Case Report ISSN 2689-1093

Surgical Research

Combined Laparoscopic And Posterior En Bloc Resection for Giant Sacral Chordoma in an Elderly Patient: A Case Report

Ivan Vasilevski, MD, PhD[1]*

[1]*Department of General, Abdominal and Vascular Surgery, Medical Institute of the Ministry of Interior, Sofia, Bulgaria.*

ORCID: 0009-0008-3242-8227.

***Correspondence:**
Ivan Vasilevski, Department of General, Abdominal and Vascular Surgery, Medical Institute of the Ministry of Interior, Sofia, Bulgaria.

Received: 10 Feb 2026; **Accepted:** 18 Mar 2026; **Published:** 29 Mar 2026

Citation: Ivan Vasilevski. Combined Laparoscopic And Posterior En Bloc Resection for Giant Sacral Chordoma in an Elderly Patient: A Case Report. Surg Res. 2026; 8(1): 1-4.

ABSTRACT

Chordoma is a rare malignant neoplasm characterized by slow growth and pronounced local aggressiveness. It originates from remnants of the embryonic notochord and demonstrates a predilection for the sacral region.

Chordomas account for approximately 1–4% of all primary bone tumors and nearly 50% of sacral tumors. The disease is frequently diagnosed at an advanced stage due to its indolent course. These tumors exhibit a strong tendency for local invasion of adjacent neurovascular structures, high rates of local recurrence, and potential for distant dissemination. Complete surgical resection with negative margins remains the most important prognostic factor, while responsiveness to conventional radiotherapy and chemotherapy is limited.

We report the case of an 85-year-old patient presenting with progressive low back pain, a palpable sacral mass, and bowel and bladder dysfunction. A combined surgical strategy was implemented, consisting of laparoscopic pelvic tumor mobilization followed by radical partial sacrectomy with bilateral resection of the S3–S5 nerve roots. Histopathological and immunohistochemical analyses confirmed the diagnosis of chordoma with tumor-free resection margins. A delayed reconstructive procedure was subsequently performed. At 3.5-year follow-up, no evidence of local recurrence was observed.

Keywords

Chordoma, Treatment, Sacrectomy minimally invasive surgery, Sacral tumors.

Abbreviations

CTl: Computed tomography, MRI: Magnetic resonance imaging, PET/CT: Positron emission tomography/Computed tomography.

Introduction

Chordomas are rare, slow-growing malignant neoplasms accounting for approximately 1–4% of primary bone tumors [1,2]. The reported annual incidence is approximately 0.08 per 100,000 population [3]. The disease occurs more frequently in males, with peak incidence between the fifth and sixth decades of life [1,3]. Mean overall survival is approximately 6.3 years, with reported 5- and 10-year survival rates of 68% and 40%, respectively [4].

Chordomas arise almost exclusively along the midline of the axial skeleton, reflecting their origin from embryonic notochordal remnants [2,5]. They are distributed relatively evenly between the skull base, vertebral column, and sacrum, with sacral chordomas comprising approximately 50% of tumors in this region [1,6]. Due to their indolent growth pattern, sacral lesions frequently remain asymptomatic until substantial tumor enlargement occurs. When symptomatic, patients typically present with deep, progressive pain, radiculopathy, and bowel or bladder dysfunction [6,7].

Cross-sectional imaging plays a pivotal role in diagnosis and surgical planning. Computed tomography (CT) typically demonstrates destructive bone lesions, whereas magnetic

resonance imaging (MRI) reveals a T2-hyperintense soft tissue mass with heterogeneous contrast enhancement and frequent extension into adjacent disc spaces and soft tissues [6,8].

Although histologically classified as low- to intermediate-grade malignancies, chordomas behave in a locally aggressive manner, are associated with delayed diagnosis, and demonstrate high rates of local recurrence [2,9]. Radical en bloc resection with negative margins remains the cornerstone of treatment and the most important determinant of long-term outcome [4,6]. Despite relative resistance to conventional radiotherapy and chemotherapy, advances in high-precision radiotherapy techniques and targeted therapies offer additional treatment options in selected cases [10,11].

Case Report

An 85-year-old patient presented with progressively worsening low back pain, a palpable sacral mass, and disturbances in bowel and urinary function. The medical history included lumbar disc surgery performed seven years earlier, complicated by persistent cerebrospinal fluid leakage.

Pelvic magnetic resonance imaging (MRI) demonstrated a 105 × 75 × 87 mm presacral mass involving the presacral fascia and adipose tissue, with rectal displacement and bone destruction extending caudally from the S2–S3 level and involving the coccyx (Figures 1,2). Colonoscopy excluded rectal invasion. CT-guided core needle biopsy revealed nests of epithelioid cells with abundant eosinophilic cytoplasm, focal vacuolization, and myxoid stromal changes, consistent with chordoma. Immunohistochemical analysis confirmed the diagnosis. Positron emission tomography/ Computed tomography (PET/CT) showed no distant metastases.

