

# Clinical and oncological outcomes in single-stage versus staged surgery for pediatric craniopharyngiomas: a multicenter retrospective study

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## Abstract

**Purpose:** Craniopharyngiomas (CPGs) are aggressive brain tumors responsible of severe morbidity in children. The best treatment strategies are under debate. Our study evaluates surgical, pituitary, and hypothalamic outcomes of a tailored staged-surgical approach compared to a single-stage radical approach in children with CPGs.

**Methods:** Multicenter retrospective study enrolling 96 children treated for CPGs in the period 2010-2022. The surgical management was selected after a multidisciplinary evaluation. Primary endpoint includes the inter-group comparison of preservation/improvement of hypothalamic-pituitary function, the extent of resection, and progression-free survival (PFS). Secondary endpoints include overall survival (OS), morbidity, and quality of life (QoL).

**Results:** Gross Total Resection (GTR) was reached in 46.1% of cases in the single-stage surgery group (82 patients, age at surgery  $9 \pm 4.7$  years) and 33.3% after the last operation in the staged surgery group (14 patients age  $7.64 \pm 4.57$  years at first surgery and  $9.36 \pm 4.7$  years at the last surgery). The PFS was significantly higher in patients addressed to staged- compared to single-stage surgery (93.75% vs 70.7% at 5 years, respectively,  $p = 0.03$ ). The recurrence rate was slightly higher in the single-stage surgery group. No significant differences emerged in the endocrinological, visual, hypothalamic outcome, OS, and QoL comparing the two groups.

**Conclusions:** In pediatric CPGs' surgical radicality and timing of intervention should be tailored considering both anatomical extension and hypothalamic-pituitary function. In selected patients, a staged approach offers a safer and more effective disease control, preserving psychophysical development.

**Keywords:** Craniopharyngioma; Hypothalamus; Pituitary; Quality of life; Staged surgery.