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## Biopsies of caudal brainstem tumors in pediatric patients - a single center retrospective case series

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## Abstract

**Objective:** The indication for performing biopsies in patients with diffuse lesions in the brain stem is controversial. Possible risks associated with the technical challenging interventions need to be balanced against clarifying the diagnosis and possible therapeutic options. We reviewed the feasibility, risk profile and diagnostic yield of different biopsy techniques in a pediatric cohort.

**Methods:** We retrospectively included all patients under 18 years of age that received a biopsy of the caudal brainstem region (pons, medulla oblongata) at our pediatric neurosurgical center from 2009-2022.

**Results:** We identified 27 children. Biopsies were performed using frameless stereotactic (Varioguide) (n=12), robotic assisted (Autoguide) (n=4), endoscopic (n=3) and open biopsy (n=8) technique. Intervention related mortality was not observed. Three patients experienced transient post-surgical neurological deficit. No patient showed intervention related permanent morbidity. Biopsy yielded histopathological diagnosis in all cases. Molecular analysis was feasible in 97% of cases. Most common diagnosis was H3K27M mutated diffuse midline glioma (60%). Low-grade gliomas were identified in 14%. Overall survival was 62.5% after 24 months of follow up.

**Conclusion:** Biopsies of the caudal brainstem in children were feasible and safe in the presented setup. The amount of acquired tumor material allowing integrated diagnosis and was obtained at reasonable risk. The selection of the surgical technique depends on tumor location and growth pattern. We recommend brainstem tumor biopsies in children being performed at specialized centers to better understand the biology and enable possible novel therapeutic options.

Keywords: Brain stem; DIPG; Frameless biopsy.

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