

At Low Temperature Plasma Preoperative and Postoperative Treatment of Chronic Tonsillitis Tonsillectomy

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DOI: [10.36348/sjimps.2023.v09i12.012](https://doi.org/10.36348/sjimps.2023.v09i12.012)

| Received: 12.11.2023 | Accepted: 18.12.2023 | Published: 21.12.2023

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Abstract

Objective to explore the clinical efficacy of low-temperature plasma tonsillectomy in the treatment of patients with chronic tonsillitis and tonsillar hypertrophy. **Methods:** 100 patients with chronic tonsillitis and tonsillar hypertrophy admitted to the first affiliated hospital of Xinjiang Medical University from August 2021 to August 2023 were randomly selected as the research subjects. Based on the voluntary principle and different treatment plans, The patients were divided into two groups. 50 patients who underwent dissection tonsillectomy treatment were selected into the control group, and 50 patients who underwent low-temperature plasma tonsillectomy were selected into the observation group. The differences in clinical indicators between the two groups of patients were compared, The pain levels of patients at different postoperative periods were evaluated, and the differences in serum inflammatory factor levels were detected. **Results:** Compared with the control group, after surgical treatment, the operation time, and intra-operative bleeding volume of the blood observation group were significantly shorter, and the difference was statistically significant ($P < 0.05$); 1, 3, 5 and 7 days after surgery in the observation group. The Visual analogue scale VAS pain scores at 7 days were lower than those in the control group, and the difference was statistically significant ($P < 0.05$); after surgery in the observation group, the patient's high-sensitivity C-reactive protein (hs-CRP) (14.18 ± 0.51) mg/L, Tumor necrotic factor-alpha (TNF- α) (4.23 ± 0.31) pg/ml was significantly less, and the difference was statistically significant ($P < 0.05$); 5 patients in the observation group suffered from postoperative bleeding and complications The incidence rate was 16.00%, which was significantly lower than that of the control group, and the difference was statistically significant ($\chi^2 = 4.588$, $P < 0.05$). **Conclusion:** From our study it was able to show that tonsillectomy for adults and children with recurrent tonsillitis were widely used which improves health and quality of life and reduces the need to consume medical resources. When low-temperature plasma tonsillectomy is used in the clinical treatment of patients with chronic tonsillitis and tonsillar hypertrophy, the inoperative blood loss of the patients is significantly reduced, the clinical pain of the patients is further relieved, and the serum inflammatory factor levels of the patients are adjusted.

Keywords: Chronic Tonsillitis, Tonsillectomy, Tonsillar hypertrophy, Postoperative Pain, Clinical Efficacy.

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1. INTRODUCTION

Tonsillectomy is the one most commonly performed surgical procedure globally by otolaryngologists in children and adults also in china, Surgical operation is setting of recurrent attacks of acute

tonsillitis [1-2]. The tonsillectomies performed in the all aged of the patients with chronic tonsillitis [3].

Tonsillitis refers to inflammation of the pharyngeal tonsils, Inflammation may involve other areas of the back of the throat including the adenoids and

the lingual tonsils, Inflammation components are lymphatic ring of the larynx, often occur in the palatine tonsils, Tonsillitis is the infection of the tonsils usually caused by bacteria but also can be viruses, The most common causes of upper respiratory tract infections and sore throat are: Streptococcus pneumonia, Streptococcus pyogenes, Haemophilus influenzae, Moraxella catarrhalis, and Staphylococcus aureus [4-6].

Patients with chronic tonsillitis are usually caused by repeated attacks of acute tonsillitis multiple times during a year, It is a common clinical chronic disease, It is also easy to increase the patient's risk of infection in nearby organs, causing patients develop sinusitis, otitis media, etc [7].

Chronic tonsillitis characterized by symptoms such as swollen tonsils, pain when swallowing, Fever, Headache, Swollen of lymph nodes in the neck, Nausea, Vomiting, Pain in ear and neck, furry tongue, tiredness, chills, pharyngeal discomfort, foreign body sensation, itching, dryness, bad breath, and irritating cough [8].

Acute recurrent or chronic tonsillitis is multiple repeated infection of tonsils which can effect patient life. Tonsillectomy is surgical removal of the tonsils [9].

Tonsillectomy is painful surgical procedure, The most common postoperative complain in children to manage postoperative pain at home, Children suffer from pain and refuse to drink, eat and speak, Also in adults most common postoperative complain is sore throat; dehydration and post operative bleeding [10-11].

