



## REDEFINING INDICATIONS AND EVALUATION OF DISSECTION

### VERSUS DIATHERMY METHOD OF TONSILLECTOMY

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#### ABSTRACT

The current availability of randomized clinical trials have assessed the efficacy of the most common presumed indications for tonsillectomy, but the controversy still exists So, the present study was conducted to assess (1) Whether tonsillectomy leads to any significant benefits as compared to watchful waiting (2) evaluating the two most commonly used techniques for tonsillectomy i.e; cold dissection & diathermy.

170 patients were included,104 were assigned to the surgical group (Group A) & 66 patients acted as control (Group B). The surgical group underwent tonsillectomy. The efficacy of tonsillectomy viz-a-viz chronic tonsillitis related morbidity, school absenteeism, & work absenteeism, Group A beta hemolytic streptococcal pharyngitis, otitis media, Rhinosinusitis, obstructive sleep apnoea & psoriasis was studied. The results of our study were as; Majority among children ( 7-15 years) & the mean age of adult population was 23.02 years.

Tonsillectomy definitely provided benefit in case of chronic tonsillitis , mild to moderate obstructive sleep apnea on polysomnographic findings where as the Patients who had been included in this study to redefine otitis media & rhinosinusitis as an indication for tonsillectomy

did not benefit much when compared to the watchful waiting group. The three most commonly used techniques of tonsillectomy i.e; cold steel using ties & packs, cold steel using monopolar diathermy for hemostasis & using monopolar diathermy exclusively were evaluated. The operating time was least for the diathermy alone method .The intraoperative blood loss was minimal for the monopolar diathermy method .The primary hemorrhage rate was maximum in technique of cold steel with ties & packs as hemostasis. The secondary hemorrhage rate was maximum in monopolar diathermy method . The postoperative pain measured by using the verbal rating scale was considerable after using monopolar diathermy alone with 33% complaining of severe pain & 67% complaining of moderate pain.

## INTRODUCTION

The lymphoid tissue that has come to surround the oropharyngeal isthmus and the opening between the nasopharynx and the oropharynx is arranged in the form of a ring known as the Waldeyer's internal ring. Its components include the nasopharyngeal tonsils (or adenoids) located superiorly in the midline of the posterior nasopharyngeal wall & continuous laterally on each side with the lymphoid tissue of the tubal tonsils. Lower down at the lateral wall of the oropharynx are the palatine tonsils.

The RING is completed inferiorly by the lingual tonsil in the posterior third of the tongue.(1) "The Waldeyer's External ring" consists of two circles of nodes, one situated in the head and another in the neck. In the head the nodes are situated around the skull base and are the occipital, post-auricular, parotid, pre-auricular, buccal & facial nodes.

In the neck superficial nodes consist of sub-mandibular, submental and anterior cervical nodes.(2)

Palatine tonsils and adenoids are involved in the processing and transportation of antigens to lymphocytes which is essential to their recognition and antigen specific immunoglobulin synthesis. Both of them provide a site for the proliferative expansion of selected B & T lymphocyte clones destined for immune function in the neighboring areas of the pharyngeal mucosa and also produce IgA & IgG for local secretion, primarily concerned for its own protection.(11)

Tonsillectomy is one of the most frequently undertaken procedures in the otorhinolaryngology. Tonsillectomy is defined as the removal of the entire tonsil (17).The procedure involved scraping the mucus membrane with a finger & enucleating the tonsil. One of the earliest attempts at removal of the entire tonsil was described by Edwin Pynchon in 1890. Ballenger established the capsule as an important surgical landmark in tonsil surgery and advocates the removal of the entire tonsil with the capsule intact(17).

Every Pediatrician has wrestled with the question of appropriate criteria for recommending tonsillectomy for an individual child & multiple factors influence the decision making (9)

Despite the current availability of randomized clinical trials that have assessed the efficacy of the most common presumed indications for tonsillectomy, controversy still exists not only among physicians , but also among patients & their families (5).

Tonsillectomy is often performed for recurrent tonsillitis in young adults, but the opinions vary. A significant improvement in quality of life has been reported in adult patients with recurrent tonsillitis following tonsillectomy(36)

Airway obstruction attributable to adenotonsillar hyperplasia is the primary cause of sleep related breathing disorder (SRBD). Patients with upper airway resistance syndrome have snoring, mouth breathing, sleep pause or breath holding, gasping, enuresis & restless sleep, hypersomnolence,

behavioural disorders, morning headache, dry mouth, halitosis, audible breathing with open mouth, hyponasal speech & chronic nasal obstruction. Adenotonsillectomy though recommended as a definite indication for OSA, tonsillectomy alone offers a simple & promising surgical therapy in patients with a manifest OSA. Enlargement of the tonsils & adenoid may cause dysphagia. Obstructive tonsils occasionally interfere with the pharyngeal phase of swallowing, so that patients have more difficulty in swallowing solids than liquids.

In patients with adenoid hyperplasia swallowing difficulties are more often related to poor coordination of breathing & swallowing(7) Rhinosinusitis in children remains primarily a clinical diagnosis. The main symptoms primarily because of allergy are nasal congestion, rhinorrhea, cough, headache, post-nasal drainage, halitosis & irritability. Previous investigations have shown an association between children with adenotonsillar hypertrophy & rhinosinusitis.

A relationship may exist between the size of the adenoid & the frequency of rhinosinusitis.(41) Adenotonsillar hypertrophy is believed to play a dual role in the etiology of otitis media. First, it may serve as a mechanical obstruction to the orifice of the Eustachian tube in the nasopharynx.

Secondly, they may serve as a reservoir of infection, providing a bacterial source for otitis media (24) Tonsillectomy as part of the surgical management plan has been advocated by some for such pathologies.(5) Group A beta hemolytic streptococcal (GABHS) infections are responsible for 15%-30% of all cases of pharyngitis. Patients who have been exposed to GABHS may carry the organisms asymptotically, even after adequate antimicrobial therapy. Tonsillectomy as treatment of an asymptomatic carrier is desirable when the carrier family has a history of rheumatic fever, the carrier has a history of acute glomerulonephritis, the carrier family is having a "PING PONG" spread of disease, carrier attends a school experiencing a GABHS epidemic, or the carrier is the food handler or hospital worker.(7) Many skin diseases like Psoriasis are caused by GABHS & the load of causative organism is proportionate to severity of disease. There is a probable association between acute tonsillitis due to GABHS & exacerbation of psoriasis, particularly the guttate variety where numerous small psoriatic lesions appear to be generated by each episode of acute tonsillitis. (40) This process appears to be an immune phenomena. Tonsillectomy has been shown to either reduce the number of acute exacerbations or severity of the disease by reducing the Load of beta-hemolytic streptococci (12.) As with most early operations, early tonsillectomies were hindered by the lack of anesthesia, & surgeons try to operate as quickly as possible. Shulder's Gullitine was one tool introduced to speed up the procedure. A simpler approach was enucleation of the tonsils with reverse gullitine (37).

