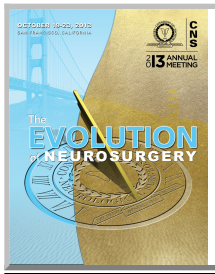

Prediction of Consistency of Meningioma by Magnetic Resonance (MR) Imaging

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Introduction

Meningioma consistency is an important characteristic as it affects the difficulty of surgery. Regarding preoperative prediction of consistency, several methods have been proposed; however, they lack objectivity and reproducibility. We propose a new method for prediction based on Tumor to Cerebellar peduncle T2-weighted imaging Intensity (TCTI) ratios and introduce an objective, intraoperative grading method.

Methods

Twenty consecutive patients who underwent resection of meningioma were examined. An intraoperative consistency scale was applied to these lesions prospectively by the operating surgeon based on Cavitron ultrasonic aspirator intensity used. Tumors were classified as A, very soft; B, soft/intermediate; or C, fibrous. Using T2-weighted MR sequence, regions of interest (ROI) were chosen from the lesion and from the cerebellar peduncle, and the TCTI ratio was calculated. Tumor consistency grades and TCTI ratios were then correlated.

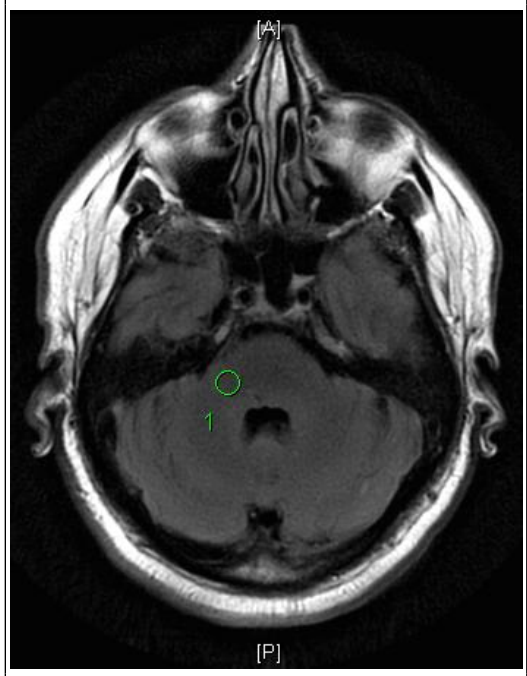
Meningioma ROI

Utilization of T2 axial for ROI measurement.

Results

Of the 20 tumors evaluated prospectively, 7 were classified as very soft, 9 as soft/intermediate, and 4 as fibrous. TCTI ratios for fibrous tumors were all </= 1; very soft tumors were >/= 1.8, except for one outlier of 1.66; and soft/intermediate tumors were >1 to <1.8.

Cerebellar Peduncle ROI



Utilization of T2 axial for ROI measurement.

Patient Data

	Age	Sex	Location	Size	ROI Ratio	Clinical Consistency
1	68	M	Olfactory groove	4cm	1.96	Very Soft
2	71	M	Sphenoid wing	3.3cm	2.8	Very Soft
3	54	F	Tuberculum sella	2.3cm	1.66	Very Soft
4	45	F	Planum sphenoidale	3.6cm	1.88	Very Soft
5	49	F	Sellar/suprasellar	5.6cm	1.79	Very Soft
6	66	F	Foramen magnum	2.7cm	2.16	Very Soft
7	58	M	Sphenoid wing	7.5cm	2.53	Very Soft
8	50	F	Sphenoid wing	4.7cm	1.74	Soft/Intermediate
9	64	M	Rt parietal convexity	4.1cm	1.27	Soft/Intermediate
10	47	F	Planum sphenoidale	3.5cm	1.38	Soft/Intermediate
11	68	F	Sphenoid wing	5.9cm	1.13	Soft/Intermediate
12	36	M	Lt anterior fossa	2.8cm	1.44	Soft/Intermediate
13	41	F	Lt parietal convexity	4cm	1.72	Soft/Intermediate
14	76	F	Rt orbital roof	1.8cm	1.64	Soft/Intermediate
15	61	F	Rt frontal convexity	3.4cm	1.6	Soft/Intermediate
16	79	M	Tuberculum sella	3.3cm	1.75	Soft/Intermediate
17	36	F	Pineal region	2.5cm	0.88	Fibrous
18	46	F	Lt occipital convexity	3.7cm	0.42	Fibrous
19	52	F	Foramen magnum	2.1cm	0.71	Fibrous
20	51	F	Lt petrous ridge	4.1cm	0.53	Fibrous

Conclusions

Predicting the consistency of meningioma can significantly affect the decision-making of the operating surgeon. We propose a method using quantifiable ROI intensity ratios of tumor in comparison to the cerebellar peduncle, as a uniform and reproducible way to predict tumor consistency. Additionally, the intraoperative consistency was graded in an objective and clinically significant way.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Understand the importance of meningioma consistency and its impact on surgical difficulty, 2) Describe current methods of preoperative tumor consistency prediction, and 3) Understand our proposed tumor consistency grading scale and method of T2-weighted imaging prediction.

References

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