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CASE REPORT / OLGU SUNUMU

Rapidly Progressive Pediatric Intervertebral Disc Calcification

Hızlı İlerleyen Pediatrik İntervertebral Disk Kalsifikasyonu

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Abstract

Intervertebral disc calcification is rare in childhood. Genetic, metabolic, inflammatory, and infectious factors have been shown in its etiology. It may be asymptomatic or present with sudden physical and neurological findings. Laboratory tests are generally nonspecific. Imaging modalities are helpful both in diagnosis and follow-up. Conservative treatment is beneficial in most cases for the resolution of calcification and symptoms. In this report, we present the case of a 4-year-old male patient with sudden onset neck pain and stiffness rapidly progressing intervertebral disc calcification with direct X-ray, computed tomography, and magnetic resonance imaging.

Keywords: Calcification, end plate, intervertebral disc, vertebra

Öz

Çocukluk çağında intervertebral disk kalsifikasyonu nadirdir. Etiyolojisinde genetik, metabolik, enflamatuvar ve enfeksiyöz faktörler gösterilmiştir. Asemptomatik olabilir veya ani fiziksel ve nörolojik bulgularla ortaya çıkabilir. Laboratuvar testleri genellikle spesifik değildir. Görüntüleme modaliteleri hem tanıda hem de takipte yardımcıdır. Konservatif tedavi çoğu durumda kalsifikasyon ve semptomların düzelmesinde faydalıdır. Bu yazıda ani başlayan boyun ağrısı ve tutukluğu ile hızla ilerleyen intervertebral disk kalsifikasyonu olan 4 yaşında erkek hastayı direkt grafi, bilgisayarlı tomografi ve manyetik rezonans görüntüleme bulguları ile sunuyoruz.

Anahtar Kelimeler: Kalsifikasyon, uç plak, intervertebral disk, vertebra

Introduction

Intervertebral disc calcification (IDC) can be seen in adulthood for various reasons, especially degeneration. However, it is an extremely rare condition in the pediatric population. It is mostly diagnosed between 6 and 10 years of age[1]. The etiology has not been clearly established. IDC can cause neck pain, stiffness, and torticollis[2]. Clinically, it can mimic spinal tumors, spondylodiscitis, posttraumatic injury, and meningitis[3]. However, it is usually benign and self-limiting and resolves over time. Conservative treatment is often helpful. In this report, we present a rapidly progressive cervical IDC with radiographic, computed tomography (CT), and magnetic resonance imaging (MRI) findings in a 4-year-old patient.

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Case Report

A 4-year-old male patient was admitted to the pediatric emergency department with complaints of sudden-onset non-traumatic neck pain and stiffness. Physical examination revealed limited motion and tenderness in the neck. He had no known disease or operation history. There was no history of hereditary or metabolic disease in his family. Acute phase reactants, calcium, phosphor, alkaline phosphatase, parathormone, and vitamin D levels were within normal limits. There was no significant finding in complete blood count and other biochemical laboratory parameters. Calcification at the level of the C4-5 intervertebral disc and irregularities in adjacent endplates were observed on direct radiography (Figure 1). The vertebral column axis was preserved. CT was performed in the emergency department to detail the cause of disc calcification. Similarly, on CT, there was a calcification area of approximately 8x4x7 mm in the intervertebral disc (Figure 2). No significant soft tissue pathology or spinal canal stenosis was detected. Conservative treatment with cervical collar and non-steroidal anti-inflammatory medicine was planned. However, because the patient's symptoms did not resolve, contrast-enhanced MRI was applied about one week later. On MRI, there was a low-signal structure consistent with calcification in the central part of the C4-5 disc. In addition, compared with previous examinations, erosive changes were present instead of vertebral endplate irregularities. There was height loss in the middle parts of the C4 and C5 vertebrae corpus. There was medullary edema in both vertebral bodies and enhancement at the disc and endplates on postcontrast images (Figure 3). Pediatricians did not consider a metabolic or infectious pathology with the present findings. Outpatient follow-up was recommended for a detailed evaluation of hereditary osteodystrophy and growth development. A decrease in calcification size and density was observed on CT taken one month later. In addition, the collapse of the C4 vertebral corpus became evident and the vertebral plana appeared (Figure 4). No surgical intervention was performed, and it was decided to follow up with conservative treatment. The family's consent was obtained for this case report.