The traditional technique of Cold Dissection was introduced about 100 years ago. In this technique, the tonsils are dissected with metal instruments by blunt dissection. Any subsequent bleeding may be controlled by packing the tonsillar fossae with gauze dressings or ligating bleeding vessels.(5) Many different advances in this surgical technique have developed with a aim of reducing intra-operative bleeding, & subsequent post-operative morbidity. About 40 years ago, diathermy technique was first introduced. Importantly, while diathermy is often used for tonsillar dissection & hemostasis, its use may be reserved for hemostasis after a traditional cold steel dissection.(40)

#### Methods of tonsillectomy

#### DISSECTION TECHNIQUES

Appropriate exposure of tonsils through the open mouth is usually achieved with a BOYLE-DAVIS gag. The tonsil is grasped & retracted forcefully towards the midline allowing identification of the intended plane of dissection.

- Cold steel with ties & packs
- Cold steel and monopolar diathermy
- Cold steel and bipolar diathermy
- Cold steel with capsule preservation

#### DIATHERMY OR ELECTROCAUTERY METHODS:

Which uses an electrically heated instrument to cut or coagulate tissues.

- Monopolar diathermy
- Bipolar diathermy forceps

#### RADIOFREQUENCY/ ELECTROSURGERY TONSILLECTOMY:

In which the instrument itself does not become hot but rather produces a current flow that generates heat within the tissue.

COBLATION TONSILLECTOMY: Uses radiofrequency signals to produce an electrodissection effect to generate a plasma of excited ions. Coblation is associated with a greater hemorrhage rate. It is associated with less postoperative pain & quicker healing.

#### ARGON PLASMA COAGULATOR TONSILLECTOMY:

Require an argon plasma coagulation dissector, an argon gas source & a high frequency voltage generator. It is associated with reduced surgical time, less intraoperative blood loss & no increase in postoperative pain compared with cold dissection.

HARMONIC SCALPEL: Coagulation occurs due to mechanical disruption of hydrogen bonds & thus protein-denaturation. Harmonic scalpel is associated with less postoperative pain & increased operating time.

LASER TONSILLECTOMY: is associated with less perioperative haemorrhage, most postoperative pain & a higher rate of reactionary & secondary haemorrhage.

Morbidity from the operation is significant. It includes both the expected & adverse consequences & the possible complications.

Pain & dysphagia are normal in the early post-operative period. Most children require almost a week to resume normal functioning & an average return to school or work time in 1-2 weeks.

The complications of tonsillectomy may be divided into those associated with anaesthetic & those directly associated with the operation itself. As the operation is normally performed on children & young otherwise fit adults, for the majority of patients the risk of the short anaesthetic required for tonsillectomy. There are risks inherent in anaesthesia in very young children & for this reason tonsillectomy is seldom performed in children below the age of 2 years.

Occasionally, patients may experience temporomandibular joint dysfunction due to mouth being open too widely with the tonsillectomy gag. Small tears at the commissures of the mouth & the cracks of the lip vermilion may be avoided by careful placement of the gag & the use of an emollient jelly. Non-traumatic atlantoaxial subluxation (GRISSEL SYNDROME) may occur secondary to any inflammatory process in the upper neck.

The main early complication is hemorrhage. This is defined as primary (within the first 24 hours postoperatively) or secondary i.e; occurring after 24 hours & during the phase of healing of the tonsil bed. Postoperative infection is sometimes diagnosed in primary care. Late complications are generally associated with the scarring that inevitably takes place as the tonsillar bed heals. On rare occasions, this may result in impairment of palatal functioning with velopalatine insufficiency.(40)

Mckee WJE (1963) (25) studied the efficacy of tonsillectomy in children & reported that tonsillectomised children, if done in initial years, show an overall improvement in general health, decrease in illness from 23% to 40% than the control group. Also, postoperative, reduction in school days lost or confinement to bed. Nyfors A, Rasmussen PA, Lemholt K. et al.(1976)(33) conducted tonsillectomy in 74 patients, all with psoriasis vulgaris. They reported a clearance in 32%, improvement in 39%, 22% had no benefit & in 7% disease worsened. Jack L. Paradise, Charles D. Bluestone, Ruth Z. Bachman et al (1984) (16) studied efficacy of tonsillectomy in 187 children severely affected with recurrent sore throat & reported a decrease in the number of episodes of sore throat by 1.85/subject & a decrease in the school absence of 3.2 days/subject. Conway WA, Fujita Ss, Zorick F et al (1985)(6). Adenotonsillectomy which is a far less extensive procedure than UPPP resulted in complete normalization of the RDI in 85% (22 of 26) of patients. Niels Rasmussen (1987) (31) reported that during actual surgery various techniques can be used to stop bleeding, diathermy may be superior to ligation or at least equally effective. Fixation sutures should be abandoned owing to the risk of perforating major vessels & their particular risk in causing post-operative hemorrhage. Phillipps J,J; Thornton ARD (1989) compared tonsillectomy hemostasis by diathermy & by ligation & quoted a primary bleed rate of 0.8% for diathermy & 1.3% for ligation.

