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Comparison of adjuvant radiation versus observation and salvage radiation after subtotal resection of a WHO grade I skull base meningioma: a propensity score-adjusted analysis

Anish R Kosanam¹, Jun Ma², Alexandra J White³, Roger Murayi⁴, Pranay Soni^{2,4}, Pablo F Recinos^{2,4}, Varun R Kshetty^{5,6,7}

Affiliations

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Abstract

Purpose: In patients with subtotal resection (STR) of WHO grade I skull base meningiomas, treatment strategies of adjuvant radiation versus observation with salvage radiation, if necessary, were compared using progression-free survival (PFS) and radiation failure-free survival (RFFS).

Methods: Patients with newly diagnosed WHO grade I skull base meningioma who underwent radiographically confirmed STR between 1995 and 2021 were included. PFS was measured from last treatment date. RFFS was measured from surgery date to first radiation failure. Multivariable Cox regression, adjusted for propensity score (PS) and inverse probability treatment weighted (IPTW), was performed.

Results: Of 179 patients, 25 (14.0%) received adjuvant radiation. Among 154 observed patients, 90 (58.4%) experienced tumor progression and 64 (71.1%) received salvage radiation. Observation after STR had PFS at 3, 5, and 10 years of 60.6%, 47.5%, and 26.8%, respectively. Adjuvant radiation had PFS/RFFS at 3, 5, and 10 years of 84.2%, 77.2%, and 77.2%. Salvage radiation had PFS at 3, 5, and 10 years of 96.0%, 85.0%, and 80.0%. RFFS after observation with salvage radiation, if needed, at 3, 5, and 10 years was 100%, 97.7%, and 92.8%. PS and IPTW Cox regression models, controlling for residual tumor volume, demonstrated that observation with salvage radiation significantly prolonged RFFS (HR = 0.06, $p = 0.013$; HR 0.08, $p = 0.026$, respectively) compared to adjuvant radiation. Median follow-up was 77.5 months.

Conclusion: Most patients will have tumor progression within 10 years of STR. Our data suggests that appropriately selected patients can be observed with close follow-up, reserving radiation for progression.

Keywords: Adjuvant radiation; Salvage radiation; Skull base meningioma; Subtotal resection.

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