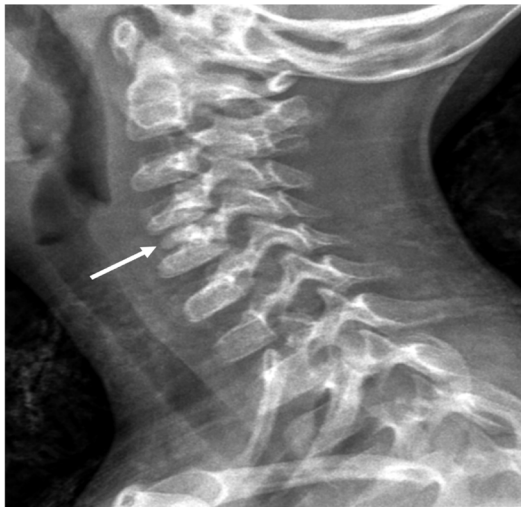

Figure 1. Direct radiography shows a calcific area (arrow) at the level of the C4-5 intervertebral disc and irregularities in adjacent endplates

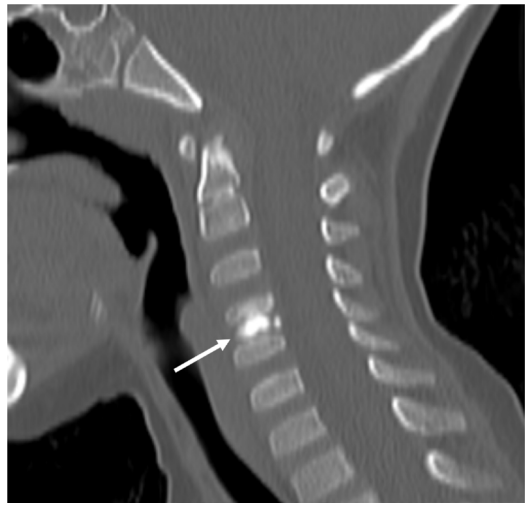

Figure 2. Calcification (arrow) is observed in the C4-5 intervertebral disc on sagittal reformatted computed tomography image

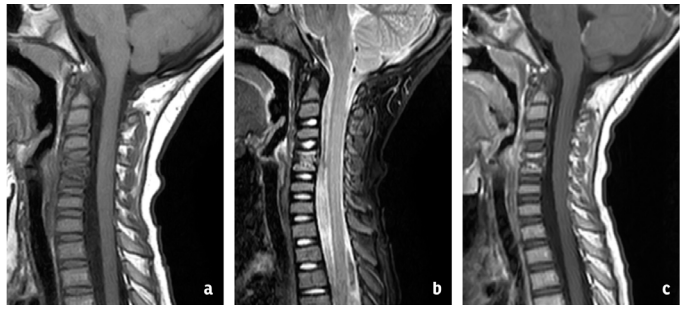

Figure 3. Sagittal plane T1 weighted magnetic resonance imaging (MRI) **(a)** shows height loss in the middle parts of the C4 and C5 vertebra corpus and endplate erosive changes. There is a medullary edema in both vertebral bodies on T2-weighted image **(b)** and enhancement at the endplates on postcontrast T1-weighted image **(c)**

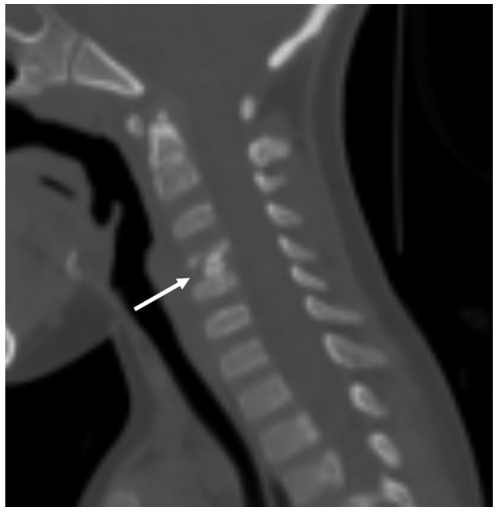

Figure 4. Follow-up computed tomography one month later. A decrease in calcification size and density, also collapse of the C4 vertebral corpus are seen

Discussion

Pediatric IDC is a very rare condition and the cause of which has not been clearly explained. It is usually seen in the lower cervical vertebrae, mostly in the C6-7 intervertebral disc[4]. Posterior longitudinal ligament ossification may rarely accompany[5]. There is inflammation in the intervertebral disc and in some cases, the inflammation may cause neck pain, fever, muscle spasm and torticollis[2,4,6]. However, most cases are diagnosed incidentally[7]. Pediatric IDC is more common in males, and the mean age at diagnosis has been reported as 7.7[8].

