

# A Comparison between Cold Steel Method and Bipolar Diathermy Method of Tonsillectomy

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## ABSTRACT

### Introduction

It is generally accepted that the ideal method of tonsillectomy should have less operative time, blood loss, post-operative haemorrhage and morbidity.<sup>1</sup> Objective of the present study was to compare post-operative pain, intra-operative blood loss and duration of surgery between cold dissection and bipolar diathermy dissection method of tonsillectomy.

### Materials and Methods

This study was a prospective and comparative hospital-based study. It was conducted from January 2021 - June 2022 at the department of ENT of a tertiary referral hospital, Kolkata. 90 patients were included in this study fulfilling the inclusion and exclusion criteria.

### Results

In bipolar diathermy method, the mean total blood loss (in ml) (mean±s.d.) of patients was 15.0778±4.6011 and in cold steel method it was 33.0000±5.8737. Post-operative pain for cold dissection on day 1, day 3 and day 10 was [4.4889±.6613], [2.0222±.7830] and [1.3778±.4903] respectively. Post-operative pain for bipolar diathermy on day 1, day 3 and day 10 was [4.9556±.2084], [2.5778±1.0111] and [1.6222±.7474] respectively. Duration (in minutes) for bipolar diathermy dissection was [15.2889±1.9612] and for cold dissection it was [24.0444±2.3351].

### Conclusion

The blood loss and duration were less in bipolar diathermy method but post-operative pain was more as compared to cold steel method.

### Keywords

Tonsillectomy; Cold Steel; Bipolar Diathermy; Post-operative Pain.

Operations have been performed on the tonsils from the earliest times. The first mention of tonsillectomy refers to Hindu medicine about 100 B.C. While recent advances are of great interest to medical and lay persons, it is both interesting and instructive to trace the history of this operation back to the earliest times. This study was done by McNeill RA.<sup>2</sup> Tonsil removal has traditionally been achieved by cutting the pharyngeal mucosa with scissors, then dissection of the tonsil from the lateral pharyngeal wall. This is the so called 'dissection' tonsillectomy. Haemostasis is achieved with ligatures (ties), sutures or diathermy once the tonsil has been removed. Tonsillectomy using bipolar diathermy was associated with quicker procedure, less intra-operative blood loss, comparable post-operative pain and

less post-operative haemorrhage according to Karan Sharma and Devinder Sharma.<sup>3</sup>

In diathermy tonsillectomy, the tonsil is removed and haemostasis secured simultaneously, using diathermy.<sup>4</sup> Diathermy is used to incise the mucosa and divide the strands of tissue that bind the tonsil to the pharyngeal wall. At the same time the vessels that run in these strands are visualised, and can be coagulated before they are divided, thus minimising blood loss and speeding up the surgery by 40% (Roy 1976)<sup>4</sup> to 50% (Haase 1962).<sup>5</sup>

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However, cold steel tonsillectomy is associated with lesser post-operative pain.<sup>6</sup> A further refinement of this technique uses the operating microscope to facilitate dissection, and identification of the glossopharyngeal nerve, which is said to be an important source of referred otalgia after tonsillectomy (Andrea 1993).<sup>7</sup> The operating surgeon may be more concerned about bleeding, but for the patient, pain is likely to be the most important issue, with concerns regarding time off school or work and resumption of normal activities. Bleeding may be during the operation (primary), during the first 24 hours post-operatively (reactionary haemorrhage), or after 24 hours (secondary haemorrhage). Primary and secondary haemorrhage may require further surgical intervention. Rates for all types of haemorrhage vary slightly from series to series. Carmody in 1982 reported a primary haemorrhage rate of 1.03% in 3756 tonsillectomies, with 1% secondary haemorrhage requiring active measures for control.<sup>8</sup> Phillipps in 1989 compared diathermy haemostasis with ligation and quoted a primary bleed rate of 0.8% for diathermy and 1.3% for ligation.<sup>9</sup> Secondary haemorrhage rates were also not significantly different, at 1.9% and 1.3%, respectively. This difference may be real or simply reflect differences in reporting what constitutes a significant bleed. Pain is a significant factor after tonsillectomy, and may be severe enough to delay discharge from hospital, resumption of normal diet and normal activities (Drake Lee 1998).<sup>10</sup>

## Materials and Method

A prospective and comparative hospital-based study was done in the department of ENT at a tertiary referral hospital at Kolkata from 1st January, 2021 to 30th June, 2022 (18 months). In adherence to the inclusion and exclusion criteria, 90 patients undergoing tonsillectomy in the department of ENT were selected by consecutive method of sampling. Half the study population underwent tonsillectomy by cold steel method and other half by bipolar diathermy method. Sample size was calculated using  $N = Z^2(1-\alpha) * \sigma^2/d^2$ . Patients between 6-40 years of age were selected, who had recurrent acute tonsillitis

with five or more episodes of sore throat per year or symptoms for at least a year, or patients with enlarged tonsils causing mechanical obstruction to the aerodigestive tract. Patients with medical contraindications, ulceroproliferative growth on the tonsil, acute or chronic tonsillitis were excluded.

