

Combined Laminotomy and Spinal Endoscopic-Assisted Decompression for Gouty Tophi Involving the Lumbar Epidural Space and Multi-level Paravertebral Regions: A Case Report

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Abstract: Tophaceous gout involving the spinal canal is a rare but potentially debilitating condition. The study reports the case of a 41-year-old man with chronic gout who developed severe lumbar radiculopathy from extensive intraspinal epidural and multi-level paravertebral tophaceous deposits. The patient was treated with a combined procedure involving open L3–4 laminotomy and spinal endoscopic-assisted decompression to remove both intraspinal and extraspinal tophi. This strategy enabled thorough neural decompression and tophus excision while minimizing tissue disruption. Postoperatively, the patient's neurological symptoms improved significantly. The study examines the technical nuances and benefits of integrating open and endoscopic methods for managing complex spinal gout, particularly in cases where the lesion involves multiple segments of the paravertebral region.

Keywords: Gouty tophus; Spinal gout; Lumbar posterior elements; Spinal endoscopic-assisted; Laminotomy

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1. Introduction

Gout is a metabolic disorder characterized by the deposition of monosodium urate crystals in joints and periarticular soft tissues. Spinal involvement occurs only rarely, with fewer than 200 cases reported in the literature^[1]. Clinical manifestations range from axial back pain to radiculopathy or myelopathy resulting from nerve root or spinal cord compression^[2–3]. Diagnosis is often delayed due to nonspecific imaging features and a low index of clinical suspicion^[4]. The study presents a case of gouty tophi in the L3/L4 spinal canal epidural space and paravertebral regions from L1 to L3, which was successfully treated with a combined surgical approach.

2. Case presentation

A 41-year-old male presented with a one-year history of low back pain and right lower extremity radiculopathy, which had acutely worsened over the preceding week and was accompanied by neurogenic claudication. He also reported a ten-year history of gouty arthritis, with a peak serum uric acid level of 950 $\mu\text{mol/L}$ (reference range 202–420 $\mu\text{mol/L}$), managed intermittently with colchicine, febuxostat, celecoxib, and dexamethasone. Physical examination revealed multiple gouty tophi in the hands, knees, and toes, resulting in joint deformities, and right lower extremity motor weakness graded at 3/5.

Imaging studies included:

X-ray: patchy high-density shadow at L3–4 (**Figure 1**).

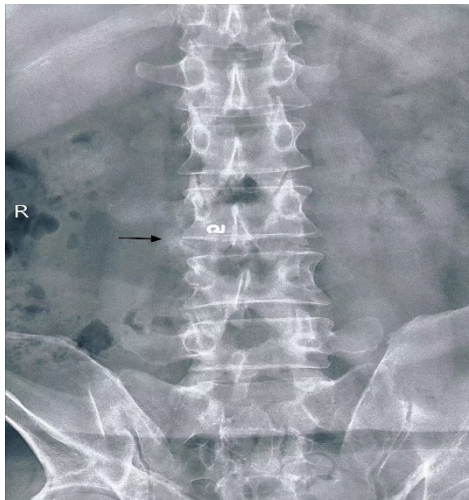


Figure 1. X-ray: Flocculent paraspinal opacity at L3/4

CT: Erosive changes in L1–4 vertebral appendages and paravertebral soft tissues, with a mass in the L3–4 spinal canal causing stenosis (**Figure 2**).

MRI: Intraspinal epidural and multi-level paravertebral tophaceous deposits compressing the thecal sac and nerve roots at L3–4 (**Figure 3**).