Genetic and metabolic deficiencies, infection, reduced nutrient supply, vitamin D metabolism disorders, and trauma may be involved in its etiology[9,10]. Since the nucleus pulposus is avascular, nutrient supply disorders may predispose to degeneration and calcification[9]. Inflammation and reactive fibroblastic proliferation were detected in the calcified disc space in IDC cases[11,12]. The rapid destruction and lysis of adjacent endplates in this study indicated that the inflammation was more severe. At the same time disc calcification in this study significantly resolved within a month. The enhancement of this time disc space on contrast-enhanced MRI supports the inflammatory etiology. Such a predominance of inflammation initially led us to suspect an infectious etiology, but none of the infectious markers were positive in this study. We think that such a rapid course in our case was secondary to the predominance of inflammatory character and that the main etiology of pediatric IDC was excessive inflammation that was triggered somehow. In the English literature, we did not find a case of pediatric disc calcification with rapid progression and inflammation in which radiography, CT, and MRI findings were presented together. We think that our case is the first in this respect.

Laboratory tests are generally non-specific, and elevated white blood cells, erythrocyte sedimentation rate, and C-reactive protein can be seen[4]. However, their presence should not directly suggest an infectious etiology such as spondylodiscitis or meningitis. Because these values can be increased according to the dominance of inflammation. Lumbar puncture and cerebrospinal fluid examination can be performed to exclude meningitis. In this case, however, no abnormality was detected in laboratory tests. The absence of a lumbar puncture in this study can be considered a limitation. However, because the clinical and laboratory data did not support meningitis, lumbar puncture, which is an invasive procedure, was not considered.

The first-line imaging method is anteroposterior and lateral radiographs of the affected spinal tract in a child with neck pain and limited range of motions. Spinal alignment and posttraumatic injury can be evaluated. At the same time, the presence of IDC and the condition of adjacent vertebrae can be examined. CT does not provide additional information in most cases. However, because of the complex anatomical structure of the spine, small calcifications and extensions of them that are not reflected on the direct radiograph can be detected. In most cases, CT is not required and increases the patient's radiation exposure[13]. In this study, MRI was requested first, but CT was decided because the pediatric case could not stay in MRI for a long time. After one week, MRI was performed using sedation. MRI is important for evaluating disc herniation, spinal cord, and nerve roots. The use of contrast material may be required in some cases in terms of differential diagnosis, such as spondylodiscitis and tumor. It should be kept in mind that symptoms may not be correlated with radiological findings.

Analgesics and anti-inflammatory therapy relieve symptoms within a few days in most cases[14]. The restriction of neck movements and use of a cervical collar may reduce the risk of calcified disc extrusion and neural compression. On the other hand, radiological recovery occurs in a longer period, usually in a period of 2-8 months[14,15]. It has been suggested that spontaneous resolution of disc calcification in pediatric cases may be due to active metabolism in the disc[4]. Inflammation dominance may also accelerate this resolution.

In addition, it is thought that the presence of non-ochordal cells in pediatric age may contribute to the resolution of the calcification and rehydration of the disc[5]. Unless pediatric IDC is complicated, conservative treatment is beneficial and the calcification resolves. Surgical decompression may be considered when cord compression or myelopathy develops due to disc herniation or calcification[14,16]. Anterior herniation may cause dysphagia[17]. In this case, no neurological finding or compression was detected. Despite its rapid course conservative treatment was continued. Considering that neurological deficits may be subtle in pediatric cases; we think that a close neurological follow-up during conservative treatment will be beneficial.

Conclusion

Pediatric IDC is a rare condition with an unclear etiology. Radiographs are the first-line imaging method, and MRI can be planned in the next step for differential diagnosis and for complications. It should be kept in mind that IDC may be present in a pediatric case with neck pain and stiffness, and unnecessary interventions should be avoided if there is no deficit.

Ethics

Informed Consent: The family's consent was obtained for this case report.

Peer-review: Externally peer-reviewed.

Author Contributions

Concept: A.H.Ç., Desing: A.H.Ç., Data Collection or Processing: A.H.Ç., M.F.Y., Analysis or Interpretation: A.H.Ç., A.Ö., A.K.G., Literature Search: A.H.Ç., M.F.Y., Writing: A.H.Ç., M.F.Y., A.Ö., A.K.G.

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