Clinical Validation of a Proposed Intraoperative Consistency Grading System for Meningiomas

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Introduction

The present study aims to clinically validate a previously proposed intraoperative grading system to objectively assess consistency of meningiomas and relate consistency scores to extent of tumor resection.

Methods

The proposed consistency grading system, ranging from 1) extremely soft tumor to 5) extremely firm and/or calcified tumor approaching density of bone, was prospectively collected for 128 consecutive patients undergoing craniotomy for meningioma resection by multiple neurosurgeons at our hospital. Grading scores were subjected to chi-square analysis for independence with extent of tumor resection, categorized by gross total resection (GTR) or subtotal resection (STR), which was determined by postoperative MRI findings.

Results

128 patients were included in the analysis. The distribution of overall tumor consistency scores was as follows: Grade 1, 3.1%; Grade 2, 14.1%; Grade 3, 44.5%, Grade 4, 32.0%, Grade 5, 6.3%. For statistical analysis, individual grades were grouped into Grade 1 and 2, Grade 3, and Grade 4 and 5, the distribution of which was as follows: 17.2%, 44.5%, and 38.3%, respectively. The proportion of STR for each category was as follows: Grade 1 and 2, 23%; Grade 3, 32%; Grade 4 and 5, 57%. A chi-square test of independence was performed to examine the relation between consistency scores and extent of resection. The relation between these variables was significant, X^2 (5, N = 128) = 10.4, $p<0.05$.

Conclusions

These data demonstrate evidence for the clinical validity of the proposed intraoperative grading scale with respect to extent of tumor resectability, a measure of surgical outcome in the resection of meningiomas. Future studies will relate intraoperative consistency scores to preoperative MRI studies in order to predict tumor consistency and, thus, extent of resectability during the preoperative planning stage.

Learning Objectives

By the conclusion of this session, participants should be able to

1) Describe the importance of characterizing intraoperative tumor consistency

2) Discuss, in small groups, the 5 different grading scale of intraoperative meningioma consistency and how it relates to degree of resection

3) Identify an effective treatment of resecting meningiomas of different consistency

References

Zada, G., Yashar, P., Robison, A., Winer, J., Khalessi, A., Mack, W. J., & Giannotta, S. L. (2013). A proposed grading system for standardizing tumor consistency of intracranial meningiomas. Neurosurgical focus, 35(6), E1.