

## Case Report

# To cut or not to cut? A case report on pediatric intervertebral disc calcification

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## ABSTRACT

**Background:** Intervertebral disc calcification (IVDC) is a rare cause of acute spinal pain in pediatric patients. The most common symptom is back or neck pain, but muscle spasm, muscle weakness, and sensory loss also occur. Many patients have an alarming presentation and radiological findings concerning for spinal cord compression.

**Case Description:** A 10-year-old female presented with 2 weeks of worsening back pain and restricted neck flexion with no history of preceding trauma. Magnetic resonance imaging (MRI) showed T4/5 and T5/6 vertebral disc calcification and posterior herniation causing thoracic spinal cord compression. Despite concerning imaging findings, we decided to manage this patient conservatively with nonsteroidal anti-inflammatory drugs, leading to the improvement of symptoms within 9 days, and resolution of all pain within 1 month after hospital discharge. At 6 months follow-up, MRI showed complete resolution of calcification within the spinal canal.

**Conclusion:** This case report emphasizes IVDC as an important differential diagnosis of pediatric disc disease that does not require surgical intervention. X-ray imaging with PA and lateral views is an adequate screening for these patients. Majority of cases resolve within 6 months with conservative therapy.

**Keywords:** Disc calcification, Intervertebral, Nontraumatic, Pediatric, Spinal pain

## INTRODUCTION

Intervertebral disc calcification (IVDC) in pediatric patients is a rare occurrence with approximately 300 documented cases in the medical literature.<sup>[2]</sup> The average age of onset for this condition is 5–12 years, generally presenting as back pain and neck stiffness.<sup>[2]</sup> The underlying pathophysiology is poorly understood but may involve an aberrant maturation of intervertebral disc nutrient vascular supply.<sup>[5]</sup>

Diagnosis of IVDC relies on successful radiologic studies, with X-ray as an adequate initial screening.<sup>[3]</sup> Laboratory findings are typically unremarkable but may demonstrate elevated inflammatory markers such as erythrocyte sedimentation rate (ESR), C-related peptide (CRP), and white blood cell count.<sup>[4]</sup> Treatment of IVDC should be conservative management, with surgical intervention reserved only for cases involving progressive neurological degeneration.<sup>[2]</sup> It is highly unusual for patients, regardless of the treatment, to have long-term neurological sequelae.<sup>[5]</sup>

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We present a case involving a 10-year-old female patient that exhibits IVDC and posterior disc herniation into the spinal canal with no prior trauma or other underlying etiology.

## CASE DESCRIPTION

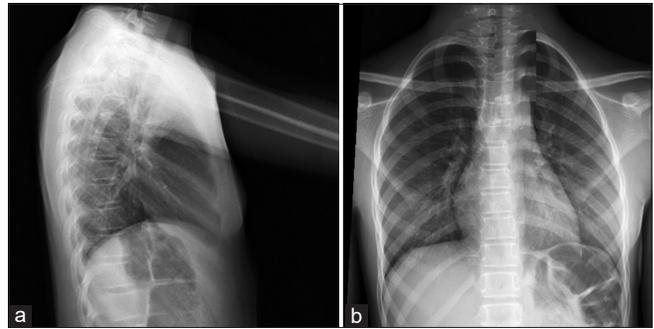
A 10-year-old unvaccinated healthy female with a history of sickle cell trait and enuresis presented to the emergency department complaining of progressive midline back pain for 2 weeks and restricted neck flexion for several days. Pain was exacerbated by movement and no preceding trauma was reported. Conservative treatment consisting of heat and cold packs, massage, acetaminophen, and ibuprofen was unable to adequately provide relief. The patient also demonstrated lower extremity paresthesia and inability to ambulate on examination, but full motor strength.

Emergency department course was remarkable for tachycardia and tachypnea. Initial physical examination demonstrated restricted neck flexion without tenderness or swelling. Her back was tender to palpation over the left lower paraspinal muscles with slight decreased range of motion. Initial laboratories were significant for a mildly elevated ESR of 17 mm/h and CRP of 5.23 mg/L. Initial X-rays showed disc calcification without any fractures [Figure 1]. Ketorolac was administered which improved neck flexion. The patient was admitted to the hospital for further workup.

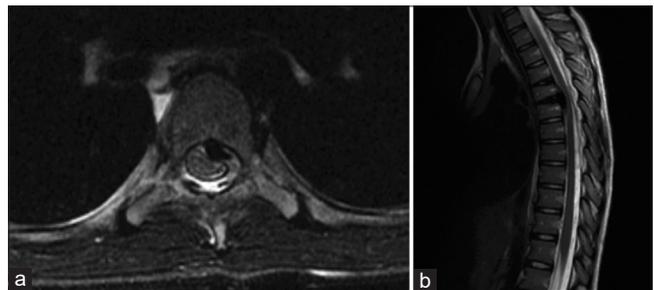
Hospital course continued with ketorolac and acetaminophen overnight which reduced her pain. Repeat physical examination was notable for positive Brudzinski and Kernig sign, abnormal gait, and nuchal rigidity with total neck extension worrisome for possible meningitis. Neurological examination was otherwise normal and nonfocal. Empiric treatment with ceftriaxone and vancomycin was started. Lumbar puncture was deferred for magnetic resonance imaging (MRI) due to concerns of a possible epidural abscess or space-occupying lesion. MRI of brain, cervical, and thoracic spine was performed under general anesthesia, showing disc calcification with herniation causing spinal cord compression of T4-T6. The discs were involved at T4/5 and T5/6, with a flattened T5 vertebrae posteriorly, and hypointense signal indicative of calcification [Figure 2].