Following multidisciplinary discussion, a combined surgical approach was undertaken.

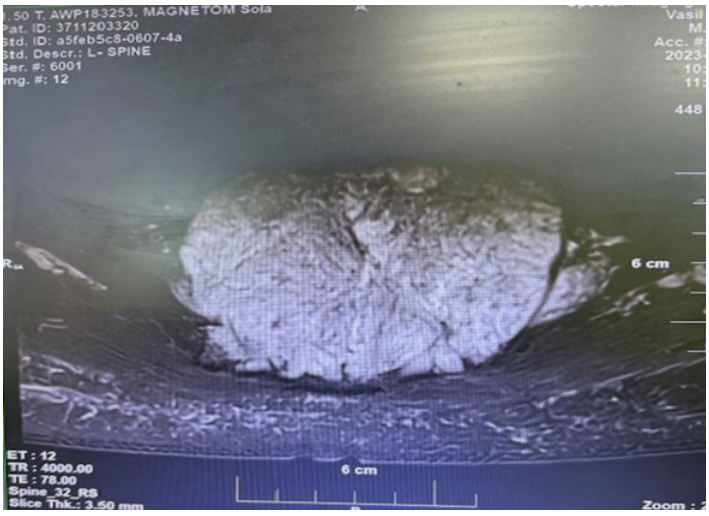

Figure 1: Preoperative pelvic MRI demonstrating a large presacral mass with sacral bone destruction and displacement of the rectum.

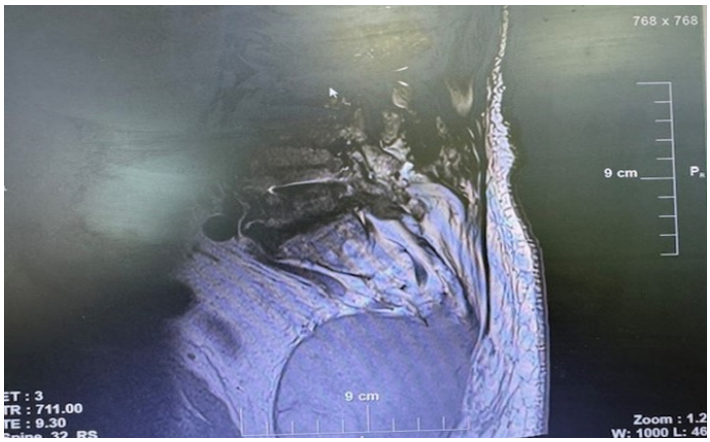

Figure 2: Sagittal MRI view showing craniocaudal tumor extension with involvement of the sacrum at the S2–S3 level.

Anterior (Laparoscopic) Stage

Under general anesthesia in the supine position, laparoscopic mobilization of the sigmoid colon and entry into the presacral space were performed. Both ureters were identified and preserved. No involvement of iliac vessels or pelvic walls was detected. Mesorectal dissection in the avascular presacral plane allowed mobilization of the 13 × 10 cm tumor from the rectum and surrounding structures (Figure 3), while maintaining rectal integrity.

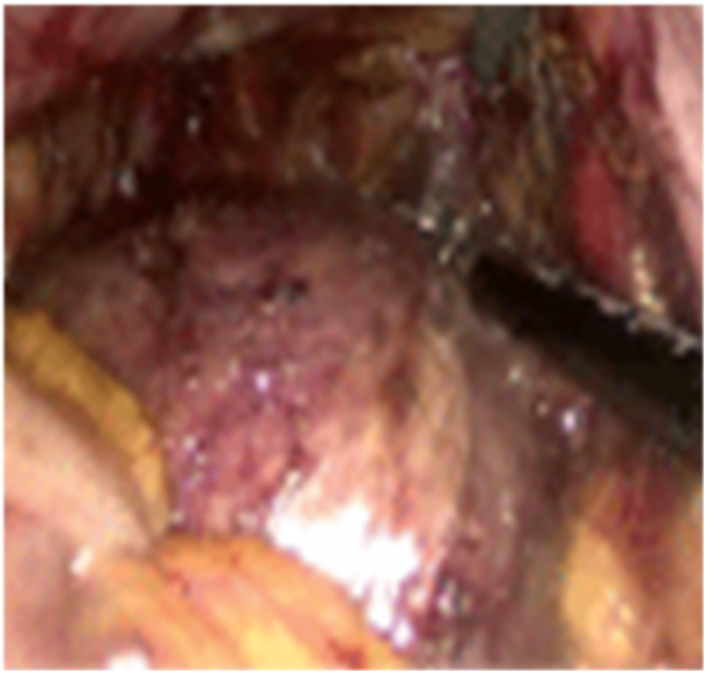

Figure 3: Intraoperative laparoscopic view illustrating mobilization of the presacral mass and mesorectal dissection with preservation of adjacent pelvic structures.

