

Middle turbinate medialization and preservation in endoscopic sinus surgery

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OBJECTIVE/HYPOTHESIS: Lateral synechia formation between the middle turbinate (MT) and the lateral nasal wall is the most common complication of endoscopic sinus surgery. In an attempt to prevent this complication, a simple technique to preserve and medialize the MT was studied.

METHODS: Five hundred patients underwent endoscopic sinus surgery with MT medialization and preservation. The caudal end of the MT and the opposing septal mucosa were abraded with a microdebrider for controlled synechia formation in an attempt to avoid lateralization of the MT. Follow-up ranged from 6 to 18 months, with a mean follow-up of 10 months.

RESULTS: Ninety-three percent of the patients had successful MT medialization with a well-defined synechia between the septum and the MT.

CONCLUSIONS: MT medialization with a microdebrider is simple, is reliable, and should be considered an alternative to turbinate resection or to other turbinate medialization techniques. (Otolaryngol Head Neck Surg 2000;123:76-80.)

The controversy over whether to preserve the middle turbinate (MT) or to sacrifice it is as old as the history of endoscopic sinus surgery (ESS). Those who condemn MT resection are concerned with alteration in nasal function (humidification, filtration), promotion of frontal sinusitis, loss of an important anatomic landmark, development of anosmia, and formation of excessive scar tissue. Most surgeons who advocate complete or partial MT resection do so for practical reasons, including ease of postoperative care,

decreased lateral synechia formation, and higher middle meatal antrostomy patency rates. The ideal surgery will include preservation of the MT with a minimal rate of lateral synechia formation. To reach this goal, some authors have described techniques such as suturing the MT to the nasal septum or using a middle meatal antrostomy stent.^{1,2} Although these authors reported good results, their techniques have not become popular, and many surgeons still routinely perform partial MT resection during middle meatal antrostomy.

The objective of this study was to evaluate our technique for medialization and preservation of the MT. The technique results in controlled synechia formation between the MT and the nasal septum.

METHODS AND MATERIAL

We evaluated 500 patients whose ESSs included MT medialization performed unilaterally or bilaterally with the described technique. Patients who had previous endonasal surgery were not selected for the study. All the patients had undergone ESS between July 1997 and December 1998 to treat persistent chronic sinusitis or polyposis resistant to medical therapy (antibiotics, intranasal steroids, or systemic steroids). The criteria for chronic sinusitis included 8 weeks of persistent symptoms and signs or 4 episodes per year of recurrent acute sinusitis, each lasting at least 10 days with persistent changes on CT 4 weeks after medical therapy.³

Septoplasty and submucosal resection of the inferior turbinates were combined with the endoscopic sinus procedure as indicated. We assessed patients' symptoms (nasal congestion, headache, postnasal drip, nasal discharge, and olfactory disturbance) before and after surgery. After surgery, we asked patients whether they felt their condition had significantly improved, had improved somewhat, had not improved at all, or was worse. Endoscopic appearance (polyps, edema, and discharge) was recorded before and after surgery. Specifically, postoperative endoscopy assessed the presence of controlled synechia between the MT and the septum and the undesired presence of synechia between the MT and the lateral nasal wall. Preoperative CT scan findings were scored on the basis of Kennedy's CT staging.⁴ Surgical extent and intraoperative and postoperative minor and major complications were recorded.

The first postoperative visit was 1 week after the surgery and then monthly as required. The follow-up period ranged from 6 months to 18 months, with a mean of 10 months.

