Abstract

Objective:

The aim of the study was to compare the surgical outcome between powered turbinectomy and powered turbinoplasty as two surgical procedures in the treatment of hypertrophied inferior turbinate.

Design:

Prospective randomized controlled trial study.

Setting:

Tertiary academic hospital (Kaser Al-Ainy School of medicine)

Candidates:

Forty patients were randomized into two study groups; twenty patients underwent powered turbinectomy and the other twenty patients underwent powered turbinoplasty.

Outcome: Assessment was done after 1 week, 4 weeks and 12 weeks.

- Subjective: postoperative assessment of the subjective symptoms (i.e., nasal obstruction and nasal discharge).
- Objective: postoperative assessment of the patients in the outpatient clinic by endoscopic examination and rhinomanometry.

Results:

There was no significant difference between the two groups regarding nasal obstruction. However, powered turbinoplasty had postoperative advantages over powered turbinectomy in crustation, blood clots and nasal discharge.

Conclusion:

Both surgical procedures are promising to achieve the optimum reduction of the turbinate and the minimal postoperative morbidity.

Key words:

Inferior _ turbinate _ powered _ nasal _ obstruction _ turbinoplasty _ turbinectomy

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Acknowledgement

Firstly, I would like to express my sincere gratitude to ***Prof. Dr. Sherif Gabr*** Professor of Otorhinolaryngology, Faculty of Medicine, Cairo University, for his supervision, help and support during the conduction of this work.

I would also like to thank ***Prof. Dr. Nabil Galal*** Professor of Otorhinolaryngology, Faculty of Medicine, Cairo University, for his valuable advice in choosing the topic of this study.

I owe my thanks to ***Dr. Mahmoud El Fouly***, Lecturer of Otorhinolaryngology, Faculty of Medicine, Cairo University for his help throughout the study especially in the operation theatre.

I deeply thank ***Dr. Ahmed kamel*** Lecturer of Otorhinolaryngology, Cairo University, for his great role & efforts during the fulfilment of this study.

I am greatly thankful to ***Dr. Basim Metwally*** Lecturer of Otorhinolaryngology, Cairo University, for his continuous guidance & help during conduction of this work.

Also I wish to express my deep thanks to ***Dr. Ahmed Elbatawy*** Lecturer of Otorhinolaryngology, Cairo University, for his encouragement during preparation of this work.

Lastly, I am really grateful to my friend and brother ***A.Lect. Ahmad Mohamed Eltelety*** Assistant Lecturer of Otorhinolaryngology, Cairo University, for his endless help from the first day I knew him and very especially during the selection of cases for this study.

DEEP THANKS

✓ I would like to convey my immense gratitude to this epic facility, to all professors, doctors and ancillary staff of Kasr Al Ainy Hospital.

Introduction

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Chronic nasal obstruction is one of the most common human problems and a very frequent symptom in the otorhinolaryngology. Inferior turbinate hypertrophy is one of the main causes of chronic nasal obstruction ***(Passali et al., 1995)***.

A study of the nasal valve confirmed that most nasal resistance occurs at the level of the anterior end of the inferior nasal concha. Hypertrophy of the inferior turbinate maybe due to allergic, pseudo allergic, infectious, vasomotor, eosinophilic syndrome, medicamentous or due to iatrogenic rhinopathy. Hypertrophy of the inferior turbinate classified into mucosal or bony, therefore surgery has the upper hand on management of cases with bony hypertrophy and cases that did not respond to medical treatment ***(Friedman et al., 2006)***.

The usual medical treatment is nasal decongestant drops with antihistamines, topical and systemic steroids, allergen avoidance, and specific immunotherapy involving hyposensitisation. Extensive use of nasal decongestants usually leads to damage of the nasal mucosa. As medical treatment modalities last only for a short period, surgery is necessary in many cases ***(Kassab, 2012)***.

Since the 1890s, at least 13 different surgical techniques for reduction of the inferior turbinate have been described. The ideal surgery of the inferior turbinate should accomplish a long-lasting reduction of the turbinate size with preservation of the turbinate function and with minimal complications. Evidence is mounting that submucosal resection (turbinoplasty), combined with a lateral displacement of

the remainder inferior turbinate, is the nearest to this ideal ***(Hol & Huizing, 2000)***. However, no technique is perfect, and each is associated with known short and long-term complications such as postoperative bleeding, crustations, foul odour, pain, hyposmia and synechiae ***(Kassab, 2012)***.

