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## Convection-enhanced delivery catheter placements for high-grade gliomas: complications and pitfalls.

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### Abstract

Convection-enhanced delivery (CED) of compounds into brain tumors reportedly circumvents the blood brain barrier. CED intends to increase drug delivery to malignant cells, reaching high local therapeutic concentration and decreasing or eliminating systemic side effects. Clinical experience and published data on catheter placement (CP) surgery are scarce. We propose practical and technical guidelines for planning CED based on our experience. We retrospectively analyzed the medical charts and relevant neuroimages of 25 patients following the insertion of 64 CED catheters. The patients were enrolled in at least one of four clinical trials using CED for treating recurrent glioblastoma multiforme in our institution between 2003-2006. Intra- and postoperative complications related to CP surgery and the difficulties and pitfalls of planning were evaluated. There were 29 CP surgeries. Forty-four peritumoral brain tissue catheters were inserted in 16 CP surgeries following tumor resection in 16 patients, and 20 catheters were placed into the tumor in 13 procedures in 10 patients. The lesions were in or near eloquent brain tissue areas in 13 of all CP surgeries. Complications included increased edema (31%), infection (6.9%), bleeding (6.9%) and seizures (13.8%). Significant neurological deterioration occurred in 4 patients (13.8%). Difficulties in adhering to CP surgery guidelines included lesion site (superficial, mesial temporal lobe, proximity to CSF spaces), proximity to eloquent cortical areas, tissue density that interfered with the trajectory, and technical limitations of stereotactic instruments. CED procedures for high-grade gliomas may be associated with surgical morbidity. Adherence to guidelines might be difficult because of lesion site and complicated by brain and tumor tissue characteristics. This should be considered while planning clinical trials that use convection-based technology.

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