Secondary hemorrhage rates were reported as 1.9% & 1.3% respectively. Laing MR, Mckerrow WS (1991)(22) conducted a study on 100 adult patients having tonsillectomy & reported that there was a very high patient satisfaction following tonsillectomy compared with the clinical course of 100 age & sex matched controls. MG Watson, PJD Dawes, PR Samuel, HF Marshall et al(1993)(27) carried out a diathermy hemostasis in 523 patients & reported that although there were more bleeds in the diathermy patients, but the difference fell short of statistical significance. Rosenberg EW, Dubenstein LE, Dubenstein AJ et al (1994)(39) carried out tonsillectomy in 14 patients, all of whom had evidence of Streptococcal colonization & reported clearance of psoriasis in 9 out of 14 patients following tonsillectomy. H.L.Tay(1995) (13) in his prospective randomized study showed that electrodissection significantly increased the delayed postoperative pharyngeal pain & otalgia. Hone SW, Donnelly MJ, Powell F. et al (1996)(12) investigated 13 patients with either guttate or plaque psoriasis aged 6-28 years & observed that on follow-up, 26 months after tonsillectomy, psoriasis cleared in 53%, improvement was seen in 23% & in 24% no benefit has been reported. H.L. Tay (1996)(14) assessed the post-tonsillectomy morbidity of the selective diathermy technique as opposed to ligation technique.

No significant difference was observed regarding pharyngeal discomfort, otalgia & incidence of haemorrhage between the two techniques. Kujawski O, Dulgerov P, Gysin C. et al (1997) (21) performed tonsillectomy by diathermy & by dissection in 100 patients each & reported a variation in blood loss (12ml in diathermy & 36 ml in the dissection group), Secondary haemorrhage (in 3 patients in diathermy & 8 patients in dissection) Mui S. Rasgon, Hilsinger RL (1998)(28) studied the efficacy of tonsillectomy for recurrent tonsillitis in an adult population & found a statistical significant decrease of number of clinical visits & antibiotic prescriptions.

Mcmillan BD, Maddern BR, Graham WR (1999)(26) found two children with recurrent streptococcal pharyngitis or tonsillitis free of psoriasis 16 months after tonsillectomy. Kidera Kazuki, Takagi Seiji, Uchida Masabumi (2000)(20) followed up 89 patients with skin disease & tonsillar focal infection. Patients who were cured or showed recovery accounted for 85.7% after tonsillectomy. Nunez BA, Provan J, Crawford M.(2000)(32) carried out monopolar diathermy dissection in 24 children & cold dissection tonsillectomy in 26 children & compare the two & found the mean blood loss of 15.1 ml & 33.7 ml & secondary haemorrhage in 2 patients & 1 patient respectively. T.Verse, Beatrice A. Kroker, Wolfgang Pisig et al.(2000) (42) performed tonsillectomy in 9 patients, 5 of which had severe OSA & 4 had mild OSA. The surgical response rates (defined as decrease in the postoperative AHI > or = 50% & a postoperative AHI of less than 20%) were 80% in severe apneics & 100% in mild apneics. Neil Bhattacharya, Lynn j. Kepnes, Jo Shapiro (2001) (29) conducted a cross-sectional survey analysis of 65 adult patients who underwent tonsillectomy one year back & found that there was a statistically significant decreases in mean weeks receiving antibiotics, mean physician visits & mean work days missed. V Raut, N. Bhat, J.Kinsella et al (2001) (44) compared cold dissection to bipolar scissor tonsillectomy in 200 consecutive patients undergoing tonsillectomy for recurrent or chronic tonsillitis & observed intra-operative blood loss of 5 ml in bipolar scissors tonsillectomy & 115 ml for cold dissection tonsillectomy.

David H. Darrow, Christopher Siemens (2002)(7) reviewed recent clinical trials addressing indications for adenotonsillectomy & concluded that adenotonsillectomy was the first line therapy for SRBD in patients with at least mild adenotonsillar hyperplasia, & both symptomatic & PSG Improvement may be anticipated in such patients. David H. Darrow (2002) (7) studied absolute indications for tonsillectomy & adenotonsillectomy & relative indications as well. Interim results from National Prospective Tonsillectomy Audit (2003)(15)The interim analysis compared the rates of postoperative haemorrhage for seven tonsillectomy techniques & was shown that the use of a hot technique throughout an operation had a postoperative haemorrhage rate three times as high as following cold steel technique. Neil Bhattacharya (2003) (30) reported that adults who have 3 or > 3 episodes of infectious tonsillitis per year with severe symptoms should be seriously considered for tonsillectomy & those with > 4 or 5 episodes per year should definitely be considered for tonsillectomy. Birgit K Van Staaïj, Emma H Van der Akker, Maroeska K. Rovers (2004)(3) observed in follow – up period of a group of adenotonsillectomy patients that they had 2.97 episodes of fever per person years compared with 3.18 in the watchful waiting group. Birgit K Van Staaïj, EH Van den Akker, SJMG Van der Heijden, AG Schilder, AW Hoes (2005)(4)studied the efficacy of tonsillectomy with or without adenoidectomy in children under 18 years .Six randomized trials & seven non- randomized controlled studies were evaluated. The pooled risk difference was -1.2 episodes per person per year. For sore throat associated school absence the pooled risk difference was -2.8 days per person year. For URTI the pooled risk difference was -0.5 episodes per person per year.

Karin PQ Oomen, Maroeska M. Rovers, Emma H. Van den Akker, Birgit K. Van Staaïj et al (2005) (18)also studied the various parameters among 300 children selected for adenotonsillectomy & watchful waited group. Laura J. Orvidas, Jennifer L, Amy L. Weaver (2006)(23)conducted a retrospective cohort study of 290 children 4 to < 16 years of age who experienced 3 or > 3 episodes of GABHS pharyngitis at least 1 month apart in 12 months. Children without tonsillectomy were 3.1 times more likely to develop a subsequent GABHS Pharyngitis infection during follow-up. Olli-Pekka Alho, Petri Koivunen, Tomi Penna et al. (2007)(34) found on follow-up of 70 adults who underwent tonsillectomy, that at 90 days, pharyngitis had recurred in 24% of the control group & 3% of the surgical group. E A Magdy, S Elwany, AS El-daly et al . (2008)(8)conducted a study in 60 patients in which coblation tonsillectomy was compared to three common techniques-Cold dissection with ligation, monopolar electrocautery & laser.

