

Impact of resection of the head of the middle turbinate in endoscopic sinus surgery

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Aim

The aim of the present study was to evaluate the effects of middle turbinate head resection (MTR) on the outcome of endoscopic sinus surgery.

Patients and methods

Patients with bilateral nasal polyps were bilaterally operated upon. From one side, the polyps were removed with preservation of the head of the middle turbinate. From the other side, polyps were removed with MTR. Patients were followed up at 1, 2, 4 weeks, 6 months, 1, and 2 years postoperatively for the presence of crusts, adhesions, polyp recurrence, smell affection, frontal sinus drainage pathway obstruction, and overall nose patency. Moreover, the duration of surgery for both sides was compared.

Results

No statistically significant differences were observed in the presence of crusts, adhesions, polyp recurrence, smell affection, frontal sinus drainage pathway obstruction, or overall nasal patency between the findings on the two operated sides. The operative time was significantly shorter for the group with MTR.

Conclusion

MTR carries no adverse effects and can be carried out safely in endoscopic sinus surgery.

Keywords:

endoscopy, middle turbinate resection, nasal surgery

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Introduction

The middle turbinate (MT) is a dynamic structure. It participates in the direction of the air flow, olfaction, humidification, filtration, and temperature control of inspired air [1,2]. Moreover, it serves as a vital landmark to the maxillary ostium, frontal, ethmoid, sphenoid sinuses, skull base, orbit, and olfactory cleft [3].

The surgical fate of the MT has remained a point of argument throughout the history of endoscopic sinus surgery. Early teaching was divided, with Wigand advocating routine resection of middle turbinate (MTR), whereas Messerklinger taught routine preservation [1,4,5].

Although some surgeons emphasize the importance of maintaining the MT, others resect it without adverse sequelae [6]. The fate of the MT in endoscopic sinus surgery is determined by its structural integrity, its potential to obstruct the middle meatus (MM), and the potential need for easy access to the ethmoid cavity [7].

Several authors cited multiple risks of MTR including alteration in nasal function, formation of excessive scar tissue, postoperative epistaxis, atrophic rhinitis, anosmia, frontal sinusitis, and loss of anatomic landmarks for revision surgery [8–11].

Alternatively, many surgeons believe that MTR avoids the negative impact of turbinate lateralization,

improves intraoperative visualization and access to the posterior ethmoid and sphenoid sinuses. It also prevents synechia formation and improves long-term patency of MM antrostomy [8,12–14].

To resect the MT when needed or to do your best to preserve it is still a matter of debate among surgeons.

The aim of our study was to evaluate the effects of resecting the anteroinferior part (head) of MT on airway patency, crustations and adhesions in the MM, recurrence of nasal polyps, sense of olfaction and frontal sinus drainage pathway. We also calculated the time required to perform the surgery with and without MTR.

Patients and methods

The present study was conducted in Assiut University Hospital during the period from March 2009 to June 2013. In total, 42 patients (26 females, 16 males) with a mean age of 32 ± 1 years, were included in this study. Each patient had bilateral nasal polyps

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refractory to medical treatment. Written informed consent was obtained from all patients. The study protocol was approved by the local ethical committee. All cases were surgically treated with functional endoscopic sinus surgery (FESS) with a follow-up for a minimum of 2 years. Children and patients suffering from fungal rhinosinusitis and sinonasal polyposis associated with systemic diseases involving nasal structures (e.g. primary ciliary dyskinesia, cystic fibrosis) were excluded from the study. Furthermore, patients with anatomic variants of the MT, clinically significant deviated nasal septum, and revision surgery were excluded from the study.

A total of 84 sides were operated upon; FESS was done for both sides of each patient, one with MTR and the other without resection. This was done to compare both sides of the same patient and to avoid confounding factors that may get in the way of the comparison, like differences in immunity, allergy, asthma, smoking and so on.

The technique of MTR was similar on all the operated nasal cavities. Utilizing nasal scissors, through-cutting instruments, the anteroinferior part of the MT is removed, sparing 0.5 cm of the superior, sagittally-oriented portion as a landmark. We used to preserve the MT from the first operated side on the grounds that should the MT from the second side flail or get lateralized, the case would not be lost as an invalid case for comparison.

