

# Limited accuracy and utility of surgeon's estimate of gross total resection following endoscopic endonasal transsphenoidal surgery for non-hormone producing pituitary macroadenomas

Jesse Lawrence MD, Parsa Nilchian, Jeffrey Shi, Steven Zeldin, Rupen Desai MD, Theodore H. Schwartz MD

Weill Cornell Medicine, New York Presbyterian Hospital, New York, NY, USA

## Background

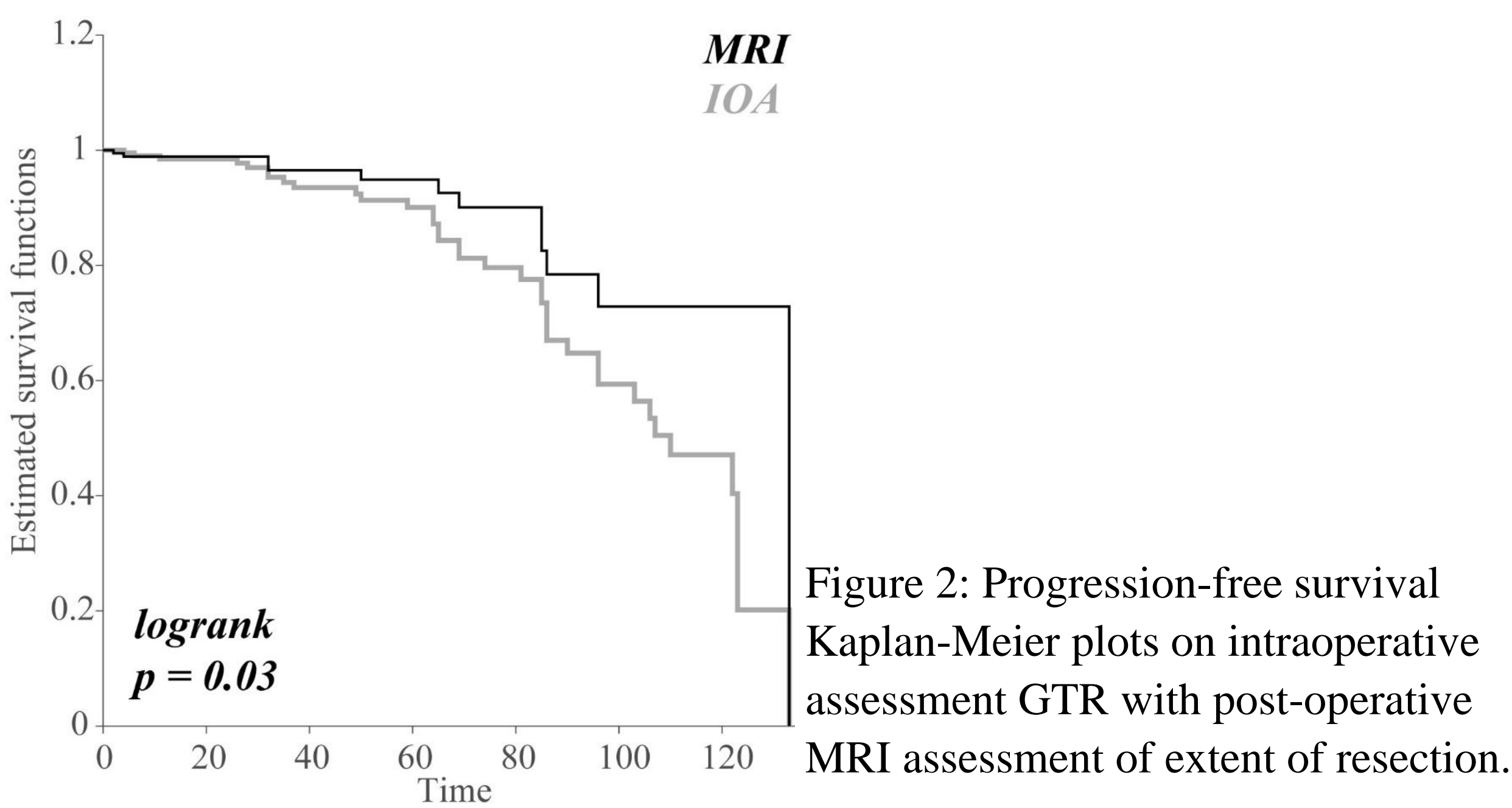
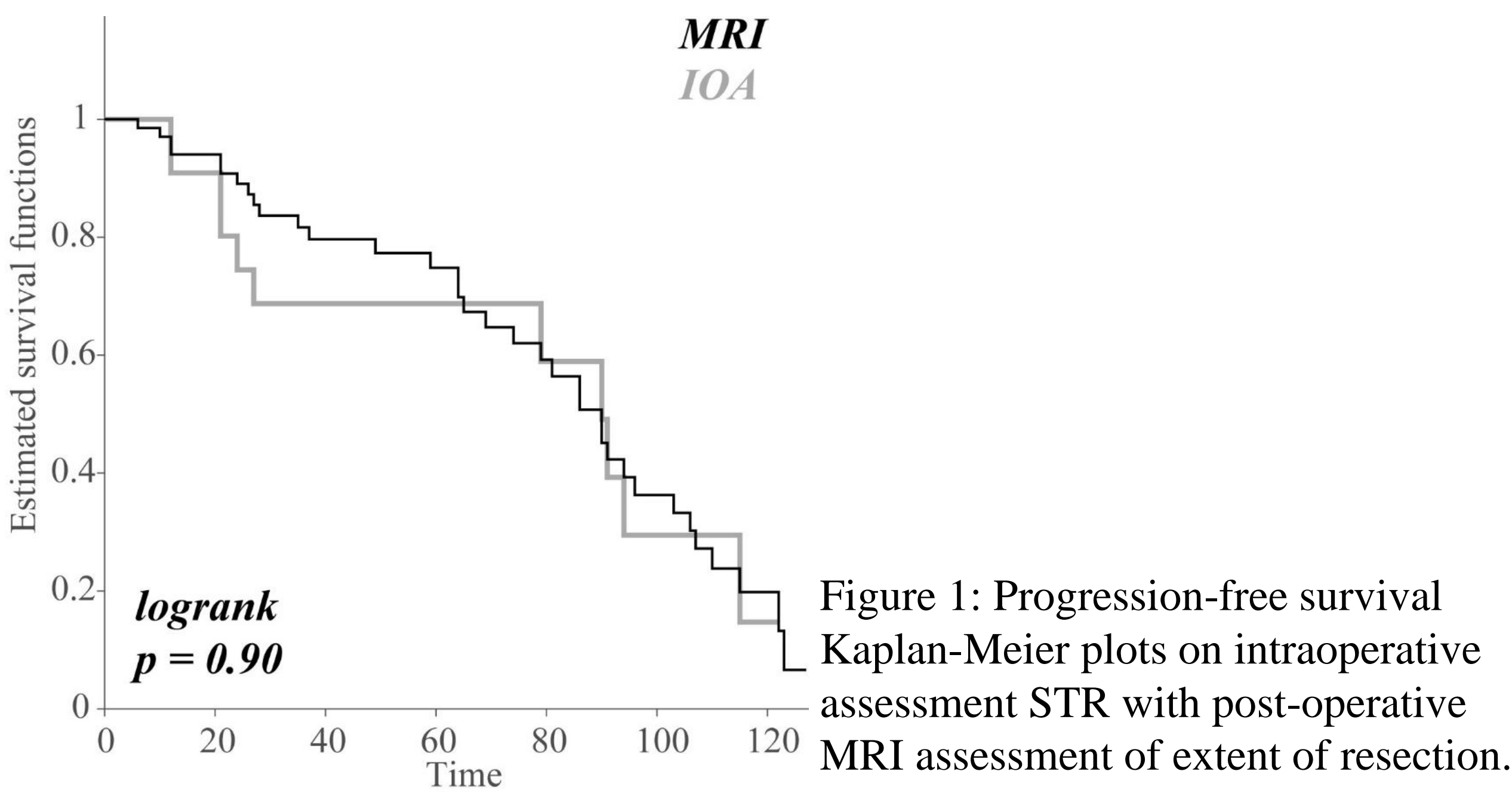
The surgeon’s intraoperative assessment (IOA) of extent of resection has been shown to be a useful means of predicting recurrence rates after surgery for benign tumors such as meningiomas, although many more recent studies have revealed that other metrics such as imaging or genetics are more powerful.<sup>1-5</sup> Studies of the accuracy of surgeon’s assessment compared with post-operative MRI after removal of pituitary adenomas has not been previously investigated.

