Open Access Original Research Article

MedPeer Publisher
Abbreviated Key Title: MedPeer
ISSN : 3066-2737
homepage: https://www.medpeerpublishers.com

Structural Thoracic Kyphosis in an Adolescent : CT Findings Consistent with Scheuermann disease

DOI: 10.70780/medpeer.000QGRO

AUTHOR AND AFFILIATION

Alia Yassine Kassab[1], Lina Lasri[1], Mehdi Salmane[1], Sarah Loubaris[1], Fatima Zohra Benbrahim[1], Lina Belkouchi[1], Siham El Haddad[1], Nazik Allali[1], Latifa Chat[1]

[1] Department of Radiology, Mother-Child Hospital, Mohammed V University, Rabat, Morocco

Corresponding author : Alia Yassine Kassab

ABSTRACT

Scheuermann disease is the most common cause of structural thoracic hyperkyphosis in adolescents. It is characterized by anterior vertebral body wedging, irregular vertebral endplates, and ring apophysis abnormalities. Imaging plays a key role in confirming the diagnosis and assessing severity, particularly in the preoperative setting.
We report the case of a 16-year-old adolescent referred for preoperative evaluation of progressive thoracic hyperkyphosis. Computed tomography of the thoracolumbar spine demonstrated multilevel anterior vertebral wedging from D7 to L1, irregular endplates, and anterior ring apophysis fragmentation without evidence of acute fracture or disc space narrowing.
These findings were consistent with structural kyphosis secondary to Scheuermann disease and illustrate the characteristic CT features useful for surgical planning.

KEYWORDS

Scheuermann disease, Thoracic juvenile hyperkyphosis, Vertebral wedging, Ring apophysis

MAIN ARTICLE

INTRODUCTION

Structural thoracic hyperkyphosis in adolescents is most commonly caused by Scheuermann disease, a growth-related vertebral disorder first described in 1921. The condition results from abnormal vertebral endplate development during skeletal maturation, leading to anterior vertebral body wedging and progressive kyphotic deformity. Radiographically, the diagnosis is based on anterior wedging of at least three contiguous vertebrae measuring more than 5° each, associated with irregular endplates and Schmorl nodes. While conventional radiography remains the first-line modality, computed tomography (CT) provides detailed evaluation of vertebral morphology and is particularly useful in preoperative assessment [1]. We report a case illustrating typical CT features of Scheuermann disease in a 16-year-old patient undergoing surgical evaluation.

CLINICAL INFORMATION

A 16-year-old male adolescent presented with progressive dorsal spinal deformity noted over the past two years. He reported intermittent mechanical back pain exacerbated by prolonged sitting and physical activity. There was no history of trauma, inflammatory symptoms, or systemic disease. Clinical examination revealed a rigid thoracic hyperkyphosis that did not correct on extension. Given the severity of the deformity and planned surgical management, a thoracolumbar CT scan was performed for preoperative evaluation.

IMAGING FINDINGS

CT demonstrated exaggerated thoracic kyphosis centered at the thoracolumbar junction. From D7 to L1, multilevel anterior vertebral body wedging was observed, involving at least three contiguous vertebrae. The vertebral bodies displayed a characteristic wedge-shaped configuration contributing to the kyphotic curvature (Figures 1A and 1B). Irregularities of the superior and inferior vertebral endplates were noted at the affected levels. Small osseous fragments were identified at the anterosuperior and anteroinferior vertebral corners, corresponding to ring apophysis fragmentation (Figures 1A,1B and Figures 2A,2B). These findings were consistent with structural thoracic kyphosis secondary to Scheuermann disease.

DISCUSSION

Scheuermann disease is a structural kyphotic deformity that develops during adolescence due to abnormal enchondral ossification of the vertebral endplates. The resulting growth disturbance leads to anterior vertebral wedging and progressive sagittal imbalance.

The classical diagnostic criteria include anterior wedging of at least three contiguous vertebrae greater than 5°, irregular vertebral endplates, and Schmorl nodes. Ring apophysis abnormalities, as observed in our case, represent secondary ossification center involvement and may appear as anterior vertebral corner fragmentation [2,3].

