MICRODEBRIDER INTRACAPSULAR TONSILLOTOMY

VS.

CONVENTIONAL EXTRACAPSULAR TONSILLECTOMY

Thesis

Submitted for partial fulfillment of the master degree in Otorhinolaryngology.

By

Mostafa Mahmoud Aly Salem Eldaebes

M.B., B.Ch.

Supervised by

Prof. Dr. Sherif Ibrahim Gabr

Professor of Otorhinolaryngology, Faculty of Medicine.

Cairo University

Prof. Dr. Khaled Abdel Hamid Harhash

Professor of Otorhinolaryngology, Faculty of Medicine.

Cairo University

Dr. Mahmoud Sayed El Fouly

Lecturer of Otorhinolaryngology, Faculty of Medicine.

Cairo University

2013

Acknowledgement

All gratitude is due solely to Allah. Exclusive of all those who might be worshipped besides him, for the inestimable blessing which He bestowed upon His slaves.

Words won't be enough to describe my deep thanks and great appreciation to **Prof. Dr. Sherif Gabr Ibrahim Gabr**, professor of Otorhinolaryngology, Faculty of Medicine, Cairo University, for his valuable supervision, generosity, support and useful suggestions.

I want, from the bottom of my heart, to express my deep and sincere gratitude to **Prof. Dr. Khaled Abdel Hamid Harhash**, professor of Otorhinolaryngology, Faculty of Medicine, Cairo University, who has encouraged and supported me and in any way contributed to the work and for his generous supervision.

I am deeply grateful for **Dr. Mahmoud El Sayed El Fouly**, Lecturer of Otorhinolaryngology, Faculty of Medicine, Cairo University, for his keen supervision, continuous help and perfect guidance.

I would also like to thank **Dr. Basim Wahba** and **Dr. Ahmed Kamel**, Lecturers of Otorhinolaryngology, Faculty of Medicine, Cairo University for their support during my work.

Abstract

OBJECTIVES:

The aim of this study is to evaluate the efficiency of microdebrider intracapsular tonsillotomy compared with conventional extracapsular tonsillectomy.

STUDY DESIGN:

A prospective randomized controlled study was designed to compare between the two groups. Time of operation, estimated blood loss, postoperative pain, rate of postoperative hemorrhage, tonsillar fossa healing, swallowing and complication rate were evaluated.

RESULTS:

Regarding intraoperative blood loss the conventional group had significantly lower blood loss ($P < 0.05$). The microdebrider group showed significantly less pain and better swallowing function ($P<0.05$) than the conventional group. There were no significant differences in operative time or wound healing. No postoperative complications as recurrence or hemorrhage were detected in either group.

CONCLUSION:

Microdebrider intracapsular tonsillotomy is an effective method to remove tonsillar tissue. There was significantly less pain and better swallowing function compared to the conventional extracapsular tonsillectomy group.

Keyword: TONSILLOTOMY- EXTRACAPSULAR- INTRACAPSULAR- CW

List of Contents

List of Figures

List of Tables

List of Abbreviations

Abbreviation.	Abbreviation stands for
AAO-HNS	American Academy of Otolaryngology Head and Neck Surgery
AD	After Death (of Christ)
APC	Argon Plasma Coagulation
BC	Before Christ
BDT	Bipolar Diathermy Tonsillectomy
°C	Degree Celsius
CDL	Contact Diode Laser
CNS	Central Nervous System
Co	Coblation
CO2	Carbon Dioxide
CW	Continuous Wave
De	Microdebridement
Ec	Electrocautery Dissection
ECA	External Carotid Artery
ENT	Ear, Nose and Throat
FL	Florida
GABHS	Group A β Hemolytic Streptococci

Abbreviation.	**Abbreviation stands for**
ICA	Internal Carotid Artery
IT	Intracapsular Tonsillectomy
KTP	Potassium Titanyl Phosphate
LVSS	Ligasure Vessel Sealing System
MIT	Microdebrider Intracapsular Tonsillectomy
OH	Ohio
OSA	Obstructive Sleep Apnea
PIT	Partial Intracapsular Tonsillectomy
PTA	Peritonsillar Abscess
P value	Predictive value
RPM	Revolutions Per Minute
SPSS	Software Package for Statistical Analysis
TT	Traditional Tonsillectomy
YAG	Yttrium Aluminum Garnet

Tonsillectomy is among the oldest and most commonly performed procedures in the pediatric population. Approximately 530,000 outpatient pediatric adenotonsillectomies are performed annually in U.S. hospitals ***(Cullen et al., 2006).***

Although tonsillectomies historically rank as one of the most common surgical procedures performed, these numbers have steadily declined with the advent of antibiotics since the middle of the 20th century. By 1959, the incidence of tonsillectomy reached its all-time high of 1.4 million operations per year ***(Grundfast and Wittich, 1982).***