Introduction of microdebrider to nasal surgeries by ***Setcliff and Parsons*** encourages many surgeons to perform inferior turbinoplasty, utilizing the advantages of the powered system. Therefore the common complications of standard submucosal resection of the inferior turbinates were largely avoided. In addition, this technique of turbinate reduction has been shown to be reliable, safe and mucosal sparing which provides more nasal function sparing with less post operative complications ***(Lee et al., 2001)***.

Review of literature

Review of Literature

Embryology of the nasal turbinate

The developmental precursors of the nose are the neural crest cells, which commence their caudal migration toward the midface around the fourth week of gestation. Two nasal placodes develop inferiorly in a symmetrical fashion. Nasal pits divide the placodes into medial and lateral nasal processes. The medial processes become the septum, philtrum, and premaxilla of the nose; whereas the lateral processes form the sides of the nose. Inferior to the nasal complex, the stomodeum, or future mouth, is formed ***(Szolar et al., 1994)***.

A series of elevations appear on the lateral wall of the nose from the sixth fetal week which will ultimately form the turbinates. The most inferior or maxilloturbinal forms the inferior turbinate. The middle, superior and supreme turbinates result from reduction of the complex ethmoturbinal system found in lower mammals. Similarly, the primitive nasoturbinal is represented by the agger nasi region and uncinate process of the ethmoid ***(Stammberger & Lund, 2008)***.

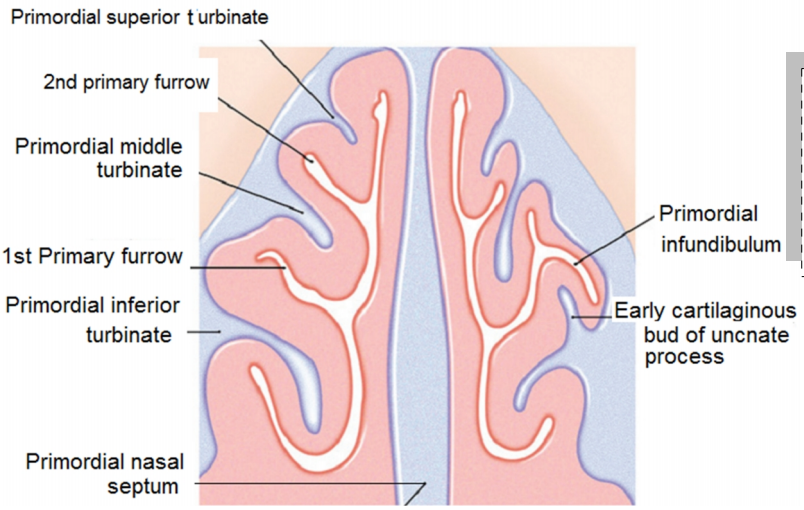

Figure 1: Illustration of cartilaginous nasal capsule at 9 to 12 weeks of fetal development ***(Sarah et al., 2012)***.

Anatomy of the inferior turbinate

The lateral wall of the nasal cavity is formed from the maxilla and its anterior and posterior fontanelles anteroinferiorly, by the perpendicular plate of the palatine bone posteriorly; and by the labyrinth of the ethmoid bone superiorly. It contains three projections of variable size, the inferior, middle and superior nasal turbinates (conchae). The turbinates curve generally inferomedially, each roofing a groove, or meatus, which is open to the nasal cavity ***(Susan et al., 2005)***.

The inferior nasal turbinate is a curved horizontal lamina in the lateral nasal wall. Each turbinate has medial and lateral surface, superior and inferior border and anterior and posterior end. The medial surface is convex, much perforated, and longitudinally grooved by vessels. While, the lateral surface is concave and a part of the inferior meatus. The superior border, is thin and irregular, may be divided into three regions: an anterior region articulating with the conchal crest of the maxilla; a posterior region articulating with the conchal crest of the palatine bone;

