Growth Rate Analysis of Meningiomas Selected for Observation Without Treatment – Comparison of ABC/2 Estimation Method With Computerized Volumetric Measurement

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Introduction

- Small and/or asymptomatic meningiomas often undergo serial surveillance without treatment
- Surveillance can be performed by measuring tumor diameters
- The ABC/2 method uses half the product of three orthogonal diameters (A, B, C) to approximate tumor volume (simplified ellipsoid volume), which is a validated standard for measuring volume
- However, proprietary software provides another approach to tumor volume measurements
- Radiologists at our institution have yet to incorporate this into regular evaluations of tumors on imaging

Study Aim

To compare methods for assessing meningioma volume as a way to determine their validity for future implementation in studies evaluating meningioma growth over time.

Methods

Data come from a database patients (n=26) with meningiomas seen at VCU between 2005 and 2015

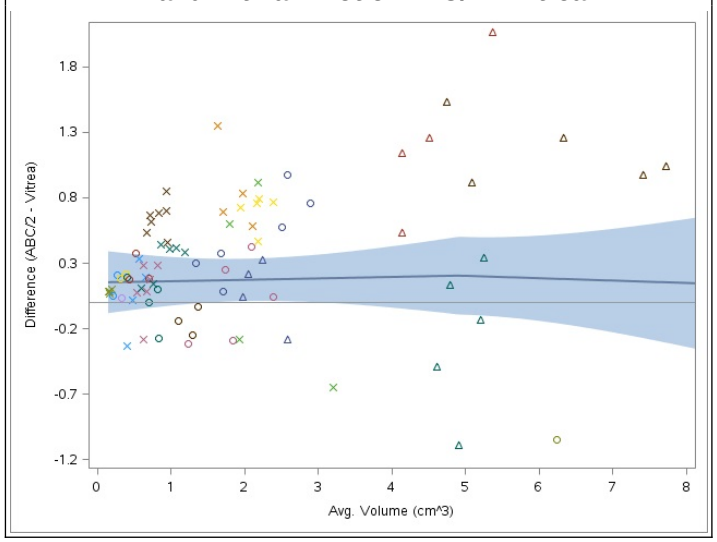
Inclusion criteria:
1. Presence of meningioma managed conservatively
2. At least 18 years of age
3. At least 3 magnetic resonance (MR) scans
4. At least 1.5 years of follow-up
5. Vitrea measurement present for one or more of their scans

T1-weighted three plane post-contrast MR images were used measurement by two methods:

1. ABC/2 technique
2. Planimetric volume analyses with Vitrea workstation (Vital Images, Plymouth, Minn)

Measurements were compared using Bland-Altman plots and concordance correlation coefficients (CCC) with significance set at p-value <0.05

Bland-Altman Plot of ABC/2 v Vitrea



Results

- A total of 146 images were obtained across 26 patients
- Of these, 122 paired volume measurements were obtained with subjects contributing 1 to 7 dyads
- The Vitrea workstation was unable to measure tumor volumes for 24 (16.44%) of scans available
- The CCC between the two methods of volumetric analysis was 0.93 (95% CI: 0.86, 0.97)

Conclusions

- There is moderate to substantial correlation between ABC/2 and planimetric methods of volumetric analysis
- Vitrea was unable to obtain planimetric data for 24 (16.44%) of scans using standard applications commands
- The ABC/2 method remains validated and easily applied supporting its use in longitudinal evaluation of meningioma volume

Coronal Image of Vitrea ROI Selection