

Clival Chordoma Resection Without Occipitocervical Fusion: A Case Report

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Abstract

Clival chordomas are rare, slow-growing malignant tumors originating from remnants of the notochord, predominantly affecting the axial skeleton. These tumors are known for their locally aggressive behavior and challenging anatomical location, particularly when involving the clivus at the skull base. Standard treatment typically involves surgical resection, often followed by radiation therapy to manage potential recurrences. However, the decision to perform occipitocervical (OC) fusion during resection is complex and depends on various factors, including tumor extent and craniocervical junction (CCJ) stability.

In cases where the tumor extends to the ventral craniovertebral junction, OC fusion is commonly performed to prevent instability. Nevertheless, there are instances where resection without fusion may be feasible without compromising stability. This report presents a case of a 66-year-old male with a clival chordoma involving the anterior arch of C1 and the rostral odontoid, who underwent successful endoscopic transnasal resection without the need for OC fusion, thereby preserving his cervical mobility.

Introduction

Clival chordomas are rare, slow-growing malignant tumors arising from notochordal remnants, predominantly located at the skull base. Their proximity to critical neurovascular structures and the craniocervical junction (CCJ) poses significant challenges in surgical management. Achieving total resection is often complicated by the tumor's invasive nature and the need to maintain CCJ stability.¹

Occipitocervical (OC) fusion is a surgical procedure employed to stabilize the CCJ, particularly when structural integrity is compromised. In the context of clival chordomas, the decision to perform OC fusion hinges on factors such as tumor extension into the occipital condyles, involvement of the anterior arch of C1, and the integrity of the transverse ligament. Studies have indicated that tumor invasion into these structures may necessitate fusion to prevent postoperative instability.²

However, the necessity of OC fusion in all cases remains a topic of debate. Some reports suggest that with careful preoperative assessment and surgical planning, resection without fusion is feasible, thereby preserving patient mobility and reducing associated morbidities. The limited published experience on OC fusion after CVJ chordoma resection underscores the need for further studies to clarify anatomical predictors of instability in this context.³

Surgical Approach

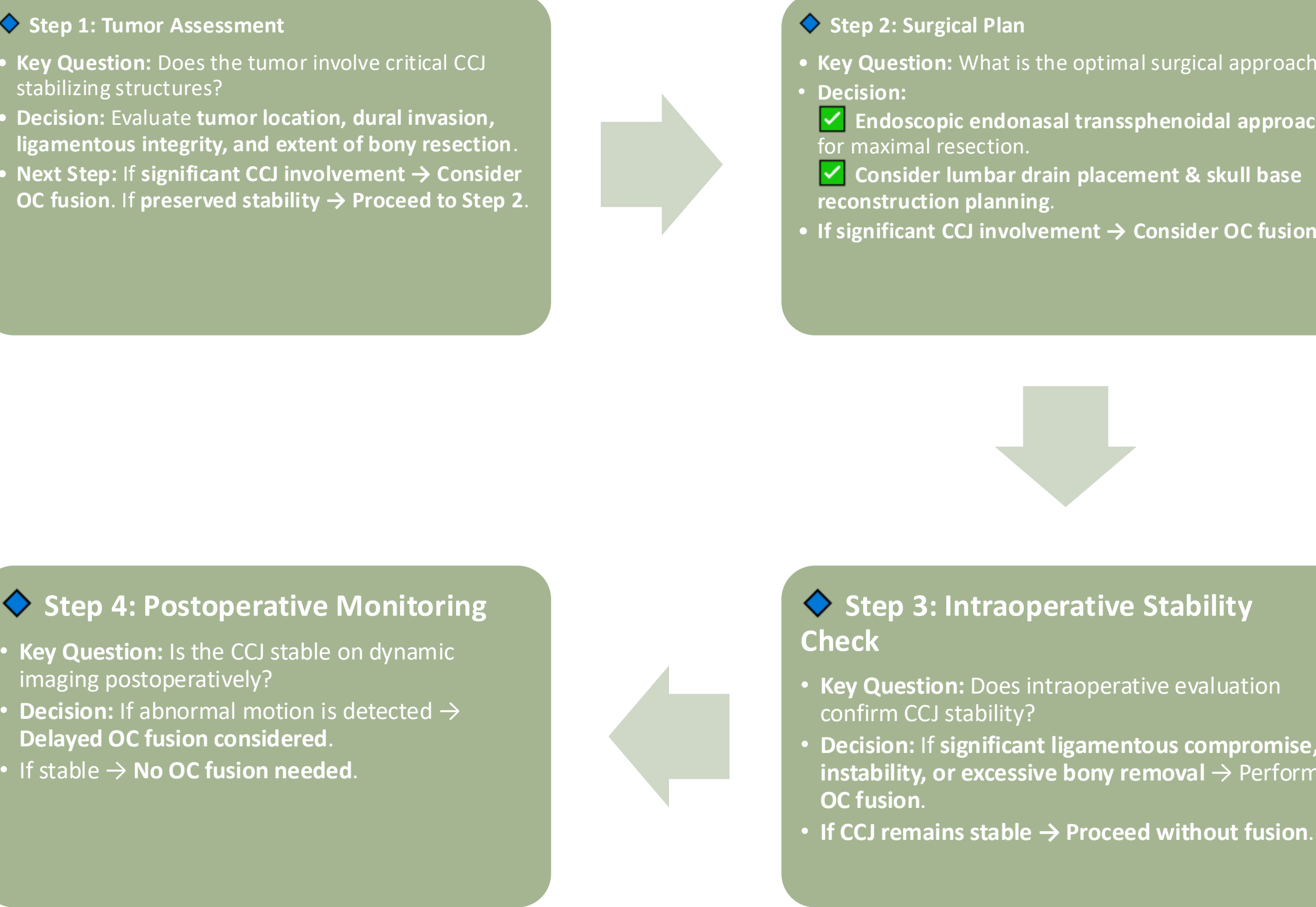
- ◆ **Patient:** 66-year-old male with a **presumed clival chordoma** involving the **posterior fossa and craniovertebral junction (CVJ)**
- ◆ **Key Imaging Findings:**
 - ✓ **Transdural invasion** of the tumor.
 - ✓ **No significant craniocervical instability** on **dynamic cervical flexion-extension films**.
- ◆ **Treatment Decision:**
 - ✓ **Endoscopic endonasal transsphenoidal approach** selected for **maximal tumor resection**.
 - ✓ **No upfront OC fusion**, as **preoperative imaging and intraoperative findings** suggested preserved CCJ stability.
- ◆ **Surgical Procedure**
 - Tumor Exposure & Resection**
 - **Clival drilling** performed to **expose tumor and ventral C1**.
 - **Transdural invasion noted** → Careful dissection of the **arachnoid off the tumor**.
 - ◆ **Key Intraoperative Considerations**
 - **Risk Factors Addressed:**
 - ✓ **Preserving CCJ Stability** → Avoided excessive resection of critical stabilizing structures.