A pre-designed and pre tested proforma was used to collect patients' relevant data. The patients were evaluated for fitness for surgery under general anaesthesia. Basic investigations like complete blood count, coagulation profile, pre-operative serology, electrocardiography, chest X-ray (postero-anterior view) were done. For duration of surgery, time was measured from the end of intubation to the start of anaesthetic reversal. All the tonsillectomies were performed by the same surgeon having expertise. Bottles of suction apparatus were used to measure intra-operative blood loss. The plain soaked gauze packs used for pressure haemostasis were weighed pre and post-operatively while being kept in the same kidney dish using a digital weighing machine. All the soiled gauzes together with unused ones were placed on the weighing machine and weighed post-operatively. The difference in weights was the weight of blood lost in gauze during surgery. This was converted into millilitres by dividing this weight by the specific gravity of blood, which is 1.055. In case of post-operative blood loss, an institutional resuscitative protocol was followed. The pain during post-operative period was measured by Wong Baker faces pain scale on 1st post-operative day (after 24hrs), 3rd post-operative day and 10th post-operative day. For statistical analysis data was entered into a Microsoft excel spreadsheet and then analysed by SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and Graph Pad Prism version 5. Two-sample t-tests for a difference in mean involved independent samples or unpaired samples. Paired t-tests were a form of blocking and had greater power than unpaired tests. A chi-squared test ( $\chi^2$  test) was any statistical hypothesis test wherein the sampling distribution of the test statistic

is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. Once a t value is determined, a p-value can be found using a table of values from Student's t-distribution. If the calculated p-value is below the threshold chosen for statistical significance (usually the 0.10, the 0.05, or 0.01 level), then the null hypothesis is rejected in favour of the alternative hypothesis. P-value  $\leq 0.05$  was considered statistically significant.

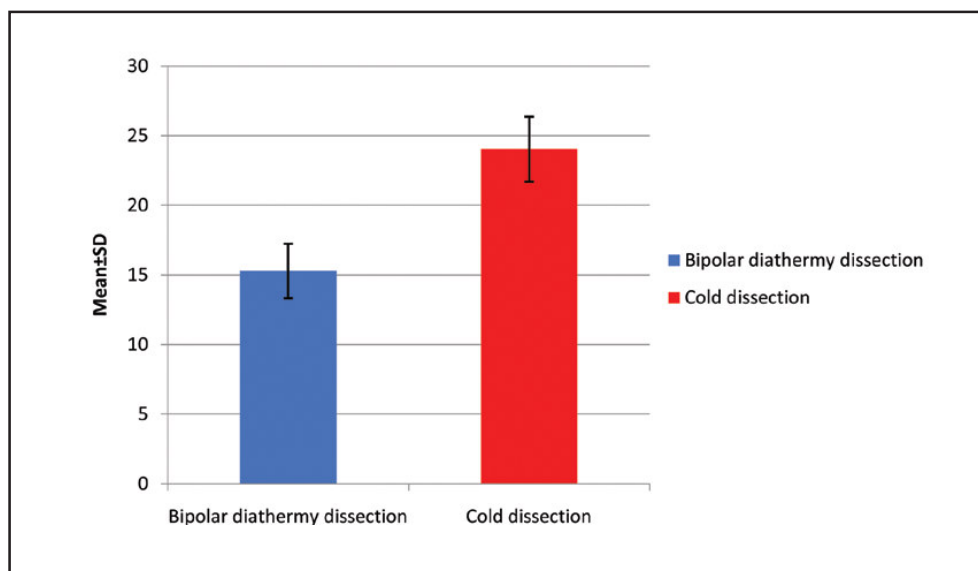
## Results

Salam MA et al<sup>11</sup> in 2019 found that the mean duration of surgery was  $10.6 \pm 0.4$  minutes in group A and  $17.0 \pm 0.7$  minutes in group B. Muthubabu K et al<sup>12</sup> (2019) showed that blood loss and post-operative pain were less in coblation group and the duration of surgery was less in cold steel group.

