CLINICAL OUTCOME OF LIGATION VERSUS BIPOLAR DIATHERMY IN TONSILLECTOMY

By

DR. GAUTHAM.S

DISSERTATION SUBMITTED TO

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTRE, KOLAR

In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

OTORHINOLARYNGOLOGY

Under the guidance of

DR.K.C.PRASAD, M.B.B.S., M.S (ENT), FELLOWSHIP IN OTOLOGY

DEPARTMENT OF OTORHINOLARYNGOLOGY
SRI DEVARAJ URS MEDICAL COLLEGE
TAMAKA KOLAR
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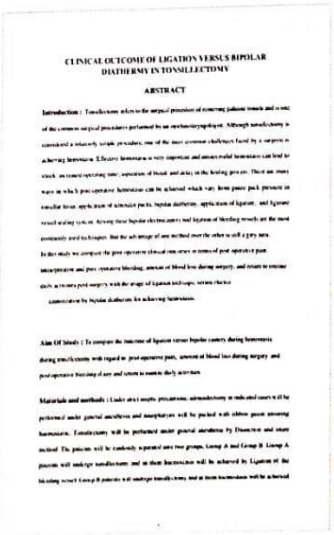

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CLINICAL OUTCOME OF LIGATION VERSUS BIPOLAR DIATHERMY IN TONSILLECTOMY ABSTRACT Introduction : Tonsillectomy refers to the surgical procedure of removing palatine tonsils and is one of the common surgical procedures performed by an otorhinolaryngologist. Although tonsillectomy is considered a relatively simple procedure; one of the most common challenges faced by a surgeon is achieving hemostasis. Effective hemostasis is very important and unsuccessful hemostasis can lead to shock, increased operating time, aspiration of blood, and delay in the healing process. There are many ways in which post-operative hemostasis can be achieved which vary from gauze pack pressure in tonsillar fossa, application of adrenalin packs, bipolar diathermy, application of ligature, and ligasure vessel sealing system. Among these bipolar electrocautery and ligation of bleeding vessels are the most commonly used techniques. But the advantage of one method over the other is still a grey area. In this study we compare the post-operative clinical outcomes in terms of post-operative pain, intraoperative and post-operative bleeding, amount of blood loss during surgery, and return to routine daily activities post-surgery with the usage of ligation technique versus electro cauterization by bipolar diathermy for achieving hemostasis. Aim Of Study : To compare the outcome of ligation versus bipolar cautery during hemostasis during tonsillectomy with regard to post-operative pain, amount of blood loss during surgery and post operative bleeding if any and return to routine daily activities. Materials and methods : Under strict aseptic precautions, adenoidectomy in indicated cases will be performed under general anesthesia and nasopharynx will be packed with ribbon gauze ensuring haemostasis. Tonsillectomy will be performed under general anesthesia by Dissection and snare method. The patients will be randomly separated into two groups, Group A and Group B. Group A patients will undergo tonsillectomy and in them haemostasis will be achieved by Ligation of the bleeding vessel. Group B patients will undergo tonsillectomy and in them haemostasis will be achieved by Cuadra Bipolar electrocauterization. Intraoperatively the amount of blood loss will be calculated in Group A and Group B by adding the total blood collected in the suction bottle after discarding the blood during adenoidectomy plus the weight difference in the plain soaked cotton ball and gauze balls used for pressure hemostasis and documented. The post operative bleeding if any will be documented and compared between Group A and Group B.After the surgery all patients in both the groups will be given standard analgesics (Paracetamol , Aceclofenac or Ibubrufen) and antibiotic (Amoxycillin+clavulanic acid injections according to hospital antibiotic policy). Post tonsillectomy pain will be analyzed by visual analogue scale (VAS) (ANNEXURE II) for adults and children more than 7 years old and Wong-Bakers FACES(ANNEXURE III) pain scale for children of 3-7 years old. In all patients in Group A and Group B, post operative pain will be documented on 1st, 4th, 7th and 14th postoperative day and compared and documented. The analgesia requirement in the first 24 hours will be

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DR.GAUTHAM S

LIST OF ABBREVIATIONS

VAS	Visual Analogue Scale
PTH	Post-tonsillectomy haemorrhage
SPSS	Statistical Package for Social Science
SD	Standard Deviation

ABSTRACT

Introduction : Tonsillectomy refers to the surgical procedure of removing palatine tonsils and is one of the common surgical procedures performed by an otorhinolaryngologist. Although tonsillectomy is considered a relatively simple procedure, one of the most common challenges faced by a surgeon is achieving hemostasis. Effective hemostasis is very important and unsuccessful hemostasis can lead to shock, increased operating time, aspiration of blood, and delay in the healing process. There are many ways in which post-operative hemostasis can be achieved which vary from gauze pack pressure in tonsillar fossa, application of adrenalin packs, bipolar diathermy, application of ligature, and ligasure vessel sealing system. Among these bipolar electrocautery and ligation of bleeding vessels are the most commonly used techniques. But the advantage of one method over the other is still a grey area.

In this study we compare the post-operative clinical outcomes in terms of post-operative pain, intraoperative and post-operative bleeding, amount of blood loss during surgery, and return to routine daily activities post-surgery with the usage of ligation technique versus electro cauterization by bipolar diathermy for achieving hemostasis.

Aim Of Study : To compare the outcome of ligation versus bipolar cautery during hemostasis during tonsillectomy with regard to post-operative pain, amount of blood loss during surgery and post operative bleeding if any and return to routine daily activities.

Materials and methods : Under strict aseptic precautions, adenoidectomy in indicated cases was performed under general anesthesia and nasopharynx was packed with ribbon gauze ensuring haemostasis. Tonsillectomy was performed under general anesthesia by Dissection and snare method. The patients was randomly separated into two groups, Group A and Group B. Group A patients underwent tonsillectomy and in them haemostasis

was achieved by Ligation of the bleeding vessel. Group B patients will underwent tonsillectomy and in them haemostasis was achieved by Cuadra Bipolar electrocauterization. Intraoperatively the amount of blood loss was calculated in Group A and Group B by adding the total blood collected in the suction bottle after discarding the blood during adenoidectomy plus the weight difference in the plain soaked cotton ball and gauze balls used for pressure hemostasis and documented. The post operative bleeding if any was documented and compared between Group A and Group B.After the surgery all patients in both the groups was given standard analgesics (Paracetamol , Aceclofenac or Ibubrufen) and antibiotic (Amoxycillin+clavulanic acid injections according to hospital antibiotic policy). Post tonsillectomy pain was analyzed by visual analogue scale (VAS)(ANNEXURE I) for adults and children more than 7 years old and Wong-Bakers FACES(ANNEXURE II) pain scale for children of 3-7 years old. In all patients in Group A and Group B, post operative pain was documented on 1st, 4th, 7th and 14th postoperative day and compared and documented. The analgesia requirement in the first 24 hours was documented and compared between the two groups. The patients time of recovery period and return back to their routine activity was also documented and compared among the two groups .

Statistical analysis: Data was entered using Microsoft Excel and analyzed using the Statistical Package for Social Science (SPSS) standard version 20. All socio-demographic and clinical characteristics of the patient was summarized using Mean (SD) for continuous variables and proportions (%) for categorical variables. Comparison of continuous variable (blood loss, VAS scores for pain) across the two groups (ligation vs diathermy) was performed using the student's t test. Comparison of categorical variables across study groups was done using Chi square test. P-value of <0.05 was considered statistically significant.

RESULTS : The mean age of patients in the ligation group was 16.46 years (SD = 12.51), while the mean age in the bipolar cautery group was 12.17 years (SD = 7.65). There was no significant difference in mean age between the groups (p = 0.088). The mean blood loss in the ligation group was 42.60 ml (SD = 5.09), whereas the mean blood loss in the bipolar cautery group was 43.46 ml (SD = 8.20). There was no significant difference in mean intraoperative blood loss between the groups (p = 0.601). This study evaluated postoperative pain on days 1, 4, 7, and 14 after tonsillectomy using ligation versus bipolar cautery. On day 1, the mean pain score was 7.57 (SD = 0.50) in the ligation group and 7.51 (SD = 0.51) in the bipolar cautery group, with no significant difference (p = 0.637). By day 4, the mean pain score was significantly lower in the ligation group at 2.43 (SD = 0.88) compared to 3.37 (SD = 0.81) in the bipolar cautery group, with a significant difference (p < 0.0001). On day 7, the ligation group again had a significantly lower mean pain score of 0.11 (SD = 0.32) versus 0.57 (SD = 0.50) than the bipolar cautery group, with a significant difference (p < 0.0001). By day 14, both groups had a mean pain score of 0, indicating complete resolution of pain. The mean day of return to routine activities for the ligation group was 6.91 days (SD = 0.74), while for the bipolar cautery group, it was 7.63 days (SD = 0.94). This difference was statistically significant (p = 0.001), indicating that patients in the ligation group returned to routine activities significantly sooner than those in the bipolar cautery group.

CONCLUSION : The results of this study suggest that ligation and bipolar cautery techniques are both effective methods of achieving haemostasis for tonsillectomy procedures, with comparable intraoperative blood loss. However, ligation may offer advantages in terms of reduced postoperative pain. And the recovery for ligation is lower as compared to bipolar group. Both the methods shows negligible risk towards development of post operative haemorrhage.

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INTRODUCTION

INTRODUCTION

Tonsillectomy is one of the commonly performed procedures by otolaryngologists and continues to be the most regularly performed surgeries in adults[1]. The procedure is performed in both adults and children. It is usually safe, simple and uncomplicated, yet the surgeons who perform this operation are keenly aware of the threat of its most frequent and dreaded complication i.e. haemorrhage which might lead to aspiration and shock.

Tonsillectomy encompass complete removal of the palatine tonsils through dissection in the peritonsillar space. The procedure is often combined with adenoidectomy (surgical removal of the adenoid tissue from the nasopharynx) [2].

Tonsillectomy techniques are currently undergoing something of a revolution. Dissection and snare tonsillectomy with hemostasis performed with or without ties was the standard but more recently there has been an explosion of different dissection techniques in order to reduce postoperative pain and haemorrhage associated with this procedure.

Tonsillectomy is considered a major surgery because of its very well known postoperative haemorrhage and anaesthesia complications [3]. The intraoperative haemorrhage with loss of greater than 10% of the patient's blood volume is reported to be as high as 18% and postoperative haemorrhage occurs in 0–10% of cases. The mortality has been reported to be between 1 per 1100 and 1 per 16000 [4]. Haemorrhage may be conveniently divided into perioperative and postoperative and the latter subdivided into reactionary and secondary haemorrhage. Much of the mortality associated with tonsillectomy is directly or indirectly associated with this complication [5].

Various newer techniques are intracapsular tonsillectomy with debrider, harmonic scalpel (ultrasound) tonsillectomy, plasma mediated ablation technique, cryosurgical technique,

electrocautery, laser tonsillectomy, coblation tonsillectomy and radiofrequency but all are still under consideration[6]. Diathermy involves the use of high radiofrequency current that is used to cut through or coagulate tissue[7]. Bipolar diathermy involves current that is being passed through 2 tips of the same forceps, hence the term ‘‘bipolar.’’[8].

Various complications may occur after tonsillectomy, including haemorrhage, infections, pain, nausea, vomiting, and dehydration[9]. Post-tonsillectomy haemorrhage (PTH) is the most critical complication and usually resolves with spontaneous hemostasis. However, surgery can be needed to stop bleeding as PTH can cause airway obstruction, or in rare cases, hemorrhagic shock[10]. Control of haemorrhage is the most important part of tonsillectomy surgery. Even today the deadliest complication of tonsillectomy in some patients is haemorrhage and is a life-threatening complication. Post tonsillectomy too, haemorrhage becomes a risk due to airway obstruction, shock, and ultimately death, if not diagnosed early or inappropriately treated [11].

Visual analogue score(VAS) is scored by measuring from no pain to the point selected on the scale for post operative patients[12].

AIMS & OBJECTIVES

AIMS AND OBJECTIVE

AIM OF STUDY

To compare the outcome of ligation versus bipolar cautery during haemostasis during tonsillectomy with regard to amount of blood loss during surgery, intraoperative and postoperative bleeding, post operative and return to routine daily activities.

OBJECTIVES OF STUDY

PRIMARY OBJECTIVE

1. To assess the post-operative pain using Visual Analogue Scale(VAS) and Wong-Baker FACES pain scale, amount of blood loss during surgery and post operative bleeding if any following ligation technique for haemostasis in tonsillectomy .
2. To assess the post operative pain using Visual Analogue Scale(VAS) and Wong-Baker FACES pain scale, amount of blood loss during surgery and postoperative bleeding following bipolar cauterization for haemostasis in tonsillectomy .
3. To compare the operative and post operative outcome between ligation technique and bipolar cauterization during tonsillectomy with regards to the above mentioned parameters.

SECONDARY OBJECTIVE

1. To compare time taken for return to routine daily activities post tonsillectomy between ligation technique and bipolar cauterization.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORY OF TONSILLECTOMY

One among the most common surgeries in children is tonsillectomy. The procedure is quoted in some literature as ‘‘Hindu medicine’’ about 1000BC. Others literatures refer to it as cleaning of tonsil using the nail of the index finger. About a millennium later, the Roman nobleman Aulus Cornelius Celsus (25 BC–AD50) wrote of a method that involved using a finger to separate the tonsils from the surrounding tissue or using a hook to grasp them and cut them out with a knife. Galen (AD 121–200) was the first to use a surgical instrument known as the snare, a practice that became common until Aetius (AD 490) recommended partial removal of the tonsil, writing ‘‘Those who extirpate the entire tonsil, remove at the same time, structures that are perfectly healthy, and in this way, give rise to serious hemorrhage’’. Paulus Aegineta (c. AD 625–690) gave a thorough description of tonsillectomy techniques in the seventh century, along with instructions for handling the inevitable bleeding that occurs after surgery. It took 1200 years for the process to be thoroughly and accurately explained once more. During the Middle Ages, tonsillectomy became less common. According to Ambroise Pare (1509), it was "a bad operation," and he recommended a method that involved gradual strangulation with a ligature. Patients disliked this procedure because of the excruciating agony it caused and the frequent infection that resulted. About 1600 AD, Scottish physician Peter Lowe compiled the three techniques that were available at the time: the snare, the ligature, and the excision. At the time, it was believed that the tonsils' purpose was to absorb nasal secretions. It was thought that removing a significant portion of the tonsillar tissue would make it more difficult to eliminate these secretions, which would lead to an accumulation of them in the larynx and hoarseness. Doctors like as Dionis (1672) and Lorenz Heister disapproved of the process because of this. The tonsil guillotine, also known

as a tonsillotome, was created in 1828 by physician Philip Syng Physick after Benjamin Bell's original design for the device to remove the uvula was altered. For more than 80 years, this was considered the standard instrument for tonsillectomy.