Postoperative Course & Follow-Up

- ◆ **Immediate Postoperative Period**
 - ◆ **Patient Status:**
 - ✓ Extubated in the OR without complications.
 - ✓ No new neurological deficits.
 - ◆ **Imaging Findings:**
 - ✓ **Post-op MRI showed gross total resection** with no evidence of residual tumor.
 - ✓ **Dynamic cervical spine X-rays showed no abnormal motion**, confirming CCJ stability.
- ◆ **Short-Term Follow-Up (First Two Weeks)**
 - ◆ **Patient remained neurologically intact** with **no new deficits**.
 - ◆ **Repeated cervical spine X-rays confirmed continued CCJ stability**.
 - ◆ **No evidence of delayed CSF leak or surgical complications**.
- ◆ **Long-Term Follow-Up (Three Months Post-Op)**
 - ◆ **No recurrence of symptoms or tumor regrowth** on surveillance MRI.
 - ◆ **Stable CCJ on dynamic imaging**, reinforcing **no need for OC fusion**.
 - ◆ **Patient reports full mobility** with **no significant postural limitations**.

Clinical Implications

- ◆ **This case supports the feasibility of chordoma resection without OC fusion** in select patients with preserved ligamentous integrity.
- ◆ **Preoperative dynamic imaging & intraoperative stability assessment were key factors** in avoiding unnecessary fusion.
- ◆ **Long-term monitoring remains critical** to detect potential **delayed instability**.



Conclusions

Preserving **craniocervical mobility** significantly reduces morbidity and improves **postoperative quality of life**. While OC fusion is often necessary for tumors extending into **stabilizing structures**, this case suggests that a **tailored, patient-specific approach** can optimize outcomes. Further studies are needed to refine **radiological and intraoperative criteria** for determining **when fusion can be safely avoided**.

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References

- Vigo, Vera et al. "Extreme Far-Lateral Approach for Recurrent Chordoma: 3-Dimensional Operative Video." *Operative neurosurgery (Hagerstown, Md.)* vol. 24,5 (2023): e365. doi:10.1227/ons.0000000000000584
- Hong, Sukwoo et al. "Predicting the Need for Occipitocervical Fusion for Patients with Lower Clival Chordoma: A Single-Center Retrospective Study." *World neurosurgery* vol. 187 (2024): e321-e330. doi:10.1016/j.wneu.2024.04.081
- Golub, Danielle et al. "Anatomical determinants of occipitocervical fusion in skull base chordoma resection: a systematic review of the literature with illustrative cases." *Neurosurgical focus* vol. 56,5 (2024): E8. doi:10.3171/2024.3.FOCUS248