In this study our main goal is to evaluate the outcome of tonsillectomy for chronic tonsillitis, at low body temperature plasma, postoperative pain.

Therefore, this department carried out clinical research on 100 patients with chronic tonsillitis and tonsillar hypertrophy admitted to the hospital from August 2021 to August 2023 and choose the patients low-temperature plasma tonsillectomy for treatment. The report is as follows.

2. MATERIAL AND DATA

This study was done at First Affiliated Hospital of Xinjiang Medical University of Xinjiang Urumqi China. Study randomly chose 100 patients with chronic tonsillitis attended in Otolaryngology outpatient department and admitted to the hospital for the treatment of chronic tonsillitis and tonsil hypertrophy principle of different treatment plans of tonsillectomy. The chronic tonsillitis patients are divided in the two groups. 50 patients of chronic tonsillitis who underwent dissection tonsillectomy treatment were chose into the control group and 50 patients of chronic tonsillitis, Patients who underwent low-temperature plasma tonsillectomy were chose into the observation group. All the data were checked and verified thoroughly.

(n=50), 23 Males and 27 Females: Age 4-16 years old, average (9.12±2.34) years: duration of disease 0.5-7 years, average (4.35±0.84) years: Tonsil enlargement degree: Tonsil Grade II degree 45 cases, 5 cases of tonsil III degree.

Observation group:(n=50), 23 Males and 27 females: age 4-18 years old, average (10.12±3.65) years: Duration of disease 6 months-8 years, average (4.52±0.88) years: Tonsil enlargement degree: Tonsil II degree 46 cases, 4 cases of III degree.

There was no statistically significant difference in the general information between the two groups (P>0.05) and they were comparable.

All patients participated in this study on a voluntary basis. The study was approved by the ethics committee. Inclusion criteria is patients all meet the clinical diagnosis of chronic tonsillitis and tonsil hypertrophy, The patients had no cognitive dysfunction or mental illness and the patients had no history of acute tonsil infection.

Exclusion Criteria: Patients with abnormal coagulation function and acute inflammation. Patients with heart, liver, kidney and other organ dysfunction diseases. Patients with a history of radiotherapy of the throat and acute tonsil infection, Patients with tuberculosis, heart disease and other diseases.

3. METHODOLOGY

After admission, all 100 patients underwent various routine examinations. All patients received general anesthesia. The patients were placed in a supine position, with a soft pillow under their shoulders and an opening device was used to open the mouth. 50 patients in the control group were treated with dissection tonsillectomy. After anesthesia, an opener was used to exposed the patient tonsils.

An incision is made upward through the patient's palatoglossal, Separated the opposite pole capsule, Disentangle the patient tonsils from top to bottom, Place the snare, and then remove the tonsils. Then use gauze ball compression to stop bleeding. If good compression effect is not achieved, then need to be undergo sutured to stop bleeding.

50 patients in the observation group underwent low-temperature plasma tonsillectomy, Using the low-temperature plasma surgical instrument system (manufacturer: Jesse Company of the United States) Reasonably adjustment the relevant parameters, Adjust the electric-coagulation to level 3, Electric-surgical cut to level 5. The surgeon controls the surgical blade with the resection and homoeostasis pedals. Fully exposed the upper pole of the tonsils, make an incision on the upper mucous tissue of the patient glossopalatine arches, make

an incision from capsule, Remove the tonsils. During the removal tonsils, pay attention to bleeding and end the operation after confirming that there is no residual tissue.

4. OBSERVATION INDICATION

Clinical indicators between groups accurately record the operation time. Observe the patient's inoperative blood loss and evaluate the patient's surgical and prognostic effects.

Pain conditions at different postoperative periods between groups. Visual analogue scale (VAS) scale was used to evaluate patients pain conditions at 1,3,5 and 7 day after surgery.

Full score is 10 points, with 0 to 10 points indicating no pain and severe pain respectively.

Serum inflammatory factor levels of patients between groups before and after surgery. 5 ml of cub-ital venous blood was collected from the patients, centrifuged in a centrifuge, The upper serum was taken. Enzyme-linked immunodeficient assay to used detect the patients Hyper-sensitive C-reactive protein (hs-CRP).

Tumor necrotic factor-a (TNF- α) serum inflammatory factors were detected and the differences in levels before and after surgery were compared between patients.

Differences in postoperative complications among patients between groups check whether the patients are accompanied by common complications such as bleeding, infection, secondary hemorrhage after surgery.