Posterior Stage

In the prone position, a midline lumbosacral incision was performed with exposure of the sacroiliac joints. Laminectomy

and osteotomies at S2–S3 were carried out while preserving the S2 nerve roots. Complete en bloc resection of the tumor with partial sacrectomy was achieved (Figure 4). The defect was reconstructed using adjacent autologous tissues.

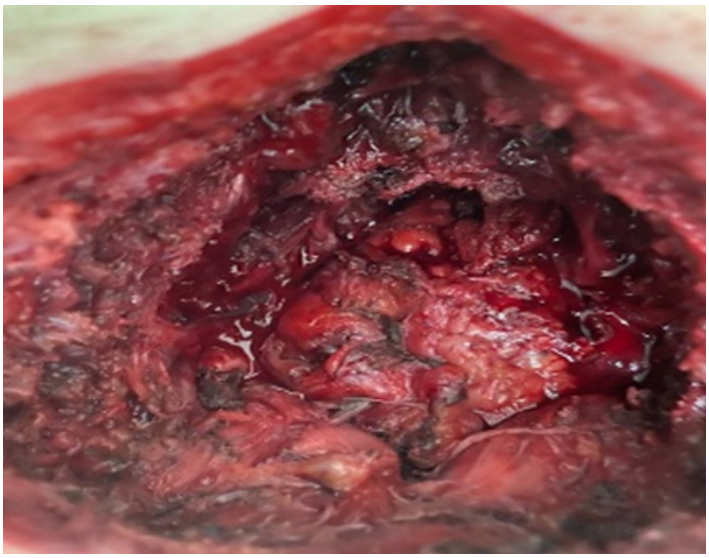

Figure 4: Posterior surgical approach with en bloc resection of a sacral chordoma following partial sacrectomy.

The early postoperative course was uneventful. Bowel function recovered; bladder dysfunction persisted as preoperatively. A secondary soft tissue defect developed, necessitating reconstructive surgery three months later. Bilateral pedicled gracilis muscle flaps were transposed to cover the 18 × 12 cm sacral defect and isolate the rectum (Figure 5).

At 3.5-year follow-up, the patient demonstrated preserved bowel function, acceptable quality of life, and no evidence of local recurrence.

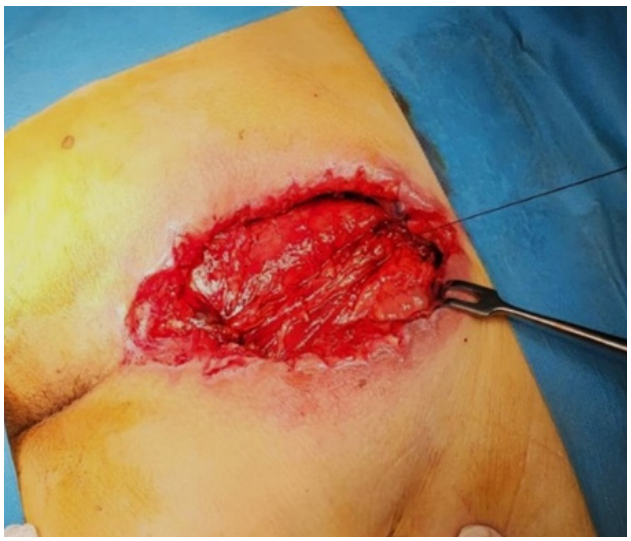

Figure 5: Reconstructive stage demonstrating bilateral gracilis muscle flap transposition to cover the sacral defect and protect the rectum.

Discussion

Management of sacral chordoma presents significant surgical challenges due to anatomical complexity, tumor size at diagnosis, and the need for radical resection. Differential diagnosis includes chondrosarcoma, plasmacytoma, giant cell tumor, and metastatic bone disease [1,5,9]. Treatment should therefore be centralized in specialized centers with multidisciplinary expertise [11].

Achieving complete surgical resection with negative margins (R0 resection) is the most critical prognostic factor for overall and disease-free survival [6,7]. Preoperative imaging is essential for assessing tumor extension and planning osteotomy levels [8]. Surgical strategy depends on craniocaudal extension; lesions above S3 frequently require combined anterior–posterior approaches [4,6].

Minimally invasive anterior mobilization offers superior visualization of the presacral space and facilitates vascular control while reducing morbidity [12-14]. Postoperative complications are primarily related to sacral nerve root sacrifice and may include bowel, bladder, sexual, and motor dysfunction [6,15]. Although perioperative mortality is low, massive intraoperative hemorrhage remains a major risk [16]. Surgical site infection is the most frequent complication and may be mitigated by meticulous operative planning and reconstructive strategies employing well-vascularized muscle flaps [17].

Conclusion

This case highlights the feasibility and oncological effectiveness of a combined laparoscopic and posterior approach for large sacral chordoma involving anterior and posterior sacral compartments. Meticulous preoperative planning, multidisciplinary coordination, and appropriate reconstructive strategies are essential for optimizing oncological and functional outcomes. In specialized centers, minimally invasive techniques can be successfully integrated into the comprehensive management of anatomically complex sacral tumors.

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