Effect of Rhinoplasty on Nasal Function

Thesis

Submitted for partial fulfillment of Master Degree in Otorhinolaryngology

By

Mohamed Aly Mahmoud Hazem Abou-Zeid

(M.B., B.Ch.)

Supervisors

Prof. Dr. Nabil Galal Mohamed Zeid

Professor of Otorhinolaryngology

Faculty of medicine

Cairo University

Dr. Mahmoud El Sayed El Fouly

Lecturer of Otorhinolaryngology

Faculty of medicine

Cairo University

Dr. Basim Metwally Wahba

Lecturer of Otorhinolaryngology

Faculty of Medicine

Cairo University

Faculty of Medicine

Cairo University

2015

Abstract

Septorhinoplasty is the most commonly performed facial plastic surgery procedure, which aims to correct nasal shape and nasal function. Following the septorhinoplasty procedure, there is a potential risk of postoperative nasal obstruction. In the present study twenty subjects who underwent rhinoplasty for cosmetic or functional reasons were subjected to preoperative and postoperative evaluation of nasal function both objectively and subjectively. Follow up assessment was done two weeks and three months postoperatively. Subjective evaluation was done by the NOSE score technique and objective evaluation by active anterior Rhinomanometry to measure the nasal airway resistance. In conclusion: Rhinoplasty positively affects the nasal function subjectively and objectively in the long term and this is believed to be achieved by proper selection of patients and recognizing the patients who are at high risk of airway compromise so as to use the suitable surgical techniques according to the surgeons experience to achieve a favorable outcome both functional and aesthetical.

Key Words: Rhinoplasty, Rhinomanometry, Nasal function.

Acknowledgment

Thanks to Allah, without his help this work couldn't be accomplished.

I'd like to express my deep & sincere gratitude to my eminent supervisor Prof. Dr. Nabil Galal, Professor of otorhinolaryngology, Cairo University, for his continuous teaching, support and care. He is a role model in being highly ethical and scientific,

I'd like to greatly thank Dr. Mahmoud El-Fouly, lecturer of otorhinolaryngology, Cairo University, he is a highly skilled and talented plastic surgeon this work could not be accomplished without him.

I am indebted to Dr. Basim Metwally, lecturer of otorhinolaryngology, Cairo University, for his supervision and continuous advice and dedication to this work

I have to acknowledge that I am proud to be a part of the otorhinolaryngology, Cairo University, and that I promise to serve my country well in it.

I dedicate this work to my family for enduring with me and always encouraging and supporting me during the journey of my residency and my whole life before it.

Last but not least I would like to thank my friends and colleagues.

M. Aly Abou-Zeid

List of Abbreviations

AR: Acoustic rhinometry

B-SIT: Brief smell identification test

CC-SIT: Cross-cultural smell identification test

CSA: Cross-sectional area

CT: Computed tomography

FEV 1: Forced expiratory volume in one second

INV: Internal nasal valve

LLC: Lower lateral cartilage

MCA: Minimal cross-sectional area

MRI: Magnetic resonance imaging

NOSE: Nasal obstruction symptom evaluation

PIFR: Peak inspiratory flow

QOL: Quality of life

ROE: Rhinoplasty Outcome Evaluation

SIT: Smell identification test also known as UPSIT University of Pennsylvania smell identification test

SNOT-22: Sino-nasal outcome test-22

TDI: Threshold, discrimination and identification

ULC: Upper lateral cartilage

VAS: Visual analogue scale

List of Figures

List of Tables

Table of Contents

Introduction

Rhinoplasty has become one of the main cosmetic surgeries performed by otorhinolaryngologists and plastic surgeons. The major indications for rhinoplasty are: cosmetic and cosmetic-functional. Cosmetic-functional rhinoplasty, or septorhinoplasty, means the cosmetic repair of the nasal pyramid, together with surgery of the nasal septum in order to improve patient complaints associated with nasal obstruction and hyposmia ***(Arima et al., 2011)***. Septorhinoplasty is the most commonly performed facial plastic surgery procedure, which aims to correct nasal shape and nasal function ***(Celebi et al., 2014).***

Following the septorhinoplasty procedure, there is a potential risk of postoperative nasal obstruction ***(Johnson and Hollins, 2009)***.

As a result 10% of the patients after primary rhinoplasty complain about residual or new breathing problems primarily because of residual septal deviations or nasal vestibular stenosis ***(Beekhuis, 1976).*** Valve problems are very often caused by the separation of the upper lateral cartilages from the septum ***(Roithman et al., 1997).*** Deep osteotomies can narrow the airways at the piriform aperture ***(Guyuron, 1998).*** Excessive alar cartilage resections can cause alar collapse and semicircular scars. In most of the cases however rhinoplasty does not deteriorate the breathing function ***(Adamson et al., 1990)***. If a patient's complaint of a blocked nose cannot be explained by inspection or measurement, a loss of mucosal sensitivity has to be taken into consideration. The feeling of warm and cold air during respiration is essential for the perception of a well functioning nose ***(Wrobel and Leopold, 2005)***. The loss of sensitivity caused by surgical scars can give the impression of a blocked nasal airway. Additional surgical interventions like turbinate resections or

widening of the nasal vestibule do not improve the situation but even make it worse. Hyposmia after rhinoplasty is only temporarily in most cases because of mucosa swelling. It is only found by testing and not even realised by the patient ***(Dürr et al., 2002).***

If the nasal muscles are damaged during the surgical procedures, their functions can also be affected and their role in phonation, respiration and facial mimics ***(Clark et al., 1998)***. Many patients are concerned about possible changes in the ability to smell ***(Razmpa et al., 2013)***.