Borelli (1860) brought back the ancient enucleation process as mentioned by Celsus. In 1897, American physician Ballenger popularized the excision of the tonsil entirely as opposed to in part. He reported that in most cases, partial removal was insufficient to totally relieve symptoms. His outcomes were far better than partial tonsil removal when he used a procedure that involved removing the tonsil with a blade and forceps. Guillotine tonsillectomy became less common in America over time. The dissection tonsillectomy was invented by George Waugh in 1909, and it dominated the field for a very long time[13].

The mid- and late-20th century saw changes in tonsillectomy indications and techniques due to advancements in biomedical devices and equipment as well as a greater understanding of the illness process. Noguera and Haase Developed the notion of suction coagulation in 1982, while Goycoolea created diathermy in 1969 [14, 15] .

The first recorded instance of bipolar tonsil electrodissection was documented in 1995 [16]. Although cryosurgery was performed for tonsillectomy in late 1960s and early 1970s, it never became widely used [17]. Krespi first proposed the idea of a laser-assisted bloodless tonsillectomy in 1994 [18]. Cooler ablation, also known as Coblation tonsillectomy, was first used in 1998. Koltai used powered soft

tissue shavers or microdebriders in 2002 [19]. It was first created for microarthroscopy, then utilized for nose surgery, and now, with positive outcomes, it is being utilized for partial tonsillectomy.

Many authors have promoted the use of robotic tonsillectomy, harmonic scalpel, electrodissection, radiofrequency, and other procedures, each with pros and cons. These

instruments are appealing to surgeons due to their ability to remove tissue quickly, precisely, with less harm to adjacent tissue, and with fewer operating and postoperative problems.

EMBRYOLOGY OF TONSIL

The tonsil arises from the second branchial pouch which becomes visible after the 4th week of intrauterine life followed by canalization and branching in the 8th week of intrauterine life. This canalization and branching leads to formation of tonsillar sinus where it is divided into superior and inferior division by 'Intratonsillar fold of Hammar' in 28 weeks of gestation. In the 7th month of intrauterine life, lymphoid follicles infiltrate the lamina propria of the mucosa, then at the end of the gestation period, primary follicles are formed, and only after the birth of the child do germinal centres form. A newborn's tonsils are hidden between two tonsillar pillars. During the first year of life, lymphatic follicles proliferate rapidly and activate germinal centres . Over the following years, the lymphoid elements increased thereby increasing in tonsillar bulk.

The proximal portion of the tonsil is compressed, whereas the distal portion is dilated and contains squamous debris. As the tonsils enlarge, the surrounding pharyngeal musculature is displaced and invades the oropharynx and peritonsillar soft tissue. As ageing progresses, there is involution of the lymphoid elements and proliferation of fibrous tissue in the capsule and trabeculae. The overall bulk of the tonsil is much decreased[(20)].

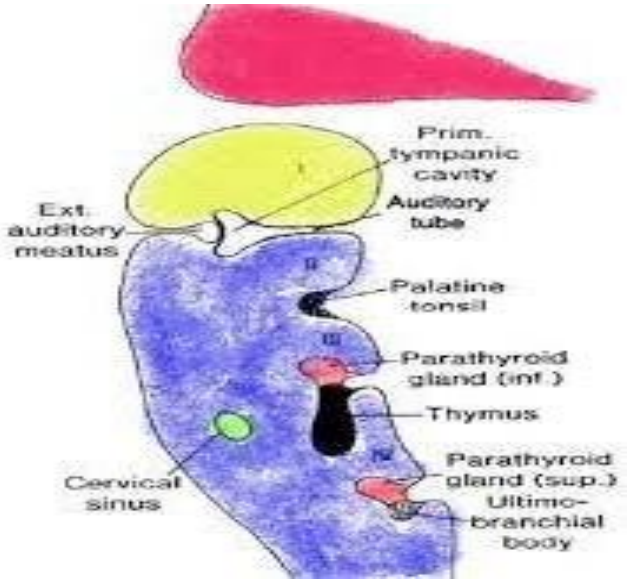

Figure 1 - Pharyngeal Pouches and its Derivatives

ANATOMY OF TONSILS

Tonsils are subepithelial collections of lymphoid follicles located between the anterior and posterior pillars. Anterior pillars and posterior pillars are made of mucosal reflection of the muscles palatoglossus and palatopharyngeus[(21)]. Underneath the tonsil is the superior constrictor muscle covered by pharyngo-basilar fascia medially and bucco-pharyngeal fascia laterally. Condensation of pharyngeal fascia forms the capsule. The trabeculae of the capsule extend into the tonsillar tissue, which supports the neurovascular bundle.

The medial surface of the tonsil is covered with stratified squamous epithelium, forming pouches and crypts. The crypts are usually 8 to 10 in number. The crypts extend deep and come in contact with the lymphatic germinating follicles. The largest crypt, located near the superior pole of the tonsil, is called the crypta magna or intratonsillar cleft. Primary crypts give rise to secondary crypts[(22)]. Young lymphoid cells in various stages of development are formed from germinating follicles[(23)].

The triangular fold of the membrane connecting the anterior and posterior pillars at the lower pole is called “PLICA TRIANGULARIS”, which also forms a space called the anterior tonsillar space. In between the tonsil and the tongue there forms the sulcus called Tonsillo-lingual sulcus – a hidden area for carcinoma. Likewise, at the superior pole, the membrane connects the anterior pillar to the anterior surface of the tonsil, forming the “PLICA SEMILUNARIS” or “supratonsillar fossa.”[22]. The upper pole contains several tubular glands called WEBER'S GLANDS, which sends a common duct to the tonsils secreting saliva over the surface of the tonsil. Sometimes these glands can be left behind and may lead to Quinsy post tonsillectomy [24].

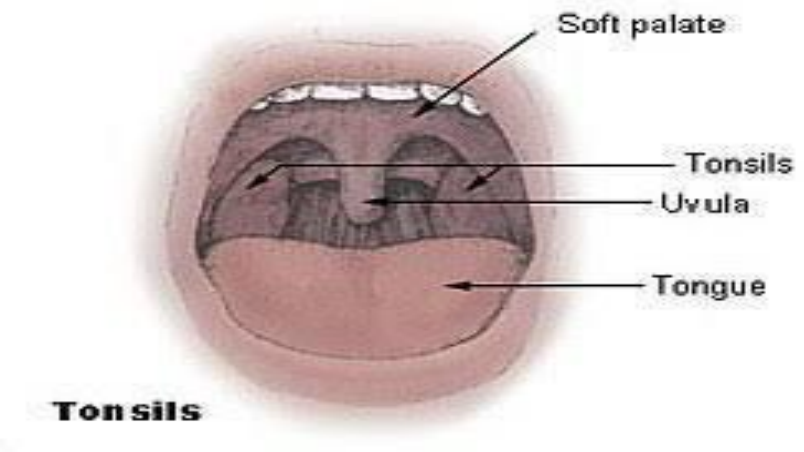

Figure 2 - Oropharynx with tonsils in the tonsillar fossa

BED OF TONSIL

Tonsillar bed is formed by the following structures from medial to lateral

i) Loose areolar tissue containing Para-tonsillar vein

ii) pharyngo-basilar fascia

iii) Superior constrictor muscle

iv) Bucco-pharyngeal fascia

v) Styloglossus muscle

vi) Medial pterygoid muscle

vii) Glossopharyngeal nerve

viii) Facial artery

ix) Submandibular salivary gland

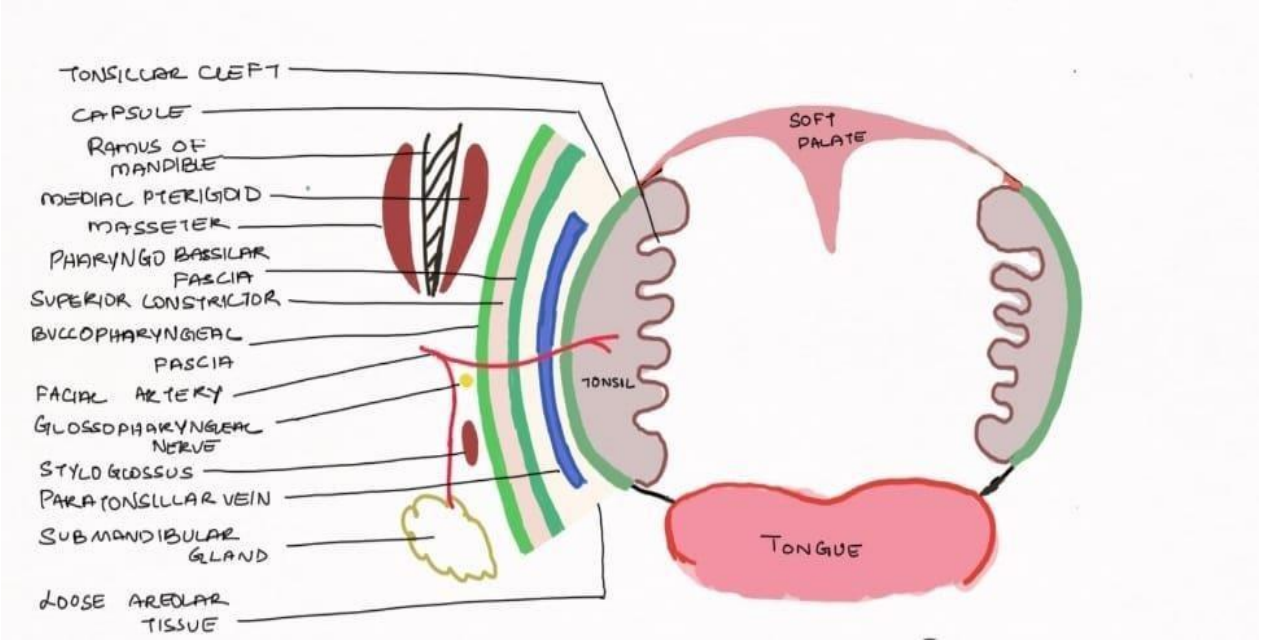

Figure 3 - Contents of Tonsillar Bed

BLOOD SUPPLY OF TONSIL

The arterial blood supply of tonsil is mainly from three arteries, the tonsillar branch of the dorsal lingual artery anteriorly, the ascending palatine artery of the facial artery posteriorly, and the tonsillar branch of the facial artery entering between these two in the lower pole of the tonsillar bed. In the upper pole, the ascending pharyngeal artery enters posteriorly and the lesser palatine artery enters anteriorly. Among the three, the tonsillar branch of the facial artery is the largest [(25)]. The venous blood drains into the paratonsillar vein then into the lingual and pharyngeal vein and finally into the internal jugular vein[(26)].

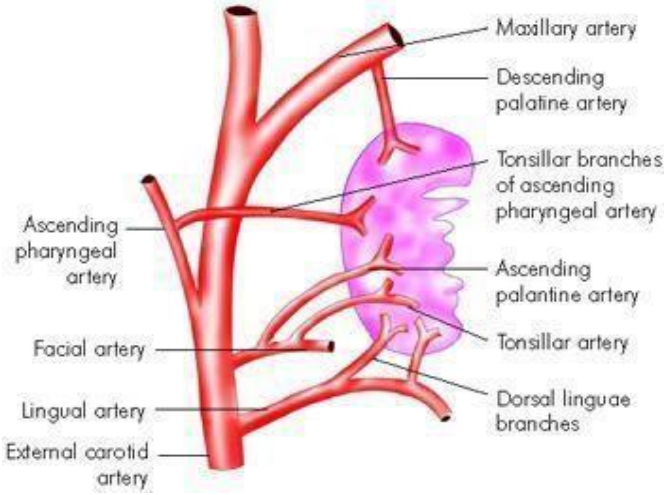

Figure 4 - Blood supply of tonsil

NERVE SUPPLY OF TONSIL

The nerve supply of the tonsil is by the tonsillar branches of the glossopharyngeal nerve and through the descending branches of the lesser palatine nerves. The ear symptoms in tonsillitis are through the tympanic branch of the glossopharyngeal nerve[26].

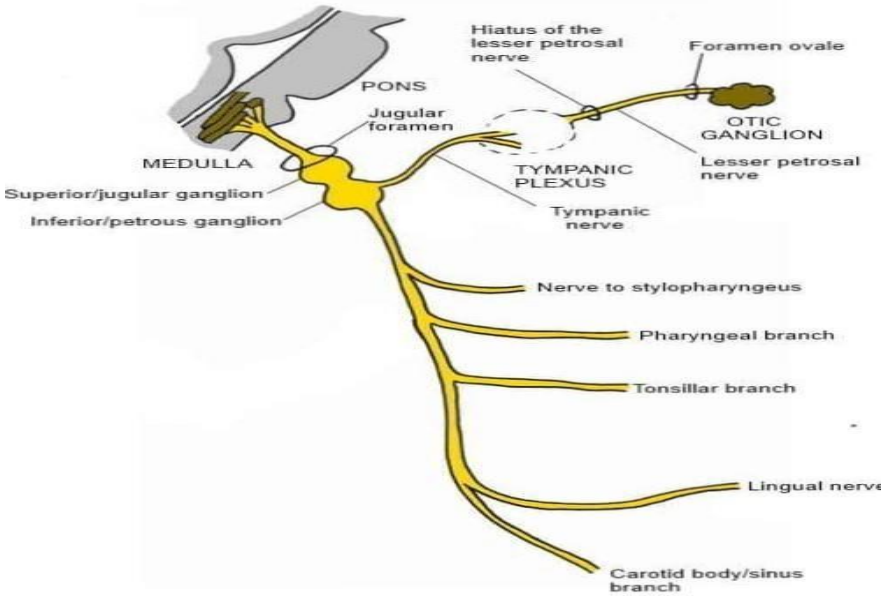

Figure 5 - Nerve Supply OF Tonsils

LYMPHATICS OF TONSIL

Oropharynx acts as a barrier system filtering out the bacteria and foreign bodies with the help of tonsillar tissue and other lymphoid tissues around oropharynx. There are no afferents in the lymphatic system. Efferents drain into upper deep cervical lymph nodes, especially the jugulo-digastric node[26].