We found that duration (in minutes) was less in bipolar diathermy method [ $15.2889 \pm 1.9612$ ] compared to cold steel [ $24.0444 \pm 2.3351$ ] and this was statistically significant ( $p < 0.0001$ ).

**Table I. Duration in minutes for bipolar diathermy dissection and cold dissection method**

		NO.	MEAN	SD	MIN.	MAX.	MEDIAN	P-VALUE
Duration (minutes)	Bipolar diathermy dissection	45	15.2889	1.9612	12.0000	19.0000	15.0000	<0.0001
	Cold dissection	45	24.0444	2.3351	20.0000	28.0000	24.0000	



**Fig. 1. Distribution of mean Duration (in minutes)**

Table II : Total blood loss in ml for bipolar diathermy dissection and cold dissection method

		NO.	MEAN	SD	MIN.	MAX.	MEDIAN	P-VALUE
Total Blood loss (ml)	Bipolar diathermy dissection	45	15.0778	4.6011	8.0000	28.0000	14.0000	<0.0001
	Cold dissection	45	33.0000	5.8737	24.5000	48.5000	32.0000	

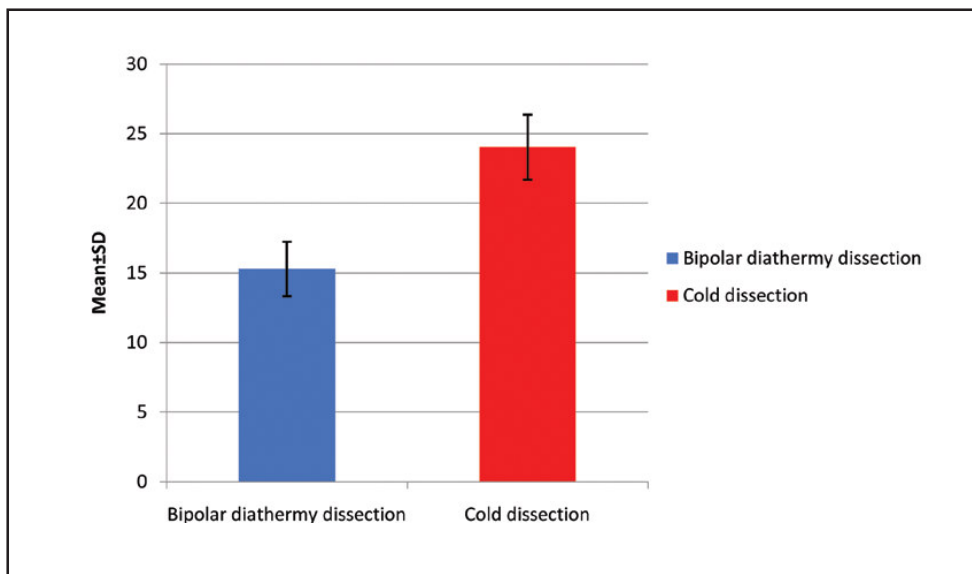


Fig. 2. Mean distribution of total blood loss in both groups

It was found that, volume of soaked blood (ml) was more in cold steel method [ $15.6222 \pm 6.1489$ ] compared to bipolar diathermy method [ $7.3889 \pm 3.1764$ ] which was statistically significant ( $p < 0.0001$ ). Collection in suction (ml) was higher in cold steel method [ $17.3778 \pm 6.7766$ ] compared to bipolar diathermy [ $7.7111 \pm 4.9572$ ] and this was statistically significant ( $p < 0.0001$ ).

In our study, total blood loss (in ml) was less in bipolar diathermy method [ $15.0778 \pm 4.6011$ ] compared to cold steel method [ $33.0000 \pm 5.8737$ ] and this was statistically significant ( $p < 0.0001$ ).

Chettri ST et al<sup>13</sup> (2013) observed that on the second post-operative day, 35% of the patients complained of pain on the cauterized side, 30 % complained of more

pain on the cold dissection side, while 35 % experienced equal pain on both sides. Chughtai A et al<sup>14</sup> (2016) found cold steel method to be superior in healing and causing less post-operative pain than the bipolar diathermy method.

We found that, pain on post-operative day 1 was less in cold steel method [ $4.4889 \pm .6613$ ] compared to bipolar diathermy method [ $4.9556 \pm .2084$ ] and this was statistically significant ( $p < 0.0001$ ). Pain on post-operative day 3 was significantly lower in cold dissection method [ $2.0222 \pm .7830$ ] compared to bipolar diathermy method [ $2.5778 \pm 1.0111$ ], ( $p = 0.0045$ ). Pain on post-operative day 10 was more in bipolar diathermy method [ $1.6222 \pm .7474$ ] compared to cold steel method [ $.3778 \pm .4903$ ] and this was statistically significant ( $p < 0.0001$ ).