## Methods

A retrospective review of consecutive patients with pituitary adenomas operated on by a single surgeon was performed. IOA of tumor resection was recorded by the senior surgeon at the conclusion of the operation (THS). Preoperative and postoperative MRI scans were obtained for all patients and radiographic extent of resection was determined by neuroradiology. Radiographic recurrence and need for further intervention were examined and correlated with extent of resection.

## Results

Three hundred seventeen consecutive patients undergoing resection of a non-hormone producing pituitary adenomas were included. Intraoperatively, the surgeon tended to overestimate the rate of GTR. While IOA GTR was reported in 90%, MRI revealed GTR in only 72%. The positive predictive value of IOA was 74% and the negative predictive value was 84%. After a mean follow-up of 40.7 months, there was a 16.7% recurrence rate. Patients with IOA GTR and STR recurred at rates of 14% and 39%, respectively. Patients with radiographic GTR and STR recurred at rates of 6% and 44% respectively. Discordant cases with IOA GTR and MRI STR (n=57) recurred at a rate of 42%, indicating that the MRI was a more accurate predictor of recurrence. Discordant cases with IOA STR and MRI GTR (n=6) recurred at a rate of 0%, again indicating the higher accuracy of post-operative MRI. The sensitivity and specificity of IOA to predicting recurrence was 24 and 93%, respectively. Both the sensitivity and specificity of postoperative MRI to predicting recurrence were 78%.



## Conclusion

Post-operative MRI was more accurate at establishing GTR and identifying residual tumor and predicting recurrence compared with the surgeon’s intraoperative assessment. This study provides further evidence that surgeon’s intraoperative assessment of extent of resection is a poor metric compared with post-operative imaging.

**References**  
1. Sughrue, M.E., et al., *The relevance of Simpson Grade I and II resection in modern neurosurgical treatment of World Health Organization Grade I meningiomas*. J Neurosurg, 2010. 113(5): p. 1029-35.  
2. Brokinkel, B., et al., *The Simpson grading: defining the optimal threshold for gross total resection in meningioma surgery*. Neurosurg Rev, 2021. 44(3): p. 1713-1720.  
3. Spille, D.C., et al., *Risk of tumor recurrence in intracranial meningiomas: comparative analyses of the predictive value of the postoperative tumor volume and the Simpson classification*. J Neurosurg, 2021. 134(6): p. 1764-1771.  
4. Fukushima, Y., et al., *Effect of dural detachment on long-term tumor control for meningiomas treated using Simpson grade IV resection*. J Neurosurg, 2013. 119(6): p. 1373-9.  
5. Materi, J., et al., *Predictors of recurrence and high growth rate of residual meningiomas after subtotal resection*. J Neurosurg, 2021. 134(2): p. 410-416.