

Computer-Assisted Cranial Surgery Navigation Accuracy: A One Year, Single Center Quality Assessment Saint-Aaron Morris MD; Rahil MD Tai; Dong H. Kim MD; Yoshua Esquenazi MD

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Introduction

Computer aided navigation has become fundamental to enhancing the safety and efficiency of shunts, biopsies, and tumor resections. 1 – 2 mm accuracy has become the expectation when using this technology, but understanding the limits for the various registration modalities, as well as pitfalls in the technology's detection interface largely influence success. The last study to assess the clinical rate of registration errors suggested a frequency of 12.4%.(5)

Methods

Faculty at our institution were surveyed for known cranial navigation issues in the prior year. A restrospective review was performed on the reported cases with accuracy concerns. An electronic data entry point was added to the pre-operative checklist and tracked whether stealth was used, which modality (optical versus electromagnetic) was implemented, and whether a rigid or adhesive patient reference was utilized. Similarly, postoperative notes collected data on when stealth registration errors were encountered, whether registration checkpoints were created during the

case and if so did this reconcile the error. The initial 9 months of data was anazlyzed for reported errors and trends.

Results

6 errors were reported from a prior 6 month period. Errors stemmed from reference localizer shifts, patient shifts within headframe, or suboptimal registration strategies. Stealth was utilized in 259 cranial cases. This included extra-axial and intra-axial tumor resections or biopsies, and shunts. 5 stealth problems were reported during the study interval. Registration checkpoints were created in 3 of these instances (60%) and reconciled the registration accuracy in 2 of these cases (66%). Ultimately, registration accuracy was a concern in 1.3% of cases.

Conclusions

The frequency of computer assisted navigation errors is 1.3% at our institution. Implementing a perioperative checklist to account for navigation pitfalls and annual inservice of nursing and physician staff ensures proper use and maintenance of technology. Registration checkpoints are useful to prevent unreconcilable loss of accuracy.

Learning Objectives

Computer assisted surgery registration errors should be infrequent (< 2%).

Quality assurance measures should be in place to prevent track and rectify common causes of problems (annual surgical team in-service on maintenance and use, creation of registration checkpoints once accurate registration has been achieved, and use of pre-operative checklists to avoid common sources errors)

Cranial navigation registration inaccuracy should be reconcilable.

References

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