh M.Ragab also found that there is a 45 % shorter mean time in radiofrequency tonsillectomy than in cold dissection tonsillectomy operation <sup>(10)</sup>.

The postoperative pain in our study was found to be significantly less in radiofrequency tonsillectomy patients especially after 3<sup>rd</sup> postoperative day till it disappeared at day 5, unlike cold dissection tonsillectomy group of patients who have more severe pain till day 5 when it becomes mild till it disappeared in day 10 postoperatively.

Polites et al found that patients who sustained radiofrequency coblation on one side and conventional cold dissection tonsillectomy on the other side reported that radiofrequency side

was significantly less painful than on day 1, 2, and 3 postoperatively than other side<sup>(11)</sup>. Zhong et al reported a significantly earlier return to normal diet and less pain in radiofrequency tonsillectomy patients in comparison with blunt dissection patients<sup>(12)</sup>, while NunezDA. Et al<sup>(13)</sup> and Blomgren K. et al<sup>(14)</sup> reported that those who sustained electrodissection tonsillectomy complained from more severe pain after hospital discharge. Philpott et al showed no significant benefit for radiofrequency plasma tonsillectomy over cold steel dissection tonsillectomy with regards to pain 14 days postoperatively<sup>(15)</sup>.

In our study, no postoperative complications reported in radiofrequency tonsillectomy patients, while 2 patients have post-tonsillectomy bleeding in cold dissection tonsillectomy group. These figures agreed with Lee MS et al.<sup>(16)</sup> and Tami TA et al.<sup>(17)</sup> and Pang YT et al.<sup>(18)</sup> who denied postoperative bleeding in radiofrequency tonsillectomy patients in their studies. While Lowe D. et al.<sup>(19)</sup> and O' Leary et al.<sup>(20)</sup> reported increased risk of delayed postoperative hemorrhage when using plasma radiofrequency device for tonsillectomy.

## 5. CONCLUSIONS:

Radiofrequency Tonsillectomy is a new technique that offers a safe eradication of palatine tonsils, in a significantly short operation time, lower intraoperative blood loss, and limited postoperative morbidity in terms of pain and postoperative bleeding, that makes this technique superior to traditional cold steel dissection tonsillectomy.

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