The median operating time for DL was 30 min & for EC it was 20 min & the median intraoperative blood loss was 45 ml for DL & 25 ml for EC. R Fox, M Temple, D Owens, AS Short et al.(2008)(38) did a cohort of 257 children & 159 adults . 47% of the cohort had undergone tonsillectomy . Respondents who had undergone tonsillectomy reported significantly greater reductions in morbidity than those who had not. Scott- Browns's Otorhinolaryngology. Head & Neck Surgery 7th edition (40)

There is probable association between acute tonsillitis due to Group A beta hemolytic streptococci & exacerbation of psoriasis particularly of the guttate variety. TS Anand, MS Arun, Ekta Chabra, TB Shashidhar et al. 2009 (43). carried out a randomized prospective study of two groups of patients undergoing tonsillectomy. In group A tonsillectomy was performed with dissection & snare method followed by spot coagulation by diathermy & in Group B, hemostasis was achieved by ligatures. The time to achieve hemostasis was more in case of bipolar diathermy (19.06 mn) as compared to ligature (17.26 mn) & pain appeared to persist in the diathermy group as compared to the ligature group.

#### MATERIALS & METHODS

The study was conducted in the Otorhinolaryngology & Head & Neck Surgery department of SMHS Hospital, Govt. Medical College, Srinagar. The Study was conducted from Dec.2010 to Dec. 2012. A total of 170 patients were included in the study. The patients were divided in two groups.

**GROUP A:** This group comprised of 104 patients & included those who were planned to undergo tonsillectomy.

**GROUP B:** This group comprised of those patients who were in the waiting list for tonsillectomy. 66 patients were included in this group. This group was taken as control.

The inclusion criteria for this study were:

- Children with recurrent/chronic tonsillitis
- > Or = 7 episodes/ year for one year
- > or = 5 episodes/ year for 2 years
- > or = 3 episodes/ year for 3 years

- Children who have considerable school absenteeism because of severe attacks
- Children with recurrent Group A beta hemolytic streptococcal pharyngitis
- Children with recurrent otitis media
- Children with recurrent rhinosinusitis
- Adults with chronic tonsillitis
- Adults with Guttate psoriasis or chronic skin diseases.
- Adults with obstructive sleep apnea

The severity of OSA was rated as:

- a) Mild-AHI of 10-29
- b) Moderate-AHI of 30-49
- c) Severe- AHI of > or = 50

The patients included in this study were subjected to:

- a) Detailed History (personal history & chief complaints)
- b) General Physical Examination
- c) Local examination (ear, tympanic membrane, hearing assessment)
- d) Nose: Anterior rhinoscopy was done to look for any discharge, congestion, patency, post-nasal drip & posterior rhinoscopy
- e) Throat Examination (oral hygiene, condition of teeth, gums & mucosa, congestion of tonsillar pillars, tonsillar size, discharge from crypts)

Tonsillar Size was graded as:

Grade I - 25% of oropharynx occupied

Grade II – 50% of oropharynx occupied

Grade III – 75% of oropharynx occupied

Grade IV > 75% of oropharynx occupied

f) Neck Examination: Neck was palpated for any lymphadenopathy especially the submandibular & the jugulo-digastric group of lymph nodes.

BMI of patients presenting with clinical features of obstructive sleep apnoea was calculated

Investigations:

- a) Haemogram
- b) Urine examination
- c) Radiology-CXR, X-ray nasopharynx, X-ray PNS

Special Investigations

- 1) Throat swabs for detection of GABHS pharyngitis
- 2) Polysomnography for patients presenting with clinical features of obstructive sleep apnea

Patients in Group A underwent tonsillectomy by the dissection ligation method, by the dissection diathermy method or by monopolar diathermy method. All tonsillectomies were done by surgeons of consultant grade under general anaesthesia.

The two techniques were evaluated with respect to operating time, intraoperative bleeding, rate of primary & secondary hemorrhage & postoperative pain.

a) The operating time was noted from the time of insertion of the mouth-gag till its removal

b) Intraoperative bleeding was assessed by measuring the amount in the suction aspirate.

c) Primary hemorrhage was defined as that occurring within 24 hours of the procedure

d) Secondary hemorrhage was defined as bleeding occurring > 24 hours after the procedure

e) Postoperative pain was assessed by the verbal rating scale & graded as:

- No pain
- Mild pain-complains of pain only when asked
- Moderate pain-complains of pain spontaneously
- Severe pain- cries with pain

All patients were discharged the following day & followed up for a period of 6 months to 1 ½ year. Any significant change in the pre-operative symptoms after tonsillectomy were recorded in the follow-up period & compared to those in the waiting group.

## OBSERVATIONS & RESULTS

TABLE 1: AGE DISTRIBUTION OF THE STUDY POPULATION

AGE(YEARS)	NUMBER OF PATIENTS	PERCENTAGE(%)
3-15	112	66
< or = 16 years	58	34

The age – group of 3-15 years formed the majority of the patients (66%)

TABLE 2: GENDER DISTRIBUTION (n=170)

GENDER	NUMBER OF PATIENTS	PERCENTAGE(%)
Males	71	42
Females	99	58

Females formed 58% of the study population & males formed 42% of the study population.

TABLE 3: DISTRIBUTION ACCORDING TO TREATMENT GROUP (n=170)

TREATMENT GROUP	NUMBER OF PATIENTS	PERCENTAGE(%)
Surgical	104	61
Control	66	39

Out of the study population (61%) were assigned to the surgical group & (39%) were assigned to the control group.

TABLE 4: INDICATIONS OF TONSILLECTOMY IN CHILDREN

INDICATIONS	NUMBER OF PATIENTS	PERCENTAGE(%)
Chronic tonsillitis	34	53
Pharyngitis	16	25
URTI (Rhinosinusitis, Otitis media)	14	22

Chronic tonsillitis was the commonest indication in children (53%) for which tonsillectomy was done. Chronic tonsillitis as an indication was primarily defined on the basis of school absenteeism & impact on quality of life of patient & parents. This was followed by GABHS pharyngitis (25%) & URTI(22%)

TABLE -5 : INDICATIONS OF TONSILLECTOMY IN ADULTS

INDICATIONS	NUMBER OF PATIENTS	PERCENTAGE
Chronic tonsillitis	28	70
Psoriasis	4	10
Obstructive Sleep apnoea (OSA)	8	20

In adults chronic tonsillitis was the commonest indication (70%) for surgery followed by OSA (20%) & Psoriasis (10%). Again chronic tonsillitis was redefined on the basis of work absenteeism & impact on quality of life.