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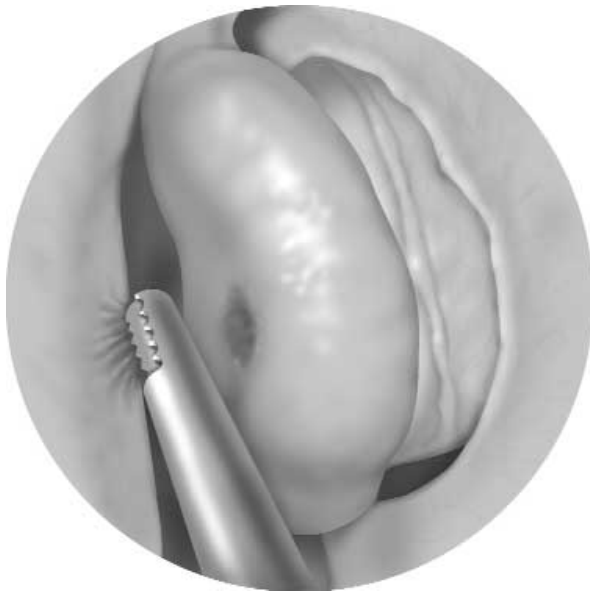


Fig 1. Mucosa of the medial surface of the MT, just posterior to the turbinate caudal edge, and the opposing septal mucosa are abraded with the microdebrider.



Fig 2. Postoperative synechia formation between the MT and the septum. Ethmoid cavity is widely exposed.

SURGICAL TECHNIQUE

The ESS is done almost entirely with the microdebrider. The first surgical maneuver is to gently displace the MT medially with a freer elevator. The uncinete process is identified and then medialized with the hooked end of a frontal sinus ostium seeker. The uncinectomy is done first with small back-biting forceps and then with the 40°, curved microdebrider blade. The visible uncinete process must be completely removed, with great care taken not to abrade the mucosa overlying the lacrimal bone anteriorly or to abrade the anterosuperior attachment of the MT to the lateral nasal wall. At that point, if the maxillary sinus ostium is normal and free of mechanical obstruction, it is preserved. We find it unnecessary to routinely enlarge the maxillary ostium because this creates more raw surface on the lateral nasal wall with a greater potential for lateral synechia formation. The entire ESS is performed with a microdebrider, as described by Cristmas and Krouse,⁵ when indicated.

The MT medialization takes no more than a few seconds and can be performed at any stage during the surgery. The mucosa of the medial surface of the MT, just posterior to the turbinate caudal edge, and the opposing septal mucosa are abraded with the straight microdebrider. This results in a denuded area measuring approximately 3 × 3 mm on both surfaces (Fig 1). The MT is pushed medially by the long nasal speculum, and nasal packing (Telfa) is placed lateral to the MT to maintain its position for 24 to 48 hours. This technique results in controlled synechia formation between the MT and the nasal septum (Fig 2).

RESULTS

We performed MT medialization unilaterally in 284 patients and bilaterally in 216 patients. All together, we performed 716 MT medialization procedures. The ESS included 716 anterior or complete ethmoidectomies, 328 uncinectomies with maxillary ostium preservation, 388 uncinectomies with maxillary antrostomy, 190 sphenoidotomies, and 90 frontal sinusotomies. Septoplasty and submucosal resection were often combined as indicated.

Before surgery, the most frequent symptoms were nasal congestion (94%), headache (63%), postnasal drip (35%), nasal discharge (32%), and olfactory disturbance (8%). After the surgery, 390 (78%) patients reported significant improvement, and 72 (14%) reported some improvement. Overall, 462 (92%) patients reported an improvement in symptoms. Thirty-four (7%) patients noted little or no improvement, and 4 (1%) felt worse after the surgery.

The CT scan staging ranged from stage 1 to stage 4: 190 (38%) patients with stage 1, 160 (32%) with stage 2, 115 (23%) with stage 3, and 35 (7%) with stage 4.

Preoperative endoscopic appearance included 136 (27%) patients with polypoid disease (25 patients with diffuse nasal polyposis and 111 patients with middle meatal polyposis) and 364 with nonpolypoid disease (mucosal edema and nasal discharge).