Preoperative and postoperative alterations in nasal function can be measured both objectively and subjectively (***Erdogan et al., 2013)***.

By documenting both preoperatively and postoperatively the patient's subjective nasal function with a questionnaire and objective nasal function with rhinomanometry, a patient's condition and surgical result can be measured quantifiably ***(Murrell, 2014).***

Aim of the work

The aim of this study is to evaluate the effect of rhinoplasty on the nasal function, to assess the nasal function both subjectively and objectively in healthy individuals undergoing rhinoplasty. Moreover, this will help determine whether the cause of postoperative nasal obstruction, if it is present, is subjectively felt by the patient only or due to an organic cause.

Nasal Valves Anatomy

The word valve derives from the Latin “valva” and was originally used to describe one leaf of a folding door. A structure which controls flow is therefore implicit in the concept of a valve, and a controlling function is also stressed in modern dictionary definitions which define a valve as a regulatory device which acts to control the flow of liquids or gases (Oxford English Dictionary, 1971) ***(Shaida and Kenyon, 2000)***.

The concept of a valve in the nasal airway was first suggested by Mink who used it to describe the region of maximal nasal resistance (Mink, 1920) ***(Shaida and Kenyon, 2000)***. Mink applied the term to the main site of nasal resistance, which he placed at the junction of the upper and lower lateral alar cartilages ***(Haight and Cole, 1983)***, which he initially described as a ‘‘slit-like opening’’ placed at the junction between the upper lateral cartilage (ULC) and the lower lateral cartilage (LLC) ***(Lee et al., 2009)***.

The nasal valve is the part of the nose with the narrowest cross-sectional area. Anatomically, it is the triangular area bordered by the caudal edge of the ULC superolaterally, the septum medially, and the bony pyriform aperture inferiorly. The triangle may be indented at its inferolateral corner by the inferior turbinate. The septum at this level is usually just anterior to the bony-cartilagenous junction. The internal valve is located at the junction of the medial caudal ULC with the dorsal septum. The external valve is composed of the dense connective tissue that surrounds the sesamoid cartilages. This dense fibrous tissue also connects the ULC and the lateral crura of the LLC to the bony pyriform aperture ***(Miller and Constantinides, 1999)***.

The nasal valve area is located at an angle in the sagittal plane ***(Bloching, 2007)***.

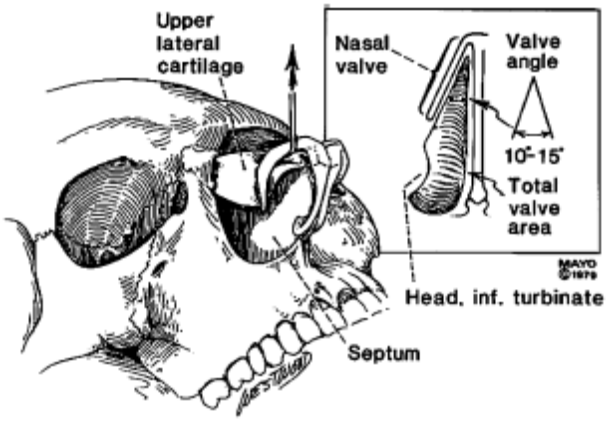

Figure 1: The nasal valve area is bounded by nasal septum. Caudal end of upper lateral cartilage, and soft fibrofatty tissue overlying pyriform aperture and floor of nose and posteriorly by the head of the inferior turbinate. This area is shaped like an inverted cone or teardrop, the slit like apex of which is the nasal valve angle, and normally subtends an angle of 10 to 15 degrees after ***(Kim and Rodriguez-Bruno, 2009)***

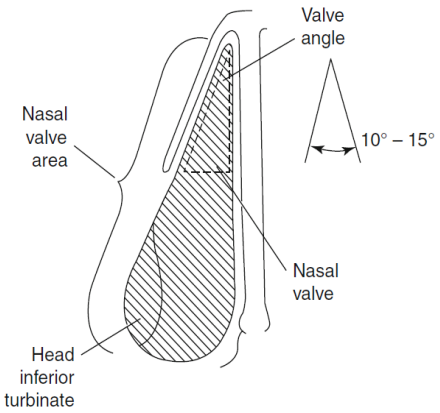

Figure 2: Anatomy of the nasal valve after ***(Friedman, 2013).***