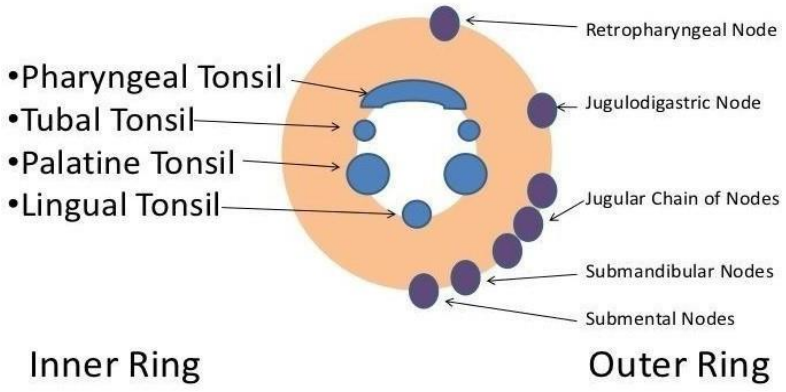

Figure 6 - Waldeyers Ring

HISTOLOGY OF TONSILS

The oropharyngeal surface of the tonsils is covered with stratified squamous nonkeratinized epithelium. Simple and branched epithelial crypts, representing tubular invaginations of the surface epithelium can be seen in lamina propria. Evidence of keratinization can be seen on the lining epithelium of the tonsillar crypts which are shadowed when heavily infiltrated with lymphocytes. The crypts contains, large number of lymphocytes, desquamated epithelial cells and cellular debris. Between the crypts are masses of the numerous individual lymphoid nodules. Some of them contain a large pale-staining germinal centre. These are called secondary nodules[27]

In the figure the surface of the tonsil is lined by a layer of stratified squamous epithelium (left panel, arrows). Deep invaginations of the epithelium into the underlying lymphoid tissue are the tonsillar crypts (left panel, arrowheads). The epithelium lining these crypts is disrupted by

a number of permeating lymphocytes that separate the epithelium into cords of basaloid cells (right panel)

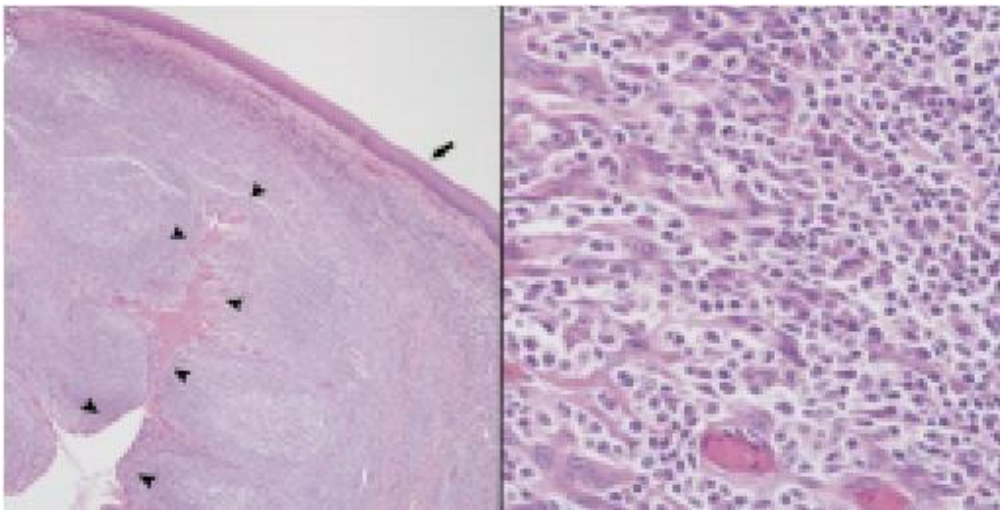

Figure 7 -Histology Of Tonsil

IMMUNOLOGY OF TONSILS

The tonsils are part of Waldeyer's ring.

There are

(1) Adenoids

(2) Palatal tonsils

(3) Lingual tonsils

(4) Scattered lymphoid follicles

(5) Lateral pharyngeal strings

(6) Nodules near the Eustachian tube

Waldeyer's ring helps produce B cells during the first few years of life. It produces large quantities of immunoglobulins and T lymphocytes, which are essential for cellular or delayed immunity [28]. Immunoreactive lymphoid cells of the adenoids and tonsils are found in four zones: the mantle zone of lymphoid follicles, reticular epithelial cells, germinal centres of lymphoid follicles, and extrafollicular zone and the different components that forms Waldeyer's. Proliferation of antigen-sensitive B cells occurs in germinal centres only when antigen load is high and low antigen signals are eliminated by tonsillar defence mechanisms, but lymphocytes differentiate into plasma cells [29].

THEORIES OF ANTIBODY FORMATION

Though Dr.Jenner introduced the vaccine first, Pasteur explained the 'Exhaustion theory' i.eAfter the attack of infection, some of the nutrients are depleted in the body as they are consumed by organisms. Chauveau, 'Retention theory 'said that micro-organisms leave behind some of the substances after first invasion which prevents further attacks, but both of them failed to explain 'active production of antibodies '. Later a Russian biologist, Metchnikoff postulated that specialised cells of the body attack the infecting agents by a process called phagocytosis. Von fodor of Budapest and Hans Buchner of Munich laid the foundation for 'Alexin theory 'or 'Complement theory' that some cells in blood have effect against bacteria. Paul Ehrlich, 'founder of immunology' was the first one to state about the antibody formation. Few theories of antibody formation are as follows:

1) SIDE CHAIN THEORY BY EHRLICH

2) DIRECT TEMPLATE THEORY

3) INDIRECT TEMPLATE THEORY BY BURNET

4) THE NATURAL SELECTION THEORY BY JERNE

5) CELLULAR SELECTION THEORY BY TALMAGE

6) CLONAL SELECTION THEORY

DISEASES OF TONSIL

Tonsillitis usually occurs in children. Microorganisms and nutrients entering the digestive system bypass the tonsil tissue. There are crypts between the tonsils. Nutrients, microbes, and desquamated epithelium accumulate in the crypts, causing severe and recurring inflammation, leading to infection[30,31].

Tonsillitis is an infection of the pharyngeal tonsils and may also be associated with the adenoids and lingual tonsils, which are part of the Waldeyer's ring. Different types of tonsillitis are acute, chronic and peritonsillar abscess [32]. Acute tonsillitis may be either

a) Superficial or catarrhal

b) Follicular or cryptic

c) Membranous

d) Parenchymatous [22].

CHRONIC TONSILLITIS

People often experience sore throat, bad breath, tonsil enlargement and persistent non-tender jugulo-digastric nodes usually. When a person has tonsillitis multiple times, it is called recurrent tonsillitis. This condition is surgically treated with tonsillectomy.

Paradise et al found the effectiveness of tonsillectomy and tonsillectomy procedure in children with recurrent tonsillitis. Recurrent tonsillitis is a sore throat – 7 or more attacks in the past year, or 5 or more attacks in the last 2 years, or 3 or more attacks in the last 3 years [33].

The clinical features (sore throat plus any one or more of the following symptoms quantifies to count as an episode)

a) Temperature >38.30C,

b) OR tonsillar exudates,

c) Cervical lymphadenopathy (tender lymph nodes of >2 cm),

d) OR positive culture for Group A beta haemolytic streptococcus.

DIFFERENTIAL DIAGNOSIS OF CHRONIC TONSILLITIS

DIPHTHERIA

It is characterised by "bull neck" as a result of swelling of the lymph nodes enlargement and membranes present in the tonsils over the neck. Patients often present with complaints of difficulty in swallowing and breathing, pain when swallowing, and hoarseness of voice. The diphtheria membrane is grey in colour and fixed to the tonsils and pharyngeal mucosa. Attempting to remove the membrane will cause bleeding, a sign of diphtheria. May cause airway obstruction in severe cases.

Before starting antibiotics, the diagnosis should be made by taking a throat swab, which will show Gram-positive bacilli on Gram stain and Corynebacterium diphtheria on culture.

Treatment is intravenous anti diphtheria serum (ADS), benzylpenicillin, or oral erythromycin [34]

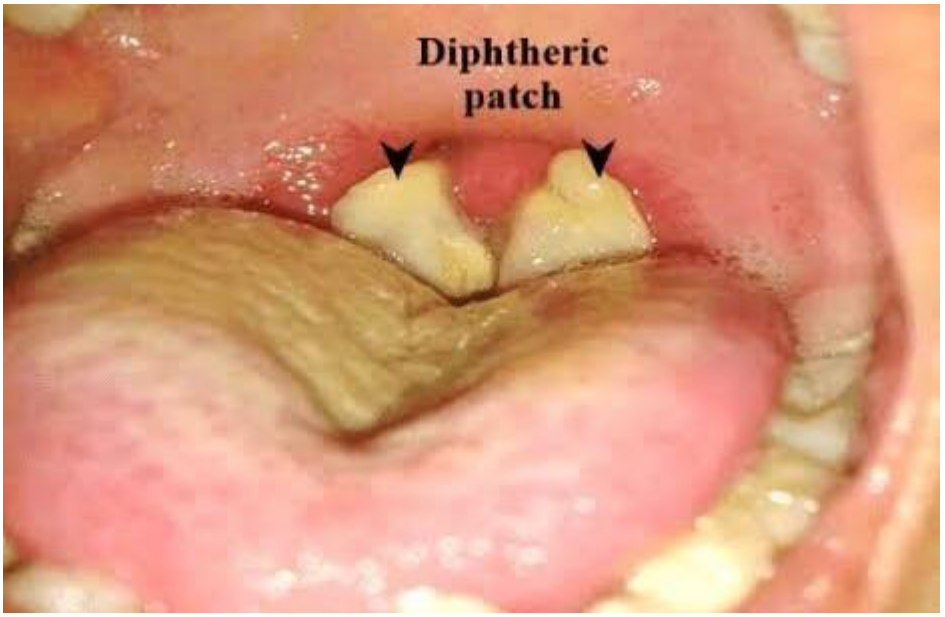

Figure 8 - Diptheria Patch

VINCENT'S ANGINA (TRENCH MOUTH)

In patients with poor oral hygiene, they will tend to develop gingivitis, stomatitis, and pharyngitis, as well as oral spirochete and Bacteroides infection. Covering the tonsil surface and pharyngeal mucosa with a grey film causes the surface mucosa to become necrotic by microorganisms. Diagnosis is made by clinical examination demonstrating oral bacteria and identification of bacteria with methylene blue in smears or cultures. Differential diagnoses include scurvy, erythema multiforme, pellagra, bismuth stomatitis, mercury stomatitis [33].

INFECTIOUS MONONUCLEOSIS

It is caused by the Epstein Barr virus. Its clinical features are sore throat and it has serious effects on the body, such as blood and liver disease and splenomegaly. Diagnosis is made by the Paul Bunnel or Monospot test, which has a sensitivity of 70-90% in adults, and is

confirmed by a specific EBV test. The patient developed severe dysphagia, resulting in decreased appetite and dehydration. The second most common bacterial infection is beta-hemolytic streptococcus. These patients were treated with high doses of penicillin, metronidazole, or second- or third-generation cephalosporins. Short-term steroids may be used if there is significant airway involvement, but are not used as a routine treatment for lymphoproliferative disorders [35].

TONSILLOLITH

They are formed due to the growth of bacteria and products remaining in the tonsil crypts. Patients with tonsilloth complain of bad breath or halitosis, sore throat, presence of whitish grey material and odour in the tonsils. Local management includes mechanically cleaning with help of pulsating jets of water, topical silver nitrate to cauterise and obliterate them. Persistent symptoms such as pain, shortness of breath, foreign objects, or earache may require tonsillectomy as a last resort.

Figure 9 - Tonsillolith entrapped in the crypt of tonsil

EVALUATION OF TONSILLITIS

GRADES OF TONSILS

Brodsky Grading Scale

The Brodsky grading scale comprised the following 5 grades:

Grade 0 - tonsils within the tonsillar fossa

Grade 1 - tonsils just outside of the tonsillar fossa and occupy ≤25% of the oropharyngeal width

Grade 2 - tonsils occupy 26%-50% of the oropharyngeal width

Grade 3 - tonsils occupy 51%-75% of the oropharyngeal width

Grade 4 - tonsils occupy >75% of the oropharyngeal width [36].

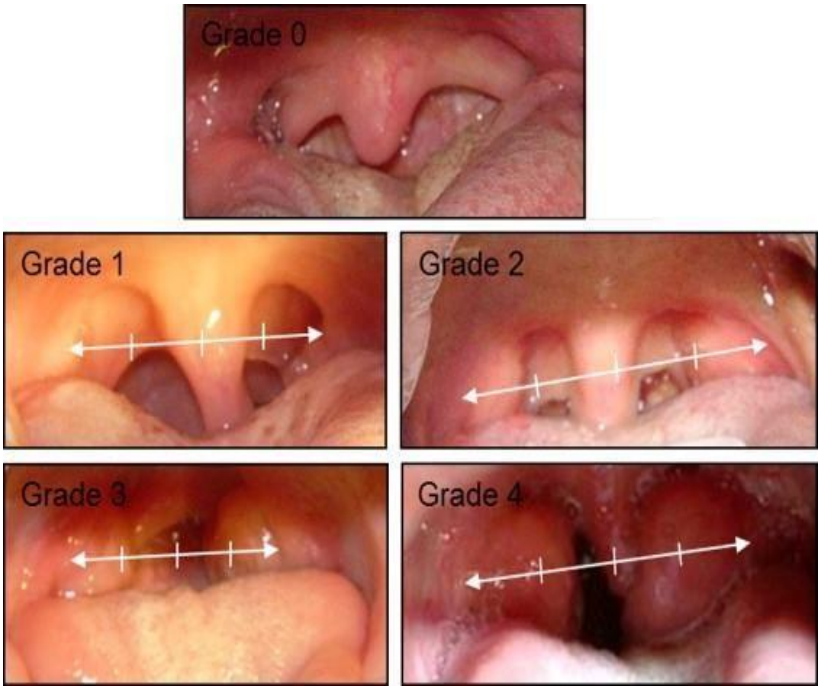

Figure 10 - Grades Of Tonsils

EVALUATION OF TONSILLITIS

Group A hemolytic Streptococcus is the most common cause of tonsillitis and requires antibiotic treatment, so it is important to diagnose GABHS with a throat swab. If the throat sample sent for culture is GABHS, the patient should be started on a penicillin group of i.v antibiotics [(36)]. Early diagnosis and treatment with benzathine penicillin may reduce the incidence and spread of type A beta-hemolytic streptococcal disease [(37)].

MANAGEMENT OF TONSILLITIS

General measures include increasing fluid replacement and relieving pain with mouthwash or oral antibiotics

If the initial presentation indicates streptococcal infection, antibiotics are indicated for the following reasons:

1) Reduction of suppurative complications

2) Reduces risk of rheumatic fever

3) Rapid reduction of symptoms [(22)].

MEDICAL MANAGEMENT OF TONSILLITIS

Penicillin is the antibiotic of choice for the treatment of streptococcal infections, especially GABHS.

Both oral and intramuscular injections are effective.

a) Penicillin G or V,125-250 mg/dose three times a day for 10 days is appropriate or

b) Benzathine penicillin G 600,000-12,000,000 IU once intramuscularly.

