The Role of Middle Meatal Spacers after Functional Endoscopic Sinus Surgery

Thesis study

Submitted for the fulfillment of Master Degree in Otorhinolaryngology

By

Dina Mahmoud Awad Allah

(M.B.B.Ch.)

Supervised by:

Prof. Dr. Mohamed El-Ayadi

Professor of Otorhinolaryngology

Faculty of medicine

Cairo University

Prof. Dr. Louay El Sharkawy

Professor of Otorhinolaryngology

Faculty of medicine

Cairo University

Prof. Dr. Nassim Talaat

Professor of Otorhinolaryngology

Faculty of medicine

Cairo University

2015

Acknowledgment

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

I'd like to show my gratefulness to my ***Prof. Mohamed El-Aiady*** *for his supervision and encouragement during this work.*

I'd like to thank ***Prof. Louay El Sharkawy*** *for his support and help throughout this work.*

Also, I would like to express my appreciation to ***Prof. Nassim Talaat*** *for his support. He has spared no effort in his help and advice during the work.*

I won't forget my family encouragement and support during this work specially my parents, my husband, my little son and my sisters.

Finally I would like to thank my father for his support, help and encouragement.

Abstract

Lateralization of the middle turbinate is the most common complication encountered after endoscopic sinus surgery and can result in occlusion of the sinus drainage pathway leading to recurrent symptoms and subsequent surgical failure. Middle meatal spacer is often used after endoscopic sinus surgery to prevent synechiae and bleeding. This study have shown that Surgicel® (absorbable spacer) is more comfortable giving less pain, nasal blockage and nasal crustations; however this is statically insignificant. The results have also shown Surgicel® side had better results in significant less bleeding, better mucosal healing and decreased the incidence of lateralization of middle turbinate.

Keywords

ESS–Lateralization of middle turbinate –nasal packing–absorbable packing

List of Contents

- Introduction ……...……..	1
- Aim of work……..	3
- Review of literature	4
• Anatomy of the Nose and paranasal sinuses	4
• Physiology of the Nose	17
• Endoscopic sinus surgery (ESS)	22
• Complications of ESS	34
• How to avoid lateralization of middle turbinate?	38
- Material and Methods ……..….	59
- Results ……...	63
- Discussion ……..	98
- Conclusion ……	107
- Summary ……	108
- References ……...……...	110

List of figures

❖ Figures	Page
• **Fig 1** Saggital plane of the turbinates.	5
• **Fig 2** Anatomical configuration of the basal lamella.	6
• **Fig 3** The relationship of the superior, inferior, and middle meatus to the sinus ostia.	10
• **Fig 4** Anatomy of opened left maxillary sinus.	12
• **Fig 5** Sagittal section through the nose and ethmoid sinuses.	13
• **Fig 6** Classic Messerklinger incision.	27
• **Fig 7** Uncinate process luxation.	28
• **Fig 8** Maxillary antrostomy.	29
• **Fig 9.** Steps of anterior ethmoidectomy.	30
• **Fig 10.** CT image demonstrating suture medialization technique	40
• **Fig 11.** Schematic diagram of nasal septal flap technique.	40
• **Fig 12** Surgiclip technique	41
• **Fig 13** Steroid eluting sinus implant	42
• **Fig 14** Rubber coated sponge packs	43
• **Fig 15** Merocel ® pack	44
• **Fig 16** Rapid Rhino ® Nasal Dressing	45
• **Fig 17** Fan-shaped Silastic sheet.	47
• **Fig 18** Gelfoam	49
• **Fig 19** Stammberger Sinu-Foam® Nasal Dressing.	50
• **Fig 20** Nasopore®	52

• **Fig 21** Percentage of the aetiology among cases	63
• **Fig 22-23** case of sinonasal polypi as detected by endoscopic examination	64
• **Fig 24-25-26-27** CT of nose &PNS	65
• **Fig 28-29** Surgicel placed in the middle meatus at the end of endoscopic sinus surgery	67
• **Fig 30** Frequency of bleeding after pack removal on day 2	68
• **Fig 31**Postoperative endoscopic evaluation of the left middle meatus that was not packed by Surgicel® showing blood clots in the middle meatus after 1week	79
• **Fig 32** Postoperative endoscopic evaluation of the left middle meatus that was not packed by Surgicel® showing purulent discharge in the middle meatus after 2 weeks.	80
• **Fig 33** Surgicel® appearance after 2 weeks completely absorbed with no adhesion in the middle meatus	81
• **Fig 34** Postoperative endoscopic evaluation of the left middle meatus that was packed by Surgicel® show no edema, adhesions, granulation or crusts after 1 month	83
• **Fig 35** Postoperative endoscopic evaluation of the right middle meatus that was not packed by Surgicel® show minimal adhesions after 1 month	84
• **Fig 36** Postoperative endoscopic evaluation of right side that was packed by Surgicel® after 1 month showing minimal crustations	86
• **Fig 37** Postoperative endoscopic evaluation of left side that was not packed by Surgicel® after 1 month showing mild edema.	87
• **Fig 38** Postoperative endoscopic evaluation of the right middle meatus that was packed by Surgicel® show minimal adhesions after 2 month	88
• **Fig 39** Postoperative endoscopic evaluation of the right middle meatus that was packed by Surgicel® show no edema, adhesions, granulation or crusts after 3 month	91
• **Fig 40** Postoperative endoscopic evaluation of the leftt middle meatus that was not packed by Surgicel® show moderate adhesions after 3 month.	92