5. STATISTICAL METHODS

SPSS 23.0 statistical software was used for data analysis. Measurement data consistent with normal distribution were expressed as ($\bar{x}\pm s$), and differences between groups were compared using *t* test; count data were expressed as [n(%)], and differences between groups were compared using χ^2 test. $P < 0.05$ means the difference is statistically significant.

6. RESULTS

In figure-1 Shows that gender distribution of the study group where female are 54% and male are 46%. The following figure is given below in detail:

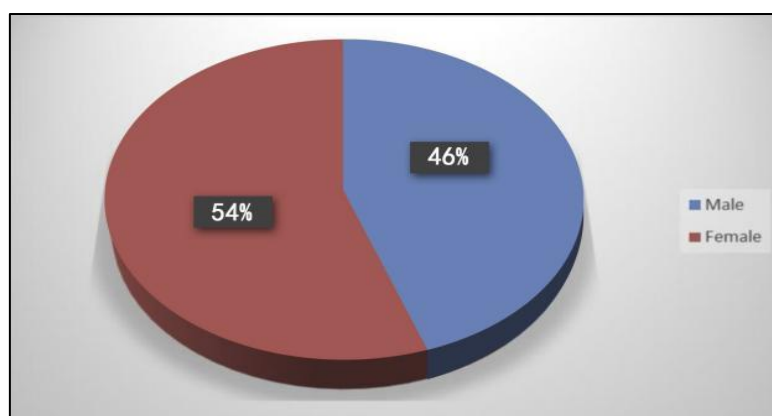


Fig-1: Gender distribution of the study group

In figure-2 mention that bilateral adenotonsillar hypertrophy (inoperative photograph). The figure is given below in detail:

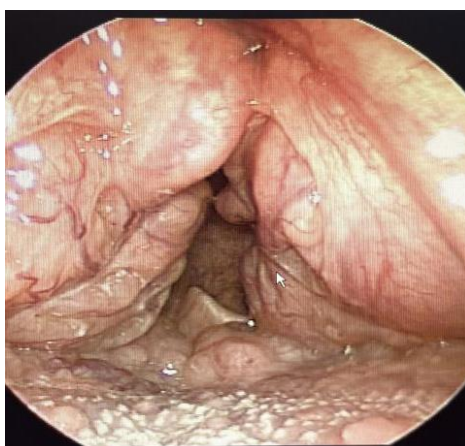
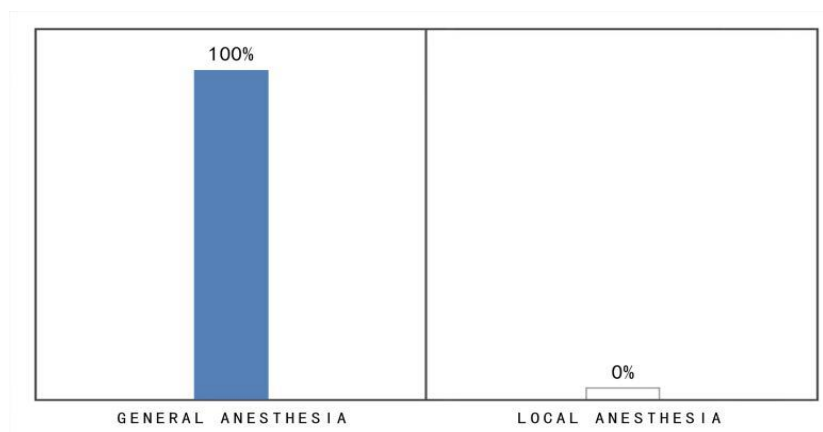


Fig-2: Bilateral adenotonsillar hypertrophy

In figure-3 mention that the operative surgery majority performed difference between general and local anesthesia. The figure is given below in detail:



In table 1 observable differences in clinical indicators between groups after surgical treatment. The operation time of patients between the observation groups (34.02 ± 2.49) min, inoperative blood loss

(7.91 ± 2.08) ml, there was a significantly small amount of radioactivity involved. and the difference was statistically significant ($P < 0.05$). See below Table 1 in detail:

Table: 1 Comparison of differences in clinical indicators between patient groups ($x \pm s$)

GROUP	Operation Time (min)	Inoperative blood loss (ml)
Control Group(n=50)	50.91 ± 3.81	15.25 ± 2.49
Observation Group(n=50)	34.02 ± 2.499	7.91 ± 2.08
<i>t</i> value	23.896	14.468
<i>P</i> value	<0.001	<0.001