In patients resistant or allergic to penicillin, erythromycin at 20-40mg/Kg/day for 10 days may be given. Sometimes, Azithromycin 500 mg once daily for 3 days can be used since it has prolonged half-life and achieves higher tonsillar drug concentrations [(38)].

SURGICAL MANAGEMENT –

TONSILLECTOMY INDICATIONS –

Tonsils are normally much larger in children than in adults and physiologically involute during adolescence, thus only the presence of large palatine tonsils cannot be taken as an indication for tonsillectomy[39]. Thus certain criteria's needs to be fulfilled to justify surgical removal of tonsils.

Table 1 -American academy of otolaryngology, head and neck surgery guidelines for Tonsillectomy 2011 [40]

Criteria for tonsillectomy	
Criterion	**Definition**
Minimum frequency of sore throat episodes	7 or more episodes in the preceding year, OR
	5 or more episodes in each of the preceding 2 years
	3 or more episodes in each of the preceding 3 years
Clinical features (sore throat plus the presence of one or more qualifies as a counting episode)	Temperature >38.3°C, OR 101°F
	Cervical lymphadenopathy (tender lymph nodes or >2 cm), OR
	Tonsillar exudate, OR
	Positive culture for group A beta-hemolytic streptococcus
Hypertrophy causing upper airway obstruction (sleep apnea)	Severe dysphagia (trouble swallowing), sleep disorders, or cardiopulmonary complications. Usually, removal of both the tonsils and adenoids are indicated
Peritonsillar abscess	Unresponsive to medical management and drainage documented by surgeon, unless surgery performed during acute stage
Streptococcal carrier	Chronic or recurrent tonsillitis associated with the streptococcal carrier state and not responding to beta-lactamase-resistant antibiotics
Unilateral enlargement	Unilateral tonsil hypertrophy presumed neoplastic. Although without other indications (abnormal appearance, physical examination, symptoms or history) most asymmetries can be followed conservatively
Adenoidectomy alone	Recurrent acute otitis media or chronic serous otitis media. Adenoidectomy should not be performed with the insertion of the first set of myringotomy (ear) tubes unless there is another indication for adenoidectomy besides chronic otitis media. However, repeat surgery for chronic otitis media should consist of adenoidectomy with myringotomy (with or without myringotomy (ear) tube placement)

PITTSBURG CRITERIA:

1. a) At least 3 episodes of tonsillitis per year for 3 years. 5 episodes of tonsillitis per year for 2 years.7 or more episodes of tonsillitis in 1 year.

b) Each episode must have been characterised by

i) Oral temperature 38.3degree Celsius.

ii) Enlarged >2 cm or tender anterior cervical lymph node.

iii) Tonsillar exudates.

iv) Positive culture for group-A beta haemolytic streptococci

c) Apparently adequate antibiotic therapy must have been administered for proven or suspected streptococcal episodes.

d) Each episode must have been confirmed by examination and its qualified features described in a clinical record at time of occurrence.

2. Peritonsillar abscess.

3. Chronic tonsillitis (minimum 6 months) persisting despite appropriate antimicrobial therapy.

4. Obstructive symptoms if tonsils are very large Stretor or mouth breathing with or without episodes of obstructive sleep apnoea, muffled hot potato voice if child is at least 6 years' old.

5. Chronic (minimum 6 months) enlargement (>2cm) or tenderness of anterior cervical lymph nodes persisting despite appropriate antibiotic therapy [41]

The Scottish Intercollege Guidelines Network (SIGN) guidelines

SIGN guidelines are based on the Paradise criteria.

Adult and children should meet the below mentioned criteria for tonsillectomy

1. Sore throats are due to tonsillitis
2. The episodes of sore throat should be disabling and prevent normal functioning
3. Seven or more well-documented, clinically significant, adequately treated sore throats in the preceding year, or

4. Five or more such episodes in each of the preceding 2 years or
5. Three or more such episodes in each of the preceding 3 years [42].

TONSILLECTOMY also done as a part of other surgeries which includes:

1. In uvulopalatopharyngoplasty 2. Glossopharyngeal neurectomy

3. Eagle's syndrome [22].

CONTRAINDICATIONS:

1) Presence of acute infection

2) Haemoglobin less than 10 gm%

3) Overt sub mucous cleft palate

4) Bleeding disorders like purpura, leukaemia, aplastic anaemia

5) Poliomyelitis epidemic

6) Uncontrolled systemic illnesses like diabetes, cardiac diseases

7) During menstruation [22].

TECHNIQUES OF TONSILLECTOMY

COLD TONSILLECTOMY

HOT TONSILLECTOMY

COLD TONSILLECTOMY METHODS

1) Dissection and snare method

2) Guillotine method

3) Intra capsular tonsillectomy

4) Harmonic scalpel

5) Plasma mediated ablation technique

6) Cryosurgical technique

HOT TONSILLECTOMY METHODS

1) Electrocautery

2) Laser tonsillectomy

3) Coblation tonsillectomy

4) Radiofrequency [22].

COMPLICATIONS OF TONSILLECTOMY

Table 2 - Tonsillectomy complications [43]

Intraoperative	– Laryngospasm and/or bronchospasm – Aspiration – Trauma: tooth fracture, perioral burns, Grisel syndrome, subcutaneous emphysema, subcondylar mandible fracture – Uncontrollable hemorrhage
Early postoperative (<24 h)	– Nausea and vomiting – Pain – Bleeding – Edema of the uvula – Airway obstruction – Postobstructive pulmonary edema
Delayed postoperative (2–21 days)	– Pain – Dehydration – Bleeding – Tonsillectomy bed infection – Neck infections: neck abscess, necrotizing fasciitis, cervical osteomyelitis
Long-term	– Velopharyngeal insufficiency – Pharyngeal stenosis – Tonsillar remnants – Subacute endocarditis – Cranial nerve lesions – Taste disturbances

POST OPERATIVE COMPLICATIONS

PAIN – PATHO PHYSIOLOGY

Pain may result even from the simplest step such as patient's positioning, the use of a mouth retractor (such as the Boyle-Davis mouth gag). This can cause pressure and venous congestion of the tongue in addition to postoperative swelling and pain and also temporomandibular joint stretching. Patients often report ear pain as well, which is likely referred otalgia and sensations occur primarily via the glossopharyngeal nerve.

Additionally, the removal of the tonsil leaves an open wound in the pharynx with exposed nerve fibres and injured muscle fibres, but it also sets off inflammatory cascades that aid in recovery. This confluence of circumstances results in a postoperative wound that is susceptible to mechanical damage caused by swallowing. The tonsillectomy incision also shows signs of infection and inflammation through the formation of a thick coating of fibrin, which grows larger in the first 2-4 days after surgery and starts to shed at around day 7. This typically allows the bed to remucosalize by the end of two weeks [44,45]. According to this healing process, pain after a tonsillectomy may exhibit a biphasic pattern, peaking three and seven days after surgery, but it may continue for up to three weeks after the procedure [46].

HAEMORRHAGE CONTROL

A variety of haemostatic agents and specialised surgical techniques have been used in an attempt to reduce the intraoperative and postoperative bleeding in tonsillectomy ligation of blood vessels/bleeding points has been the time honoured method of hemostasis [47].

Topical use of astringents such as silver nitrate, tannic acid and diluted adrenaline solution has been advocated for control of postoperative bleeding [48]. Intravenous administration of epsilon amino caproic acid (an antifibrinolytic agent) produces a significant reduction in blood loss during surgery[49].

In Spite of all these efforts, electro-cautery and suture ligation are the two most commonly used methods for controlling haemorrhage during and after tonsillectomy with variable results.

SUTURE LIGATION TECHNIQUE

The use of ligatures during tonsillectomy is a hemostatic procedure, but it has the disadvantage that it takes a lot of time to control bleeding, so blood loss becomes greater and increases the duration of the surgery and anaesthesia; Tonsil bed muscles may become compressed in the ligature, causing more pain after surgery [50,51]. Secondary haemorrhage after suture ligation is caused by coughing or vomiting and the ligature becomes loose and the ligature slips [52].

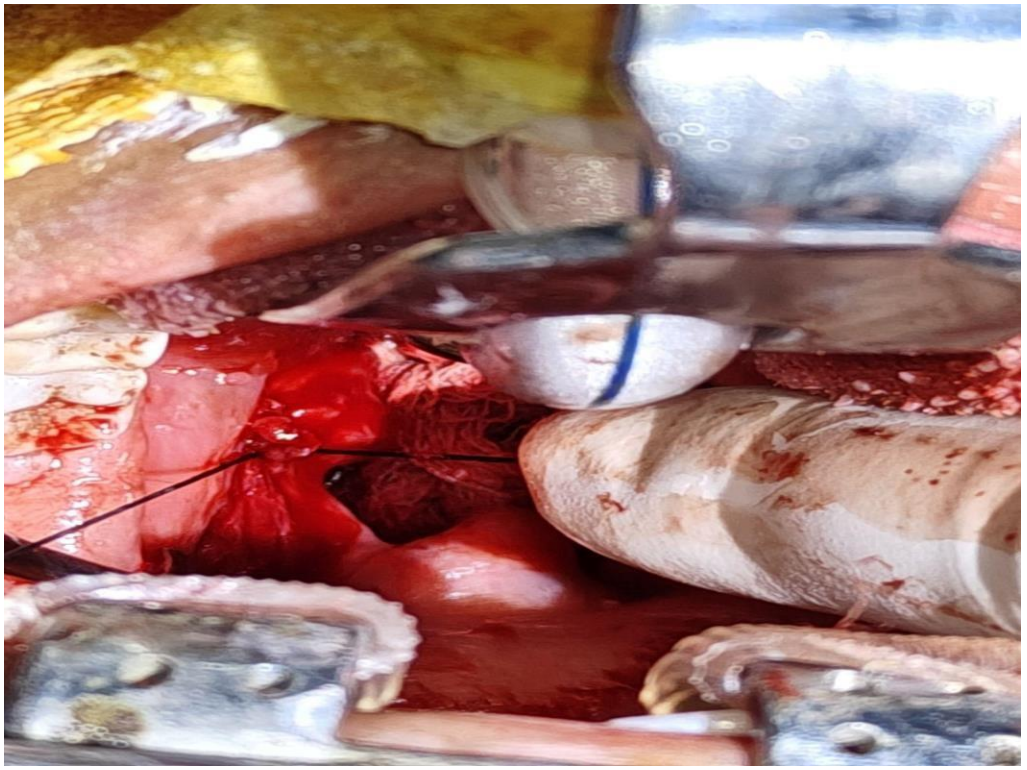

Figure 11- Suture Ligation During Tonsillectomy

BIPOLAR DIATHERMY

Bipolar diathermy is a quicker and faster method to achieve hemostasis with little intraoperative blood loss as compared to silk ligation [53]. In bipolar diathermy, cauterization is localised to tissues present between the tips of diathermy forceps and leads to less damage to tissues in a controlled and precise fashion resulting in less pain postoperatively [51].

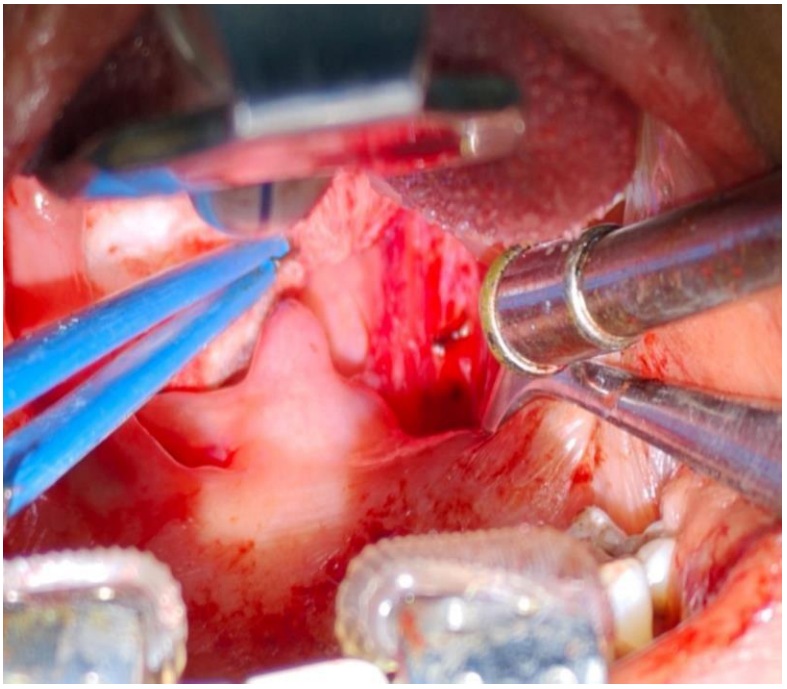

Figure 12 - Bipolar diathermy during tonsillectomy

INTRA OPERATIVE BLOOD LOSS

Bleeding because of these procedures is a common complication. Bleeding is a recognized component of the surgery since adenoid tissue is scraped with a curette, tonsil is removed by sharp dissection, and there is a complex vascular anatomy of the tonsils and adenoids [54].

Intraoperative blood loss in these operations has been reported as ranging from 5 to 10% of the circulating blood volume [55]. Amount of blood loss is important because 10% blood volume loss can alter pulse and blood pressure, whereas loss of 20% may result in shock (56). A blood transfusion should be performed in infants with a loss 10% of total blood volume, children with loss of 10–15%, and adults with loss of 20% or more [54].

Even small amounts of blood loss may lead to severe complications. No single technique of adenotonsillectomy can be recommended as an ideal method. Conventional dissection and method remains the procedure of choice in many centres. Operative blood loss depends upon sex, age, operating surgeon, grade of the tonsil and presence of fibrosis [(57)].

Various methods of blood loss measurement have been suggested. These include subjective estimation which is highly unreliable and objective methods such as gravimetric methods (swab weighing, weighing the patient, etc.), automated blood loss metre based on electrolyte conductivity, calorimetric method and measuring the radioactivity of blood [(58)].

MATERIALS & METHODS

MATERIALS AND METHOD

SOURCE OF DATA:

Patients undergoing tonsillectomy at R.L. Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College affiliated to Sri Devaraj Urs Academy of Higher Education and Research Centre, Tamaka, Kolar.

INCLUSION CRITERIA:

•All patients above the age of 3 years undergo tonsillectomy or adenotonsillectomy under general anaesthesia.

EXCLUSION CRITERIA:

- Patients where any other modality is used for haemostasis
- Patients where both modalities (ligation and cautery) where used
- Aneurysm of internal carotid artery – pulsatile tonsil
- Acute infections

STUDY DESIGN: Comparative analytical study

METHOD OF COLLECTION OF DATA

All patients above the age of 3 years undergoing tonsillectomy after applying the exclusion criteria was included in this study. A written informed consent to be part of the study and undergo bilateral tonsillectomy under general anaesthesia with either ligation technique or bipolar electrocauterization for haemostasis was obtained after describing the procedure ,

its complications and the technique being used for haemostasis was taken prior to the procedure from the patient or the care takers.

