

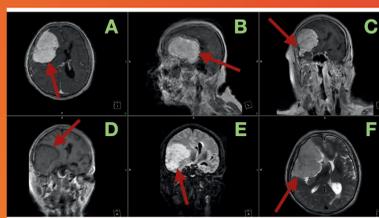
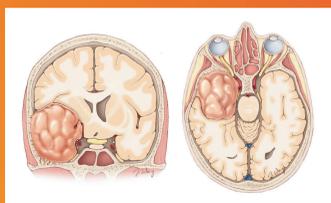
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## Tailored subtotal resection + radiosurgery balances tumor control with low mortality and meaningful visual recovery in cavernous sinus involving sphenoid wing meningiomas.

### Introduction

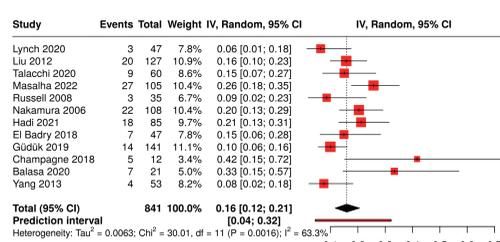
- Medial sphenoid wing meningiomas with cavernous sinus invasion are high-risk skull base tumors
- Tumors often encase/about ICA and cranial nerves, limiting safe complete resection
- Aggressive resection must be balanced against long-term neuro-visual morbidity
- We performed a single-arm meta-analysis to define pooled outcomes and prognostic factors



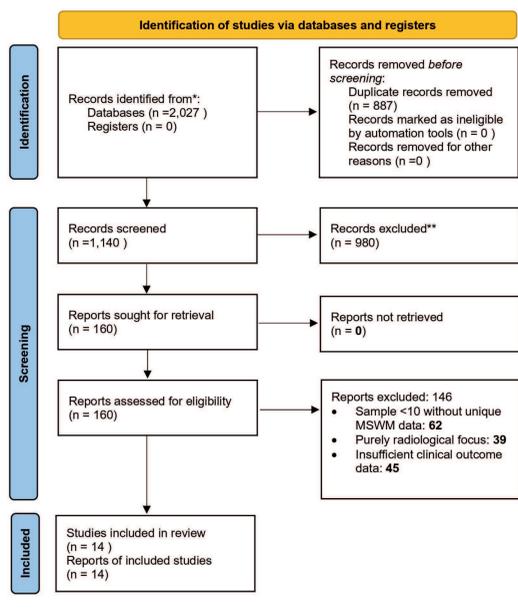
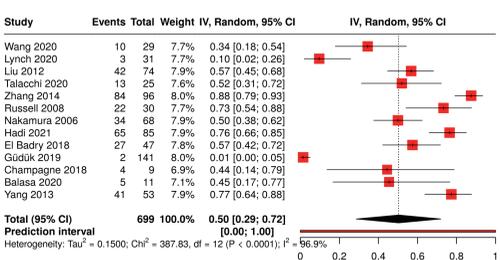
### Methods

- Systematic review + meta-analysis conducted per PRISMA
- Databases: PubMed, Embase, Cochrane (inception → June 2025)
- Inclusion: studies with ≥5 patients with medial sphenoid wing meningioma + cavernous sinus involvement
- Extracted outcomes: extent of resection, recurrence, visual outcomes, CN deficits, complications, mortality, prognostic factors
- Statistics: DerSimonian–Laird random-effects pooled proportions with 95% CI
- Heterogeneity: I<sup>2</sup>; prediction intervals reported
- Risk of bias: Newcastle–Ottawa Scale

### Recurrence results



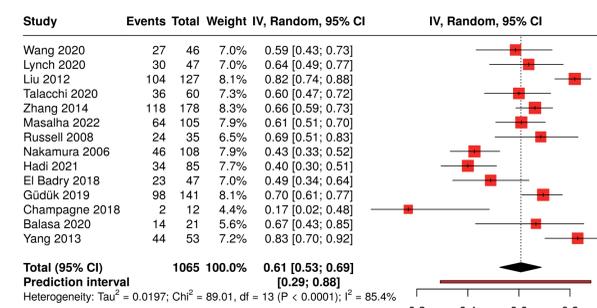
### Visual improvement results



### Results

- 14 studies, 1,065 patients included
- Gross total resection (GTR): 61% (95% CI 53–69%)
- Recurrence: 16% (95% CI 12–21%) over ~3–8 years follow-up
- Visual improvement: 50% (95% CI 29–72%)
- Mortality: <2% across studies
- Cranial nerve deficits were common; many were transient with recovery over time
- Worse outcomes associated with: large tumor size, ICA encasement, optic canal invasion, higher WHO grade
- Adjuvant radiosurgery after STR frequently provided durable control with lower morbidity

### GTR results



### Discussion

- Management is a balance between tumor control and neurological preservation
- Complete resection is often limited, but surgery can still provide meaningful control with low mortality
- Nearly half of patients achieve visual improvement, supporting surgical decompression when indicated
- Higher recurrence after subtotal resection supports a multimodal strategy (STR + radiosurgery)
- Treatment should be individualized based on anatomy (ICA/CN/optic canal) and patient goals

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