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Case Report

Scoliosis secondary to herniated lumbar disc in an adolescent: A case report

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Abstract

Background

Herniated nucleus pulposus is infrequent among children and adolescents. The first case of surgical intervention for disc herniation was reported in a 12-year-old child. Since then, very few cases or series of cases have been published. The current case report is of a 15-year-old girl with no history of spinal ailment, who presented with a large disc herniation in the L4–L5 region, associated with reactive secondary scoliosis and resolved following a successful surgical intervention.

Case Description

A 15-year-old female with a known case of scoliosis and a history of lower back pain for nine months following a fall while playing football, without any past account of the spinal disease, was presented at the outpatient clinic. After a series of proper imaging, a large L4/5 HNP with positional secondary scoliosis was diagnosed. However, due to the persistence of symptoms for more than two months in radiculopathy and reactive scoliosis, the decision was made to proceed with L4/5 microscopic discectomy. After six months, the neurological examination was normal, with a significant improvement of scoliosis with the restoration of normal spine alignment seen in plain X-ray films. The right leg radiculopathy improved as well.

Conclusion

Lumbar disc herniation in association with scoliosis needs a vigilant evaluation of signs and symptoms and appropriate diagnostic imaging. Imaging is vital in diagnosing underlying disease states and helps in clinical management and surgical planning. The appropriate treatment is a discectomy.

Keywords: *Scoliosis, Lumbar, Adolescents, Spine.*

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1. Introduction

Herniated Nucleus Pulposus (HNP) is infrequent among children and adolescents. The first case of surgical intervention for disc herniation was reported in a 12-year-old child (1). Since then, very few cases or series of cases have been Published: (1–5). Vertebral abnormalities such as scoliosis are associated with lumbar HNP in children and adolescents (1, 6–8). The reactive scoliosis is frequently related to lumbar HNP is a compensatory effort to relieve nerve compression.

Moreover, reactive scoliosis secondary to lumbar HNP is typically associated with children and usually resolves with effective management of lumbar HNP (2, 6). Even though surgical intervention is frequently employed among adults, only 0.5% of discectomies are carried out in children less than 16 years old. Occasionally, patients have trauma in the lumbar region of the spine due to motor vehicle accidents, falls, and sports accidents. Around 2% of the cases involve the L3–L4 level, and the vast majority of the lumbar HNP are equally distributed between the L4–L5 and L5–S1 levels (9). Pain-relieving posture is present in almost 20% of pediatrics with lumbar HNP, whereby scoliosis is generally present, with the convexity turned to the affected side (10).

The current case report is of a 15-year-old girl with no history of spinal ailment, who presents with a large disc herniation in the L4–L5 region, associated with reactive secondary scoliosis, and resolved following a successful surgical intervention.

2. Case Presentation

A 15-year-old female with a known case of scoliosis and a history of lower back pain for nine months following a fall while playing football, without any past account of the spinal disease, was presented at the outpatient clinic. After two months of persistent pain with radiculopathy to the right side toward the big toe, she sought a medical opinion. She did not have a motor deficit, however, decreased sensation over the right lateral malleolus and dorsum of the foot was observed. There was no unusual finding of hyperreflexia. Similarly, there was a normal plantar reflex and no clonus or Hoffman sign. There was a positive straight leg raise test and a positive contralateral straight leg raise test. X-ray showed positional scoliosis without significant vertebra rotation (see Figure 1). The magnetic resonance imaging (MRI) findings revealed an L4/5 disc causing severe narrowing centrally and on the right side (see Figures 2 and 3). A computed tomography scan (CT-scan) depicted scoliotic deformity with convexity toward the right side, and there was no apophyseal injury at the L4/5 level. Thus, the diagnosis of large L4/5 HNP with positional secondary scoliosis was made.

The patient was offered a trial of physiotherapy and non-steroidal anti-inflammatory drugs without any significant improvement. Due to the persistence of symptoms for more than two months in radiculopathy and reactive scoliosis, the decision was made to proceed with L4/5 microscopic discectomy, which had an uneventful perioperative course. The patient was flipped on her prone position on the Jackson table with a Wilson frame. The back was prepped and draped in the usual sterile manner. L4/5 disc was marked under X-ray in anteroposterior and lateral to a good position. After that, the microscope was introduced. Microscopic decompression and bilateral discectomy were done. After six months, the neurological examination was normal, with a significant improvement of scoliosis with the restoration of normal spine alignment seen in plain X-ray films (see Figure 4). The right leg radiculopathy improved as well.