METHADOLOGY

Under strict aseptic precautions, tonsillectomy was performed under general anesthesia by Dissection and snare method. The patients was randomly separated into two groups , Group A and Group B. Group A patients will undergo tonsillectomy and in them hemostasis was achieved by Ligation technique. Group B patients will undergo tonsillectomy and in them hemostasis was achieved by Cuadra Bipolar electrocauterization. After the surgery all patients in both the groups was given standard analgesics (Paracetamol , Aceclofenac or Ibubrufen) and antibiotic (Amoxycillin+clavulanic acid injections according to hospital antibiotic policy).

Intraoperatively the amount of blood loss was calculated in Group A and Group B by adding total blood collected in the suction bottle (separate suction jars are used for adenoidectomy if adenotonsillectomy is done) plus the weight difference in the plain soaked cotton ball and gauze balls used for pressure hemostasis and documented. The post operative bleeding if any was documented and compared between the Group A and Group B.

Post tonsillectomy pain was analysed by visual analogue scale (VAS) for adults and children more than 7 years old and Wong-Bakers FACES pain scale for children of 3-7 years old .In all patients in Group A and Group B , post operative pain was analysed on 1st, 4th ,7th and 14th postoperative day and compared and documented. The analgesia requirement in the first 24 hours was documented and compared between the two groups.

The patients time of recovery period and return back to their routine activity was also be compared and documented among the two groups .

STEPS OF TONSILLECTOMY

POSITION

Rose's position – Patient lies supine, shoulder bag/ sandbag is placed under the shoulder and a head ring is placed, which causes flexion of neck and extension of atlanto-occipital joint.

STEPS OF OPERATION

- Patients oral cavity and dentition is thoroughly examined for any loose tooth. In case of any loose tooth is documented.
- Throat pack is placed.
- Appropriate size Boyles tongue blade size is chosen.
- Boyles Davis mouth gag is placed and opened, adequate exposure of tonsils is ensured.
- If adenoidectomy is indicated, adenoidectomy done with St Clair Thompsons adenoid curette and nasopharyngeal pack is placed.
- Fixed with Draffins bipods.
- Tonsil is grasped with Dennis Brown tonsil holding forceps and pulled medially.
- An inverted J shaped incision is taken in the mucous membrane where it reflects from the tonsil to anterior pillar with a size 12 blade.
- Plane of dissection is identified.
- Fibers are dissected using Mollison Tonsil Dissector.
- Tonsil is held in the upper pole and traction applied downwards and medially.
- Dissection is continued till the lower pole is reached.

- Eves tonsillar snare loop is introduced over the tonsil on to its pedicle, tightened, crushed for 30 seconds and cut.
- Cut tonsil removed and cotton ball is placed.
- Tonsillar fossa is checked for any bleeding points.
- In Group A bleeders are grasped using Birketts Tonsillar first artery forceps.
- Negus Tonsillar Second artery forceps is applied over it, and first artery forceps is removed.
- A secure silk tie is placed around the Negus forceps and the knot is advanced till bleeding point and the knot is secured.
- In Group B bleeders are cauterised with cuadra bipolar cautery.
- The same procedure is repeated on the opposite side.
- Tonsillar fossa is again checked for any bleeders after relaxing the mouth gag.
- If any bleeders persists the above methods of haemostasis is applied according to the group.
- Cotton ball count is checked and verified to ensure no remaining cotton is left inside
- Throat pack and nasopharyngeal packs are removed.

INSTRUMENTS USED IN TONSILLECTOMY

Figure 13 Instrument used in Tonsillectomy

1. Boyle – Davis mouth gag
2. Boyle's tongue blade
3. Magauran's plate
4. Draffin's bipod
5. Cuadra Bipolar electrocautery
6. Yankauer suction tube
7. Birketts Tonsillar First Artery Forceps
8. Negus Knot Tier
9. Negus Tonsillar Second Artery Forceps
10. Waugh's Tonsil-Dissection Forceps
11. Mollison Pillar Retractor
12. Eves' Tonsil Snare
13. Gwynne Evans Tonsillar Dissector
14. B.P.Handle with blade
15. Denis Browne's Tonsil-holding forceps
16. St. Clair Thompson's Adenoid Curette without guard
17. St. Clair Thompson's Adenoid Curette with guard
18. Foerster Sponge Holding Forcep
19. Backhaus Towel Forceps
20. Surgical Silk Suture
21. Ligature Scissors

STATISTICAL METHODS USED FOR THIS STUDY

Data will be entered using Microsoft Excel and analyzed using the Statistical Package for Social Science (SPSS) standard version 20. All socio-demographic and clinical characteristics of the patient will be summarized using Mean (SD) for continuous variables and proportions (%) for categorical variables. Comparison of continuous variable (blood loss, VAS scores for pain) across the two groups (ligation vs diathermy) will be performed using the student's t test. Comparison of categorical variables across study groups will be done using Chi square test. P-value of <0.05 will be considered statistically significant.

RESULTS

RESULTS

The study included 70 patients divided into ligation (35 patients) and bipolar cautery (35 patients) groups.

Table 3 Comparison of age between groups

	GROUP				P value
	LIGATION		BIPOLAR CAUTERY		
	Mean	Standard Deviation	Mean	Standard Deviation	
AGE	16.46	12.51	12.17	7.65	0.088

The mean age of patients in the ligation group was 16.46 years (SD = 12.51), while the mean age in the bipolar cautery group was 12.17 years (SD = 7.65). There was no significant difference in mean age between the groups (p = 0.088).

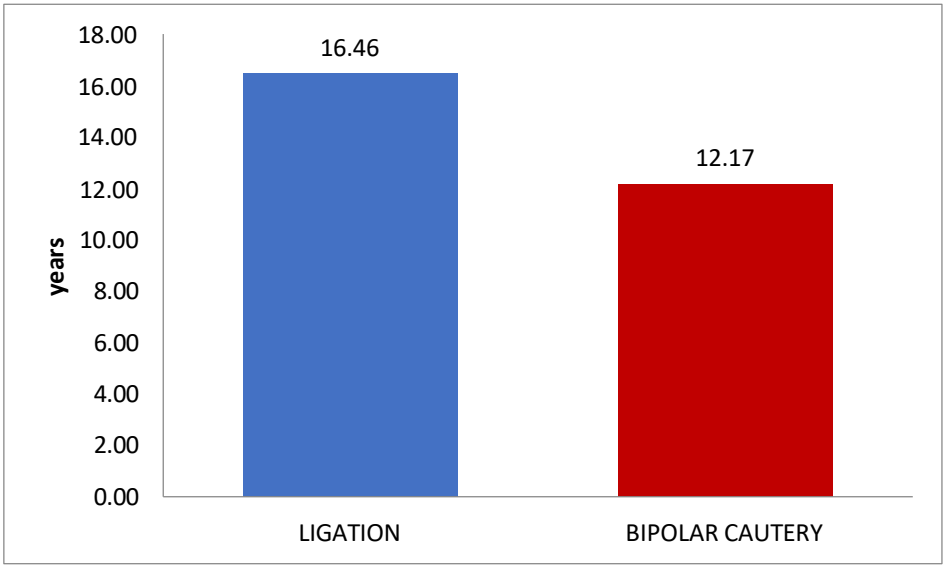

Figure 14 - Distribution of age between groups

Table 4. Comparison of gender between groups

		GROUP				P value
		LIGATION		BIPOLAR CAUTERY		
		Count	Column N %	Count	Column N %	
SEX	F	22	62.9%	16	45.7%	0.15
	M	13	37.1%	19	54.3%	

In the ligation group, 62.9% of the patients were female (22 out of 35) and 37.1% were male (13 out of 35). In the bipolar cautery group, 45.7% of the patients were female (16 of 35), and 54.3% were male (19 of 35). There was no significant difference in gender between groups (p = 0.15).

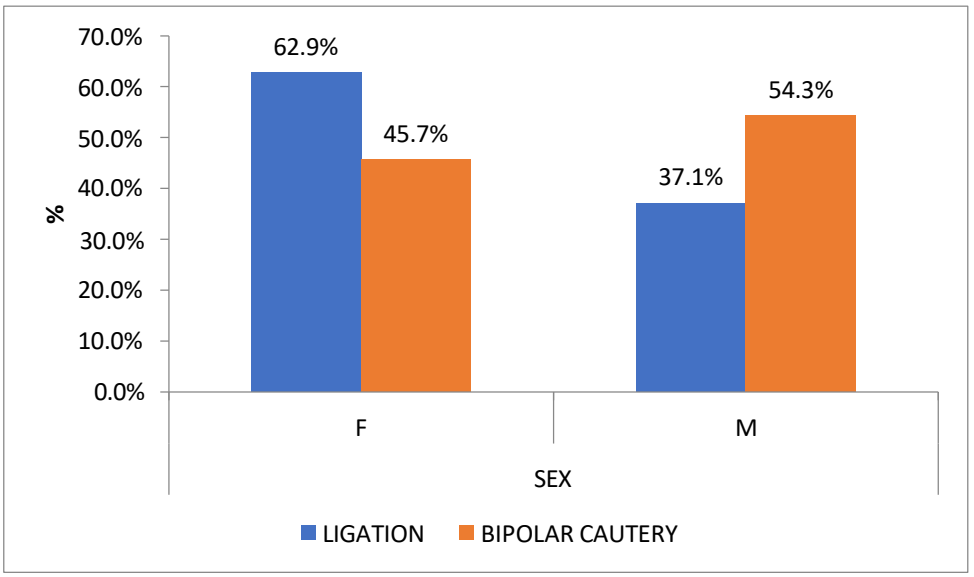

Figure 15 - Distribution of gender between groups

Table 5. Comparison of intraoperative blood loss between groups

	GROUP				P value
	LIGATION		BIPOLAR CAUTERY		
	Mean	Standard Deviation	Mean	Standard Deviation	
INTRAOPERATIVE BLOOD LOSS (ml)	42.60	5.09	43.46	8.20	0.601

The mean blood loss in the ligation group was 42.60 ml (SD = 5.09), whereas the mean blood loss in the bipolar cautery group was 43.46 ml (SD = 8.20). There was no significant difference in mean intraoperative blood loss between the groups (p = 0.601).

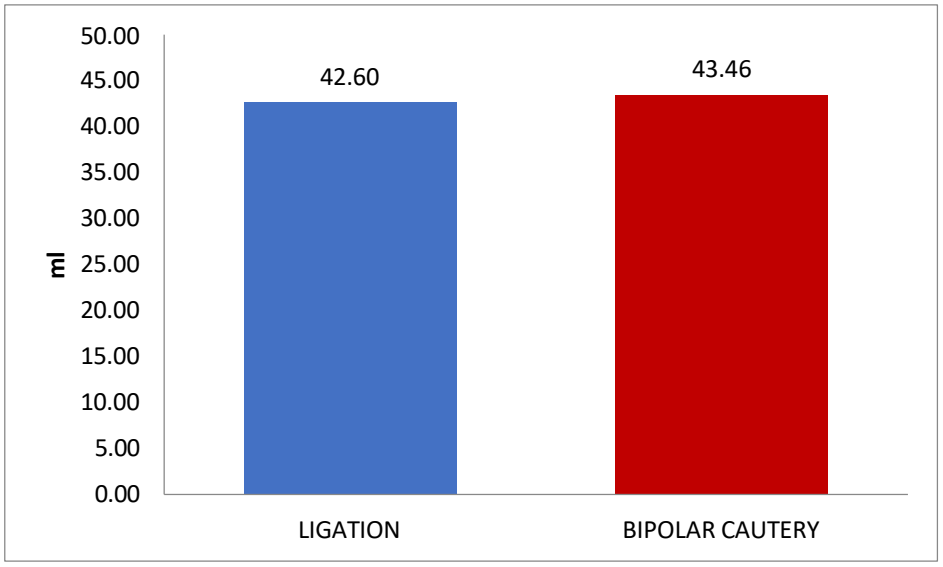

Figure 16 - Distribution of intraoperative blood loss between groups

Table 5. Comparison of postoperative pain on days 1, 4, 7, and 14 between groups

	GROUP				P value
	LIGATION		BIPOLAR CAUTERY		
	Mean	Standard Deviation	Mean	Standard Deviation	
DAY 1	7.57	0.50	7.51	0.51	0.637
DAY 4	2.43	0.88	3.37	0.81	<0.0001
DAY 7	0.11	0.32	0.57	0.50	<0.0001
DAY 14	0.00	0.00	0.00	0.00	n/a

This study evaluated postoperative pain on days 1, 4, 7, and 14 after tonsillectomy using ligation versus bipolar cautery. On day 1, the mean pain score was 7.57 (SD = 0.50) in the ligation group and 7.51 (SD = 0.51) in the bipolar cautery group, with no significant difference (p = 0.637). By day 4, the mean pain score was significantly lower in the ligation group at 2.43 (SD = 0.88) compared to 3.37 (SD = 0.81) in the bipolar cautery group, with a significant difference (p < 0.0001). On day 7, the ligation group again had a significantly lower mean pain score of 0.11 (SD = 0.32) versus 0.57 (SD = 0.50) than the bipolar cautery group, with a significant difference (p < 0.0001). By day 14, both groups had a mean pain score of 0, indicating complete resolution of pain.