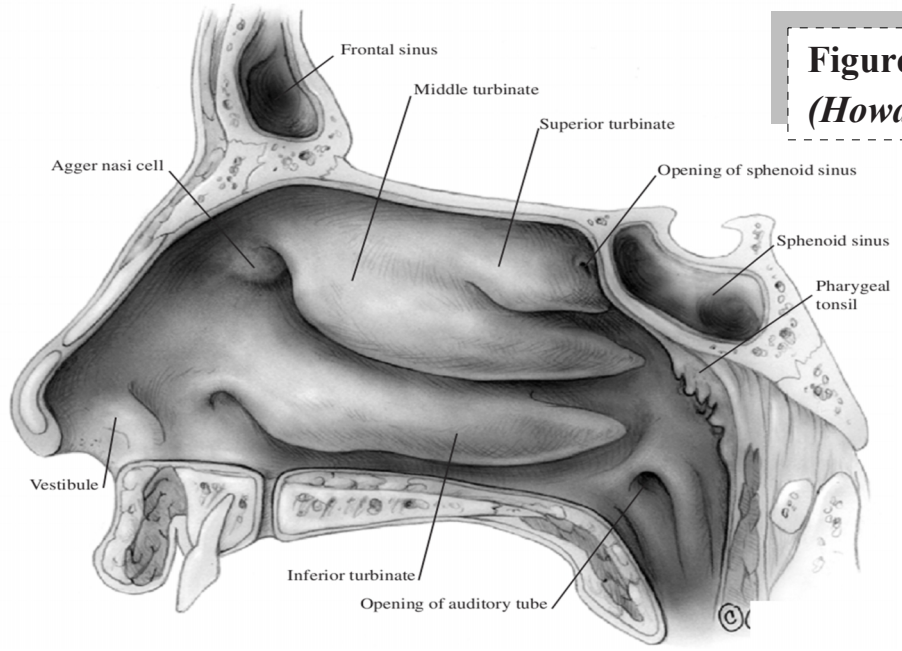

Figure 2: Lateral nasal wall ***(Howard & M. Pais 2005).***

and a middle region with three processes, which are variable in size and form ***(Susan et al., 2008)***.

The lacrimal process is small, pointed and lies towards the front. It articulates apically with a descending process from the lacrimal bone, and at its margins with the edges of the nasolacrimal groove on the medial surface of the maxilla, thereby helping to complete the nasolacrimal canal. Most posteriorly, a thin ethmoidal process ascends to meet the uncinate process of the ethmoid bone. An intermediate thin maxillary process curves inferolaterally to articulate with the medial surface of the maxilla at the opening of the maxillary sinus. The inferior border is thick and spongiose, especially in its midpart. Both the anterior and posterior ends of the inferior nasal concha are more or less tapered, the posterior more than the anterior ***(Susan et al., 2008)***.

The inferior turbinate (or concha) is an independent bone that characterized to be thin, curved and articulates with nasal surface of the maxilla and the perpendicular plate of palatine bone. The free lower border on curved and the subjacent inferior meatus reaches the nasal floor. The inferior is the largest meatus; it extends along all of lateral nasal wall. The opening of the nasolacrimal duct is found in junction between the anterior and the middle thirds of the meatus ***(Susan et al., 2005)***.

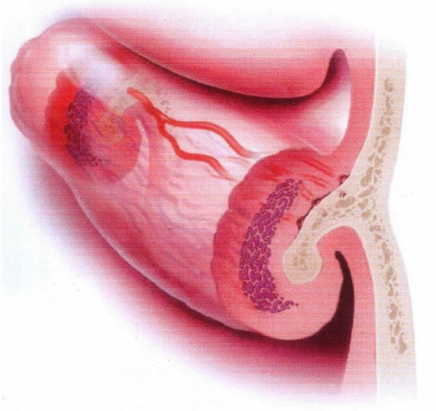

Figure 3: Diagram showing the inferior turbinate with its bony part with covering periostium and arterial blood supply ***(Liu et al., 2009)***.

The inferior turbinate plays a key role in the nasal airway. The structure consists of a bony core (conchal bone) with a soft tissue cover that consists of a fibroelastic stroma, submucosal glands, and cavernous sinusoids. The soft tissue portion of the inferior turbinate can be further broken down into medial and lateral portions that are separated by the internal conchal bone. Blood flow through the cavernous sinusoids is regulated by the autonomic nervous system and leads to subsequent enlargement or reduction in size of the inferior turbinate ***(Berger et al., 2006)***.

Inferior nasal turbinates, project from the lateral wall of each side of the nose into the cavity. It receives its blood supply from branches of the sphenopalatine artery, the end artery of the internal maxillary branch of the external carotid artery. The lymphatic system of the nasal mucosa drains into the superficial cervical lymph nodes, which drain into the posterior cervical lymph nodes ***(Lee &Chen, 2004)***.

