

# Comparison Between Tonsillectomy Performed by Bipolar versus Coblation Techniques Our Experience at Queen Rania Hospital for Pediatrics

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**Abstract— Background:** Coblation tonsillectomy has shown promising findings compared to the bipolar method regarding postoperative pain in the first two weeks and readmission rate due to bleeding or infection in addition to median operation time. **Aim:** To compare the surgical outcome between coblation and bipolar surgical techniques for tonsillectomy. **Methods:** This is a retrospective analysis of a prospectively maintained database. One hundred patients, of both sexes and with different ages ranging between 3 and 10 years, were assigned for standard tonsillectomy at Queen Rania Pediatrics Hospital and randomized using sealed envelopes into two groups, each of which included 50 patients, with a minimum follow up of 14 days. Data were collected to assess postoperative pain in the first two weeks, the return to a typical eating routine, readmission rate due to complications such as hemorrhage or infection, and median operation time. Group A included patients who underwent tonsillectomy by coblation technique whereas group B included patients who underwent tonsillectomy by bipolar technique. Postoperative pain was evaluated using the Wong-Baker Faces pain descriptive scale (0-5). **Results:** Patients in group A had lower average pain scores (3.1,4.3) than patients in group B (4.2,5.2) at day one ( $P<0.05$ ) and day five ( $P<0.05$ ) post-operatively. Both groups had very close average pain scores at day ten post-operatively (2.6 and 2.8, respectively.  $P>0.05$ ). No significant difference in average pain scores was observed at the end of the postoperative fourteen days between both groups A and B (0.15, 0.17, respectively;  $P>0.05$ ). The readmission rate was lower in group A than in group B. On the other hand, lower median operation time was reported using the bipolar method. **Conclusion:** Coblation is a useful surgical technique for tonsillectomy that could reduce postoperative pain scores. Lower postoperative complications such as hemorrhage, poor oral intake, and infection were observed among patients who underwent tonsillectomy by coblation technique. Nevertheless, the median operation time for bipolar tonsillectomy was shorter.

**Keywords—** Postoperative, pain, readmission, tonsillectomy, Coblation, Bipolar.

## I. INTRODUCTION

Tonsillectomy is performed to treat chronic or recurrent tonsillitis in throat infections and obstructive sleep apnea <sup>(1)</sup>. It is a surgical process where palatine tonsils are removed from the throat with bleeding occurring in about 1% of cases on the first day of tonsillectomy <sup>(2)</sup>. The standard cost for this procedure, when done as an inpatient in the United States is US\$ 4.400 as of 2013<sup>(3)</sup>.

Discussion normally concentrates on postoperative pain and complication rates including bleeding and infection when assessing a variety of tonsillectomy procedures <sup>(4)</sup>. Coblation is a technique that aids the ablation of tonsils at a considerably lower temperature than bipolar diathermy. This technique includes radiofrequency bipolar electrical current passing via a saline medium. This leads to the fabrication of a plasma field of sodium ions, which breaks intercellular bonds, thus dissolving tissues <sup>(5)</sup>. The temperature utilized in this technique is around 60°C, whereas the temperature during electrocautery is in the range of 400–600°C <sup>(6)</sup>.

Previous clinical studies have been performed by The UK National Prospective Tonsillectomy Audit across Wales between 2003 and 2012, suggesting that there are multiple techniques to undertake tonsillectomy, including bipolar electrocautery and coblation. The study declared that the number of bipolar tonsillectomies has increased by 80%

compared to the dramatic increase of coblation tonsillectomies (by 120%) during the last decade <sup>(7)</sup>. Furthermore, a prospective observational study was achieved by the National Tonsil Surgery Registry in Sweden to analyze tonsillectomies between 2009 and 2013. The results showed that bipolar diathermy and coblation were used in 15% and 10% of cases, respectively.

The objective of this study was to assess postoperative pain in the first two weeks, complications incidence such as bleeding and infection, the return to a typical eating routine, and median operation time.

## II. METHODS

This is a retrospective analysis of a prospectively maintained database. One hundred patients suffering from chronic or recurrent tonsillitis, of both sexes (56 girls and 44 boys) and with different ages ranging between 3 and 10 years (median age: 5.2 yrs.) were assigned for standard tonsillectomy under general endotracheal anesthesia at Queen Rania military Pediatrics Hospital (Royal medical services) during the period, after obtaining written informed consent from all parents of children and approval from the ethical and research board review committee of the Royal medical services. Patients with a history of quinsy, bleeding disorder, or any main health issues such as heart defect or congenital (present from birth) heart disease were excluded.

Patients were randomized using sealed envelopes into two groups, each of which included 50 patients, with a minimum follow-up of 14 days. Data were collected to assess postoperative pain in the first two weeks, the return to a typical eating routine, readmission rate due to complications such as hemorrhage or infection, and median operation time. Group A included patients who underwent tonsillectomy by coblation technique whereas group B included patients who underwent tonsillectomy by bipolar technique. Patients were given paracetamol suppositories and ibuprofen syrup six hours after the operation. Postoperative pain was evaluated using Wong-Baker Faces pain descriptive scale (0-5 grades) where 0 means no hurt, 1 means hurts a little bit, 2 means hurts a little more, 3 means hurts, even more, 4 means hurt a whole lot and 5 means hurts worst, where every grade equal 2 points (0-10). Postoperative average pain scores were evaluated and compared for both groups.

