



# Skull Base Approaches in Skull Base Meningiomas: An Analysis of Postoperative Complications



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## Introduction

Wide bony approaches can enhance tumor exposure and are often employed to achieve a better resection and access to skull base meningiomas. This approach may contribute to preserving cranial nerve function by mitigating compressive effects exerted by the tumor. However, due to the close anatomical proximity to visual structures, these procedures carry a risk of injury to critical neurovascular structures.

Balancing the goals of maximal tumor removal with preservation of neurological function remains a central challenge in meningioma resection. Prior work has emphasized the importance of surgical corridor selection, yet the contribution of bone and dural resection to cranial nerve outcomes has not been extensively characterized.

## Aims

To evaluate the differences between bone and dural approaches on post-operative cranial nerve outcomes in skull base meningioma resections.

## Methods

We retrospectively reviewed 110 patients who underwent resection of petroclival, sphenoid wing, or cavernous sinus meningiomas between 2000 and 2022. Clinical and operative variables, including bone and dural resection, were extracted from operative records, and postoperative outcomes were extracted from follow-up records. Associations between bone and dural resection and postoperative morbidity were assessed using chi-square or Fisher's exact tests as appropriate.

## Results

Bone and dural resection were each associated with divergent patterns of postoperative morbidity.

- Bone resection correlated with significantly lower rates of sensory complaints (12.5% vs 60.5%,  $p < 0.001$ ) and tinnitus (14.1% vs 60.5%,  $p < 0.001$ ), but higher rates of decreased visual acuity (57.8% vs 15.8%,  $p < 0.001$ ), visual field effect (21.9% vs 5.3%,  $p = 0.026$ ), and proptosis (10.9% vs 0%,  $p = 0.044$ )
- Dura resection was associated with reduced sensory complaints (9.8% vs 59.1%,  $p < 0.001$ ) and tinnitus (11.8% vs 59.1%,  $p < 0.001$ ), but greater risk of decreased visual acuity (54.9% vs 22.7%,  $p = 0.001$ ), visual field effect (25.5% vs 6.8%,  $p = 0.015$ ), and proptosis (11.8% vs 0%,  $p = 0.029$ ).

## Conclusion

Bone and dural resection of meningiomas were protective against postoperative sensory loss and tinnitus but were simultaneously associated with increased risk of visual complications. These findings suggest that surgical maneuvers at the skull base may carry trade-offs between cranial nerve preservation and visual outcomes.

Importantly, the data underscore the need for surgeons to weigh the benefits of wider exposure and improved resection against the potential for visual and auditory morbidity. Future studies that further delineate tumor location, size, and cranial nerve involvement are warranted to validate these associations in order to refine operative strategies.

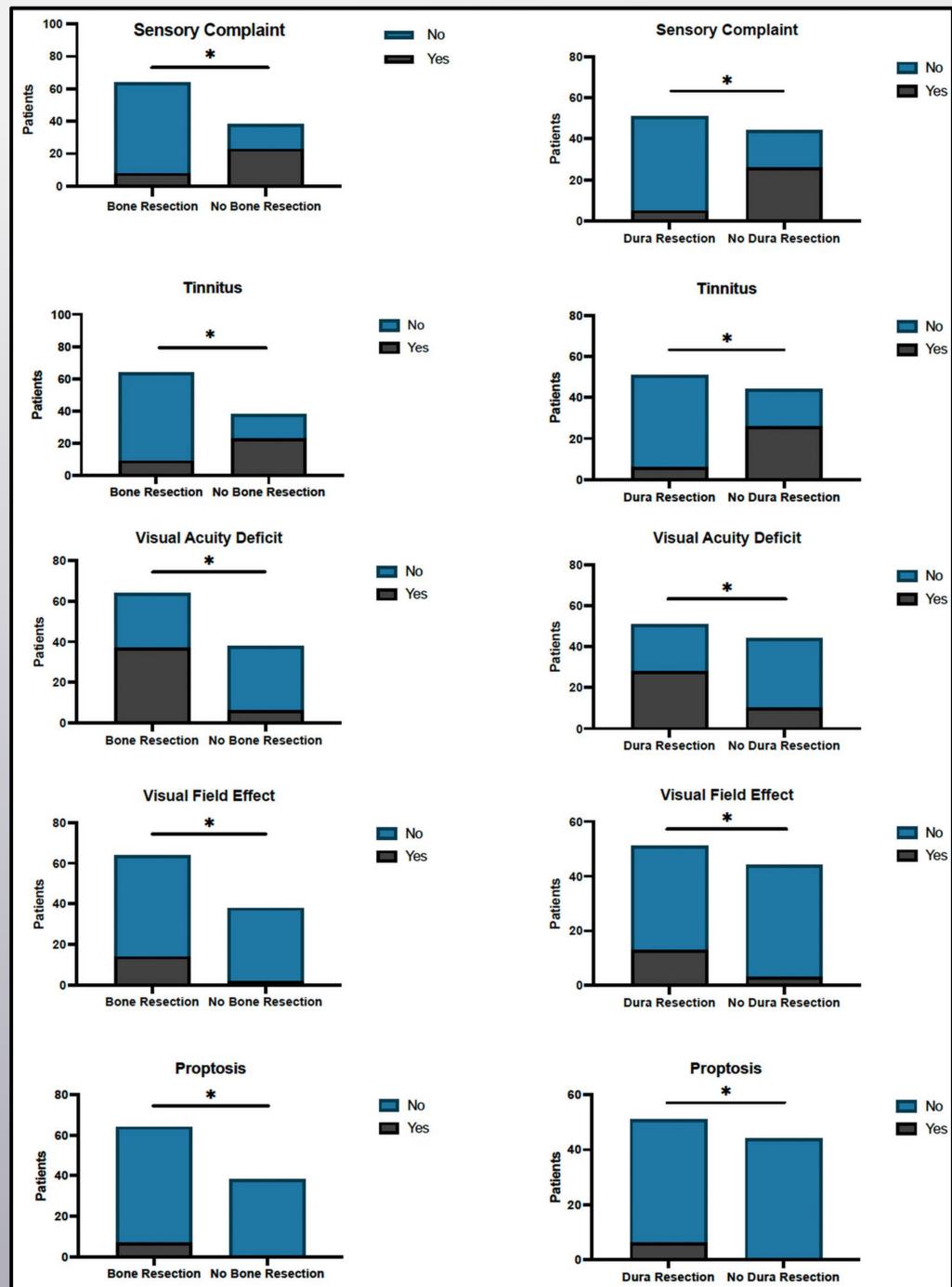


Figure 1: Differences in sensory complaint, tinnitus, visual acuity deficit, visual field effect, and proptosis between patients with/without bone resection (left), and with/without dura resection (right)