Figure 1. Preoperative radiograph. AP view scoliosis series X-Ray showing significant coronal deformity and imbalance without significant vertebral rotation.

3. Discussion

Scoliosis is a musculoskeletal ailment characterized by a lateral curvature of the spine. Scoliosis is idiopathic in the majority of young patients. However, it might also arise as a part or complication of a triggering health state, for example, lower limb discrepancy, LDH, and neuromuscular disorders. Even though scoliosis has been frequently associated with lumbar HNP among adolescents (4, 11, 12), most patients of lumbar disc ailment in this age group might be underdiagnosed initially, which can be attributed to the infrequent prevalence and the vague characteristics of lumbar HNP in adolescents in comparison to adults. Similarly, in our case study, the patient was not diagnosed when a medical opinion was sought after two months of persistent pain with radiculopathy to the right side toward the big toe.

The distinctive physiological features of children and adolescents give pediatric lumbar HNP some unique clinical characteristics (7). The clinical characteristics of pediatric lumbar HNP are usually comparable to those seen in adults (11). However, one distinguishing feature is that up to 90% have a positive straight-leg raising test (7, 13), which can be described by tending to greater nerve root tension than adults (14). Moreover, children and adolescents infrequently present neurological symptoms such as numbness and weakness (7, 8, 13).

The most frequent complaints of children and adolescents with lumbar disc herniation include difficulty in walking, inability to perform anterior flexion of the trunk, and scoliosis. The most common symptom is lumbar pain; limitation of lumbar motility and Lasègue are the most common signs (4). The etiology, pathophysiology, and patterns of the scoliotic posture in cases secondary to HNP remain debated. Zhu hypothesized that the trunk shift on the opposite side of the HNP reduces the weight-bearing on the involved leg, improving the symptoms of the nerve root irritation (12). Finneson speculated that the opposite trunk shift allows for decreasing the nerve root compression.

Conversely, Suk hypothesized that the trunk shift side is opposite to the HNP side and is not related to the inflammation (15, 16). Scoliosis may also be congenital or associated with neuromuscular diseases and syndromes, spondylolysis/spondylolisthesis,

Figure 2. Preoperative MRI T2 Sagittal view showing L4/5 disc herniation.

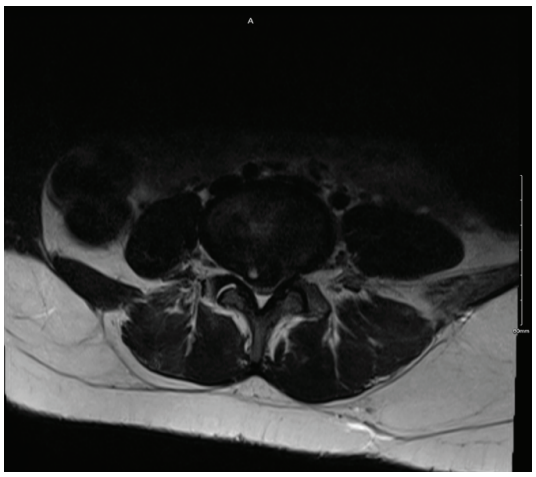

Figure 3. Preoperative MRI T2 axial view showing large central disc herniation causing severe lumbar canal stenosis.

infections, syringomyelia, and tumors (17–20). HNP has been reported as a potential cause of postural, reactive scoliosis (4, 6, 11). Acute back pain with fever must be assessed for spinal infections. Back pain isolated to one area, worse at night, and significantly improved with nonsteroidal anti-inflammatory drugs, might suggest a spinal tumor such as an osteoid osteoma. However, most scoliosis cases come across by the general practitioner would be idiopathic, that is, without an apparent cause (21).

