Cervical Gibbectomy for Rigid, Rounded Kyphosis in Pediatric Patient: Surgical Planning with Technical Note

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■ OBJECTIVES: **Cervical kyphosis surgery poses a significant challenge to spine surgeons. Etiologies of cervical kyphosis are many, each having its own outcome and treatment challenges. Irrespective of the etiology, the treating physician should consider all options fully to improve function and prevent neurologic worsening. We outline management principles and decision making in the case of a rigid, rounded kyphosis of the cervical spine and highlight the technique of an internal gibbectomy procedure, which has never been reported in the cervical spine.**

■ METHODS: **We report a case of Ewing sarcoma of the cervical spine that presented with progressive myelopathy symptoms. The patient was operated on multiple times (anterior and posterior) and presented to us with rigid, rounded global kyphosis of the cervical spine. We performed internal gibbectomy from a posterior approach and decompressed the neural tissue.**

■ RESULTS: **The patient had a satisfactory recovery in myelopathy symptoms, and the modified Japanese Orthopaedic Association score improved at subsequent follow-ups. There was no recurrence at 2-year follow-up.**

■ CONCLUSIONS: **Internal gibbectomy can be a treatment option in rigid, rounded kyphosis in which the primary goal of surgery is neural decompression.**

INTRODUCTION

Cervical kyphosis is an uncommon scenario. It is caused due to degenerative disk disease, inflammatory arthritis, congenital syndromes, tumors, postlaminectomy kyphosis, etc.[1,2] Cervical kyphosis is broadly classified into 2 types—rigid (commonly due to ankylosing spondylitis and postlaminectomy kyphosis) and flexible (dropped head syndrome). On the basis of the flexibility of the curve, the surgical approach and technique to be performed are planned.[3]

Gibbectomy or internal kyphectomy for rounded kyphosis has been described for healed tuberculosis of the spine. It is commonly performed in the thoracic spine. The primary goal of gibbectomy is neural decompression. It is an uncommon procedure due to technical difficulty and its high rate of complications.[4,5]

We report the case of a pediatric patient with fixed rounded kyphosis of the cervical spine operated with gibbectomy (kyphus excision) from the posterior approach.

CASE REPORT

An 11-year-old male child presented with neck pain and imbalance while walking for the past 2 years. There was no sensory motor deficit. He had a spastic myelopathic gait. He had spasticity in all 4 limbs. Reflexes were brisk in bilateral upper limbs and lower limbs. He had a horizontal gaze. There was no difficulty swallowing or breathing. Myelopathy, based on modified Japanese Orthopaedic Association criteria, was severe.[6] A radiograph of the cervical spine (**Figure 1**) showed rounded global kyphosis of the neck with previous implants in situ. We did not perform magnetic resonance imaging, as we were unaware of the nature of previous metallic implants, their proximity to neural structures as no additional information would be obtained. Computed tomography (CT) scan was done to better define the bony anatomy (**Figure 2**). Positron emission tomography scan of the whole body did not show lesions elsewhere.

On checking previous records, he had Ewing sarcoma of the cervical spine, for which cervical laminectomy was done at the age of 7 years (further details were not available). Post surgery the patient went into progressive kyphosis. Multiple surgeries were done elsewhere in the form of posterior "facet joint spacers," posterior bone grafting, and anterior 1-level fusion with 4-level plating. Because there was implant backout, he

Key words
- Cervical
- Gibbectomy
- Kyphosis
- Pediatric

Abbreviations and Acronyms
CT: Computed tomography

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Figure 1. Plain radiograph (anteroposterior and lateral) showing global rounded kyphosis with previous implant in situ.

underwent 1 more surgery in the form of posterior exploration of reformed laminae with anterior plate removal and fibula strut graft. The anterior graft fused completely, leading to a solid sheet of bone from C2 to C7.

We faced a situation in which a young boy whose cervical spine (anterior and posterior) was operated on multiple times with implants in situ and myelopathic symptoms. We offered him surgery in view of worsening myelopathic symptoms. A team comprising a spine surgeon, pediatric anesthesiologist, and intensivist was involved in decision making, and informed consent of both parents was given for an internal kyphectomy. The aim of the surgery was neurologic decompression rather than extensive deformity correction.

PREOPERATIVE PLANNING

We took dynamic radiographs to check for instability, which was not seen. CT angiography, undertaken to see the course of the vertebral artery, did not show any major alterations. **Figure 3A—C** shows the operative steps.

EXPOSURE

A posterior approach was taken, and dissection was done carefully through scar tissue because the patient had already been operated on twice using this approach. There was a preexisting laminectomy defect; hence the utmost care was taken while dissecting to reach the facet joints and lateral pillars of the vertebral column and prevent inadvertent dural injury.

TRANSPEDICULAR APPROACH

Cages that had been inserted in the facet joints in the previous surgery served as landmarks to define the facets and pedicles at the relevant levels of the apex of the kyphosis.

After removing the cages, we drilled down the lateral masses on either side, down to the vertebral foramen to expose the vertebral artery posteriorly.

The vertebral canal was "deroofed," and hence no handling of the vertebral artery was needed as it lay anterior to the internal gibbus. Effectively, by burring down the lateral masses, we traversed the posterior column and reached the middle column—anterior to the dural sac.

INTERNAL GIBBECTOMY

The internal gibbus presented itself after the lateral pillars were removed. An internal gibbectomy was performed from either side step by step—curetting and osteotomizing from lateral to medial. The thinned-out cortex was then carefully removed by small curettes to avoid dural puncture. Care was taken to only remove the middle column, keeping as much bone untouched anteriorly as possible to maintain stability. As the posterior shell of the internal gibbus was excised, the cord could be seen to "fall" in the front, suggesting decompression.

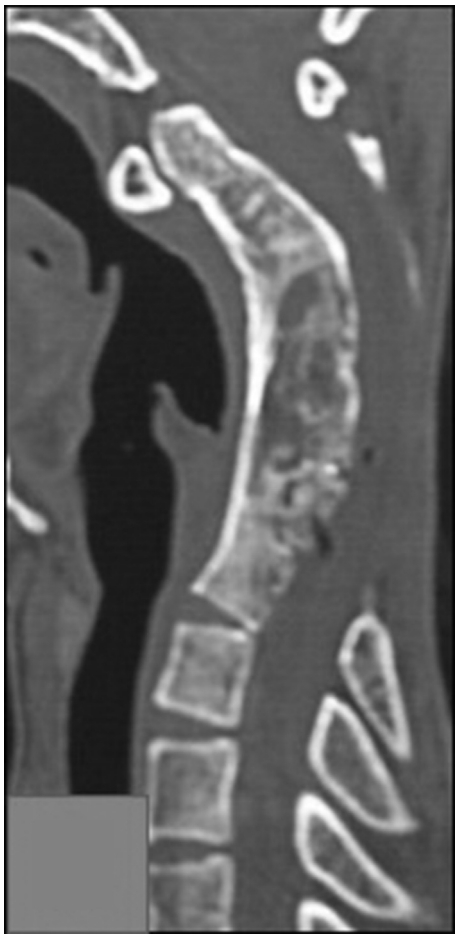

Figure 2. Sagittal computed tomography scan cut showing round kyphosis from C2 to C7.