TABLE-6 : DISTRIBUTION OF VARIOUS DEMOGRAPHIC & CLINICAL CHARACTERISTICS OF PATIENTS (<15 YEARS) WITH CHRONIC TONSILLITIS ACCORDING TO TREATMENT GROUP

CHARACTERISTIC		SURGICAL (n=34)	CONTROL (n=26)
Age (years)	3-4	2(6)	3(11)
	5-16	8(23)	7(27)
	7-15	24(70)	16(61)
Sex	Male	15(44)	12(46)
	Female	19(66)	14(64)

6.1 : HISTORY OF EPISODES OF THROAT INFECTION BEFORE ENTRY

>or =7 per year for 1 year	10(30)	6(23)
>or=5 per year for 2 years	9(26)	5(19)
>or=3per year for 3 years	15(44)	15(58)

6.2: SIZE OF TONSIL AT ENTRY

Grade I	3(9)	2(8)
Grade II	7(20)	8(31)
Grade III	16(47)	10(38)
Grade IV	8(24)	6(23)

### 6.3: SCHOOL DAYS LOST

School days lost                      98      108

Among those aged < or = 15 years having chronic tonsillitis, 35 (57%) were assigned to the surgical group & 26 (43%) to the non- surgical group. In both the groups maximum patients 70% & 61% were in the age group of 7-15 years. Females constituted 60% (19 of 34) of the surgical group & 64% (14) of the non- surgical group. Most of the patients in the study had > 3 episodes per year for 3 years (41% in the surgical group & 58% in the non- surgical group). Tonsillar hypertrophy of Grade III Severity was mostly encountered .47% in the surgical group & 38% in the non-surgical group.

TABLE- 7: DISTRIBUTION OF SELECTED DEMOGRAPHIC & CLINICAL CHARACTERISTICS OF 28 PATIENTS WITH GABHS PHARYNGITIS ACCORDING TO TREATMENT GROUP

CHARACTERISTIC	SURGICAL (n=16)	CONTROL (n=12)	
Age (year)	3-4	3(19)	3(25)
	5-16	1(6)	2(17)
	7-15	12(75)	7(58)
Sex	Male	8(50)	5(42)
	Female	8(50)	7(58)

### 7.1 : HISTORY OF EPISODES OF GABHS PHARYNGITIS BEFORE ENTRY

>or=7per year for 1 year	7(44)	8(66)
>or=5per year for 2 years	4(25)	1(8)
>or =3 per year for 3 years	5(31)	3(67)

Patients < or= of age having Group A beta hemolytic streptococcal pharyngitis,16(57%) were assigned to the surgical group & 12 (43%) were placed in the control group. Maximum of patients in both groups were in the age group of 7-15 years (75% in the surgical group & 58% in the control group). Most of the patients had > or =7 episodes per year for one year (44% in the surgical group & 66% in the control group)

TABLE-8 : DISTRIBUTION OF VARIOUS DEMOGRAPHIC & CLINICAL CHARACTERISTICS OF PATIENTS WITH URTI ACCORDING TO TREATMENT GROUP (n=24)

CHARACTERISTIC		SURGICAL (n=14)	CONTROL( n=10)
Age (year)	3-8	8(57)	7(70)
	9-15	6(43)	3(30)
Sex	Male	6(43)	4(40)
	Female	8(57)	6(60)
MEDIAN NUMBER OF EPISODES OF URTI PER YEAR BEFORE ENTRY			
		7	8

Of these patients having recurrent URTI (otitis media/rhinosinusitis),14(58%) were assigned to the surgical group & 10(42%) to the control group. The age group of 3-8 years constituted 57% of the surgical group & 70% of the control group. Females constituted 57% of the surgical & 60% of the control group.

TABLE-9: DISTRIBUTION OF SELECTED DEMOGRAPHIC & CLINICAL CHARACTERISTICS OF 46 ADULT PATIENTS(>OR= 16 YEARS) WITH CHRONIC TONSILLITIS ACCORDING TO THE TREATMENT GROUP(n=46)

CHARACTERISTIC		SURGICAL (n=28)	CONTROL (n=18)
Age(years)	16-20	18(64)	10(56)
	21-62	10(36)	8(54)
Sex	Male	7(25)	7(39)
	Female	21(75)	11(61)
MEDIAN NUMBER OF EPISODES OF SORE THROAT BEFORE ENTRY			
>or=5 episodes for1year		7(25)	5(28)
>or=3episodes for 2 years		21(75)	13(72)
WORK DAYS LOST			
Work days lost		102	108

28 (61%) of the adult patients with chronic tonsillitis were assigned to the surgical group & 18 (39%) to the control group. 64% of the surgical group & 56% of the control group belonged to the age group of 16-20 years. Females were more numerous forming 75% of the surgical group & 61% of the control group.

TABLE-10: SHOWING AGE,SEX AND BMI OF PATIENTS WITH OBSTRUCTIVE SLEEP APNOEA

PATIENT NUMBER	AGE	SEX	BMI
1	35	Male	29.4
2	45	Male	28.9
3	48	Male	26.9
4	35	Female	30.8
5	38	Female	29.4
6	48	Female	30.4
7	42	Male	30.1
8	45	Male	31.1
MEAN	42 Years		29.6

The mean age of patients with OSA was 42 years, 5 were males & 3 were females. The mean body mass index was 29.6

TABLE-11 : SHOWING THE NUMBER & GENDER OF PSORIASIS PATIENTS SELECTED FOR TONSILLECTOMY

GENDER	NUMBER OF PATIENTS	PERCENTAGE(%)
Male	1	25
Female	3	75

4 patients with guttate psoriasis were selected for tonsillectomy, 1 was male & 3 were females.

TABLE -12: DISTRIBUTION OF ASSIGNED SUBJECTS ACCORDING TO TREATMENT GROUP & OBSERVED EPISODES OF THROAT INFECTION DURING FOLLOW-UP IN PATIENTS AGED < 15 YEARS WITH CHRONIC TONSILLITIS

Treatment group	NUMBER OF EPISODES						Total number of episodes	Number of episodes per subject (mean)
	0	1	2	3	>or =4			
Surgical (n=32)	12	7	5	4	4	45	1.4	
Controls (n=24)	2	0	3	6	13	26	3.16	

In the follow-up period the mean number of episodes experienced per subject by the surgical group was 1.4 & by the control group 3.16 with a mean difference of 1.76 episodes per subject.