Neurosurgery was consulted and recommended computed tomography (CT) of the thoracic spine [Figure 3] with plans for possible surgical decompression and exploration the following day. CT confirmed T4/5 and T5/6 disc calcification in the anterior epidural space causing severe stenosis with compression and thinning of the cord. No fractures were seen.

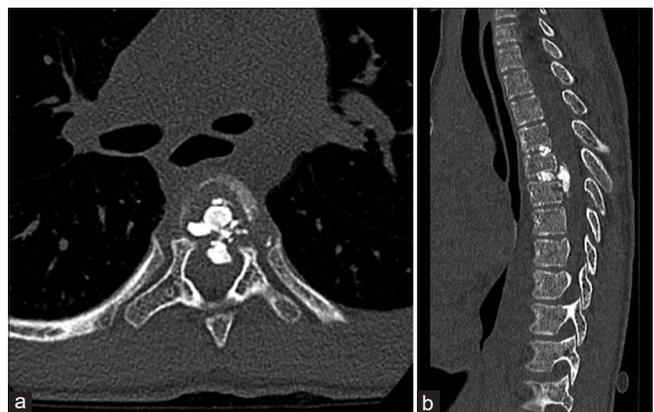
Diagnosis was made as pediatric IVDC based on a combination of imaging findings and patient history. Antibiotics were discontinued and medical management with ibuprofen and diazepam taper was recommended instead of



**Figure 1:** Initial lateral (a) and PA (b) X-ray showing T4/5 and T5/6 disc calcification without any fractures (blue and red arrows).



**Figure 2:** Magnetic resonance imaging with axial T5/6 (a) and sagittal (b) views taken during hospital day 0 showing disc calcification with herniation causing spinal cord compression of T4-6. T5 vertebrae are flattened posteriorly with hypointense signal indicative of calcification.



**Figure 3:** Computed tomography with axial (a) and sagittal (b) views shows T4/5 and T5/6 disc calcification in the anterior epidural space causing severe spinal canal stenosis.

surgery. Endocrinology workup for metabolic bone disease was unremarkable. The patient was discharged and advised for neurosurgical follow-up in 1 month.

The patient reported to the clinic 9 days after hospital discharge with marked improvement of symptoms. She reported moderate back pain, but denied any difficulty ambulating, bowel or bladder incontinence, or paresthesia.

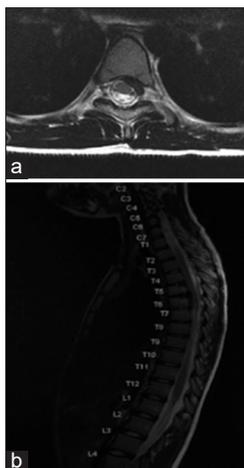
No neurological deficits were observed on physical examination. Diazepam taper, acetaminophen, and ibuprofen were given to additionally alleviate her pain.

One month repeat, MRI showed significant improvement of disc herniation and stenosis [Figure 4]. The T4/5 disc remained unchanged, but T5/6 disc herniation had decreased. The patient had complete resolution of symptoms.

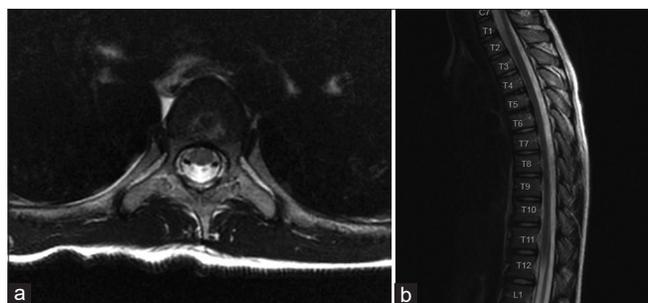
Six months repeat, MRI imaging showed complete resolution of epidural calcification and stenosis. The T4/5 and T5/6 discs still displayed some calcification, but herniation had completely resolved [Figure 5]. The patient remained symptom free at this time.

## DISCUSSION

IVDC in pediatrics is a rare condition with only around 300 reported cases in the literature.<sup>[2]</sup> It is characterized by IVDC that can progress to spinal cord and nerve root



**Figure 4:** Magnetic resonance imaging with axial (a) and sagittal (b) views 1 month after hospital discharge showed mild improvement of disc herniation and stenosis. T5/6 disc herniation is decreased, but T4/5 disc remains unchanged.