The parents of participants were requested to complete a daily basis assessment of postoperative pain for 14 days. They were asked to visit the ER-ENT clinic if they noted high temperature, decreased oral intake, or any signs of bleeding from the nose or mouth. The day of surgical operation was considered the first day of the evaluation. Parents were asked to record the date at which the patient returned to normal eating habits. All patients and their parents were unaware of which technique will be used by the surgeon. All the operations were executed by the same team of senior ENT specialists.

### III. STATISTICS

The Chi-square test was used to compare between proportions and the Students t-test was used to compare between means. A P-value less than 0.05 was considered statistically significant.

### IV. RESULTS

Our results demonstrated that patients who underwent tonsillectomy by coblation technique in group A had lower average pain scores compared to patients who underwent tonsillectomy by bipolar technique in group B. Average pain scores after tonsillectomy done by coblation technique on the first-day post-surgery were significantly less compared to scores after bipolar technique ( $P < 0.05$ ). Lower pain scores were reported at day five for group A. Group A and group B had comparable average pain scores (2.6 and 2.8), respectively, at day ten.  $P > 0.05$ . However, toward the end of the fourteen days of follow-up, there were no significant differences in average pain scores between both methods ( $P > 0.05$ ). Table I.

Furthermore, postoperative complications such as hemorrhage, poor oral intake, and infection were evaluated along with the readmission rate for both groups. All patients were discharged on the first day, but seven patients were readmitted during the first two weeks after surgery on different days after the operation.

Readmission rate due to hemorrhage, poor oral intake, and infection was higher for patients who underwent tonsillectomy using bipolar diathermy (5 patients) compared to the coblation

method (2 patients). Two patients from group A were readmitted. The first patient was readmitted on day three with bleeding and discharged after five days, while the second patient was readmitted with poor oral intake on the third day and discharged after three days. Table II. On the other hand, five patients from group B were readmitted. Two of them were readmitted with bleeding on day two and day three and discharged after five days. Two patients were suffering from poor oral intake on day three and were discharged after three days of admission. In addition to that, one patient was readmitted with infection and fever on day six and discharged after three days with an antibiotic prescription for one week. Table II.

The median operation time for the bipolar technique was found to be shorter than for the coblation method. The median operation time was 21.0 min (range: 12–46 min) when using the coblation technique and only 13.0 min (range: 7–20 minutes) for bipolar electrocautery (i.e., 21 min. vs. 13 min. when using coblation and bipolar techniques, respectively). Thus, using coblation technique requires about 0.6 of the operation time that is required by the bipolar technique. The difference was extremely significant ( $P < 0.05$ ).

TABLE I. Average pain scores.

DAY	Group A	Group B	P
1 (average, range)	3.1(0-7)	4.2(2-8)	$<0.05$
5 (average, range)	4.3(2-7)	5.2(2-8)	$<0.05$
10 (average, range)	2.6(0-7)	2.8(0-8)	$>0.05$
14 (average, range)	0.15(0-2)	0.17(0-5)	$>0.05$

TABLE II. Readmission Patients.

COMPLICATIONS	Group A	Group B
HEMORRHAGE	1	2
POOR ORAL INTAKE	1	2
INFECTION	0	1

### V. DISCUSSION

In this research, the principal concern was to evaluate and compare postoperative pain scores and associated complications including hemorrhage, poor oral intake, and infection after tonsillectomy achieved by coblation and bipolar techniques. However, there is a significant difference in the temperature utilized in the coblation technique, which was around 60°C, while it was in the range of 400-600 DC for the bipolar diathermy<sup>(8)</sup>

Our study demonstrated that utilization of the coblation technique for tonsillectomy significantly decreased the average postoperative pain scores compared to the bipolar method, reducing the necessity for analgesics during the first six postoperative hours when using coblation. In addition to that, readmission of patients due to postoperative bleeding was found to be lower when tonsillectomy was achieved by coblation. More readmissions due to poor oral intake and infection were observed after the tonsillectomy done by the bipolar method. Consequently, the coblation technique showed better clinical outcomes associated with less postoperative pain scores and fewer complications, while median operative time was in favor of the bipolar method.

Our findings were comparable with published studies such as Muthubabu et al<sup>(9)</sup>, who compared the outcomes between

the coblation technique and the dissection method, demonstrating that the coblation technique provides less postoperative pain and blood loss, while the duration of dissection surgery was less. Metcalfe et al. <sup>(10)</sup> declared that the coblation technique was less painful, especially on day 1 after the operation. Pynnonen et al. <sup>(11)</sup> evaluated coblation outcomes versus other surgical techniques for tonsillectomy based on 2561 patients. The obtained results showed that low pain scores were reported especially at day one by using coblation compared to other surgical techniques. The risk of postoperative bleeding was lower among patients who underwent coblation tonsillectomy. Sasindran et al. <sup>(12)</sup> declared that utilization of coblation technique for tonsillectomy significantly reduced postoperative pain and promoted patients to return to their normal diet faster. Yaseen et al. <sup>(13)</sup> showed that the coblation technique improves the healing process and reduces blood loss. Temple et al. <sup>(14)</sup> concluded that utilization of coblation technique led to a significant decrease in post-operative pain and promoted a faster return to a normal diet.

#### VI. CONCLUSION

The result of this study favors the utilization of coblation tonsillectomy due to reduction of postoperative pain especially at day one. Lower postoperative complications such as hemorrhage, poor oral intake, and infection were observed among patients with tonsillectomy performed by coblation technique. On the other hand, median operation time was reported less in the bipolar method.

#### *Ethics Approval*

An Institutional Review Board (IRB) approval was obtained from Royal Medical Services. Patient data privacy and confidentiality are maintained as this study was conducted in compliance with the ethical standards per Helsinki declaration.

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