Apophyseal ring fractures are rare injuries often associated with herniated discs among adolescents (22). The epiphyseal ring ossifies between the age of 4 and 6 years and fuses completely before the age of 18 years approximately (23). It is firmly attached to the annulus fibrosus by Sharpey's fibers. Therefore, microtraumas due to repetitive activities can lead to the extraction of the apophyseal ring that is incompletely fused. It has been reported in a study that all the patients with posterior apophyseal ring fracture were accompanied by lumbar HNP (24). The diagnosis of the apophyseal fracture needs a detailed physical examination. The simple radiography gives little information. The CT scan is the best technique to visualize the avulsed bone fragment. However, the MRI scan also enables fragment evaluation, besides

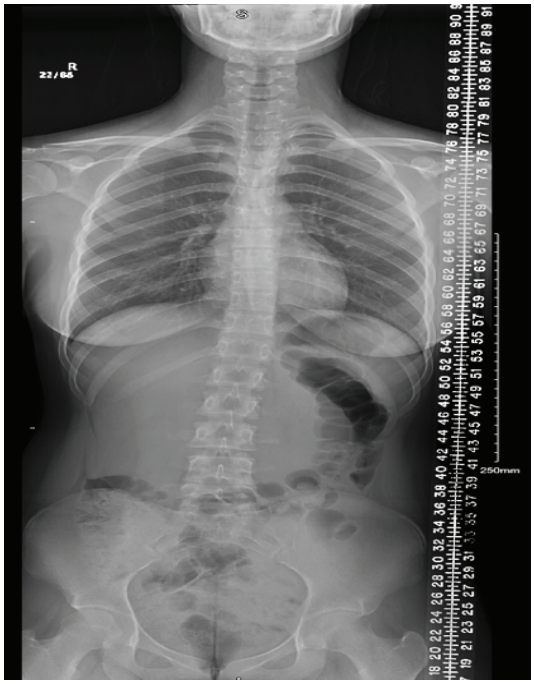

Figure 4. Postoperative radiograph. Six months postoperative AP view scoliosis series X-ray showing resolution of the coronal deformity & imbalance.

showing the quality of the intervertebral disc and herniated disc (22). After diagnosis, these lesions can be managed either by a conservative approach or by surgical treatment. It is highly recommended to do a CT scan in adolescent lumbar HNP to rule out apophyseal ring fracture, and an accurate diagnosis helps the surgeon plan the appropriate surgical intervention needed (25).

Scoliosis secondary to a lumbar disc herniation is observed occasionally. Therefore, its clinical significance and pathophysiology are not well-established. However, it is well-recognized that children's spines have a superior adaptive capacity, shielding nervous tissue. An example of this could be scoliosis in patients with root compression, when they bend to the side contrary to the compression, causing an enlargement of the affected foramen and root release (4). It has been reported that 80% of the patients with disc herniation and scoliosis had convexity on the side of the root compression (3). Furthermore, the MRI findings revealed that scoliosis widened the foramen. Similarly, the X-ray depicted scoliotic deformity with convexity toward the right side in our case report.

MRI is the best imaging technique to indicate disc herniation and eliminate other likelihoods in both children and adolescents, even though scoliosis, if present in growing patients, may worsen if the intervertebral disc herniation is not treated Surgical interventions, such as micro-endoscopy discectomy and percutaneous endoscopic lumbar discectomy, could improve considerable pain relief and function (5,9). Our case finding revealed that microscopic discectomy relieved the pain and improved scoliosis.

4. Conclusion

Lumbar disc herniation is a rare entity among both children and adolescents and may also result in scoliosis and lumbar pain with or without sciatica. Therefore, lumbar disc herniation in association with scoliosis needs a vigilant evaluation of signs and symptoms and appropriate diagnostic imaging. Imaging is vital in diagnosing underlying disease

states and helps in clinical management and surgical planning. The appropriate treatment is a discectomy.

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None.

Conflict of Interest

The authors have no conflicts of interest to declare.

Authors' Contribution

FK, TA, SA, FA and MA drafted the initial manuscript, worked on the data acquisition, and edited the manuscript. FK developed the project, supervised the work, revised and reviewed the manuscript. All authors read and approved the submitted version of the manuscript to be published.

References

[1] Børgesen SE, Vang PS. Herniation of the lumbar intervertebral disk in children and adolescents. *Acta Orthop Scand* 1974; 45(1–4): 540–549.

[2] Grass J, Dockendorff IB, Soto VA, Araya PH, Henriquez CM. Progressive scoliosis with vertebral rotation after lumbar intervertebral disc herniation in a 10-year-old girl. *Spine* 1993; 18(3): 336–338.

[3] Matsui H, Ohmori K, Kanamori M, Ishihara H, Tsuji H. Significance of sciatic scoliotic list in operated patients with lumbar disc herniation. *Spine* 1998; 23: 338–342.

[4] Pinto FCG, Poetscher AW, Quinhones FRE, Pena M, Taricco MA. Lumbar disc herniation associated with scoliosis in a 15-year-old girl: Case report. *Arq Neuropsiquiatr* 2002; 60(2A): 295–298.

