# Management of Functional Pituitary Adenomas with Suspicion for Medial Wall Invasion: Remission Rates and Residual Medial Wall Disease

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## Introduction

The resection of tumor involving the medial wall of the cavernous sinus has been associated with increased disease remission in functional pituitary adenomas. However, despite pre-operative, radiographic suspicion for medial wall involvement, a subset of tumors present without definitive evidence of medial wall invasion on intra-operative inspection. Without conclusive evidence of medial wall invasion, the medial wall is routinely preserved in these cases. However, there does remain concern for undetectable, microscopic medial wall disease. The goal of this study was to evaluate the rates of remission and residual medial wall disease in this subset of functional adenomas thought to be clear of medial wall invasion on intra-operative investigation.

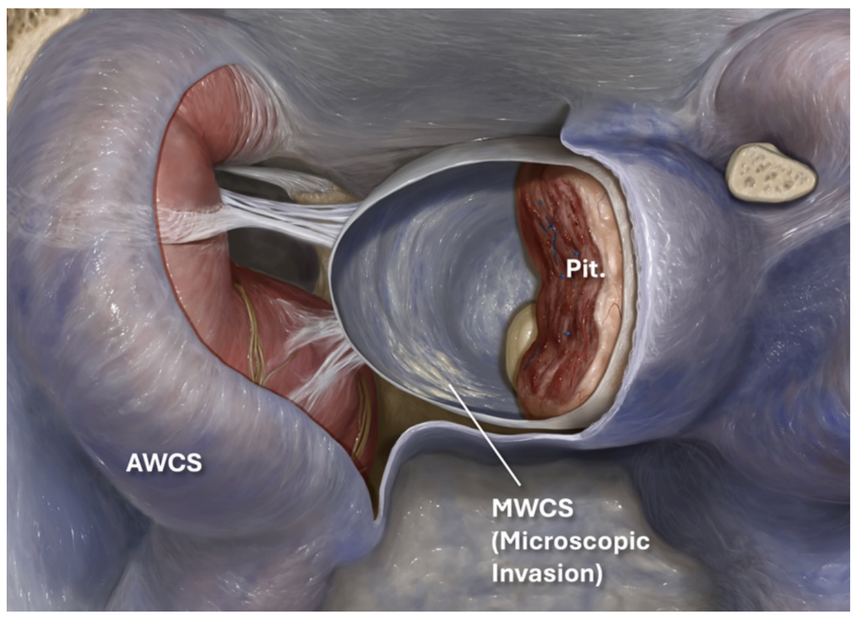


**Figure 1. Functional Adenomas with Concern for Microscopic Medial Wall Invasion.** Pre-operatively, functional adenomas in contact with the medial wall of the cavernous sinus raise suspicion for medial wall invasion. On intra-operative inspection, however, the medial wall may be without clear evidence of invasion, raising concern for microscopic invasion. Management options include preservation of the wall, resection of the wall, or cauterization of the medial wall.

## Methods and Materials

Data from 226 patients undergoing endoscopic endonasal resection of functional pituitary adenomas between 2018-2024 were analyzed. Among cases with intent to cure and pre-operative suspicion for involvement of the medial wall of the cavernous sinus, 42 patients were ultimately deemed to lack medial wall invasion based on intra-operative inspection. The medial wall was preserved in these instances and either left intact or cauterized based on the suspicion for microscopic disease. Rates of biochemical remission and residual medial wall disease among this cohort were evaluated.

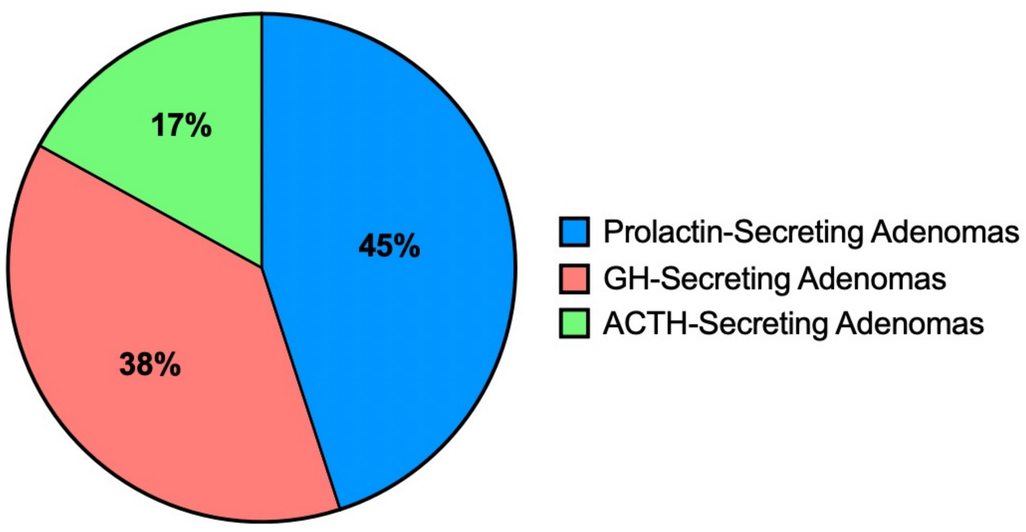


**Figure 2. Subtypes of Functional Adenomas with Pre-Operative Suspicion of Medial Wall Invasion but without Intra-Operative Evidence of Medial Wall Invasion.** The most common functional adenomas without evidence of intra-operative medial wall invasion were prolactinomas (45%, 19/42), followed by growth hormone (GH) secreting adenomas causing acromegaly (38%, 16/42), and adrenocorticotrophic hormone (ACTH) secreting adenomas causing Cushing's disease (17%, 7/42).