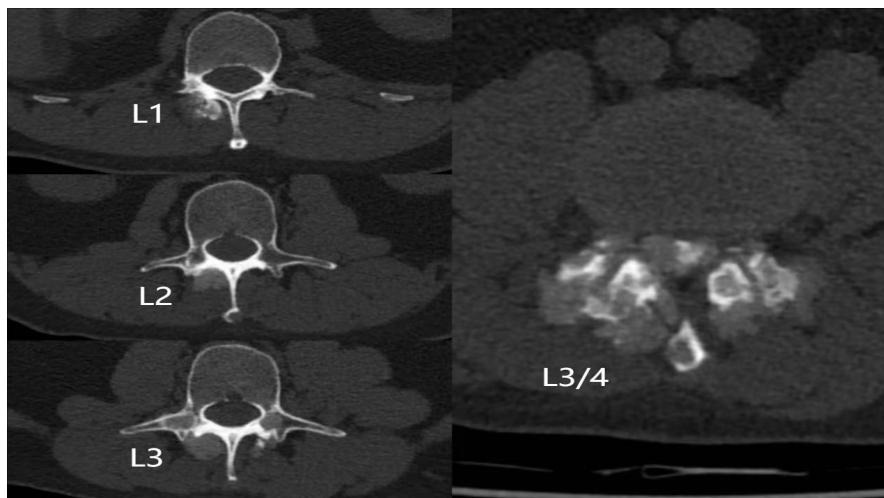


Figure 2. CT: Multiple slightly hyperdense lesions external to L1–L3 laminae and at L3/4 (intraspinal & extraspinal), accompanied by significant bony destruction

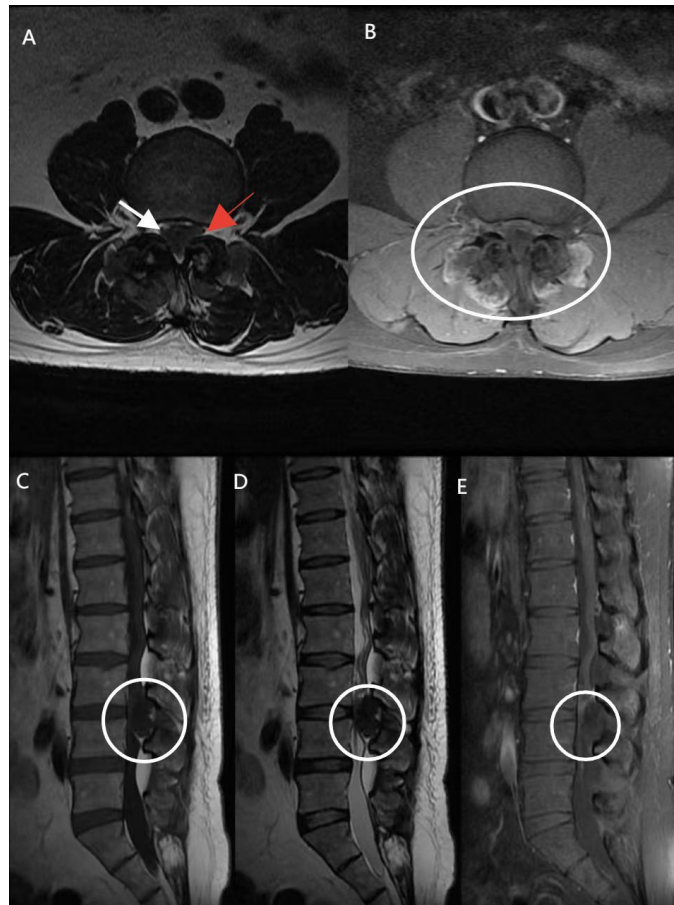


Figure 3. (A) Axial T2-weighted MRI: Red arrow, normal left nerve root; white arrow, compressed and deformed right nerve root. (B) Contrast-enhanced axial T1-weighted MRI: A slightly hyperintense, heterogeneous space-occupying lesion at L3/4, with both intraspinal and extraspinal components. (C) Sagittal T1-weighted MRI: A hypointense intraspinal space-occupying lesion at L3/4 with significant thecal sac compression. (D) Sagittal T2-weighted MRI: Persistent hypointense space-occupying lesion. (E) Contrast-enhanced sagittal T1-weighted MRI: Non-enhancing intraspinal space-occupying lesion

3. Surgical management

The patient underwent a two-part procedure:

3.1. Open L3–4 laminotomy

Extensive chalky white deposits were found eroding the lamina and compressing the thecal sac and right L4 nerve root. These were meticulously removed (**Figure 4**).