In table:2 Comparison of pain conditions between the two groups of patients at different periods after surgery. The VAS pain scores of the observation group at 1, 3, 5, and 7 days after surgery were (3.70 ± 0.632) points, (2.91 ± 0.38) points, (1.20 ± 0.32) points,

(0.62 ± 0.11) points, which were lower than those of the control group, and the difference was statistically significant ($P < 0.05$). See below Table 2 and figure 3 is given below in detail:

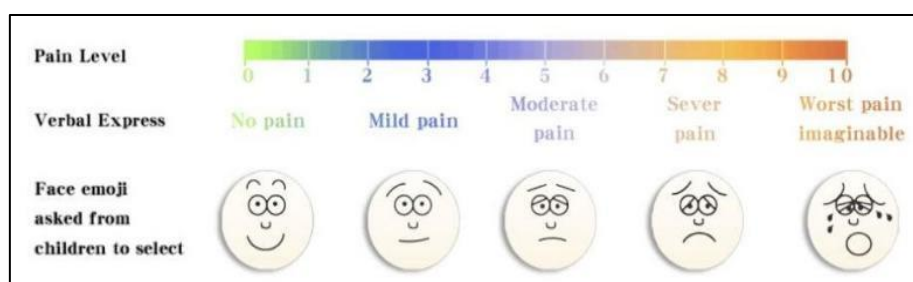


Fig-3: Measure the pain degree

Table: 2 Comparison of pain degree between different groups of patients at different time after operation ($x \pm s$)

GROUP	After Surgery			
	1 d	3 d	5 d	7 d
Control Group(n=50)	5.78 ± 0.56	3.67 ± 0.53	2.48 ± 0.41	0.87 ± 0.19
Observation Group(n=50)	3.70 ± 0.62	2.91 ± 0.38	1.20 ± 0.32	0.62 ± 0.11
<i>t</i> value	15.963	7.700	15.873	7.317
<i>P</i> value	<0.001	<0.001	<0.001	<0.001

In the observation group, 5 patients had postoperative bleeding and the incidence rate of complications was 6.0%, which was significantly lower

than that of the control group, and the difference was statistically significant ($P < 0.05$). See below table 3 in detail:

In table: 3 Comparison of postoperative complications between the two groups of patients

GROUP	Patients Infection	Bleed	Percentage%
Control Group(n=50)	5	3	16.0%
Observation Group(n=50)	2	1	6.0%
<i>P</i> value			0.016

7. DISCUSSION

In the study total patients are $n=100$, 54 (54%) patients were females and 46 patients were males (46%) female to male ratio was 1.17%. We also mention that their age of patients under examination ranged from 4-18 years with a mean both selective group age of 9.12% and 8.12 % [12].

Tonsillectomy is one of the most frequently performed surgical procedure and most commonly performed surgery in the pediatric patients and adults patients. Indications for tonsillectomy of recurrent acute tonsillitis (according to the American Academy of Otolaryngology-Head and Neck surgery physician documentation five to seven episodes per 1 year) [13]. The patients is afraid of hospitalization, Anesthetic side effect, postoperative uncomfortable, Postoperative pain, and high medical expenditures are associated with a tonsillectomy [14].

In the Children recurrent tonsillitis and tonsillar hypertrophy is a most common clinical disease. Which is most commonly develop by the inflammation of tonsils. The occurrence of chronic tonsillitis is usually caused by bacteria and virus infection, accumulated in the tonsillar fossa. Multi episodes of acute tonsillitis attack may be recurrent or chronic tonsillitis. Chronic tonsillitis and tonsillar hypertrophy sign and symptoms is snoring during sleep, with clinical manifestations of nasal congestion, apnea and open-mouth breathing [15-16].

Most commonly cases of acute tonsillitis can be treated with antibiotics but tonsillectomy is best treatment for recurrence of chronic tonsillitis. That is reasonable and mostly parents of Children satisfaction with tonsillectomy surgery operation [17-18].

After surgery we may considered that low development of tonsillitis or sore throat. Because of tonsils removed by tonsillectomy, after surgery stay period is short in hospital and recovery period is long at home treatment [19-20].

The recovery after surgery is the important things in the home rest and home treatment, also disturb the quality of children daily life activities and postoperative pain considered lasting 7 to 10 days. The

postoperative complains is bad effect like dehydration, bleed and poor food intake are mainly associated with increased pain after tonsillectomies [21-22].