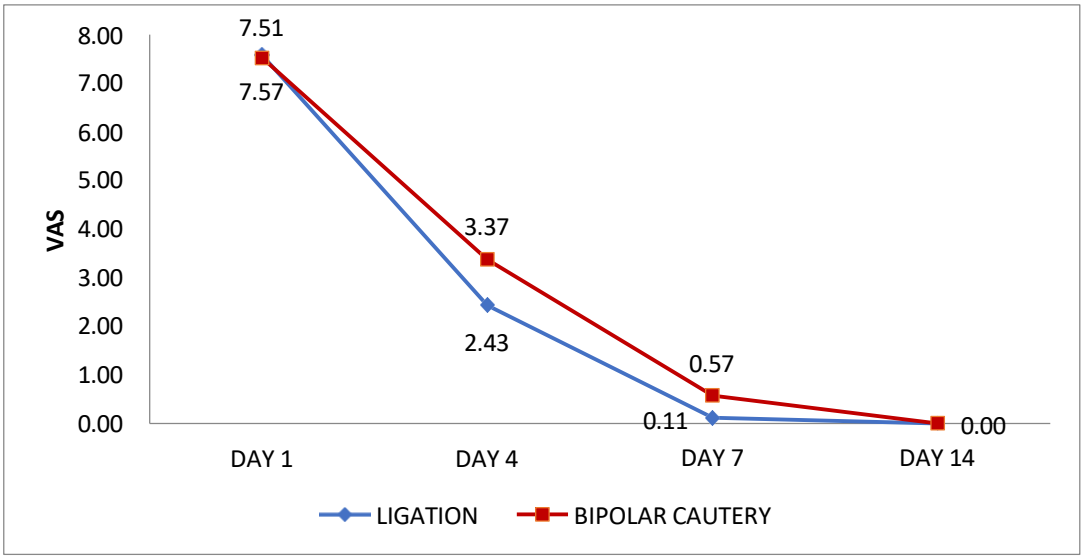

Figure 17 - Distribution of postoperative pain on days 1, 4, 7, and 14 between groups

Table 6. Comparison of day of return to routine activities between groups

	GROUP				P value
	LIGATION		BIPOLAR CAUTERY		
	Mean	Standard Deviation	Mean	Standard Deviation	
DAY OF RETURN TO ROUTINE ACTIVITY	6.91	0.74	7.63	0.94	0.001

The mean day of return to routine activities for the ligation group was 6.91 days (SD = 0.74), while for the bipolar cautery group, it was 7.63 days (SD = 0.94). This difference was statistically significant (p = 0.001), indicating that patients in the ligation group returned to routine activities significantly sooner than those in the bipolar cautery group.

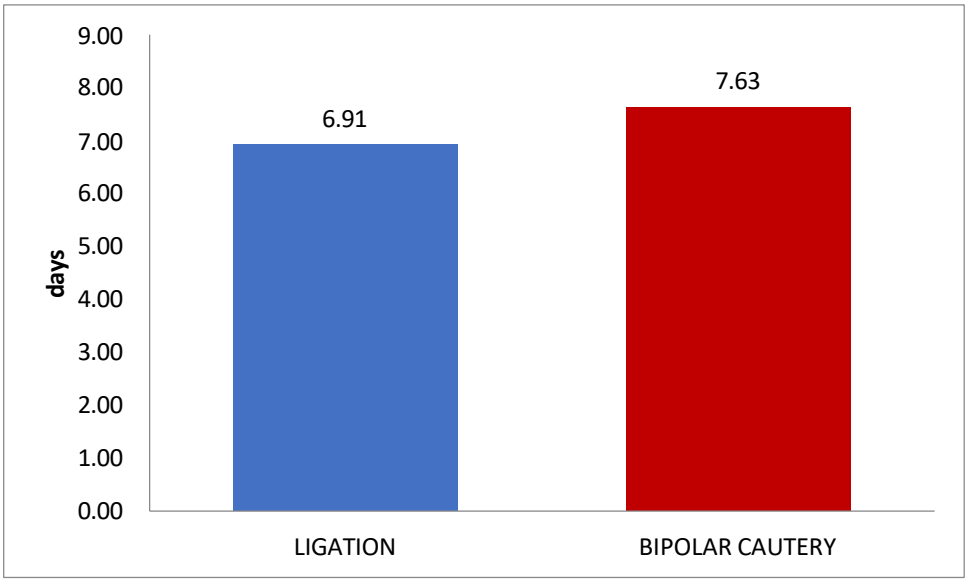

Figure 18 - Distribution of day of return to routine activities between groups

Table 7. Comparison of surgery types between groups

		GROUP				P value
		LIGATION		BIPOLAR CAUTERY		
		Count	Column N %	Count	Column N %	
SURGERY	Tonsillectomy	16	45.7%	9	25.7%	0.081
	Adenotonsillectomy	19	54.3%	26	74.3%	

In the ligation group, 45.7% (16 of 35) underwent tonsillectomy, while 54.3% (19 of 35) underwent adenotonsillectomy. In the bipolar cautery group, 25.7% (9 of 35) underwent tonsillectomy and 74.3% (26 of 35) underwent adenotonsillectomy. There was no significant difference in the type of surgery between the groups (p = 0.081).

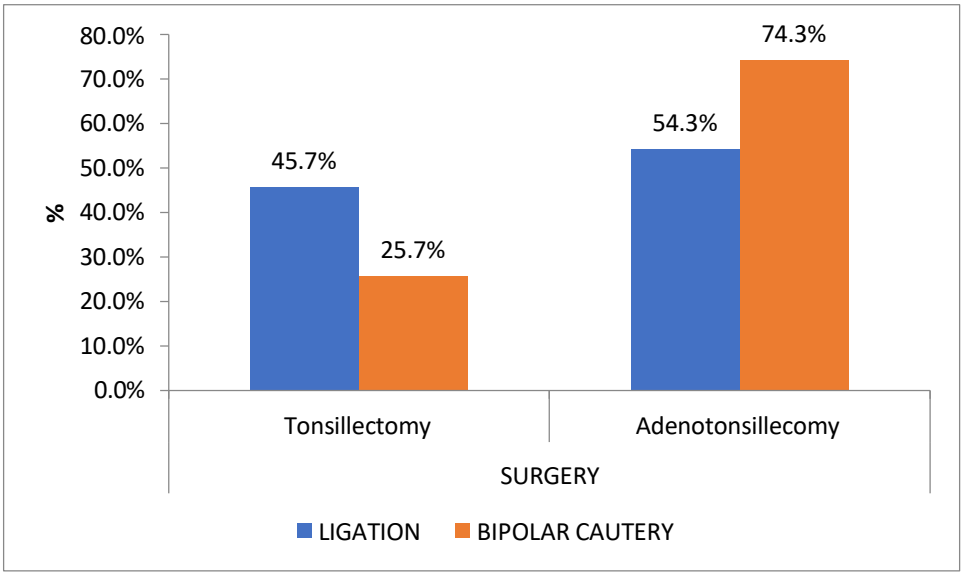

Figure 19 - Distribution of surgery types between groups

DISCUSSION

DISCUSSION

Tonsillectomy and adenotonsillectomy is one amongst the most common surgeries performed in the world. When performed for appropriate symptoms tonsillectomy and adenotonsillectomy can improve the quality of life and general health of the patients significantly[59]. However these procedures are associated with wide range of morbidities, of which post operative pain is being the most significant and most distressing for the patient. With advancements in technology and surgical techniques, methods like electrocautery, coblation, and harmonic scalpel have gained popularity for their ability to achieve haemostasis and reduce postoperative morbidity[60] . Our study compares the effectiveness and outcomes of haemostasis in tonsillectomy performed using ligation versus bipolar cautery techniques. It evaluates various parameters, including age and gender distribution, intraoperative blood loss, postoperative pain, return to routine activities, and types of surgeries performed.

Ligation and bipolar cautery are among the commonly used techniques for achieving haemostasis during tonsillectomy. Ligation involves the use of sutures or ties to ligate blood vessels, while bipolar cautery employs controlled electrical current to coagulate tissues. Both techniques aim to minimize intraoperative bleeding, thereby reducing surgical complications and improving patient outcomes.

Age and Gender Distribution:

The mean age of patients in the ligation group (16.46 years) was slightly higher than that in the bipolar cautery group (12.17 years) , although this difference was not statistically

significant(p = 0.088). Similarly, there was no significant difference in gender distribution between the groups. These findings suggest that age and gender were adequately balanced between the two study groups, reducing the potential for confounding effects on the outcomes.

Intraoperative Blood Loss And Post Operative Bleeding If Any :

The analysis revealed comparable levels of intraoperative blood loss between the ligation (mean of 42.60 ml) and bipolar cautery (mean of 43.46 ml) groups, with no statistically significant difference observed (p = 0.601). This suggests that both techniques are equally effective in controlling intraoperative bleeding during tonsillectomy procedures. The findings align with previous research indicating that both ligation and bipolar cautery are safe and efficient methods for haemostasis during tonsillectomy. However studies by *Bashir et al* states that the intraoperative blood loss in case of haemostasis achieved by ligation is more (68.6 ± 5.3 ml) compared to that of haemostasis achieved by bipolar cautery (49.5 ± 4.5 ml). There were no incidence of secondary or reactionary haemorrhage i.e. blood loss after the surgery in the study population. A study by *Dhaduk et al* states that incidence of haemorrhage increases with increase in age and the incidence of haemorrhage has a female preponderance, contrary to *Dhaduk et al* even with older age or female sex no incidence of haemorrhage, either secondary nor reactionary was noticed in our study population, which questions the association of both the risk factors with incidence of haemorrhage[(61)]. The study results was in par with *wake et al* where diathermy was the preferred method of haemostasis and was not associated with any secondary haemorrhage in their series of 120 adults[(62)].

Postoperative Pain:

Most severe pain was noted by both the ligation group and the bipolar group on day one and serial and gradual decrease in pain score was noted on Day 3, Day 7 and Day 14. This is contrary to many articles which mention a spike in pain at post operative Day 3 or Day 7. Significant differences were noted in postoperative pain scores between the ligation and bipolar cautery groups on days 4 and 7 following surgery. Patients in the ligation group reported lower levels of pain compared to those in the bipolar cautery group, indicating potentially superior pain management outcomes with the ligation technique during the early postoperative period. Study by *Stewerd et al* for 51 children who underwent adenotonsillectomy stated that pain remains to persists upto two weeks post surgery which was in par to our results which concludes all 75 patients experienced nil pain by day 14. These findings align with prior studies suggesting that ligation may result in less postoperative pain and faster recovery compared to bipolar cautery.

Return to Routine Activities:

The study demonstrated that patients in the ligation group returned to routine activities significantly sooner than those in the bipolar cautery group. This suggests that the ligation technique may facilitate a quicker recovery and earlier resumption of daily activities following tonsillectomy. The shorter recovery time associated with ligation could have important implications for patient satisfaction and healthcare resource utilization.

Implications for Clinical Practice:

The findings of this study have several implications for clinical practice. Firstly, clinicians should recognize that both ligation and bipolar cautery techniques are effective for

tonsillectomy procedures, with comparable intraoperative blood loss. However, ligation may offer advantages in terms of reduced postoperative pain and faster recovery. Therefore, when choosing the surgical approach for tonsillectomy patients, clinicians should weigh the potential benefits of ligation against other factors such as surgical complexity, patient comorbidities, and surgeon expertise.

Furthermore, the study's findings underscore the importance of personalized medicine in otolaryngology. While evidence-based guidelines provide valuable recommendations, individual patient characteristics and preferences should also inform treatment decisions. Clinicians should engage in shared decision-making with patients, discussing the potential benefits and risks of different surgical techniques to align treatment plans with patient goals and expectations.

Future Directions:

Like any research study, several limitations should be acknowledged when interpreting the findings. Although efforts were made to control for potential confounders, residual confounding cannot be entirely ruled out. Additionally, the study's sample size may have limited statistical power, particularly for detecting small differences in outcomes between the ligation and bipolar cautery groups. Moreover, the study's findings may not be generalizable to all patient populations, as demographic and clinical characteristics can vary across different settings and populations.

CONCLUSION

CONCLUSION

Tonsillectomy is one of the most commonest surgeries done all around the world. Though considered as a simple procedure the morbidity of the procedure is considerably high of which bleeding and post operative pain being main concern. Keeping in mind these morbidities various modalities has been introduced in various steps of tonsillectomy. Ligation and bipolar cautery for haemostasis are two among the most common modalities used.

As we compared two methods of achieving haemostasis i.e. ligation and bipolar, in conclusion, the results of this study suggest that ligation and bipolar cautery techniques are both effective methods of achieving haemostasis for tonsillectomy, with comparable intraoperative blood loss. In the initial post-operative days even if the pain was equal in both ligation and bipolar, as the days progress ligation may offer advantages in terms of reduced postoperative pain especially after three days. And the recovery period in terms of pain for ligation is lower as compared to bipolar group. Thus patient who underwent ligation were able to return to their routine day to day activities faster than bipolar cautery group. Both the methods shows negligible risk towards development of post operative haemorrhage. Thus even if ligation is considered a age old technique to control bleeding, the efficiency is in par with the latest technique such as bipolar cautery and the post operative outcome is significantly better especially in terms of post operative pain. Thus ligation maybe considered as a better modality in terms of post-operative morbidity and patient satisfaction as compared to bipolar cautery. However being comparatively newer modality bipolar cautery has its own advantages, and further studies and research in this area is essential to identify these. These findings have important implications for clinical practice and highlight the need for further research in this area.

SUMMARY

SUMMARY

Tonsillectomy is one of the most common surgeries performed by any otorhinolaryngologist throughout the world. Even thought the overall procedure is considered simple, the complications of the procedure is devastating and even life threatening. Among the various complications, post-operative pain and intra-op and post-op bleeding are the most common and most severe ones. Even though various methods of achieving haemostasis is present, Ligation and Bipolar are most commonly used. But the advantage of one method over the other is still a grey area.

In this comparative analytical study we compare the post-operative clinical outcomes in terms of post-operative pain, intraoperative and post-operative bleeding, amount of blood loss during surgery, and return to routine daily activities post-surgery with the usage of ligation technique versus electro cauterization by bipolar diathermy for achieving hemostasis for 70 patients who underwent tonsillectomy/Adenotonsillectomy in our institute. These patients were split into two groups, Group A (Haemostasias by Ligation) and Group B (Haemostasias by Bipolar Diathermy) based on the modality used for achieving haemostasias. In all patients in Group A and Group B, post operative pain was documented on 1st, 4th, 7th and 14th postoperative day by using VAS and Wong-Bakers Faces and compared and documented. The patients time of recovery period and return back to their routine activity was also documented and compared among the two groups.

In our analysis we found that the mean blood loss in the bipolar cautery group was 43.46 ml (SD = 8.20). There was no significant difference in mean intraoperative blood loss between the groups ($p = 0.601$). On day 1, the mean pain score was 7.57 (SD = 0.50) in the ligation group and 7.51 (SD = 0.51) in the bipolar cautery group, with no significant difference ($p = 0.637$). By day 4, the mean pain score was significantly lower in the ligation group at 2.43

(SD = 0.88) compared to 3.37 (SD = 0.81) in the bipolar cautery group, with a significant difference ($p < 0.0001$). On day 7, the ligation group again had a significantly lower mean pain score of 0.11 (SD = 0.32) versus 0.57 (SD = 0.50) than the bipolar cautery group, with a significant difference ($p < 0.0001$). By day 14, both groups had a mean pain score of 0, indicating complete resolution of pain. The mean day of return to routine activities for the ligation group was 6.91 days (SD = 0.74), while for the bipolar cautery group, it was 7.63 days (SD = 0.94). This difference was statistically significant ($p = 0.001$), indicating that patients in the ligation group returned to routine activities significantly sooner than those in the bipolar cautery group.