TABLE-13: DISTRIBUTION OF ASSIGNED SUBJECTS ACCORDING TO TREATMENT GROUP & EPISODES OF SORE THROAT DURING FOLLOW-UP IN PATIENTS AGED < 15 YEARS WITH RECURRENT PHARYNGITIS

Treatment group	NUMBER OF EPISODES	Total number of episodes					Number of episodes per subject (mean)	
		0	1	2	3	>or =4		
Surgical (n=32)		8	2	4	0	2	18	1.12
Controls (n=24)		2	0	1	3	6	35	2.91

In the follow-up period the mean number of episodes of pharyngitis experienced per subject by the surgical group was 1.12 & by the control group 2.91 with a mean difference of 1.79 episodes per subject.

TABLE-14: DISTRIBUTION OF ASSIGNED SUBJECTS ACCORDING TO TREATMENT GROUP & EPISODES OF SORE THROAT DURING FOLLOW-UP IN PATIENTS AGED > OR= 16 YEARS WITH CHRONIC TONSILLITIS

Treatment group	NUMBER OF EPISODES						Total number of episodes	Number of episodes per subject (mean)
	0	1	2	3	>or =4			
Surgical (n=32)	9	6	9	2	2	38	1.35	
Controls (n=24)	0	0	3	4	11	62	3.44	

In the follow-up period the mean number of episodes of Sore throat experienced per subject by the surgical group was 1.35 & by the control group 3.0 with a mean difference of 2.09 episodes per subject

TABLE-15: SHOWING SORE THROAT ASSOCIATED SCHOOL ABSENCE ACCORDING TO TREATMENT GROUP DURING FOLLOW-UP

TREATMENT GROUP	TOTAL NUMBER OF DAYS PER YEAR	MEAN NUMBER OF DAYS LOST PER YEAR
Surgical group (20)	77	3.85
Control group (22)	146	6.63

The mean number of school days lost per person in the control group(6.63) was almost twice as compared to the surgical group (3.85)

TABLE-16: SHOWING SORE THROAT ASSOCIATED WORK DAY MISSED IN ADULTS ACCORDING TO TREATMENT GROUP (n=37) DURING FOLLOW-UP

TREATMENT GROUP	TOTAL NUMBER OF WORK DAYS MISSED	MEAN NUMBER OF DAYS LOST PER PERSON
Surgical group(19)	14	0.73
Control group(18)	116	6.45

The mean number of Work days missed by the control group(6.45) whereas those by the surgical group was 0.73 with a mean difference of 5.71 days in favour of the tonsillectomy group.

TABLE-17: SHOWING APNOEA HYPOAPNOEA INDEX(AHI) BEFORE & AFTER TONSILLECTOMY

PATIENT NUMBER	AHI	
	BEFORE	AFTER
1	32.0	8.9
2	38.0	6.9
3	42.4	9.4
4	29.0	Lost to follow-up
5	38.0	8.5
6	26.2	5.4
7	44.0	12.0
8	41.0	29.2
Mean	36.32	11.47

The mean AHI of patients with OSA before tonsillectomy was 36.32. After tonsillectomy 1 patient was lost to follow-up, 6 patients had AHI values below 20 with a mean AHI of 11.47.

TABLE 18 : SHOWING THE RESULTS OF PATIENTS HAVING UNDERGONE TONSILLECTOMY FOR PSORIASIS

RESULT	Cleared	1	25
	Improved	2	50
	Unchanged	1	25

Out of 4 % patients, 1 patient showed clearance of psoriasis, 2 patients showed improvement & in 1 patient the disease remained unchanged.

TABLE-19 : SHOWING VARIOUS TONSILLECTOMY TECHNIQUES STUDIED

TECHNIQUE	NUMBER OF PATIENTS	PERCENTAGE(%)
Cold technique with ties & packs	32	31
Cold dissection with diathermy for hemostasis	42	40
Monopolar diathermy	30	29

The above table shows the techniques by which tonsillectomy was done & the number of patients assigned to each group .32(31%)underwent tonsillectomy by cold technique with ties & packs,42(40%) by cold dissection with hemostasis by diathermy & 30(29%) by monopolar diathermy.

TABLE-20:SHOWING THE MEAN OPERATING TIME MEASURED IN MINUTES FOR DIFFERENT TECHNIQUES

TECHNIQUE	COLD STEEL WITH TIES & PACKS	COLD STEEL WITH DIATHERMY	MONOPOLAR DIATHERMY
Operating time (mean)	29 min.	28 min.	18.2 min

INTRAOPERATIVE BLOOD LOSS FOR SHOWING THE MEAN DIFFERENT TECHNIQUES OF TONSILLECTOMY

Intraoperative blood loss (mean)	46 ml	42 ml	16 ml
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The mean operating time for monopolar diathermy technique was 18.2 min, for cold steel dissection using diathermy it was 28 min. & for cold steel dissection using ligatures for hemostasis it was 29 min.

TABLE-21: RELATION BETWEEN METHOD OF SURGERY & RATE OF HEMORRHAGE

TECHNIQUE	COLD STEEL WITH TIES & PACKS	COLD STEEL WITH DIATHERMY	MONOPOLAR DIATHERMY
Primary bleed (%)	3.1	0	0
Secondary hemorrhage rate(%)	0	2.3	6

A primary bleed rate of 3.1 was seen with the cold steel with ligatures & secondary hemorrhage was more when monopolar diathermy alone was used.(6%)

TABLE-22 : COMPARISON OF POST-OPERATIVE PAIN USING DIFFERENT TECHNIQUES

TECHNIQUE	NO PAIN	MILD PAIN	MODERATE PAIN	SEVERE PAIN
Cold dissection with ties & packs(32)	0	22 (69)	7 (22)	3 (9)
Cold dissection with diathermy(42)	0	28(67)	8(19)	6(14)
Monopolar diathermy (30)	0	0	20(67)	10(39)

On verbal rating scale 23% (10 of 42)of patients having undergone tonsillectomy by monopolar diathermy method experienced severe pain , the remaining 67%(20 of 42) experienced pain of moderate intensity. On the other hand most of the patients 69% (22 of 32) having undergone tonsillectomy by cold dissection technique experienced mild pain.