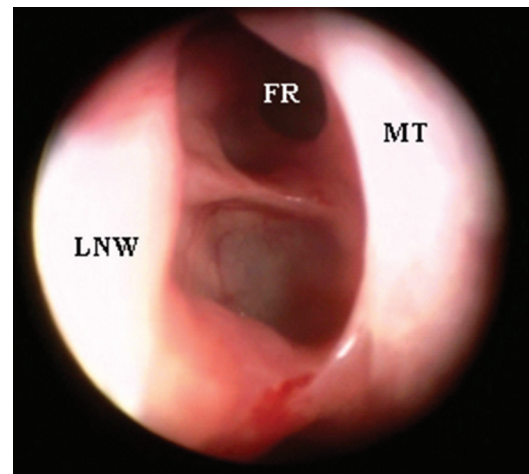
Patients were followed up postoperatively as is routinely done in FESS, weekly in the first month, monthly for 6 months, and at 12, 18, and 24 month postoperatively. The surgery time was calculated for the two sides. The points of comparison were the duration of surgery, occurrence and degree of crustations at 1 month, presence of adhesions in the MM at 6 months, smell affection, frontal drainage pathway obstruction, subjective overall nose patency at 1 year, and polyp recurrence at 2 years (Figs 1 and 2).

We applied the Lund and Kennedy staging for rhinosinusitis [15]. According to this staging system, the endoscopic appearance of the nose was quantified for the presence of crusts and adhesions (0 = absent, 1 = mild, 2 = severe), and recurrence of polyps (0 = none, 1 = confined to MM, 2 = beyond MM).

Patients' subjective opinions of differences in olfaction and nasal patency were recorded by comparing the sense of smell and patency in both sides after surgery.

The diagnosis of frontal sinus pathway obstruction and frontal sinus disease was suspected on the basis

Figure 1



Thirty degree endoscopic view of the right frontal recess area after middle turbinate resection. FR, frontal recess; LNW, lateral nasal wall; MT, middle turbinate.

of the clinical history and was then confirmed by obtaining an objective evidence of sinusitis using the nasal endoscope or computed tomography scan.

Statistical analysis

Statistical package for the social sciences (SPSS), version 16 was used for data analyses, IBM, Armonk, New York, USA. McNemar's test was used to evaluate the differences between the groups treated with different surgical modalities. A *P* value of less than 0.05 was considered statistically significant.

Results

Duration of surgery

The mean duration of FESS was significantly shorter for the side with MTR than that for the other side (36 ± 6 vs. 42 ± 6 min, respectively, $SE = 1$ in both, $P \leq 0.0001$) (Table 1).

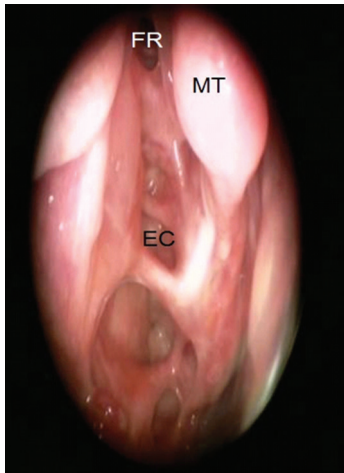
Crustations (at 1 month)

Among the resected sides, 35 (83%) mild and seven (17%) severe crustation were found in comparison with 38 (90.5%) with mild and four (9.5%) with severe crustation among the preserved sides. There were no statistically significant differences between the two sides ($P = 0.4$).

Adhesions (at 6 months)

Four (9.5%) of the resected sides showed mild adhesions in the MM, while one (2.5%) had mild and two other (5%) had severe adhesions in the preserved sides, with

Figure 2



Thirty degree endoscopic view of the right ethmoid cavity and frontal recess area after middle turbinate resection of the same patient shown in Fig. 1. EC, ethmoid cavity; FR, frontal recess, MT, lower part of resected middle turbinate.

Table 1 Postoperative results of functional endoscopic sinus surgery with/without middle turbinate resection

	FESS with MTR (n=42)	FESS without MTR (n=42)	P value
Surgery duration (mean±SD)	36±6	42±6	<0.0001
Crustation* (1 month) (n (%))			
0	0	0	0.4
1	35 (83)	38 (90.5)	
2	7 (17)	4 (9.5)	
Adhesions ^a (6 months) (n (%))			
0	38 (90.5)	39 (92.5)	0.2
1	4 (9.5)	1 (2.5)	
2	0 (0)	2 (5)	
Overall nasal patency (1 year) (n (%))	No difference between the two sides in 37 cases (88%) Better in 4 (9.5%) resected sides	Better in one (2.5%) preserved side	0.4
Smell (1 year)	No difference between the two sides in 40 cases (95%) Better in FESS without resection in 2 cases (5%)		0.5
Frontal recess adhesions (1 year) (n (%)) (n=34)	2 (6)	4 (12)	0.5
Recurrence of polyps ^b (2 years) (n (%))			
0	38 (90)	37 (88)	0.4
1	4 (9.5)	4 (9.5)	
2	0 (0)	1 (2.5)	

FESS, functional endoscopic sinus surgery; MTR, middle turbinate resection; N, number of nasal sides. ^a0=absent, 1=mild, 2=severe. ^b0=none, 1=confined to middle meatus, 2=beyond middle meatus

no statistically significant differences between the two sides ($P = 0.2$).