The results of this study suggest that ligation and bipolar cautery techniques are both effective methods of achieving haemostasis for tonsillectomy procedures, with comparable intraoperative blood loss. However, ligation may offer advantages in terms of reduced postoperative pain. And the recovery for ligation is lower as compared to bipolar group. Both the methods shows negligible risk towards development of post operative haemorrhage.

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ANNEXURE

ANNEXURES

PROFORMA

DATE:

S.NO.	COMPONENTS	
1.	PATIENT NAME	
2.	AGE	
3.	UHID	
4.	CHIEF COMPLAINTS	
5.	EXAMINATION OF ORAL CAVITY /OROPHARYNX	
6.	PLAN	
7.	DATE OF SURGERY	
8.	METHOD USED FOR ACHIEVING HAEMOSTASIS	GROUP A / GROUP B
9.	ANALGESIC USED IN THE FIRST 24 HOURS	
10.	INTRAOPERATIVE BLOODLOSS (in ml)	

POST OPERATIVE PAIN ACCORDING TO VAS SCORE

	DAY1	DAY4	DAY7	DAY14
PAIN SCORE ACCORDING TO VAS				

POST OPERATIVE BLEED

	DAY 1	DAY4	DAY7	DAY14
HAEMORRAGE	**PRESENT / ABSENT**	**PRESENT / ABSENT**	**PRESENT / ABSENT**	**PRESENT/ ABSENT**

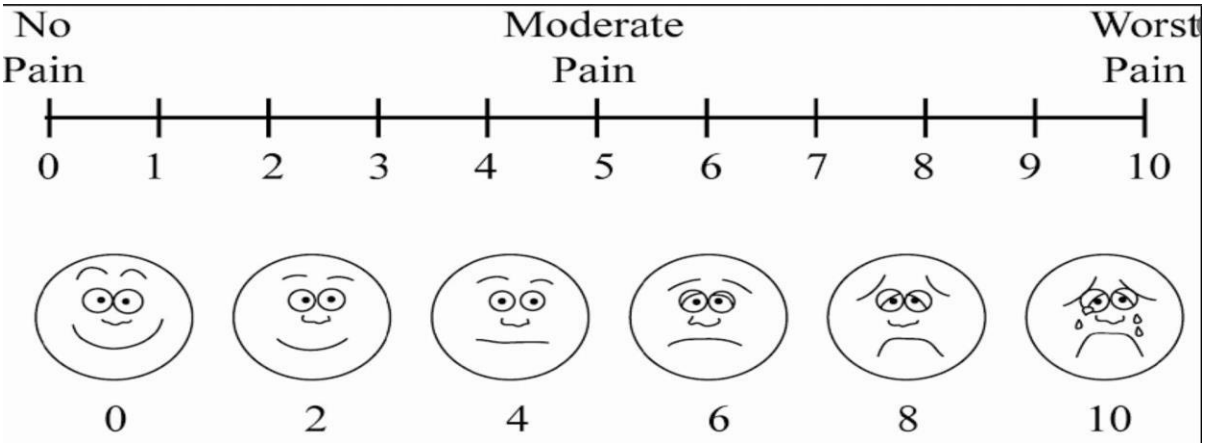
POST OPERATIVE DAY AT WHICH

PATIENT IS ABLE TO PERFORM ROUTINE :

PHYSICAL ACTIVITY

ANNEXURE I

VISUAL ANALOGUE SCALE



Pain Severity Scale

	Severity	Description
10	Unable to Move	I am in bed and can't move because of my pain. I need someone to take me to the emergency room.
9	Severe	My pain is all that I can think about. I can barely talk or move because of the pain.
8	Intense	My pain is so severe that it is hard to think of anything else. Talking and listening are difficult.
7	Unmanageable	I am in pain all of the time. It keeps me from starting most activities.
6	Distressing	I think about my pain all of the time. I have to stop during most activities because of my pain.
5	Distracting	I think about my pain most of the time. I cannot do some activities because of my pain.
4	Moderate	I am constantly aware of my pain but I can continue most of my activities.
3	Uncomfortable	My pain bothers me but I can ignore it most of the time.
2	Mild	I have a low level of pain. I am aware of my pain only when I pay attention to it.
1	Minimal	My pain is hardly noticeable.
0	No Pain	I have no pain.

ANNEXURE II

Wong-Bakers FACES pain scale

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH,

TAMAKA, KOLAR - 563101.

INFORMED CONSENT FORM

Name of the study - "CLINICAL OUTCOME OF LIGATION VERSUS BIPOLAR DIATHERMY IN TONSILLECTOMY "

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction.I consent voluntarily to participate as a participant in this research.

Print Name of Participant_____

Signature of Participant _____Date _____

For illiterate -

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness_____AND Thumb print of participant

Signature of witness _____Date _____

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant with the best of my ability. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher taking the consent_____

Signature of Researcher taking the consent_____

Date_____

Principal Investigator's Name : Dr. S.Gautham

Mobile Number : 9095207044 Email Id : gautham.muthu.ram@gmail.

ತಿಳಿವಳಿಕೆ ಸಮ್ಮತಿ ನಮೂನೆ

ಅಧ್ಯಯನ ಶೀರ್ಷಿಕೆ : "– ಟ್ಯಾನಿಲೋಮಿ ನೋವು ಜೊತೆಗೆ ಬೈಪೊಲಾರ್ ಕಾಟೇಜ್ ವಿರುದ್ಧ ಹೆಹೆಸ್ಯಾಸಿಸ್ ನ ಉಪಶಮನ ತಂತ್ರ ಒಂದು ತುಲನಾತ್ಮಕ ಅಧ್ಯಯನ

ನಾನು ಮೇಲಿನ ಮಾಹಿತಿಯನ್ನು ಓದಿದ್ದೇನೆ ಅಥವಾ ಅದನ್ನು ನನಗೆ ಓದಿದ್ದೇನೆ. ನಾನು ಅದರ ಬಗ್ಗೆ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ಅವಕಾಶವನ್ನು ಹೊಂದಿದ್ದೇನೆ ಮತ್ತು ನಾನು ಕೇಳಿದ ಯಾವುದೇ ಪ್ರಶ್ನೆಗಳಿಗೆ ನನ್ನ ತೃಪ್ತಿಗೆ ಉತ್ತರಿಸಲಾಗಿದೆ. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವವನಾಗಿ ಭಾಗವಹಿಸಲು ನಾನು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಸಮ್ಮತಿಸುತ್ತೇನೆ.

ಭಾಗವಹಿಸುವವರ ಹೆಸರನ್ನು ಮುದ್ರಿಸಿ_____

ಭಾಗವಹಿಸುವವರ ಸಹಿ _____ ದಿನಾಂಕ _____

ಅನಕ್ಷರಸ್ಥರಿಗೆ -

ಸಂಭಾವ್ಯ ಭಾಗವಹಿಸುವವರಿಗೆ ಒಪ್ಪಿಗೆಯ ನಮೂನೆಯನ್ನು ನಿಖರವಾಗಿ ಓದುವುದನ್ನು ನಾನು ನೋಡಿದ್ದೇನೆ ಮತ್ತು ವ್ಯಕ್ತಿಗೆ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ಅವಕಾಶವಿದೆ. ವ್ಯಕ್ತಿಯು ನೀಡಿದ್ದಾನೆ ಎಂದು ನಾನು ಖಚಿತಪಡಿಸುತ್ತೇನೆ
ಮುಕ್ತವಾಗಿ ಒಪ್ಪಿಗೆ.

ಸಾಕ್ಷಿಯ ಹೆಸರನ್ನು ಮುದ್ರಿಸಿ_____ ಮತ್ತು ಭಾಗವಹಿಸುವವರ ಹೆಬ್ಬೆರಳು ಮುದ್ರೆ

ಸಾಕ್ಷಿಯ ಸಹಿ _____ ದಿನಾಂಕ _____

ಒಪ್ಪಿಗೆಯನ್ನು ತೆಗೆದುಕೊಳ್ಳುವ ಸಂಶೋಧಕ/ವ್ಯಕ್ತಿಯ ಹೇಳಿಕೆ
ಸಂಭಾವ್ಯ ಭಾಗವಹಿಸುವವರಿಗೆ ನನ್ನ ಸಾಮರ್ಥ್ಯದ ಅತ್ಯುತ್ತಮ ಮಾಹಿತಿಯೊಂದಿಗೆ ನಾನು ಮಾಹಿತಿ ಹಾಳೆಯನ್ನು ನಿಖರವಾಗಿ ಓದಿದ್ದೇನೆ. ಅಧ್ಯಯನದ ಕುರಿತು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ಭಾಗವಹಿಸುವವರಿಗೆ ಅವಕಾಶ ನೀಡಲಾಗಿದೆ ಎಂದು ನಾನು ದೃಢೀಕರಿಸುತ್ತೇನೆ ಮತ್ತು ಭಾಗವಹಿಸುವವರು ಕೇಳಿದ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳಿಗೆ ಸರಿಯಾಗಿ ಮತ್ತು ನನ್ನ ಸಾಮರ್ಥ್ಯಕ್ಕೆ ತಕ್ಕಂತೆ ಉತ್ತರಿಸಲಾಗಿದೆ. ವ್ಯಕ್ತಿಯನ್ನು ಸಮ್ಮತಿಯನ್ನು ನೀಡುವಂತೆ ಒತ್ತಾಯಿಸಲಾಗಿಲ್ಲ ಮತ್ತು ಒಪ್ಪಿಗೆಯನ್ನು ಮುಕ್ತವಾಗಿ ಮತ್ತು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ನೀಡಲಾಗಿದೆ ಎಂದು ನಾನು ದೃಢೀಕರಿಸುತ್ತೇನೆ.
ಈ ICF ನ ಪ್ರತಿಯನ್ನು ಭಾಗವಹಿಸುವವರಿಗೆ ಒದಗಿಸಲಾಗಿದೆ.

ಸಮ್ಮತಿಯನ್ನು ತೆಗೆದುಕೊಳ್ಳುವ ಸಂಶೋಧಕರ ಹೆಸರನ್ನು ಮುದ್ರಿಸಿ_____

ಒಪ್ಪಿಗೆಯನ್ನು ತೆಗೆದುಕೊಳ್ಳುವ ಸಂಶೋಧಕರ ಸಹಿ_____

ದಿನಾಂಕ_____

ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿಗಳ ಹೆಸರು: ಡಾ. ಎಸ್.ಗೌತಮ್
ಮೊಬೈಲ್ ಸಂಖ್ಯೆ : 9095207044 ಇಮೇಲ್ ಐಡಿ : gautham.muthu.ram@gmail.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH,

TAMAKA, KOLAR - 563101.

PATIENT INFORMATION SHEET

Name of the study - "CLINICAL OUTCOME OF LIGATION VERSUS BIPOLAR DIATHERMY IN TONSILLECTOMY "

The purpose of this study To find out which among the two surgical techniques for achieving hemostasis in tonsillectomy , bipolar cautery and ligation technique has better post operative clinical outcome.

We are inviting people diagnosed with chronic tonsillitis to take part in this study, however based on criteria list, eligible participants will be chosen among the interested ones. Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you agree to participate in this study, you will have to undergo 1.Tonsillectomy by dissection and snare method,2 Ligation or Bipolar electrocauterization for hemostasis in tonsillar fossa.Blood investigations like CBC , serum sodium, serum potassium, coagulation profile, serology (HIV,HbsAg,HCV),renal function test , blood grouping and typing. By participating in this research you will contribute in predicting which technique of achieving hemostasis has less post-operative complications and the study will not change the final outcome of your treatment. However, patients in the future may benefit as a result of knowledge gained from this study. You will not be charged extra for any of the procedures performed during the research study. Your participation in this study will not put you at any risk.

All information collected from you will be strictly confidential & will not be disclosed to any

outsider. This information collected will be used for research purpose. This information will not reveal your identity & this study have been reviewed by central ethical committee.

For any further clarification you are free to contact the Principal investigator, Dr S.Gautham, mobile – 9095207044.

There is no compulsion to participate in this study, further you are at the liberty to withdraw from the study at anytime if you wish to do so. Your treatment aspect will not be affected if you not wish to participate. The cost of the investigations will be borne by me. You are required to sign only if you voluntarily agree to participate in proposed study. This document will be stored in a safe locker at the Dept of Otorhinolaryngology and strict confidentiality will be maintained. A copy of this document will be given to you for your information.

Principal Investigator's Name : Dr S.Gautham

Mobile Number : 9095207044

Email Id : gautham.muthu.ram@gmail.com

ರೋಗಿಯ ಮಾಹಿತಿ ನಮೂನೆ

ಅಧ್ಯಯನ ಶೀರ್ಷಿಕೆ : ''– ಟ್ಯಾನಿಲೋಮಿ ನೋವು ಜೊತೆಗೆ ಬೈಪೊಲಾರ್ ಕಾಟೇಜ್ ವಿರುದ್ಧ ಹೆಹೆಸ್ಟಾಸಿಸ್ ನ ಉಪಶಮನ ತಂತ್ರ ಒಂದು ತುಲನಾತ್ಮಕ ಅಧ್ಯಯನ

ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವು ಟಾನ್ಸಿಲೆಕ್ಟಮಿ, ಬೈಪೋಲಾರ್ ಕಾಟರಿ ಮತ್ತು ಲಿಗೇಶನ್ ತಂತ್ರದಲ್ಲಿ ಹೆಮೋಸ್ಟಾಸಿಸ್ ಅನ್ನು ಸಾಧಿಸುವ ಎರಡು ಶಸ್ತ್ರಚಿಕಿತ್ಸಾ ತಂತ್ರಗಳಲ್ಲಿ ಯಾವುದು ದೃಶ್ಯ ಅನಲಾಗ್ ಸ್ಕೇಲ್ ಅನ್ನು ಬಳಸಿಕೊಂಡು ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ನೋವನ್ನು ಕಡಿಮೆ ಮಾಡುತ್ತದೆ ಎಂಬುದನ್ನು ಕಂಡುಹಿಡಿಯುವುದು

ನಾವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ದೀರ್ಘಕಾಲದ ಟನ್ಸಿಲ್ಲೈಟಿಸ್ ಹೊಂದಿರುವ ಜನರನ್ನು ಆಹ್ವಾನಿಸುತ್ತಿದ್ದೇವೆ, ಆದರೆ ಮಾನದಂಡಗಳ ಪಟ್ಟಿಯ ಆಧಾರದ ಮೇಲೆ, ಆಸಕ್ತರಲ್ಲಿ ಅರ್ಹ ಅಭ್ಯರ್ಥಿಗಳನ್ನು ಆಯ್ಕೆ ಮಾಡಲಾಗುತ್ತದೆ. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಭಾಗವಹಿಸಬೇಕೆ ಅಥವಾ ಬೇಡವೇ ಎಂಬುದು ನಿಮ್ಮ ಆಯ್ಕೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಸಮ್ಮತಿಸಿದರೆ, ನೀವು ಹೃದಯ ಮತ್ತು ಶ್ವಾಸಕೋಶಗಳ 1. ಯೋಜನಾ-ಪ್ರಕಾಶಿತ ಪ್ರಕಾಶಕ 2.ecg 3. cbc, ಸೀರಮ್ ಸೋಡಿಯಂ, ಸೋಡಿಯಂ, ಪೊಟ್ಯಾಸಿಯಮ್. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವ ಮೂಲಕ ನೀವು ಯಾವ ತಂತ್ರವನ್ನು ಹೆಮ್ಮಾಸಿಸ್ ಅನ್ನು ಸಾಧಿಸುವಲ್ಲಿ ಕೊಡುಗೆ ನೀಡುತ್ತೀರಿ ಮತ್ತು ಅಧ್ಯಯನವು ನಿಮ್ಮ ಚಿಕಿತ್ಸೆಯ ಅಂತಿಮ ಫಲಿತಾಂಶವನ್ನು ಬದಲಾಯಿಸುವುದಿಲ್ಲ. ಆದರೆ ಭವಿಷ್ಯದಲ್ಲಿ ಈ ಅಧ್ಯಯನದಿಂದ ಸಿಗುವ ಜ್ಞಾನದಿಂದಾಗಿ ರೋಗಿಗಳು ಪ್ರಯೋಜನ ಪಡೆಯಬಹುದು. ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಡೆಯುವ ಯಾವುದೇ ಕಾರ್ಯವಿಧಾನಗಳಿಗೆ ಹೆಚ್ಚುವರಿ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆಯು ನಿಮ್ಮನ್ನು ಯಾವುದೇ ಅಪಾಯವನ್ನು ಉಂಟುಮಾಡುವುದಿಲ್ಲ.