Table III. : Mean distribution of pain for bipolar diathermy dissection and cold dissection method on post-operative day 1, day 3 and day 10

		NO.	MEAN	SD	MIN.	MAX.	MEDIAN	P-VALUE
Pain Day 1	Bipolar diathermy dissection	45	4.9556	.2084	4.0000	5.0000	5.0000	<0.0001
	Cold dissection	45	4.4889	.6613	3.0000	5.0000	5.0000	
Pain Day 3	Bipolar diathermy dissection	45	2.5778	1.0111	1.0000	4.0000	3.0000	0.0045
	Cold dissection	45	2.0222	.7830	1.0000	3.0000	2.0000	
Pain Day 10	Bipolar diathermy dissection	45	1.6222	.7474	0.0000	3.0000	2.0000	<0.0001
	Cold dissection	45	.3778	.4903	0.0000	1.0000	0.0000	

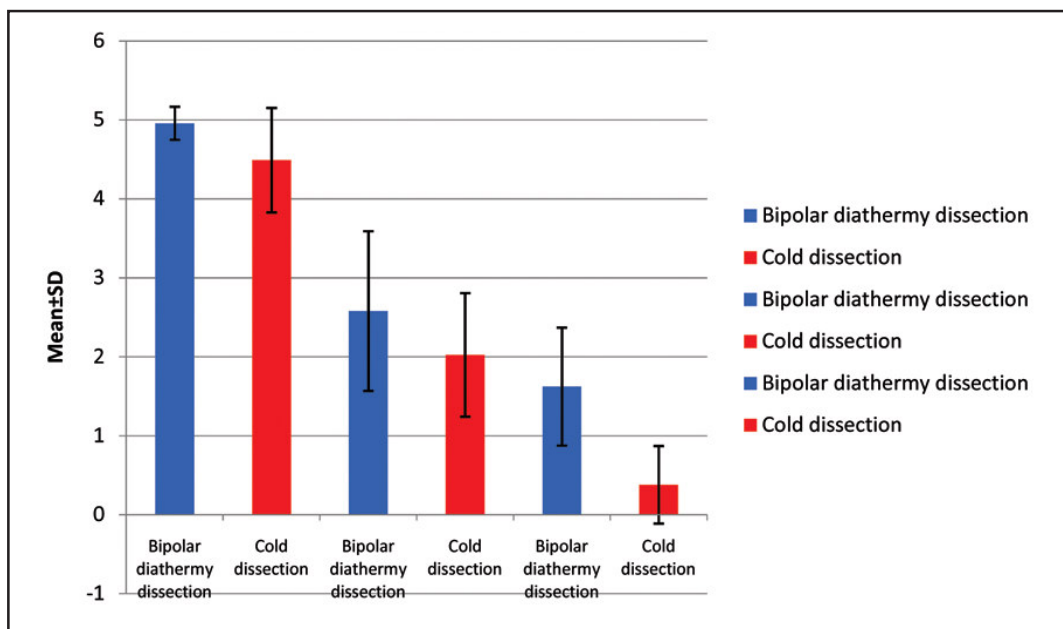


Fig. 3. Comparison of post-operative pain on day 1, day 3 and day 10 for bipolar diathermy dissection and cold dissection method

## Discussion

In our study we observed that duration (in minutes) was less in bipolar diathermy method compared to cold steel method, and this was statistically significant. We observed that volume of soaked blood (ml) was more in cold steel method compared to bipolar diathermy method, which was statistically significant. We found that collection of blood in suction (ml) was higher in cold steel method, compared to bipolar diathermy method, and this was statistically significant. Total blood loss (in ml) was less in bipolar diathermy method compared to cold steel method, and this was statistically significant.

We found that pain on post-operative day 1 was less in cold steel method compared to bipolar diathermy, and this was statistically significant. Our study showed that pain on post-operative day 3 was significantly lower in cold steel method compared to bipolar diathermy method. We observed that pain on post-operative day 10 was more in bipolar diathermy method compared to cold steel method, and this was statistically significant.

## Conclusion

We concluded that blood loss and duration (in minutes) were less in bipolar diathermy method compared to cold steel method, which was statistically significant. Post-operative pain was more in bipolar diathermy method compared to cold steel method, which was statistically significant.

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