## Results

Among functional adenomas with pre-operative suspicion of medial wall invasion, but without intra-operative evidence of medial wall involvement, 45% (19/42) were prolactinomas, 38% (16/42) were growth hormone (GH) secreting adenomas causing acromegaly, and 17% (7/42) were adrenocorticotrophic hormone (ACTH) secreting adenomas causing Cushing's disease. 33% (14/42) of cases had previously trialed medical therapy and 12% (5/42) had previously undergone surgical intervention. In 39% of cases (12/42), the medial wall was cauterized given concern for microscopic disease and in the remaining cases, the wall was left intact. Biochemical remission after surgical intervention in this cohort was 93% (39/42). Among patients failing to achieve remission, residual disease was identified on post-operative imaging involving the medial wall of the cavernous sinus in 67% (2/3) of cases, representing 5% (2/42) of the overall cohort. No significant difference in residual medial wall disease was observed across prolactinomas (5%, 1/19), GH secreting adenomas (6%, 1/16), and ACTH secreting adenomas (0%, 0/7). However, the rate of prior surgical intervention was higher among cases with unexpected residual medial wall disease (100% versus 8%, $p = 0.01$). Cases with unanticipated residual medial wall invasion were associated with increased suspicion for microscopic invasion intra-operatively, as evidence by a trend towards increased medial wall cauterization (100% versus 25%, $p = 0.08$).

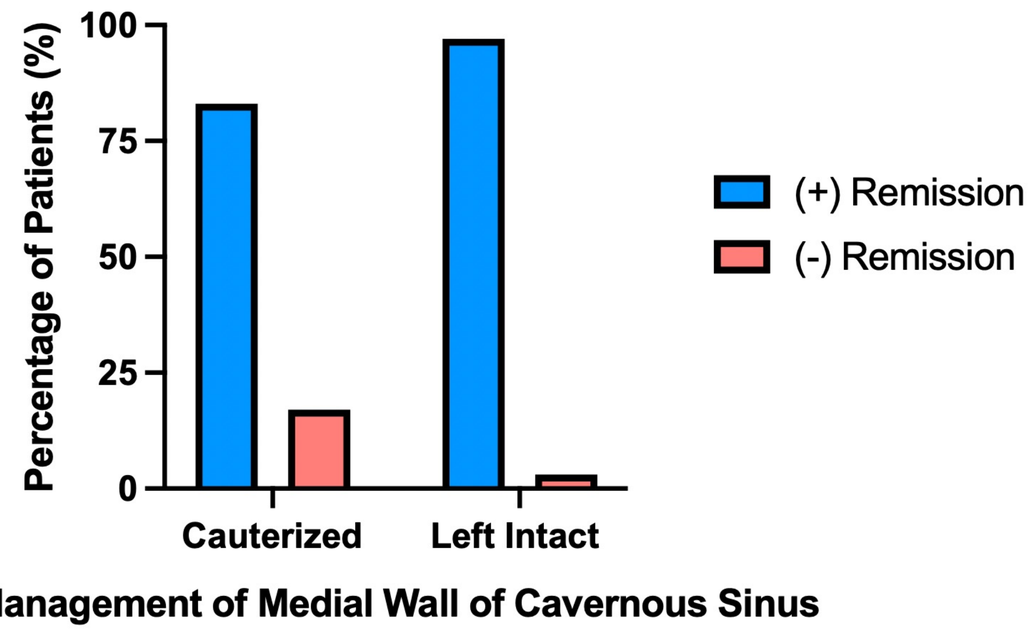


**Figure 3. Rates of Biochemical Remission Across Management Options for Possible Microscopic Medial Wall Invasion.** The overall rate of biochemical remission in this patient cohort was 93% (39/42). For patients with lower suspicion of medial wall invasion, the medial wall was left intact (71%, 30/42). For these patients, the rate of biochemical remission was 97% (29/30). For patients with increased suspicion of medial wall invasion, the medial wall was cauterized (39%, 12/42). For these patients, the rate of biochemical remission was 83% (10/12). No significant differences in remission rates were observed across these management options ($p = 0.02$)

## Conclusions

Despite pre-operative suspicion for medial wall invasion, there exists a subset of functional adenomas without definitive evidence of medial wall invasion on intra-operative inspection. In these cases, preserving and/or cauterizing the medial wall was associated with a favorable 93% remission rate. Utilizing this management strategy, there was a 5% incidence of unanticipated, residual medial wall disease driving failure to achieve disease remission. This residual medial wall disease was more prevalent among cases with a history of prior surgical intervention, highlighting a subset of cases that may possess a lower threshold for medial wall exploration.

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## References

1. Truong HQ, Lieber S, Najera E, et al. The medial wall of the cavernous sinus. Part 1: Surgical anatomy, ligaments, and surgical technique for its mobilization and/or resection. *J Neurosurg* . 2018: 131(1): 122-130.
2. Cohen-Cohen S, Gardner PA, Alves-Belo JT, et al. The medial wall of the cavernous sinus. Part 2: Selective medial wall resection in 50 pituitary adenoma patients. *J Neurosurg*. 2018: 131(1): 131-140.
3. Fernandez-Miranda JC, Zwagerman NT, Abhinav K, et al. Cavernous sinus compartments from the endoscopic endonasal approach: Anatomical considerations and surgical relevance to adenoma surgery. *J Neurosurg*. 2017: 129(2): 430-441.
4. Constanzo F, Rychen J, Lee CK, et al. Patterns of invasion of the medial wall of the cavernous sinus by pituitary adenomas. *J Neurosurg*. 2025: 143(4): 895-906.