## DISCUSSION

Two groups of patients were studied during the course of present study. Group A, Who underwent tonsillectomy & Group B, those who acted as control. Two aspects of the procedure were assessed during the study – (1) Whether tonsillectomy leads to any significant benefits as compared to watchful waiting, in other words, re-defining some of the indications for tonsillectomy & (2) evaluating the two most commonly used techniques for tonsillectomy i.e; cold dissection & diathermy.

Patients were assigned to two groups –the tonsillectomy group (61%) & the watchful waiting group(39%).In our study, maximum patients were in the age group of 3-15 years (66%) with a mean age of 8.39 years, rest of the patients (44%) fell in the age group of 16-62 years with a mean age of 23.02 years. Mckee (1963)(25)in his study of patients undergoing tonsillectomy found the average age to be 6.67 years which almost corresponds with our observations. Neil (2008)(29) while studying the impact of tonsillectomy on adults found the mean age of patients to be 27.3 years. These figures are close to that of our study.

Raut et al.(2001)(44) in his study reported the mean age of the study population as 22 years. Females formed the majority of the patients (58%) of our study while males contributed the rest(42%).Paradise(1984)(16)in his study found the percentage of females to be 51% & those of males as 49% which is almost similar to our findings.

In our study majority (70%) of the patients under  $\leq 15$  years having recurrent tonsillitis were in the age group of 7-15 years. Most of the patients included in this group had symptoms for  $\geq 3$  years(44% & 58% respectively). Patients  $\leq 15$  years who had documented Group A beta hemolytic streptococcal pharyngitis( by throat swabs) had symptoms for 3 year having  $\geq 3$  episodes of pharyngitis in this year. In the study by Paradise et al.(1984) most of the patients (63%) fell in the age group of 7-15 years. In the study by Birgit et al.(2004)(3) the median number of episodes of URTI experienced by the surgical & control group before entry were 12 episodes/ year & 10 episodes/year respectively. In our study the median number of episodes of URTI (Rhinosinusitis/otitis media) experienced by the two groups were 7 episodes/year & 8 episodes/year respectively which is very similar to the above quoted study.

In our study 8 patients with a mean age of 42 years having mild to moderate obstructive sleep apnoea were recruited for tonsillectomy. Out of 8, 5 were males. The mean body mass index of the patients was 29.6. Verse et. al(2000)(42) in his study conducted tonsillectomy in 11 patients 4 of which had severe obstructive sleep apnoea, 5 had moderate obstructive sleep apnoea & 2 had mild obstructive sleep apnoea.

The patients assigned to the surgical group underwent tonsillectomy & both groups were followed up for a mean period of 1 year.

5 patients were lost to follow up. In our study, the total number of episodes of sore throat experienced by patients of  $\leq 15$  years in control group with chronic tonsillitis were 76 with a mean number of episodes / subject of 3.16 in contrast to only 45 (mean 1.4) in the tonsillectomy group i.e; a decrease of 1.76 episodes per subject. Adult patients undergoing tonsillectomy for chronic tonsillitis benefited the most with a decrease of 2.09 episodes of sore throat per subject. This is very close to that of Paradise et al.(1984)(16) who reported a mean difference of 1.85 episodes/subject in the first year following tonsillectomy. Fox et al.(2008)(38) in their study found that respondents undergoing tonsillectomy reported significantly greater reductions in morbidity than those who had not with 5% of children who had undergone tonsillectomy experiencing 3 short episodes of tonsillitis in 6 months compared to 35% who had not. Birgit et al.(2005)(4) reported a pooled risk difference of -1.2 episodes per person per year among patients undergoing tonsillectomy & those in the control group. Those patients  $\leq 15$  years of age undergoing tonsillectomy for recurrent GABHS pharyngitis were 1.79 times less likely to have a subsequent GABHS pharyngitis during follow up as compared to those in the waiting group.

These figures are very similar to Laura et al. 2006(23) who reported a decrease in the number of subsequent attacks by 3.1 episodes per year during the follow-up. Olli-Pekka et al. (2001)(34) in their study reported that at 90 days follow-up streptococcal pharyngitis had recurred in 24% of the control group & 3% of the tonsillectomy group. Patients undergoing tonsillectomy for rhinosinusitis & otitis media did not show much benefit.

At 3 months, 20% of the surgical & 35% of the waiting group had otitis media & at 1 year 25% of the surgical & 28% of the non-surgical group, were diagnosed with otitis media. The occurrence of URTI did not differ significantly among the two groups. Karin P et al (2005)(18) in their study found that there was no significant decrease in the number of URTI among the two groups. The percentage of patients in the surgical group & the watchful waiting group diagnosed with otitis media at baseline & at 3.6.12 months were 27.7 vs 30.5, 16.8 vs 25.2, 18.3 vs 21.2 & 12.3 vs 15.2. These figures do not differ much from our observed values. Birgit et al. 2004(3) while studying the impact of tonsillectomy on rhinosinusitis & otitis media also reported a mean difference of only 0.53 episodes per subject between the surgical & non-surgical group which was not significant. The mean number of school days lost per subject in the non-surgical group was 6.63 days which was almost twice to that of the surgical group where the number of school days lost was only 3.85 days. Van Staaïj 2005(4) also reported a pooled risk difference of 2.8 days per person for sore throat associated school absence. Paradise et al. 1984(16) in his study found that the mean number of school days lost per year in the non-surgical group was 6.7 & in the surgical group was 3.5 with a mean difference of 3.2 days per year. Adults having  $\geq 3$  episodes per year of sore throat were included in this study.

Neil(2003)(29) also recommends that adults (>or=16 years) having > or=3 episodes per year should be seriously considered for tonsillectomy. Neil(2001)(28) in his study of tonsillectomy in adults reported a statistically significant decrease in the mean number of work days missed(-6.3 days) after tonsillectomy. In our study the mean number of work days missed by the non-surgical group was 6.45 & by the surgical group was 0.73 with a difference of 5.71 days/subject/year which is very similar to the above quoted study.

In our study the mean apnoea hypoapnoea index before tonsillectomy & after the surgery was 36.32 & 11.52 respectively. 6 patients (85%) had postoperative apnoea hypapnoea index values less than 20. Verse et al.(2000) (42) in their study reported that the tonsillectomy response rates (defined as a decrease in the postoperative AHI > or= 50% & a postoperative AHI of less than 20) were 80% in severe apneics & 100% in mild apneics. David (2002)(7) while reviewing clinical trials addressing indications for tonsillectomy concluded that adenotonsillectomy was the first line therapy for sleep related breathing disorder, & both symptomatic & polysomnographic improvement may be anticipated in such patients. In our study, 4 patients (3 females & 1 male) with a mean age of 19.5 years having guttate psoriasis underwent tonsillectomy.