Current clinical treatments for chronic tonsillitis and tonsil hypertrophy are often surgical remove of tonsils. Commonly used surgical methods are mainly include traditional stripping techniques, bipolar electrode-coagulation tonsillectomy, etc. Although the above surgical methods can achieved good therapeutic effects, they require relatively large wounds. However, affected by factors such as large wounds, long postoperative recovery time, and numerous postoperative complications, the surgical results for patients are limited to a certain extent [23-24].

Compared with traditional stripping technology, low-temperature plasma tonsillectomy provides a better treatment for chronic tonsillitis and tonsillar hypertrophy. By using low-temperature plasma knife and bipolar radio-frequency energy can effectively cut the diseased tissue of patient's. Radio-frequency electromagnetic waves can be used to adjust the dielectric to a low-temperature ion state. By contacting the body tissue, it exerts a destructive effect on the organic molecular chains with in the tissue, causing it to appear denaturation and gradual disintegration effect, thereby achieving good cutting purposes [25-26].

The results of this study showed that after surgical treatment, the operation time and inoperative bleeding loss of the patients in the observation group were operation time (34.02 ± 2.499) min and blood lose (7.91 ± 2.08) ml respectively, which were significantly less compared with the control group ($P < 0.05$). This suggests that compared with traditional tonsillectomy, low-temperature plasma tonsillectomy is more helpful in shortening the patient's surgery, reducing the patient's intra-operative blood loss, and ensuring the patient's inoperative safety. After surgical treatment, the operation time, intra-operative bleeding volume of the study group were (14.5 ± 2.6) min and (7.8 ± 2.0) ml respectively, it was significantly shorter than the control group ($P < 0.05$).

Low-temperature plasma tonsils have been widely used in clinical practice due to its advantages of

cutting, hemostasis and ablation. Because of there smaller blade, the surgeon's field of vision will not be affected during the cutting process, Therefore, the operation time is significantly shorter than traditional stripping surgery. The patient was treated surgically [27-28].

The visual analogue scale VAS pain scores of the observation group on days 1, 3, 5, and 7 after surgery were (3.69±0.61) points, (2.89±0.36) points (1.19±0.31), points (0.61±0.12) points, which were lower than those in the control group (P<0.05). It can be seen that low temperature plasma tonsillectomy can reduce the amount of inoperative blood loss, reduce the postoperative pain [29-30].

After surgery, the levels of Hyper-sensitive C-reactive protein hs-CRP (14.18 ± 0.51) mg/l and Tumor necrotic factor- α TNF- α (4.23 ± 0.31) pg/ml were significantly lower in the observation group than in the control group (P < 0.05). This suggests that tonsillitis and tonsillar hypertrophy patients treated by plasma tonsillectomy can effectively remove the lesion tissue, and the tissue damage caused to the patient is relatively uniform, to a certain extent, Eliminate the postoperative adverse inflammation in patients.

low-temperature plasma tonsillectomy removes the patients diseased tissue, the intensity of damage tissue in patients is relatively uniform, eliminate the body of patients with inflammation [31].

The postoperative TNF- α and hs-CRP indicators of the patients in the study group were (14.02±0.97) pg/ml and (4.41±0.30) mg/L, which were better than those in the control group (P<0.05)." This is consistent with the research results.

After treatment with low-temperature plasma tonsillectomy, the patient's wound is surrounded by a protective film of coagulated necrotic tissue,

The degree of inflammatory cell infiltration in patients was alleviated, and at the same time, it also played an inhibitory role in the inflammatory response of patients, When the low temperature plasma blade is working, the temperature is generally maintained at 70°C left and right, which can accelerate the dehydration and coagulation of protein tissue, and can prevent the infiltration of inflammatory cells in fibrous tissue, which provides a good protective role. thereby reducing the secretion of inflammatory factors in patients [32].

There were 5 patients with postoperative bleeding and uvula edema in the observation group, and the complication rate was 10.00%, which was significantly lower than that of the control group (P<0.05). low-temperature plasma tonsillectomy to the clinical treatment of patients with chronic tonsillitis and tonsillar hypertrophy.It can effectively control the extent

and depth of ablation resection, further control the postoperative complications of patients, and improve the safety of surgery [33].

CONCLUSION

Summary when low-temperature plasma tonsillectomy is used in the clinical treatment of patients with chronic tonsillitis and tonsillar hypertrophy. The blood loss during the operation is significantly reduced, which further alleviates the patient's clinical pain and helps to effectively improve the patient's serum inflammatory factors level. We also able to know that tonsillectomy for adults and children with recurrent or chronic tonsillitis were widely used which improves the patients health and quality of life.

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