Overall subjective nasal patency (at 1 year)

In total, 37 patients (88%) found the nasal patency more or less equal in both sides. Four patients (9.5%) found it better in the side with MTR and one patient (2.5%) found it better in the nonresected side. This result was statistically insignificant ($P = 0.4$).

Subjective sense of smell (at 1 year)

Overall, 40 patients (95%) noticed no differences in smell perception between the two sides of the nose, and only two (5%) had better smell perception in the nonresected side. This difference was insignificant ($P = 0.5$).

Frontal recess (at 1 year) (No. 34)

Frontal sinus/recess disease was observed in two resected sides (6%) and four preserved sides (12%), with no statistically significant differences between the two sides ($P = 0.5$). Eight operated sides were excluded during the evaluation of frontal recess/sinus because of aplasia, hypoplasia, or marked asymmetry of the frontal sinuses.

Recurrence of polyps (at 2 years)

Recurrence was noticed in five cases (12%) at 2 years. In one case (2.5%), the recurrence was only unilateral in the preserved side and was extending beyond the MM while the MTR side was recurrence-free. In the remaining four cases (9.5%), recurrence was bilateral and confined to MM. There was no statistically significant differences between the two sides ($P = 0.4$).

Discussion

A great number of reviews have been published attempting to address the issues surrounding MTR. On the whole, studies have failed to show significant deleterious effects related to MTR such as atrophic rhinitis, nasal obstruction, or olfactory loss [8,14,16,17].

In our study, in agreement with the findings of some previous studies [12,18,19], crusting was not a problem in MTR and in preservation. In almost all cases, these crusts disappeared within 4 weeks of surgery with endoscopic cleaning and debridement.

One of the most frequent complications of FESS is MT lateralization, which may promote formation of scars and synechiae in the operated MM, between the turbinate and the lateral nasal wall [20,21]. The

reported incidences vary from 1.2% [22] to 43% [23]. Ramadan and Allen [24] found that synechiae developed in 5.3% of the MTR patients and 9.3% of the MT preservation patients, whereas Vleming *et al.* [22] found no synechiae after MTR.

Several studies [18,25,26] found increased MM antrostomy patency rates, fewer synechiae, improved visualization of the surgical field, and greater ease of cleaning in patients with partial middle turbinectomies. Resection did not cause excessive drying or crusting, and the residual turbinate provided a landmark for postoperative follow-up and future surgery if necessary.

We agree with the previous studies that MTR does not significantly increase the formation of synechiae. Mild MM adhesions were formed in 9.5% of cases of MTR, compared with 2.5% only in MT preservation. On the other hand, marked adhesions were found in 5% of the cases with MT preservation, with no marked adhesions detected in cases with MTR.

A study [16] demonstrated that partial frontoinferior turbinectomy improves nasal airflow and resistance. We agree up to the point that airway patency is somewhat better in operated sides with MTR than those with preservation; however, these differences were not statistically significant.

Interference with the frontal sinus and possible risk for iatrogenic frontal sinusitis secondary to lateralization of the remnant turbinate stump has been discussed by many authors [27,28]. In our study, frontal sinus/recess disease was observed in 6% of the MTR cases, and in 12% of the MT preservation cases. This is comparable to the results of some previous studies [22,24].

Although two patients (5%) reported better smell perception in the preserved MT side at 1 year and no one found the opposite thing, the overall data concluded no significant difference in postoperative smell perception between MTR and preservation sides. Several other studies have obtained the same results [7,26,29].

Although logical that MTR should prolong the time to symptomatic recurrence by decreasing the mucosal surface area on which polyps may grow and later obstruct the sinonasal cavities, with some studies in support of that [6,27,30,31], our study found no significant difference regarding the extensive polyp recurrence between MT resection and preservation.

While Brescia *et al.* [32] showed an improvement from high to low grade of endoscopic score in 75% of the patients after FESS, with MTR, the same improvement was found in 100% of the patients with

MT preservation, we have found no difference in the whole points of evaluation discussed in our study apart from significantly shorter time of surgery.

Conclusion

Conservative MTR during FESS by leaving its superior and posterior parts seems to preserve its integrity and its value as a landmark. It even shortens the operative time and facilitates the office cleaning during follow-up without increasing the postoperative complications

Recommendation

A wider-base study with longer follow-up period is needed to address in details the positive and negative impact of MTR.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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