Currently, these operations are performed at what appears to be about half the rate of those forty years ago. However, neither the indications for tonsillectomy nor the complications associated with the procedure have changed much ***(Bluestone, 1985).***

Despite the frequency of this procedure, there continues to be no universally accepted “ideal” method. Popular techniques include standard “cold steel” tonsillectomy as well as electrocautery techniques. Over the last decade, newer technologies have been introduced, such as coblation, harmonic scalpel (Ethicon, Cincinnati, OH), CO2 laser, bipolar scissors, plasma knife (Gyrus, Tuttlingen, Germany), and microdebrider intracapsular tonsillectomy (MIT) (Medtronic, Jacksonville, FL). A surgeon may use these different techniques and technologies to perform either a complete tonsillectomy (extracapsular) or an intracapsular tonsillectomy, also referred to as a tonsillotomy ***(Gallagher et al., 2010).***

Electrocautery dissection with its advantage of improved hemostasis has since replaced cold dissection techniques for most surgeons. Direct contact between the tissue and electrodes generate local temperatures of 400 to 600 ˚c ***(Maddern, 2002).***

Not surprisingly, this increased thermal damage to the surrounding tissues from electrocautery results in more postoperative pain, odynophagia, and associated dehydration. The impact of thermal trauma is supported by studies showing that cold knife tonsillectomy results in less postoperative pain compared with electrosurgical procedures ***(Wexler, 1996).***

However, the increased operative time and intraoperative blood loss associated with cold knife tonsillectomy compared with electrosurgical tonsillectomy have limited its widespread use ***(Leinbach et al., 2003).***

An alternative means of reducing injury to the surrounding pharyngeal musculature during tonsillar surgery is to perform a subtotal tonsillar resection, also known as a partial tonsillectomy, intracapsular tonsillotomy, or intracapsular tonsillar reduction. Koltai et al., have popularized this approach ***(Koltai et al., 2002; 2003).***

Partial tonsillectomy is essentially a refinement of the historical use of a tonsillotome or tonsillar guillotine ***(Koempel, 2002).*** Various methods of performing partial tonsillectomy have been shown to reduce postoperative pain while successfully alleviating obstructive symptoms. These include carbon dioxide laser excision ***(Linder et al., 1999)***, the use of an angled endoscopic microdebrider ***(Koltai et al., 2002; 2003)*** and more recently, a radiofrequency loop electrode ***(Hultcrantz and Ericsson, 2004).***

The hypothesis is that preservation of the tonsillar capsule protects the adjacent pharyngeal musculature from injury intraoperatively and from secondary infection postoperatively, thereby reducing pain related to muscular inflammation ***(Koltai et al., 2002).***

Developmental Anatomy of The Tonsil and Its Implications for Intracapsular Tonsillectomy

The second branchial pouch is visible in the 4th postconceptional week (Fig. 1) and demonstrates canalization and branching in the 8th week (Fig. 2). The tonsillar sinus is divided into a superior and inferior division by the intratonsillar fold of Hammar in the early second trimester (Fig. 3). Lymphoid infiltration of the lamina propria occurs in the seventh month of intrauterine life. Primary follicles form late in gestation, but germinal center stimulation does not occur until shortly after birth. At birth, a vestigial tonsil is visible hidden between the tonsillar pillars. During the first year of life, there is rapid proliferation of lymphoid elements and formation of active germinal centers ***(Isaacson and Parikh, 2008).***

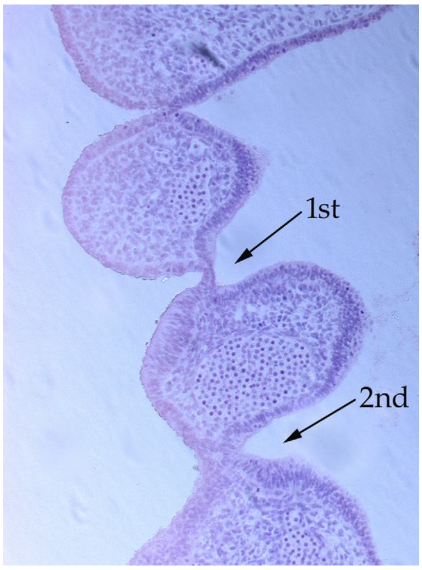

Fig. 1: 28 days post-conception —formation of the second branchial pouch from the pharyngeal endoderm *(After **Isaacson and Parikh, 2008).***

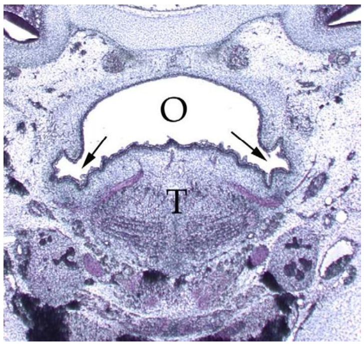

Fig. 2: 56 days post-conception — early formation of the tonsillar fossa (arrows). O, Oropharynx; T, tongue (After ***Isaacson and Parikh, 2008).***