3.2. Spinal endoscopic-assisted decompression

To prevent further destruction of the vertebral lamina, under endoscopic guidance, paravertebral tophi at L1 to L3 were removed through a minimally invasive approach (**Figure 5**).

No spinal instrumentation was required as the facet joints were preserved.

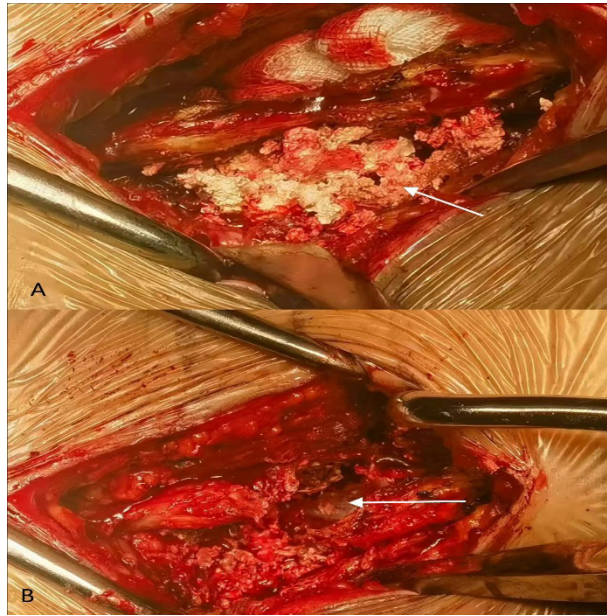


Figure 4. (A) Chalky, paste-like gouty tophus exterior to the vertebral lamina. (B) Gouty tophus eroding the right lamina with intracanalicular extension and significant thecal sac compression (arrow points to thecal sac post-removal)

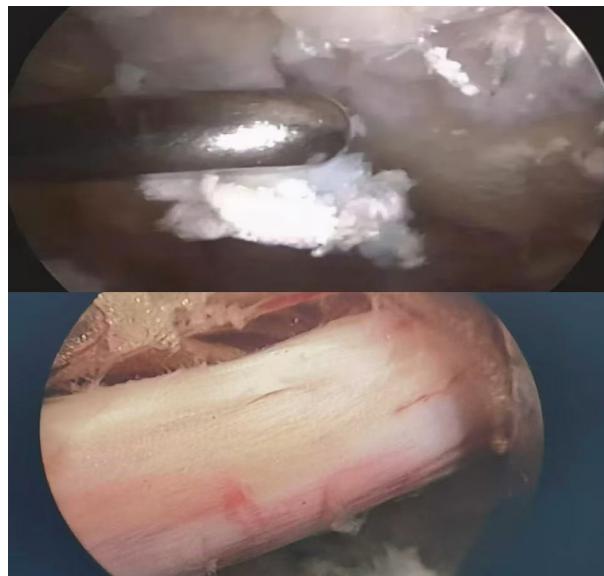


Figure 5. Endoscopic view of gouty tophi and an exposed nerve root

4. Outcome

Postoperatively, the patient's radiculopathy resolved, and motor strength improved significantly. Histopathological analysis confirmed the diagnosis of tophaceous gout (**Figure 6**). No recurrence was observed at the one-year follow-up.