ನಿಮ್ಮಿಂದ ಸಂಗ್ರಹಿಸಿದ ಎಲ್ಲಾ ಮಾಹಿತಿ ಗೌಪ್ಯವಾಗಿರುತ್ತದೆ ಮತ್ತು ಅದನ್ನು ಯಾರಿಗೂ ಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿಲ್ಲ. ಬಾಹ್ಯ. ಸಂಗ್ರಹಿಸಿದ ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಶೋಧನಾ ಉದ್ದೇಶಕ್ಕಾಗಿ ಬಳಸಲಾಗುತ್ತದೆ. ಈ ಮಾಹಿತಿಯು ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸುವುದಿಲ್ಲ ಮತ್ತು ಈ ಅಧ್ಯಯನವನ್ನು ಕೇಂದ್ರ ನೈತಿಕ ಸಮಿತಿ ಪರಿಶೀಲಿಸಿದೆ.
ಯಾವುದೇ ಹೆಚ್ಚಿನ ಸ್ಪಷ್ಟೀಕರಣಕ್ಕಾಗಿ, ನೀವು ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿ ಡಾ. ಎಸ್. ಗೌಥಮ್, ಮೊಬೈಲ್ - 909520704.
ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಯಾವುದೇ ಬಲವಂತವಿಲ್ಲ. ನೀವು ಬಯಸಿದಲ್ಲಿ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹೊರಗುಳಿಯಲು ನೀವು ಸ್ವಾತಂತ್ರ್ಯ ಹೊಂದಿದ್ದೀರಿ. ನೀವು ಭಾಗವಹಿಸಲು ಬಯಸಿದರೆ ನಿಮ್ಮ ಚಿಕಿತ್ಸೆಯ ಅಂಶವು ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ. ತನಿಖೆಯ ವೆಚ್ಚವನ್ನು ನಾನೇ ಭರಿಸುತ್ತೇನೆ. ಪ್ರಸ್ತಾವಿತ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಸ್ವ ಇಚ್ಛೆಯಿಂದ ಒಪ್ಪಿದರೆ ಮಾತ್ರ ನೀವು ಸಹಿ ಮಾಡಬೇಕಾಗುತ್ತದೆ. ಈ ಡಾಕ್ಯುಮೆಂಟ್ ನ್ನು ಒಟೊರಿಯಾಲಜಿಯಲ್ಲಿ ಸುರಕ್ಷಿತ ಲಾಕರ್ ನಲ್ಲಿ ಸಂಗ್ರಹಿಸಲಾಗುವುದು ಮತ್ತು ಕಟ್ಟುನಿಟ್ಟಾದ ಗೌಪ್ಯತೆ ಕಾಪಾಡಲಾಗುವುದು. ನಿಮ್ಮ ಮಾಹಿತಿಗಾಗಿ ಈ ದಸ್ತಾವೇಜಿನ ಒಂದು ಪ್ರತಿಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು.

ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿಯ ಹೆಸರು: ಡಾ ಎಸ್.ಗೌತಮ್
ಮೊಬೈಲ್ ಸಂಖ್ಯೆ : 9095207044
ಇಮೇಲ್ ಐಡಿ : gautham.muthu.ram@gmail.com

MASTER CHART

KEY TO MASTER CHART

UHID	Unique Hospital Identification Number
VAS	Visual Analogue Score

CASE NUMBER	UHID	AGE	SEX	DIAGNOSIS	SURGERY	HAEMOSTASIS ACHIEVED BY LIGATION	HAEMOSTASIS ACHIEVED BY BIPOLAR CAUTERY	INTRAOPERATIVE BLOOD LOSS (ml)	VAS SCORE				DAY OF RETURN TO ROUTINE ACTIVITY
									DAY 1	DAY 4	DAY 7	DAY 14	
1	118579	11	M	Adenotonsillitis	Adenotonsillectomy	+	-	45ml	8	2	0	0	Day 8
2	97835	12	F	Adenotonsillitis	Adenotonsillecomy	+	-	40ml	8	1	0	0	Day 5
3	19135	11	F	Chronic Tonsillitis	Tonsillectomy	+	-	50ml	8	1	0	0	Day 8
4	148909	18	F	Chronic Tonsilitis	Tonsillectomy	+	-	50ml	7	2	0	0	Day 7
5	134958	5	F	Adenotonsillitis	Adenotonsillectomy	+	-	48ml	8	4	0	0	Day 7
6	138105	14	M	Adenotonsillitis	Adenotonsillectomy	+	-	46ml	8	3	0	0	Day 7
7	105374	7	M	Adenotonsillitis	Adenotonsillectomy	+	-	40ml	8	3	0	0	Day 8
8	163270	12	M	Tonsillitis	Tonsillectomy	+	-	50ml	8	4	0	0	Day 7
9	163847	6	F	Adenotonsillitis	Adenotonsillectomy	+	-	46ml	8	3	0	0	Day 8
10	225599	5	F	Chronic Adenotonsilitis	Adenotonsillectomy	+	-	46ml	8	4	1	0	Day 7
11	23988	32	M	Chronic tonsillitis	Tonsillectomy	+	-	48ml	8	3	0	0	Day 7
12	75743	38	F	Chronic Tonsilitis	Tonsillectomy	+	-	56ml	7	2	0	0	Day 7
13	252226	49	F	Left Tonsillar cyst	Tonsillectomy	+	-	50ml	8	2	0	0	Day 7
14	258223	11	M	Chronic Tonsillitis	Tonsillectomy	+	-	45ml	8	1	0	0	Day 7
15	232054	12	M	Adenotonsillitis	Adenotonsillecomy	+	-	40ml	7	1	0	0	Day 8
16	282755	17	F	Chronic tonsillitis	Tonsillectomy	+	-	40ml	7	3	0	0	Day 6
17	273269	14	F	Adenotonsillitis	Adenotonsillectomy	+	-	40ml	7	2	0	0	Day 6
18	299351	13	F	Chronic Tonsillitis	Tonsillectomy	+	-	38ml	8	3	0	0	Day 6
19	239382	40	F	Chronic Tonsillitis	Tonsillectomy	+	-	45ml	7	3	0	0	Day 7
20	308465	35	M	Chronic Tonsillitis	Tonsillectomy	+	-	40ml	8	3	1	0	Day 7
21	329988	12	F	Adenotonsillitis	Adenotonsillectomy	+	-	36ml	7	3	0	0	Day 6
22	323652	9	F	Adenotonsillitis	Adenotonsillectomy	+	-	35ml	7	2	0	0	Day 7
23	310517	5	M	Chronic Adenotonsillitis	Adenotonsillectomy	+	-	38ml	8	2	0	0	Day 8
24	334033	27	F	Chronic Adenotonsillitis	Adenotonsillectomy	+	-	35ml	7	3	0	0	Day 7
25	345171	5	F	Chronic adenotonsillitis	Adenotonsillectomy	+	-	40ml	8	2	0	0	Day 7
26	347690	10	F	Adenotonsillitis	Adenotonsillectomy	+	-	45ml	8	1	0	0	Day 7
27	352443	39	F	Chronic Adenotonsillitis	Adenotonsillecomy	+	-	40ml	7	1	0	0	Day 8
28	348274	8	M	Adenotonsillitis	Adenotonsillectomy	+	-	40ml	7	3	0	0	Day 6
29	350264	4	M	Adenotonsillitis	Adenotonsillectomy	+	-	40ml	7	2	0	0	Day 6
30	363595	8	F	Chronic Tonsillitis	Tonsillectomy	+	-	38ml	8	3	0	0	Day 6
31	387732	28	F	Chronic Tonsillitis	Tonsillectomy	+	-	45ml	7	3	0	0	Day 7
32	308465	35	M	Chronic Tonsillitis	Tonsillectomy	+	-	40ml	8	3	1	0	Day 7
33	296520	12	F	Adenotonsillitis	Adenotonsillectomy	+	-	36ml	7	3	0	0	Day 6
34	302126	4	F	Chronic tonsillitis	Tonsillectomy	+	-	38ml	8	2	0	0	Day 7

CASE NUMBER	UHID	AGE	SEX	DIAGNOSIS	SURGERY	HAEMOSTASIS ACHIEVED BY LIGATION	HAEMOSTASIS ACHIEVED BY BIPOLAR CAUTERY	INTRAOPERATIVE BLOOD LOSS (ml)	VAS SCORE				DAY OF RETURN TO ROUTINE ACTIVITY
									DAY 1	DAY 4	DAY 7	DAY 14	
35	346521	8	M	Chronic Tonsillitis	Tonsillectomy	+	-	42ml	7	2	1	0	Day 7
36	141670	11	F	Adenotonsillitis	Adenotonsillectomy	-	+	45ml	8	5	0	0	Day 9
37	149054	12	F	Adenotonsillitis	Adenotonsillecomy	-	+	55ml	7	4	1	O	Day 8
38	148165	12	F	Adenotonsillitis	Adenotonsillectomy	-	+	40ml	7	2	0	0	Day 8
39	140643	5	M	Adenotonsillitis	Adenotonsillectomy	-	+	50ml	8	2	0	0	Day 10
40	140917	7	M	Adenotonsillitis	Adenotonsillectomy	-	+	40ml	7	4	1	0	Day 9
41	140914	14	F	Chronic Tonsillitis	Tonsillectomy	-	+	40ml	7	4	0	0	Day 8
42	140558	12	M	Adenotonsillitis	Adenotonsillectomy	-	+	55ml	7	3	0	0	Day 9
43	149054	7	M	Adenotonsillitis	Adenotonsillectomy	-	+	50ml	8	4	1	0	Day 9
44	161587	12	M	Adenotonsillitis	Adenotonsillectomy	-	+	65ml	8	4	1	0	Day 8
45	163874	15	F	Chronic Tonsillitis	Tonsillectomy	-	+	45ml	8	5	0	0	Day 8
46	163278	6	M	Chronic Tonsillitis	Tonsillectomy	-	+	45ml	8	5	0	0	Day 8
47	156360	5	F	Adenotonsillitis	Adenotonsillectomy	-	+	48ml	7	3	1	0	Day 8
48	206158	6	F	Adenotonsillitis	Adenotonsillectomy	-	+	48ml	7	2	1	0	Day 8
49	201058	32	M	Chronic Tonsillitis	Tonsillectomy	-	+	40ml	7	2	0	0	Day 5
50	202505	16	F	Chronic.tonsillitis	Tonsillectomy	-	+	50ml	8	3	1	0	day 8
51	217130	5	M	Adeno tonsillitis	Adenotonsillectomy	-	+	53ml	7	3	1	0	day 7
52	218585	12	M	Adeno tonsillitis	Adenotonsillectomy	-	+	42ml	7	3	0	0	day 7
53	225689	11	F	Adeno tonsillitis	Adenotonsillectomy	-	+	48ml	8	4	1	0	day 8
54	218861	5	M	Adeno tonsillitis	Adenotonsillectomy	-	+	50ml	7	3	1	0	day 7
55	251215	8	F	Adenotonsillitis	Adenotonsillectomy	-	+	53ml	8	3	0	0	day 7
56	195239	6	M	Adenotonsillitis	Adenotonsillectomy	-	+	53ml	7	3	0	0	day 8
57	292066	11	M	Chronic Adenotonsillitis	Adenotonsillectomy	-	+	40ml	8	4	1	0	Day 7
58	60815	6	M	Chronic Adenotonsillitis	Adenotonsillectomy	-	+	30ml	8	3	1	0	Day 7
59	273272	11	F	Adenotonsillitis	Adenotonsillectomy	-	+	45ml	8	4	1	0	Day 7
60	313937	6	M	Adenotonsillitis	Adenotonsillectomy	-	+	36ml	8	4	0	0	Day 7
61	318925	5	F	Adenotonsillitis	Adenotonsillectomy	-	+	30 ml	7	3	1	0	Day 8
62	324261	11	M	Chronic adenotonsillitis	Adenotonsillectomy	-	+	34ml	8	3	1	0	Day 7
63	316548	27	F	Chronic Tonsillitis	Tonsillectomy	-	+	32ml	7	3	1	0	Day 8
64	329988	12	F	Adenotonsillitis	Adenotonsillectomy	-	+	36ml	8	4	1	0	Day 7
65	334996	9	M	Chronic Adenotonsillitis	Adenotonsillectomy	-	+	40ml	7	3	1	0	Day 8
66	341057	20	M	Chronic tonsillitis	Tonsillectomy	-	+	32ml	8	3	0	0	Day 7
67	353133	33	M	Chronic tonsillitis	Tonsillectomy	-	+	36ml	8	3	1	0	Day 6
68	353148	30	M	Chronic Tonsillitis	Tonsillectomy	-	+	40ml	8	4	1	0	Day 7
69	365127	12	F	Adenotonsillitis	Adenotonsillectomy	-	+	37ml	7	3	0	0	Day 7
70	389914	14	F	Adnotonsillitis	Adenotonsilletomy	-	+	38ml	7	3	0	0	Day 7