After surgery, 93% of the patients had MT medialization with a well-defined synechia between the sep-

Table 1. Postoperative endoscopic appearance and presence of symptoms

	No. of patients (%)	No. symptomatic (%)	No. asymptomatic (%)
Medialized MT without lateralization	427 (85)	15 (4)	412 (96)
Medialized MT with lateralization	39 (8)	15 (38)	24 (62)
Nonmedialized MT without lateralization	15 (3)	0	15 (100)
Nonmedialized MT with lateralization	19 (4)	8 (42)	11 (58)
TOTAL	500	38	462

tum and the MT 4 weeks after surgery; lateral synechia did not develop in 88% of the patients. We have identified 4 main categories of endoscopic appearance: (1) medialized MT without lateralization (85% of the patients), (2) medialized MT with lateralization (8% of the patients), (3) nonmedialized MT without lateralization (3% of the patients), and (4) nonmedialized MT with lateralization (4% of the patients). There were symptomatic and asymptomatic patients in each category. The distribution and correlation with the presence of symptoms are described in Table 1.

Complications that occurred were caused by the sinus surgery and not by medialization. One patient had a cerebrospinal leak from the posterior ethmoid roof. The leak was immediately controlled with an MT flap. After surgery, this patient had no adverse effects. There were no cases of visual loss, diplopia, or orbital hematoma. Apart from lateral synechia formation, minor complications occurred in 8 (1.6%) patients with postoperative mild bleeding caused by inferior turbinate submucosal resection and 5 (1%) patients with septal hematoma caused by septoplasty.

DISCUSSION

Lateralization of the MT appears to be the most common complication of ESS, occurring in as much as 43% of patients.⁶ The formation of scar tissue between the MT and the lateral nasal wall can obstruct the outflow of the ethmoid, maxillary, and frontal sinuses, leading to recurrent symptoms and necessitating attempts of lysis in the office or further surgery. Proper handling of the MT and prevention of lateralization appear to be the keys to avoiding complications in the postoperative period and ensuring a successful outcome for the patient, and thus they are important aspects of ESS.

Lateralization of the MT can occur even in the most experienced hands. With the removal of the uncinat process, a raw surface is created on the lateral wall of the nasal cavity. Instrumentation of the lateral aspect of the MT, whether as a result of repeated scraping or debulking of the MT, results in a raw, denuded surface of this area. Mobilization of the MT can contribute to instability, and lateralization with scarring is likely to occur.

Several surgeons have attempted to prevent lateral synechia by partial or complete resection of the MT. Biedlingmaier⁷ and Davis et al⁸ reported high middle antrostomy patency rates (94.8%-96.5%) but did not address synechia formation. Other studies showed different results. Kinsella et al⁹ and Ramadan and Allen¹⁰ did not find a significant statistical difference in the rate of lateral synechia formation when comparing patients who underwent partial MT resection with patients who did not have MT resection. Partial turbinate resection does not completely eliminate the possibility of a synechia between the turbinate remnant and the lateral wall. The superior aspect of the turbinate that is often preserved may lateralize and cause iatrogenic frontal sinus obstruction. Indeed, Swanson et al¹¹ found that MT resection during sinus surgery may be a risk factor for the development of postoperative frontal sinus disease. Moreover, MT resection was found to be associated with adverse outcome. Vleming et al,¹² reporting complications of ESS, noted the absence of the MT in revision surgery to be a definite risk factor for complications. If, in addition to the above findings, we consider the role that the MT is said to play during nasal function, we must think twice before routinely performing MT resection.

Following these thoughts, attempts were made to prevent lateral synechia formation and still preserve the MT. On the basis of a controlled study with 50 patients, Shikani² has advocated placing middle meatal antrostomy stents in the maxillary natural ostium until re-epithelialization occurs. When the stents were removed 10 to 14 days after the operation, all patients had patent middle antrostomies. However, this technique may cause a foreign-body reaction with resultant granulation tissue surrounding the stent, as well as patient discomfort at the time of removal. Thornton¹ has described stabilization of the MT with a turbinate transseptal suture in 31 patients (60 operated sides). Only 1 patient was noted to have lateralization of the MT on 1 side that necessitated a further surgery. Despite the excellent results, we have found the suturing somewhat difficult and time-consuming. In addition, some turbinates are composed of thick bone that can make suturing more difficult.