Out of 4, 1 patient showed clearance of lesions, 2 patients improved & in 1 patient the disease remained unchanged. Hone et al. (1996)(12) reported clearance of psoriasis in 5 of 6 patients with guttate psoriasis. McMillin et al.(1999)(26) reported that two children with recurrent streptococcal pharyngitis complicated by guttate psoriasis were completely free of psoriasis 16 months after tonsillectomy. Rosenberg et al.(1994) (39)

reported clearance of psoriasis in 9 of 14 patients, all of them had evidence of streptococcal pharyngitis following tonsillectomy. 31% of patients underwent tonsillectomy by cold dissection with ties & packs, 42% of patients underwent tonsillectomy by cold dissection with hemostasis being achieved by diathermy & in 29% monopolar diathermy was used exclusively. The mean operating time was least for the diathermy group (18 min.) followed by the dissection ligation group (29 min) & the dissection diathermy group(28 min). Magday et al. (2008)(8) reported a median operating time for dissection ligation of 30 mn & for diathermy of 20 min. Anand et al. (2009)(43) reported that the time required to achieve hemostasis using diathermy was (19.06 min) while that after using ligatures was(17.26 min). These figures are quite similar to our observations. V.Raut et al.(2001)(44) in his study reported the mean operating time of 20 mn for the dissection ligation group. Kujawski et al.(1997) (21) reported that there was no significant difference between the mean operating time for the diathermy & dissection groups being 36.9 min for diathermy & 35.9 for dissection technique using ligatures.

The mean intraoperative blood loss was least (16 ml) for the diathermy group. The mean blood loss for the dissection group was 46 ml. Magdy (2008)(8) in his study reported an intraoperative blood loss of 45 ml for the dissection ligation group & 25 ml for the diathermy group. Nunez(2000)(32) reported a mean blood loss of 15.1 ml for the diathermy group & 33.7 ml for the dissection group.

Kujawski (1997)(21) reported a mean blood loss of 12 ml in the diathermy group & 36 ml in the dissection group. These values are very similar to those of our observations. The interim results from the National Prospective Tonsillectomy Audit (15) showed that the primary hemorrhage rate for the dissection ligation was 0.8% ,for dissection diathermy was 0.5% & for diathermy it was 1.1%. Diathermy alone was associated with a secondary hemorrhage rate of 5.5%. In our study, the primary hemorrhage rate for the dissection ligation group was 3.1% , no case of secondary hemorrhage occurred in this group. For the diathermy alone group the secondary hemorrhage rate was 6% which is very similar to the above quoted values. Watson(1993)(27) in his study reported that although there were more bleeds in the selective diathermy group as compared to the dissection ligation group , the difference fell short of statistical significance. Philips et al. (1989)(35) while comparing tonsillectomy hemostasis by diathermy on ligatures reported primary & secondary bleed rate of 0.8% & 1.9% respectively for the former & that of 1.3% & 1.3% respectively for the latter.

In our study no significant difference was found in the postoperative pain using dissection followed by ligatures or diathermy for hemostasis. However, diathermy alone was associated with a significantly greater pain in the postoperative period. Tay et al.(1996)(14) in his study reported that if selective diathermy was used there was no significant alteration in postoperative pain.

Tay et al.(1995)(13) showed that electrodissection significantly increased the delayed postoperative pharyngeal pain & otalgia. Nunez(2000)(32) in his study reported that the analgesic requirement in the first 24 hours did not differ between the two groups. However, total dose required over the first 12 days was statistically greater in the diathermy group.

#### SUMMARY & CONCLUSION

In this study 170 patients included, 104 were assigned to the surgical group & 66 patients acted as control. The surgical group underwent tonsillectomy. The efficacy of tonsillectomy viz-a-viz chronic tonsillitis related morbidity, school absenteeism, & work absenteeism, Group A beta hemolytic streptococcal pharyngitis, otitis media, Rhinosinusitis, obstructive sleep apnea & psoriasis was studied.

- Majority of cases among children were in the age group of 7-15 years & the mean age of adult population was 23.02 years
- Tonsillectomy for chronic tonsillitis definitely provided benefit over & above watchful waiting in children & more so in adults by decreasing the number of episodes & thus the school & work absenteeism.
- The attacks of Group A Beta-hemolytic streptococcal pharyngitis were reduced by a factor of 2 in patients who had undergone tonsillectomy as compared to those who had not.
- Patients who had been included in this study to redefine otitis media & rhinosinusitis as an indication for tonsillectomy did not benefit much when compared to the watchful waiting group.

- Patients included in this study for evidence of mild to moderate obstructive sleep apnea on polysomnographic findings were considerably benefited by tonsillectomy alone, thus providing adult obstructive sleep apnea as a definite indication for tonsillectomy. Tonsillectomy also provided a safe & less extensive procedure for treatment of obstructive sleep apnea in adults as compared to uvulopalatopharyngoplasty. Out of the 4 patients with guttate psoriasis included in this study, 1 patient showed clearance of his lesions & 2 patients improved. 1 patient's condition remained unchanged.

The three most commonly used techniques of tonsillectomy i.e; cold steel using ties & packs, cold steel using monopolar diathermy for hemostasis & using monopolar diathermy exclusively were evaluated.

- The operating time was least for the diathermy alone method followed by cold steel with ties & packs & cold steel using diathermy for hemostasis.
- The intraoperative blood loss was minimal for the monopolar diathermy method followed by cold steel with ties & packs & cold steel with diathermy.
- The primary hemorrhage rate was maximum in patients undergoing tonsillectomy by cold steel with ties & packs as hemostasis.
- The secondary hemorrhage rate was maximum in monopolar diathermy method followed by cold steel using diathermy as hemostasis.

- The postoperative pain measured by using the verbal rating scale was considerable after using monopolar diathermy alone with 33% complaining of severe pain & 67% complaining of moderate pain. The postoperative pain was least after using cold steel with ties & packs, 69% complaining of mild pain.

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