List of Tables

Table	**Page**
• **Table 1.** Grading of bleeding on packing removal at the first Postoperative Visit (day2)	60
• **Table 2.** Grading of presence of synechia/MT lateralization	61
• **Table 3.** Grading of the Degree of Sinonasal Mucosal edema	62
• **Table 4.** Grading of the appearance of nasal secretion	62
• **Table 5.** Grading of presence of granulation tissue	62
• **Table 6.** Grading of presence of crusts	62
• **Table 7.**Showing comparison between both sides of the nose regarding bleeding after pack removal on day	68
• **Table 8:** Showing comparison between both sides of the nose regarding questionnaire results after 1 week	70
• **Table 9:** Showing comparison between both sides of the nose regarding questionnaire results after 2 weeks.	72
• **Table 10:** Showing comparison between both sides of the nose regarding questionnaire results after 1 month	73
• **Table 11:** Showing comparison between both sides of the nose regarding questionnaire results after 2 months	75
• **Table 12:** Showing comparison between both sides of the nose regarding questionnaire results after 3 months.	76
• **Table 13:** Showing comparison between both sides of the nose regarding endoscopic examination after 1 week	79
• **Table 14:** Showing comparison between both sides of the nose regarding endoscopic examination after 2 weeks.	82
• **Table 15:** Showing comparison between both sides of the nose regarding endoscopic examination after 1 month.	86
• **Table 16:** Showing comparison between both sides of the nose regarding endoscopic examination after 2 months.	89
• **Table 17:** Showing comparison between both sides of the nose regarding endoscopic examination after 3 months.	93
• **Table 18:** Showing comparison between both sides of the nose regarding total nasal scores.	94

Introduction

Introduction

Endoscopic sinus surgery (ESS) is the mainstay of surgical management for sinus pathology in the modern age. The most common reason for performing ESS is for chronic rhinosinusitis, with or without polyp disease. However, the extended applications of ESS include closure of CSF leaks, resection of sinonasal tumors, nasolacrimal duct surgery, orbital decompression, and a means of approach to the skull base and intracranial cavity. **(Palmer and Kennedy 2005)**

However, despite numerous advances in surgical techniques and equipment, the potential for complications during the postoperative period remains. Disappointing results can occur for a variety of reasons. Scarring can manifest in numerous ways, including stenosis of the sinus ostia or adhesions/synechiae with subsequent middle turbinate lateralization. **(Otto and Del Gaudio 2010)**

Lateralization of middle turbinate with scarring and obstruction of the middle meatus are the most common complications of endoscopic sinus surgery (ESS) Consequently, the risk of synechia formation and the recurrence of sinusitis increase, necessitating further surgery.**(Lazar et al.1992)**

Various techniques are described to prevent middle turbinate lateralization after sinus surgery. **(Biedlingmaier 1993)** These include prophylactic partial turbinate resection **(Bolger et al. 1999)**, "controlled" synechiae formation **(Lindemann et al. 2002)**, and middle turbinate-septum clipping. **(Moukarzel et al. 2000)**

Other intraoperative methods aim at minimizing middle turbinate lateralization currently exists. These include the use of space occupying packing, stents, sponges, and gels. **(Weitzel and Wormald 2008)**

The use of middle meatal packing post-FESS is common among sinus surgeons. A middle meatal pack is felt to help promote homeostasis and behave as a stent to prevent middle turbinate lateralization and as a spacer to prevent blood or mucus

accumulation in the ethmoid cavity postoperatively. Packing may also prevent synechia development and reduce the risk of restenosis. **(Bugten et al. 2006)**

The use of removable nasal packing for the patients is highly uncomfortable and induces local pain and pressure. **(Pomerantz and Dotton 2005)**

The removal of nasal packing has been described as the most painful part of the whole treatment. **(Ozcan et al. 2008)**

Therefore, there has been an increasing tendency to move away from removable nasal packing due to the discomfort and bleeding experienced on removal. The use of an absorbable packing material following ESS obviates some of the drawbacks of removable nasal packing. Due to their excellent haemostatic properties and superior patient comfort, a number of absorbable materials have been developed and are now routinely used after ESS. **(Franklin and Wright 2007)**

These materials differ substantially in their mechanisms of action, composition, method of delivery, clearance profile, and cost. **(Valentine et al. 2009)**