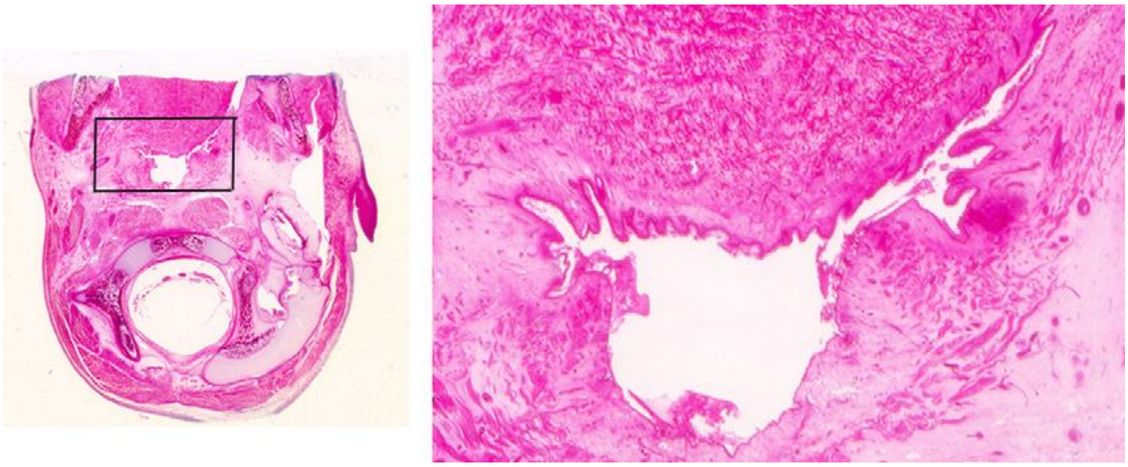

Fig. 3: Eighteen-week fetus – axial section through oropharynx. Detail shows evagination and branching of the epithelium (After ***Isaacson and Parikh, 2008).***

The epithelium that covers the tonsil's medial surface and lines the tonsillar crypts arises from the second branchial (pharyngeal) pouch. The outer edges of this outpouching goes onto form the faucial arches and mucosa plicae. In the embryo, solid epithelial cores form in the lateral walls of each pouch and grow outward into the surrounding mesenchymal tissue. These epithelial cores branch and subsequently canalize. The branches ultimately become the primary and secondary tonsillar crypts (Fig. 4a).

Transmission electron microscopy has demonstrated that the mature crypt epithelium is porous and allows the protrusion of lymphocytes that mediate the immune response ***(Choi et al., 1996).***

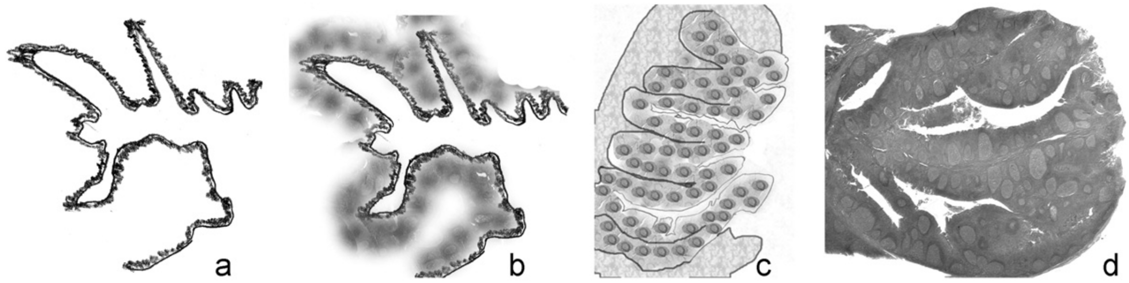

Fig. 4 Development of the tonsil (a) epithelial evagination, (b) lymphoid infiltration of the lamina propria, (c) primary germinal centers development before birth and (d) hyperplastic tonsil of childhood *(*After ***Isaacson and Parikh, 2008).***

The mucosa of the tonsillar fossa is similar in microscopic structure to the lining of the oropharynx. Its surface is non-keratinizing squamous epithelium with an underlying lamina propria. The pharyngeal tonsils are a part of the mucosa-associated lymphatic tissue system and develop their monocellular populations in a fashion much like the Peyer's patches in the gut ***(Boyaka et al., 2000).***

Around the 16^{th} week post-conception, the lamina propria is invaded by wandering lymphocytes and lymphoid stem cells of bone marrow origin ***(von Gaudecker, 1988).*** (Fig. 4b)

The lymphatic tissue surrounding the crypts becomes organized into a cellular architecture resembling that of lymph nodes and includes B-cell follicles, primary germinal centers, and extra-follicular T-cell areas ***(Brandtzaeg, 2003).*** (Fig. 4c).