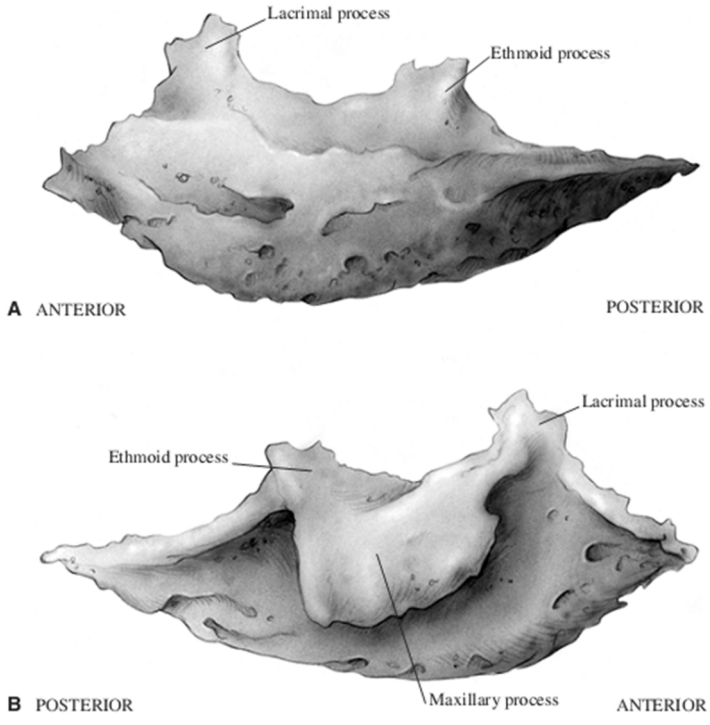

Figure 4: The right inferior turbinate. (A) Medial surface. (B) Lateral surface. ***(Howard & M. Pais 2005)***.

Microscopic Anatomy of Normal Inferior Turbinate

The inferior turbinate is an elongated scroll like paired structure situated at the lateral nasal wall and made of a central core of an irregular osseous structure covered on each side by a mucosal layer. The inferior turbinate bone articulates along its superior border with maxilla, lacrimal, ethmoid and palatine bones ***(Graney et al., 1995)***.

The inferior turbinate is composed of three layers: medial mucosal layer, lateral mucosal layer and a central osseous core in between them. The mucosal layer resembles each other except the medial layer is considerably thicker than the lateral one. The bony layer of inferior turbinate is attached to the lateral wall superiorly and laterally. Inferiorly its wall is circumscribed by an ellipse shaped mucosa ***(Tuvia et al., 2005)***.

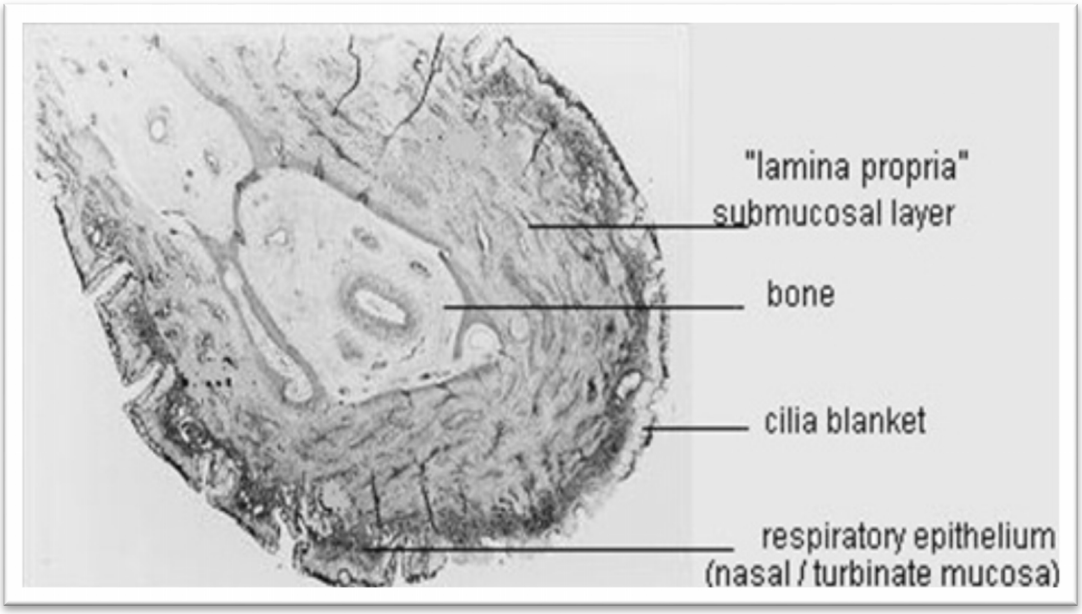

Figure 5: Cut section in Inferior turbinate showing histology ***(Tuvia et al., 2005)***.