

## Abstract

**Introduction:** The decision to resect the middle turbinate (MT) during functional endoscopic sinus surgery (FESS) is controversial. While there have been a variety of studies examining the functional outcome related to this maneuver, very few studies exist evaluating the potential for complications. We sought to determine if resection of the MT during FESS leads to an increased risk for post-operative bleeding.

**Methods:** Patients who underwent FESS between 2004 and 2014, at a single institution were analyzed for bleeding and other complications following resection of the MT.

**Results:** Between 2004 and 2014, 1185 sinus surgeries were performed by 15 surgeons. A propensity matched set of 228 patients who underwent turbinate resection and 228 controls were selected based on predicted probabilities from a logistic regression predicting turbinate resection, adjusted for age, sex, and procedure. There were 89 patients with bilateral turbinates removed and 139 with unilateral turbinates removed. There was no significant difference in major bleed or other complication rates between the two groups. Patients who underwent resection of at least one MT were 3.95 times more likely to have a minor bleed compared to those who did not; this risk increased with more turbinates resected (trend  $p=0.008$ ). Patients with minor bleeds were significantly more likely to be on Coumadin ( $p=0.007$ ).

**Conclusion:** There was no increased risk of major bleeding or other complications associated with resection of the MT. There was an increased minor bleed rate associated with MT resection, though these patients were more likely to be on Coumadin.

## Introduction

Treatment of the middle turbinate in functional endoscopic sinus surgery (FESS) is variable among practitioners, particularly for the the normal turbinate. Debate has centered mostly damage to olfactory epithelium, CSF leak, scarring of the frontal outflow tract, complications in revision cases, and airflow disturbances.

It is unclear if resection of the middle turbinate adds to the complication profile associated with endoscopic sinus surgery. Resection of the middle turbinate exposes the sphenopalatine artery and has the potential to result in significant epistaxis.

**Hypothesis: Resection of the middle turbinate during FESS results in increased risk of bleeding.**



Figure 1 a, b, c. MT – endoscopic view; excised MT; excised MT – endoscopic view<sup>6</sup>

## Methods and Materials

Retrospective chart review. All patients who underwent functional endoscopic sinus surgery (FESS) at Henry Ford Health System between 1/2004 and 8/2014.

**Inclusion:** surgery for sinusitis or nasal polyposis

**Exclusion:** surgery for cancer

**Variables analyzed:**

- 1) Sinuses operated on: maxillary, sphenoid, ethmoid, and frontal
- 2) Whether or not resection of the middle turbinate(s) took place
- 3) Any adjunctive procedures, namely septoplasty
- 4) Medications that could increase bleeding risk grouped into one of three classes: aspirin, "anticoagulation", and anti-platelet therapy

**Complications (within 30 days):**

- 1) Minor bleeding not requiring OR
- 2) Major bleeding requiring OR
- 3) Other complications

## Results

**2951 patients** underwent FESS at Henry Ford Health System for sinusitis or nasal polyposis between 1/2004 and 8/2014

- **251 patients** had 1 or 2 MTs resected (162 with 1 and 89 with 2)
- **228 patients** matched to control group with matched covariates
- total sample size of **456 patients**.

There were no differences between these two groups in terms of age, sex, sinuses operated on and adjunctive procedures

**No significance found:**

- Major bleed rates
- Other complications

**Significance found:**

- Minor bleeding stratified for 1 v 2 MT resected – **3.53 and 4.57 fold** increased risk
- Anticoagulation and minor bleeding ( $p=0.007$ )

Table 1. Comparison of complications

Complication	No MT resected	MT(s) resected	p-value	OR (95% CI)
Minor bleed	1.75% (4/228)	6.58% (15/228)	<b>0.016</b>	<b>3.95 (1.29, 12.09)</b>
Major bleed	0.88% (2/228)	0.44% (1/228)	0.570	0.50 (0.05, 5.53)
Other complication	0.88% (2/228)	0.44% (1/228)	0.616	0.50 (0.05, 6.21)
		1 turb resected		
		2 turb resected		
Minor bleed	1.75% (4/228)	5.8% (8/139)	<b>0.043</b>	<b>3.53 (1.04, 16.98)</b>
Minor bleed	1.75% (4/228)	7.9% (7/89)	<b>0.018</b>	<b>4.57 (1.30, 16.12)</b>

Table 2. Comparison of bleed rate with medication usage

Medication	MT(s) resected		p-value	OR
	No bleed	Minor bleed		
Aspirin	12.2% (26/213)	20.0 (3/15)	0.406	1.76 (0.46, 6.68)
Anti-coagulation	0.9% (2/213)	13.3 (2/15)	<b>0.007</b>	<b>16.65 (2.15, 129.22)</b>
Anti-platelet therapy	0.5% (1/213)	6.7 (1/15)	0.058	15.59 (0.91, 266.05)
Medication	No MT resected		p-value	OR
	No bleed	Minor bleed		
Aspirin	9.4% (21/224)	0 (0/4)	0.999	1.68(0, 10.12)
Anti-coagulation	2.7% (6/224)	0 (0/4)	0.999	5.95(0, 40.89)
Anti-platelet therapy	0.5% (1/224)	0 (0/4)	0.999	43.78(0, 831.89)

## Discussion

In a study by Shih, 31 consecutive patients were followed and each had one MT resected, leaving the other one intact with no bleeding complications on either side. Brescia looked at 48 patients, 23 of whom had had their MT removed. Bleeding rates between the two groups were similar and all resolved with topical therapy. Havas also found no difference in bleeding rate with MT resection versus preservation in a cohort of over 1000 patients. However, patients in this study were not age, sex, surgery matched pairs so comparison of complications could be skewed.

While a matched control group was able to be identified in this study, the area of greatest variability is having had 18 surgeons perform FESS over 10 years. The variability in surgical technique as well as post-operative care could lead to differing results among the physicians if enough surgeries had been performed to allow further stratification of the data by surgeon.

## Conclusions

There is an increased risk of minor bleeding following resection of the middle turbinate in FESS, but no significant increase in major bleeding or other complications.

Further risk of bleeding is associated with anticoagulation therapy if the middle turbinate has been resected.

## Contact

Anya Miller  
Henry Ford Health System  
Detroit, MI  
Email: Amille10@hfhs.org

## References

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