**Figure 5:** Magnetic resonance imaging with axial (a) and sagittal (b) views 6 months after hospital discharge showed complete resolution of epidural calcification and stenosis. The T4/5 and T5/6 discs still displayed calcification, but herniation had entirely resolved.

compression.<sup>[2]</sup> Some cases are asymptomatic, but many patients present with back or neck pain.<sup>[2]</sup> Other associated symptoms include muscle spasms, muscle weakness, sensory loss, or torticollis.<sup>[2]</sup>

IVDC has higher prevalence in males compared to females (3:2 ratio), with estimated peak incidence of 6–10 years of age.<sup>[6]</sup> Most cases involve (i) local or referred pain, (ii) limitation of motion, (iii) evidence of inflammation, (iv) calcification of intervertebral disc, (v) pediatric age group, and (vi) self-limiting course.<sup>[6]</sup> Cervical spinal levels are affected in 74% of cases, with thoracic being reported in 38% and lumbar in 6% of cases.<sup>[2]</sup> The most common symptoms were musculoskeletal pain (71.9%), sensorimotor disturbance (20.3%), and fever (13.8%). Torticollis or scoliosis was noted in 23.4% of patients and 15.4% of patients were asymptomatic.<sup>[8]</sup> Multiple disc spaces were reported in 24.6% of patients.<sup>[8]</sup> The patient history may include remote trauma, but IVDC often occurs without any instigating event.<sup>[1]</sup> Similar to our patient, another case report of IVDC involved a patient with sickle cell trait.<sup>[7]</sup> Correlation between hemoglobinopathies and IVDC has not been investigated, but may be a topic worth exploring in future studies.

The exact etiology of IVDC is unknown, but is suggested to be multifactorial involving genetics, trauma, metabolic abnormalities, infectious, or inflammatory causes.<sup>[2]</sup> One theory is based on the maturation of the nutritional supply of the intervertebral disc from a microvascular-based system to a mature osmotic nonvascular system.<sup>[5]</sup> These changes put the disc at risk of ischemia, necrosis, herniation, and ultimately calcification.<sup>[5]</sup> After initial calcification, there is an inflammatory response that increases the nutrient supply, and spontaneous resolution of the calcified disc is seen.<sup>[2]</sup> A pathology report from a case study involving surgical decompression and stabilization of IVDC showed fibrocartilaginous tissue with reactive and degenerative changes consistent with intervertebral disc.<sup>[5]</sup> Other pathology reports have described inflammatory changes within excised disc specimens.<sup>[5]</sup>

It is important to note that pediatric IVDC has a different pathophysiology from adult patients. Adults experience disc calcification secondary to trauma, hyperparathyroidism, hemochromatosis, hypervitaminosis D, ochronosis, homocystinuria, and alkaptonuria.<sup>[1]</sup> Another important distinction with adults is that disc calcification is permanent.<sup>[1]</sup>

Radiology plays a key role in diagnosing cases of IVDC in pediatrics.<sup>[3]</sup> Workup frequently includes hematologic panels, which may include elevated leukocyte count, ESR, and CRP.<sup>[2]</sup> Tsutsumi *et al.* also reported that ESR was the most sensitive laboratory indicator in 90.9% of patients.<sup>[8]</sup> Other patients may receive lumbar puncture to rule out infectious

causes and endocrinology panels for metabolic bone disease.<sup>[2]</sup> Meningitis is often suspected due to nuchal rigidity as a presenting symptom.<sup>[6]</sup> The patient in our case only had slightly elevated inflammatory markers which is nonspecific to any spinal condition. Plain radiograph was able to show disc calcification as an initial screening test, but MRI depicted the full extent of the lesion. Similar to our patient, radiologic follow-up may demonstrate persistent calcification despite a resolution of symptoms.<sup>[2]</sup>

IVDC in pediatrics is suggested to be self-limiting and therefore responds best to medical treatment with analgesics and anti-inflammatory medications. Muscle relaxants, cervical collars, and bed rest are also helpful.<sup>[2]</sup> Surgical management is rarely needed and only indicated for patients with progressive neurological compromise. Proper diagnosis of IVDC is crucial to prevent these children from undergoing unnecessary operations. Although a patient's presenting symptoms and imaging may be alarming, IVDC resolves spontaneously with conservative treatment.

In a literature review of 50 pediatrics cases with IVDC, only eight received surgical decompression due to cord and nerve root impingement. Only one patient of the 50 had residual symptoms at 6 months follow-up.<sup>[2]</sup> Surgery should be reserved for extreme cases of IVDC with progressive neurological deficits or intractable pain secondary to herniated disc.<sup>[1]</sup> Regardless of the treatment modality, full recovery is typically expected within 1–6 months.<sup>[5]</sup>

## CONCLUSION

IVDC is a benign self-limiting condition that should be suspected in pediatrics who present with back or neck pain, and imaging suspicious of cervical or thoracic disc calcification. There is generally no preceding trauma or infectious etiology. Proper diagnosis can avoid extensive testing and surgeries. X-ray imaging with PA and lateral views is an adequate screening for these patients, and is recommended to avoid extensive workup and unnecessary therapies. The majority of cases resolve within 6 months with conservative therapies and these patients should not be operated on.

## Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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