The thoracic form is the most common presentation and typically involves the mid-thoracic spine or thoracolumbar junction. Clinically, patients may present with cosmetic concerns, mechanical back pain, or progressive deformity.

Conventional radiography is sufficient for diagnosis in most cases. However, CT provides superior depiction of cortical bone detail and is particularly valuable in preoperative planning to evaluate vertebral morphology, rule out alternative diagnoses such as traumatic compression fractures, and assess bony anatomy prior to instrumentation.

The main differential diagnoses include post-traumatic vertebral compression fractures, infectious spondylodiscitis, and metabolic bone disease. In our patient, the absence of trauma, preserved disc spaces, multilevel symmetrical involvement, and characteristic endplate irregularities strongly supported Scheuermann disease [4,5].

Early recognition is essential to guide appropriate management, which may include bracing in growing patients or surgical correction in severe, rigid deformities.

CONCLUSION

Scheuermann disease represents the leading cause of structural thoracic hyperkyphosis in adolescents. Recognition of characteristic imaging findings—multilevel anterior vertebral wedging, endplate irregularities, and ring apophysis fragmentation—is essential for accurate diagnosis. This case highlights the role of computed tomography in confirming typical features and providing detailed anatomical assessment in the preoperative setting, thereby supporting optimal surgical planning.

FIGURES

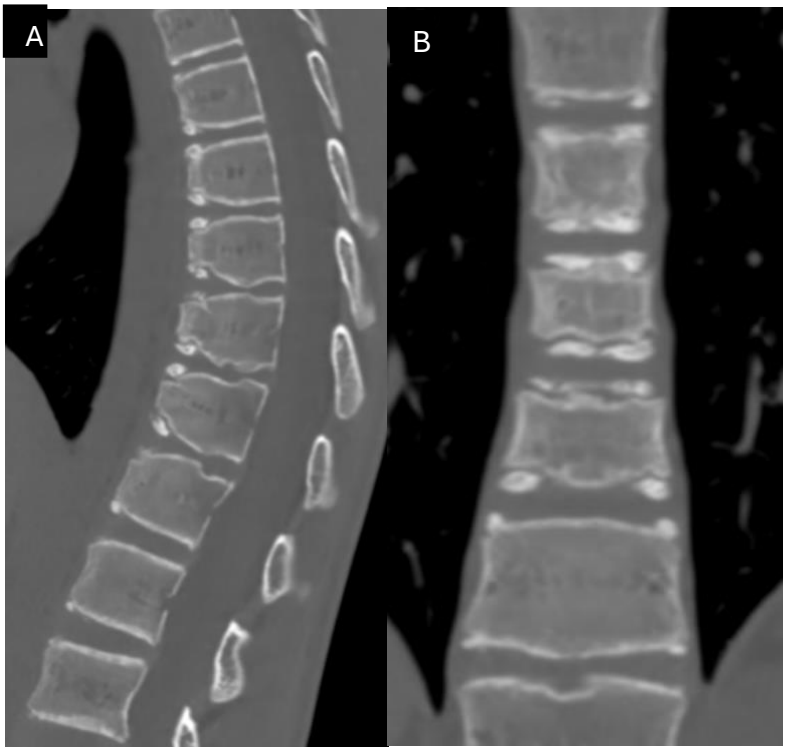

Figure 1: Sagittal (A) and coronal (B) CT reconstruction demonstrating multilevel anterior vertebral wedging from D7 to L1 and ring apophysis fragmentation with exaggerated thoracic kyphosis.