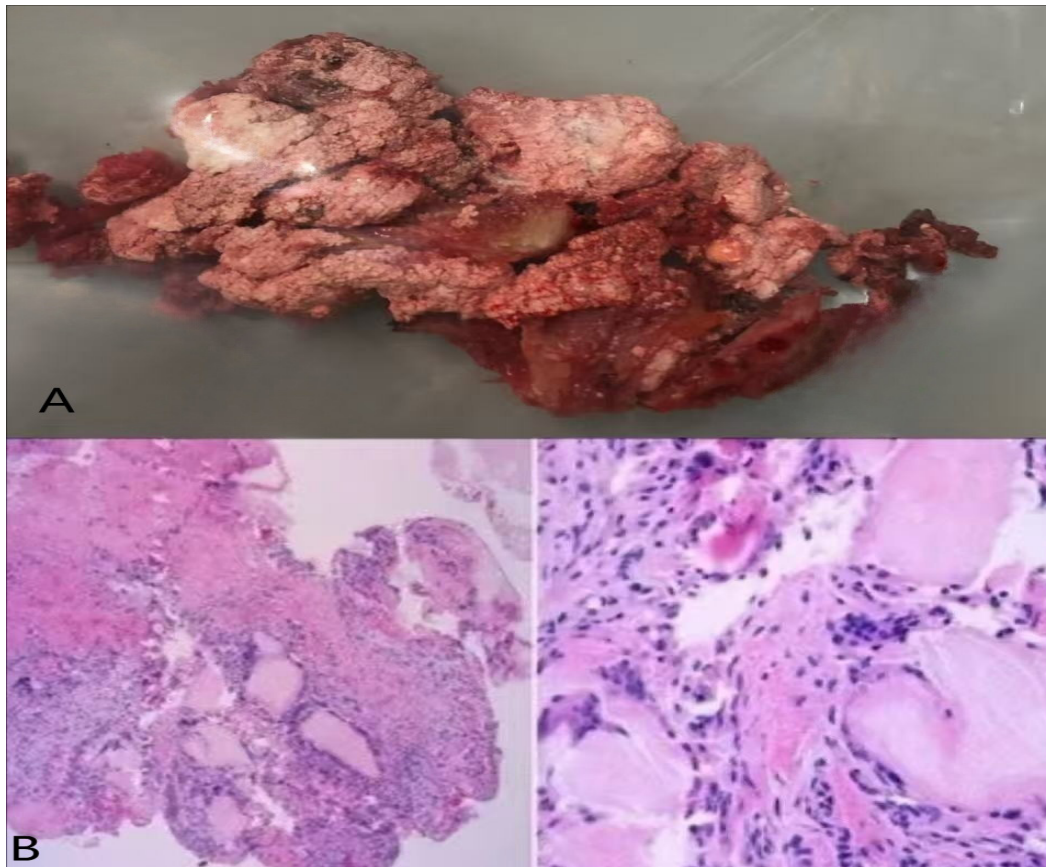


Figure 6. (A) Chalky, paste-like gouty tophus. (B) The pathological findings confirmed the lesion as a gouty tophus

5. Discussion

Spinal gout is often misdiagnosed as infection, tumor, or degenerative disease ^[5–6]. Imaging findings are nonspecific, and serum uric acid may be normal in up to 30% of cases ^[7]. Definitive diagnosis requires histopathological confirmation ^[8].

The case highlights several key points:

Combined Surgical Approach: The use of open laminotomy for direct intraspinal epidural decompression and endoscopic techniques for multi-level paravertebral tophi represents a novel and tailored strategy ^[9–10]. This combination minimizes soft tissue damage, reduces postoperative pain, and accelerates recovery compared to extensive open procedures alone ^[11].

Technical Considerations: Endoscopic visualization allows for precise identification and removal of paravertebral deposits without extensive muscular dissection ^[12–13]. Open surgery remains essential for safe and complete decompression of significant intraspinal lesions, especially those causing severe canal stenosis and nerve compression ^[14].

Literature Context: Previous reports have primarily described open laminectomy or, more recently, fully endoscopic surgery for spinal gout ^[15–18]. This integrated approach addresses the challenge of disease involving both the spinal canal and multiple paravertebral levels, which is technically difficult to manage with a single technique. This is supported by growing evidence for the efficacy of minimally invasive spine techniques in managing various pathologies ^[19–20].

6. Conclusion

Combined open laminotomy and spinal endoscopic-assisted decompression proves safe, effective, and technically feasible for managing extensive lumbar spinal epidural and multi-level paravertebral tophaceous gout. This technique enables thorough decompression and tophus removal without compromising spinal stability. Early surgical intervention is warranted for patients presenting with neurological deficits ^[21–22]. Gouty tophi should also be considered in the differential diagnosis of spinal masses, particularly in individuals with a known history of hyperuricemia ^[23–25].

Disclosure statement

The authors declare no conflict of interest.

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