[5] Ha BY, Sim HB, Kwon SC, Lyo IU. Lumbar disc herniation associated with severe scoliosis in young age: Report of three cases. *Korean J Spine* 2010; 7(2): 87–89.

[6] Kurihara A, Kataoka O. Lumbar disc herniation in children and adolescents. A review of 70 operated cases and their minimum 5-year follow-up studies. *Spine* 1980; 5(5): 443–451.

[7] Dang L, Liu Z. A review of current treatment for lumbar disc herniation in children and adolescents. *Eur Spine J* 2010; 19(2): 205–214.

[8] Sarma P, Thirupathi RT, Srinivas D, Somanna S. Adolescent prolapsed lumbar intervertebral disc: Management strategies and outcome. *J Pediatr Neurosci* 2016; 11(1): 20.

[9] Rugtveit A. Juvenile lumbar disc herniations. *Acta Orthop Scand* 1966; 37(4): 348–356.

[10] Mason DE. Back pain in children. Thorofare, NJ: SLACK Incorporated; 1999.

[11] Ozgen S, Konya D, Toktas OZ, Dagcinar A, Ozek MM. Lumbar disc herniation in adolescence. *Pediatr Neurosurg* 2007; 43(2): 77–81.

[12] Zhu Z, Zhao Q, Wang B, Yu Y, Qian B, Ding Y, et al. Scoliotic posture as the initial symptom in adolescents with lumbar disc herniation: Its curve pattern and natural history after lumbar discectomy. *BMC Musculoskelet Disord* 2011; 12(1): 1–8.

[13] Lukhele M, Mayet Z, Dube B. Lumbar disc herniation in a 9-year-old child. *SA Orthop J* 2011; 10(3): 93–96.

[14] Chen Y, et al., Percutaneous endoscopic discectomy in adolescent lumbar disc herniation: A 3-to 5-year study. *J Neurosurg Pediatr* 2018; 23(2): 251–258.

[15] Finneson B. Low back pain. Philadelphia: Lippincott Co.; 1973.

[16] Suk KS, Lee HM, Moon SH, Kim NH. Lumbosacral scoliotic list by lumbar disc herniation. *Spine* 2001; 26(6): 667–671.

[17] Zhang W, Sha S, Xu L, Liu Z, Qiu Y, Zhu Z. The prevalence of intraspinal anomalies in infantile and juvenile patients with "presumed idiopathic" scoliosis: A MRI-based analysis of 504 patients. *BMC Musculoskelet Disord* 2016; 17(1): 1–6.

[18] Zhang H, Niu X, Wang B, He S, Hao D. Scoliosis secondary to lumbar osteoid osteoma: A case report of delayed diagnosis and literature review. *Medicine* 2016; 95(47): e5362.

[19] Basile Júnior R, de Barros Filho TE, Bonetti CL, Rosemberg LA. Herniation of the lumbar disk in adolescents. *Rev Paul Med* 1992; 110(2): 51–55.

[20] D'Eufemia P, Properzi E, Palombaro M, Lodato V, Mellino L, Tetti M, et al. Scoliosis secondary to ganglioneuroma: A case report and up to date literature review. *J Pediatr Orthop B* 2014; 23(4): 322–327.

[21] Janicki JA, Alman B. Scoliosis: Review of diagnosis and treatment. *Paediatr Child Health* 2007; 12(9): 771–776.

[22] Alexandre Lopes da Silva Alvarenga J, Tadashi Salvioni Ueta F, Del Curto D, Hiroshi Salvioni Ueta R, Eulalio Martins D, Wajchenberg M, et al. Apophyseal ring fracture associated with two levels extruded disc herniation: case report and review of the literature. *Einstein (São Paulo)* 2014; 12(2): 230–231.

[23] Epstein NE, Epstein JA. Limbus lumbar vertebral fractures in 27 adolescents and adults. *Spine* 1991; 16(8): 962–966.

[24] Seo YN, Heo YJ, Lee SM. The characteristics and incidence of posterior apophyseal ring fracture in patients in their early twenties with herniated lumbar disc. *Neurospine* 2018; 15(2): 138.

[25] Kollam RK, Bheri EA, Gaddam SSK. Lumbar vertebral ring apophysis fracture with disc herniation in a young male. *Curr Med Issues* 2020; 18(1): 48.