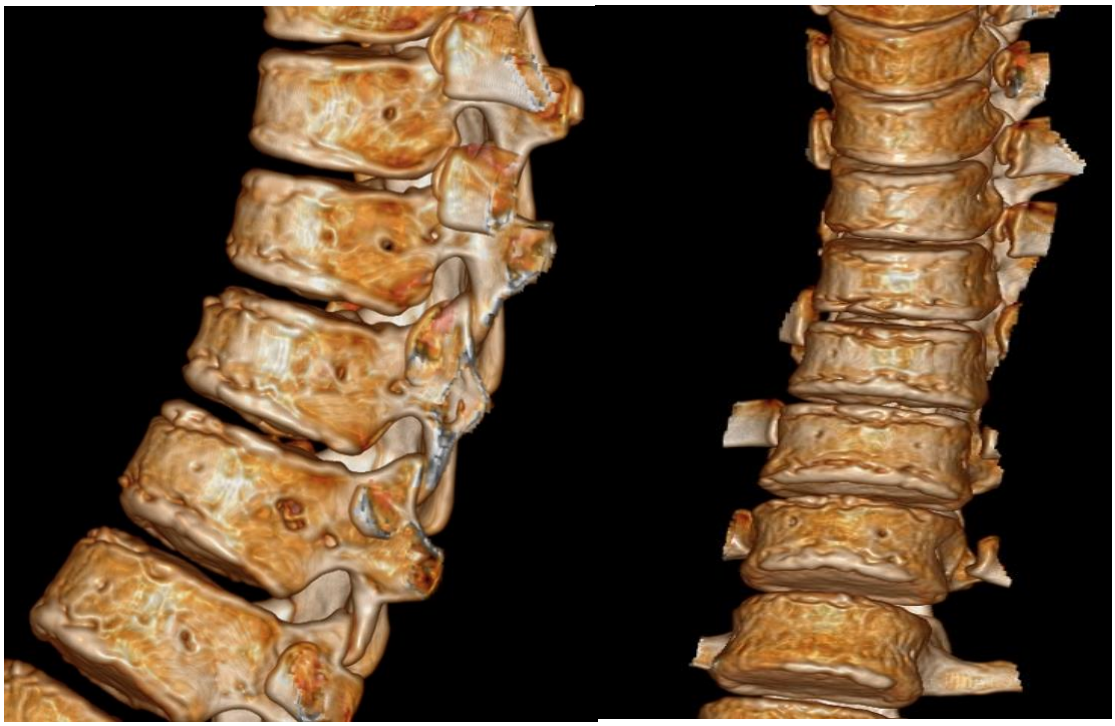

Figure 2: Sagittal (A) and coronal (B) planes from 3D CT reconstruction showing ring apophysis fragmentation.

REFERENCES

[1] Bennett DM. The natural history of Scheuermann's kyphosis. J Pediatr Orthop. 2025; eCollection 2025 Nov. doi:10.1016/j.jposna.2025.100263
https://doi.org/10.1016/j.jposna.2025.100263

[2] Kaspiris A, Spyrou I, Marougklianis V, Afrati SR, Sakellariou E, Varsamos I, et al. Insights into the pathophysiology of Scheuermann's kyphosis: from structural deformities to genetic predisposition and underlying signalling pathways. Biomolecules. 2025;16(1):56. doi:10.3390/biom16010056
https://doi.org/10.3390/biom16010056

[3] O'Donnell JM, Wu W, Youn A, Mann A, Swarup I. Scheuermann kyphosis: current concepts and management. Curr Rev Musculoskelet Med. 2023;16(11):521-30. doi:10.1007/s12178-023-09861-z
https://doi.org/10.1007/s12178-023-09861-z

[4] de Valentim Souza G, Oki LY, Portelinha AM, Pontes MDDS, Silva CFPRH. Study of the prevalence of atypical Scheuermann's kyphosis using computed tomography scans. Rev Bras Ortop. 2024;59(6):e854-e860. doi:10.1055/s-0044-1792119
https://doi.org/10.1055/s-0044-1792119

[5] Debnath UK, Quraishi NA, McCarthy MJ, McConnell JR, Mehdian SMH, Shetaiwi A, et al. Long-term outcome after surgical treatment of Scheuermann's kyphosis. Spine Deform. 2022;10(2):387-97. doi:10.1007/s43390-021-00410-7
https://doi.org/10.1007/s43390-021-00410-7

ACKNOWLEDGEMENTS

The authors have no acknowledgements to declare and report no conflicts of interest.