W. Bolger¹³ described the creation of an adhesion between the medial aspect of the MT and the nasal septum by abrading these surfaces using a sickle knife. To our knowledge, the results of this technique have never been supported by published data. We have followed the same principle using the microdebrider instead of the knife. In a separate study,¹⁴ we evaluated the effect of MT medialization on olfaction using this technique. The hypothesis was that MT medialization, especially with a planned synechia, might theoretically result in hyposmia because of decreased airflow to the olfactory area. We found that the sense of smell was not adversely affected after MT medialization.

In this study, we found it somewhat inaccurate to correlate "operated sides" with patient symptoms. Therefore, while analyzing the data we preferred to count patients and not operative sides. For instance, when a patient had one side with medialized MT without lateralization and the other side with nonmedialized MT with lateralization, we considered the worse side as the general outcome.

By using the described technique, we achieved high rates of MT medialization (93%). We failed to prevent lateral synechia in 12% of the patients. As expected, successful MT medialization was associated with a high rate of asymptomatic patients (94%), and MT lateralization was associated with a much lower rate of asymptomatic patients (60%). Clearly, successful MT medialization by itself was not an absolute guarantee for the prevention of symptoms because there are many more variables in ESS that can affect the final outcome. Similarly, MT lateralization was not necessarily associated with symptoms because the MT was often attached to the lateral nasal wall anteriorly without any visible interference with the middle meatus patency. Although we managed to lyse most of the symptomatic lateral synechiae in the office, we found these maneuvers caused patient discomfort and sometimes further trauma and scarring.

Because the sense of smell was not adversely affected after MT medialization and recurrent infections were usually attributed to MT lateralization or inadequate sinus drainage rather than to the medial synechia, we found it unnecessary to remove the medial synechia after surgery. In addition, although nasal obstruction caused by MT medialization may be considered a possible complication, we believe that the consequences of middle meatus obstruction by MT lateralization outweigh the theoretical risk of nasal airway interference by a small, controlled medial synechia.

There are a few possible explanations for failure to medialize the MT: (1) the abraded surfaces are not precisely opposed; (2) the nasal packing is placed between

the MT and the septum, a major error that might end in severe middle meatus obstruction; and (3) sometimes the MT medialization is performed too far posterior. Consequently, the superior attachment of the MT serves as an axis, and the anterior edge of the turbinate comes closer to the lateral nasal wall.

Clearly, there are modifications and exceptions to the MT preservation policy; if a large concha bullosa obstructs the access to the middle meatus, the lateral half of the turbinate may be resected with a sickle knife and scissors; the medial half is then medialized in a normal manner. Care should be taken to minimize the exposed raw surface and bone on the lateral surface of the medial half of the turbinate. In addition, it is probably not worth preserving an MT that has marked inflammation or polypoid changes. Similarly, if an MT has been significantly traumatized, it may be better to perform a partial resection than to leave a large raw surface for potential adhesions. Medialization is not likely to prevent lateralization in the face of denuded lateral surfaces of the MT.

The described technique for MT medialization is not a substitute for meticulous technique while performing the rest of the operation. If the goal is to preserve the MT, the importance of leaving the mucosa of the MT and the lateral nasal wall intact cannot be overemphasized. Often, just one careless maneuver during the very initial steps of the procedure can result in an unsuccessful surgery. Therefore it is crucial to avoid stripping the mucosa while placing the vasoconstrictor-soaked pledgets, advancing the local injection needle, or using the suction.

CONCLUSION

The ideal ESS should include preservation of the MT with a minimal rate of lateral synechia formation. Our technique is extremely simple, takes only seconds to perform, and is associated with a low rate of lateral synechia formation. We therefore conclude that MT medialization using a microdebrider should be considered an alternative to turbinate resection or to other turbinate medialization techniques. We must emphasize that using this technique is not a substitute for meticulous technique while performing the rest of the operation.

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