The use of various interventions from removable nasal spacer absorbable nasal spacer to no spacer at all is widely debated. **(Von Schoenberg et al. 1993)**

Some surgeons advocate not placing spacer in the middle meatus, whereas other continues to use this technique to prevent middle turbinate lateralization. Controversy still exists about whether to place spacer or not. **(Kennedy 1985)**

Aim of Work

Aim of work

The purpose of this study is to evaluate the efficacy of an absorbable middle meatal spacer after functional endoscopic sinus surgery. The parameters measures will include subjective assessment of four criteria: pain & headache, crustations, nasal blockage, and bleeding, as well as endoscopic assessment of healing postoperatively by applying the Lund-Kennedy endoscopic scoring system. Endoscopic assessment includes five parameters: appearance of nasal secretion, the degree of mucosal edema, the presence of granulation tissue in middle meatus, the presence of crustations in middle meatus, synechiae and lateralization of middle turbinate.

Review of Literature

Anatomy of the Nose and paranasal sinuses

❖ The External Nose:

The external nose is an inverted pyramid. It consists of an osteo-cartilagenous framework covered by muscles and skin. The upper one-third of this framework is bony while the lower two-thirds are cartilaginous. The bony part consists of two nasal bones, the upper part of the nasal process of the frontal bones, and the frontal processes of the maxillae. (**Dhingra 2010)**

The cartilaginous part consists of the upper lateral cartilages, the lower lateral cartilages (Alar cartilages), the lesser alar cartilages (Sesamoid cartilages) and the septal cartilage. The septum supports the dorsum of the cartilaginous part. (**Dhingra 2010)**

❖ The Nasal Cavities:

The nasal cavities begin anteriorly at the nasal vestibule, the anterior bony opening of the nasal cavity, called the piriform aperture, and are bounded laterally and inferiorly by the maxilla and superiorly by the nasal bone. The interior of the nose is divided by the nasal septum into two main cavities. **(Rudolf et al. 2006)**

- **The Nasal septum:**

The nasal septum is composed of a small anterior membranous portion, cartilage and several bones. The cartilaginous portion is composed mainly of the quadrilateral cartilage. It is bound firmly by collagenous fibers to the nasal bones and the bony septum. The perpendicular plate of the ethmoid forms the superior and anterior bony septum, and is continuous above with the cribriform plate and crista galli. **(Lang 1989)**

The vomer forms the posterior and inferior nasal septum and articulates by its two alae with the rostrum of the sphenoid. The inferior border of the vomer articulates with the nasal crest formed by the maxillae and palatine bones. The anterior border

articulates with the perpendicular plate above and the quadrilateral cartilage inferiorly. The posterior edge of the vomer forms the posterior free edge of the septum. **(Scott 1953)**

❖ The lateral nasal wall:

The turbinates are the most prominent feature of the lateral nasal wall **(Bodino et al.2004)**

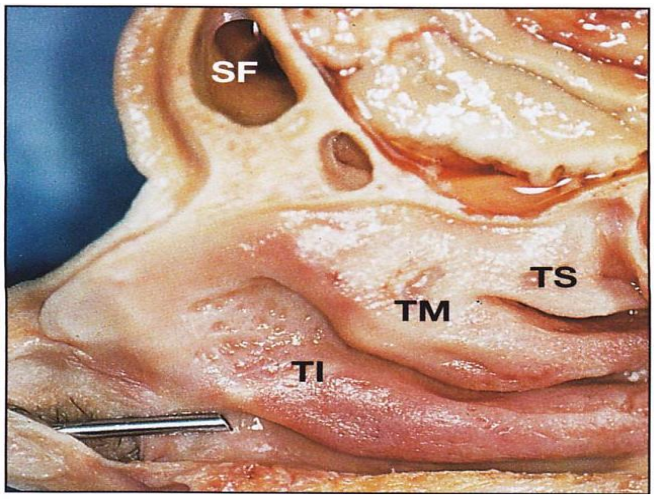

Fig 1. *A cadaveric dissection, saggital paramidian plane showing the inferior turbinate (TI) middle turbinate (TM) superior turbinate (TS) and frontal sinus (SF)* ***(Castelnuovo 2005)***

These turbinates are usually three or sometimes four in number. They appear as scrolls of bone, covered by ciliated columnar epithelium. The superior, middle and inferior turbinates are present in all individuals. A small supreme turbinate may be present in some individuals. **(Bolger 2001)**

The inferior turbinate is a separate structure deriving embryologically from the maxilloturbinal. It inserts anteriorly on the maxilla and posteriorly on the palatine bone. The other turbinates develop from the ethmoturbinals. **(Bodino et al. 2004).**

The middle turbinate has several important features. Anteriorly, the turbinate attaches laterally in the agger nasi region, specifically at the crista ethmoidalis (ethmoidal eminence) of the maxilla. From here, it courses superiorly and medially to attach vertically to the lateral aspect of the lamina cribrosa (cribriform plate). This attachment is maintained for a variable distance until the insertion courses