Did survival improve after the implementation of intraoperative neuronavigation and 3D ultrasound in glioblastoma surgery? A retrospective analysis of 192 primary operations.

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Abstract

BACKGROUND: Numerous observational studies indicate that more aggressive resection may prolong survival in glioblastoma patients. In Trondheim, Norway, intraoperative 3D ultrasound has been in increasing use since November 1997. The aim of the present study was to examine if the introduction of 3D ultrasound and neuronavigation (i.e., the SonoWand® system) may have had an impact on overall survival.

PATIENTS/MATERIAL AND METHODS: Patient data were obtained retrospectively for the 192 glioblastoma patients who received surgery and postoperative radiotherapy between 1990 and 2005. Overall survival, before and after 1997, was compared using the log rank test. Possible confounders were adjusted for in a multivariate Cox regression analysis.

RESULTS: We observed an increase in survival for patients in the last study period (9.6 vs. 11.9 months; HR = 0.7; p = 0.034). The significant improvement in the latest time period was sustained after adjusting for age, WHO performance status (≥2) and type of radiotherapy (normofractioned or hypofractioned), and chemotherapy (yes/no), p = 0.034. 10 out of 14 patients who survived more than 3 years received treatment after the implementation of 3D ultrasound.

CONCLUSION: Our study demonstrates that survival has improved within the same period that intraoperative ultrasound and neuronavigation was introduced and established in our department. The demonstrated association is a necessity for causation, but given the nature of this study, one must be cautious to claim causality. The improvement was, however, significant after adjustment for known major prognostic factors.

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