Iranian Journal of NEUROSURGERY

Issue 3 and 4, No 18 and 19

Case Report:
Ochronosis, the Rare Cause of Herniation of a Disc: A Case Report

Ali Baradaran Bagheri[1], Farsad Biglari[2*], Somayeh Soroureddin[3], Salman Azarsina[2], Mohammad Kamangar[1]

1. Department of Neurosurgery, Alborz University of Medical Sciences, Karaj, Iran
2. Department of Orthopedics, Alborz University of Medical Sciences, Karaj, Iran
3. Department of Internal Medicine, Alborz University of Medical Sciences, Karaj, Iran

Use your device to scan and read the article online

Citation: Baradaran Bagheri A, Biglari F, Soroureddin S, Azarsina S, Kamangar M. Ochronosis, the Rare Cause of Herniation of a Disc: A Case Report. Iran J Neurosurg. 2019; 5(3):161-166. http://dx.doi.org/10.32598/irjns.5.3.10

http://dx.doi.org/10.32598/irjns.5.3.10

Article info:
Received: 12 Jan 2019
Accepted: 25 May 2019
Available Online: 01 Jul 2019

Keywords:
Alcaptonuria, Lumbar Disc Herniation (LDH), Ochronosis

ABSTRACT

Background and Importance: Alkaptonuria is a rare genetic disorder due to homogentisic acid oxidase deficiency which eventuates in the reposition of homogentisic acid in different parts of the body and multi-organ involvements. The characteristic bluish-black discoloration of the skin and cartilage tissue are known as ochronosis.

Case Presentation: Herein, we reported a 45-year-old woman with chronic pain in the lumbar area and radicular pain in her left leg, aggravating gradually during the previous six months before operation. She also suffered from progressive muscle weakness in her left lower extremity. The patient was the operated for prolapsed disc herniation. Macroscopically, no abnormality of the skin, muscles, or ligaments was observed during surgery. After incision of the annulus in level L3-L4, surprisingly the excised nucleus pulposus was black. The alkaptonuria was diagnosed after histopathological examination of the black disc material and confirmed by urinalysis.

Conclusion: The postoperative course was uneventful and the patient was free from low back pain and leg pain after surgery. In patients without any manifestations of alkaptonuria or ochronosis such as our case, timely diagnosis of this pathologic condition is momentous for investigation, treatment, and prevention of other organs' involvement.

*** Corresponding Author:**
Farsad Biglari, MD.
Address: *Department of Orthopedics, Alborz University of Medical Sciences, Karaj, Alborz, Iran*
Tel: *+98 (263) 4427015*
E-mail: *biglari.farsad@gmail.com*

Highlights

- Ochronosis is the accumulation of homogentisic acid in tissues leading to dark bluish pigmentation of connective tissues including the joints, eyes, skin, cardiovascular and genitourinary systems.

- The lumbar spine is affected among ochronosis arthopathies and will often present with low back pain and stiffness with limited lumbar range of motion.

- Disc spaces reduction and wafer-like calcification in radiographic studies are characteristic findings for diagnosis of ochronosis with lumbar involvement.

Plain Language Summary

Low back pain is a universal human experience that almost everyone has it at some point. Sources of the pain are various from bony structures of the spine to soft-tissue-related causes (like disco-ligamentous complex or neural complements). The other sources of low back pain are muscular system or skin lesions in this area. It is always important to pay attention to this pain and seek medical consultation for chronic ones. Here, we discussed a rare cause of chronic low back pain which is related to a genetic disorder due to an enzyme deficiency, alkaptonuria.

1. Background and Importance

Homogentisate 1, 2-dioxygenase deficiency which is a rare Autosomal Recessive (AR) metabolic disorder can lead to tyrosine metabolism impairment. Alkaptonuria was first announced by Sir Archibald Garrod in 1908, with an estimated incidence of 1:250,000–1000,000 [1, 2]. Due to homogentisate 1, 2-dioxygenase deficiency, oxidized polymers of Homogentisic Acid (HGA) accumulate in connective tissues, and excrete in urine. In Alkaptonuria disease, homogentisic acid deposits in different parts of body and results in multi-organ involvements. The characteristic bluish-black discoloration of the skin and cartilage tissue is known as ochronosis [3].

Spine and other large joints are usually involved in ochronosis. Spinal ankylosis especially in thoracic and lumbar segments is the result of loss of flexibility in ochronosis [4]. The onset of the symptoms in the spinal region may be mild or subtle and become acute after disc herniation. Although progressive degeneration of the intervertebral discs and spondylosis are usual presenting features, the severity of the radiological changes is not completely compatible with the symptoms. Disc prolapse is not usual in ochronosis and rarely needs surgical intervention [5-8].

In this study, we described a case of chronic low back pain in a 45-year-old female patient presenting with chronic low back and left leg radiated pain and no previous history of alkaptonuria.

2. Case Presentation

A 45-year-old female patient referred to our outpa-tient clinic in Shahid Madani Hospital, Karaj, Iran, with chronic low back and left radiated leg pain that aggravated gradually in the previous six months. She also suffered from progressive muscle weakness in her left lower extremity. Her lower back pain had been disturbing her for about five years and was relieved by NSAIDs until the previous six months before she came. There were no other significant features in her past medical history. Neurological examination revealed a positive Straight Leg Raise (SLR) test and a diminished patellar reflex on the left extremity. Motor strength of the dorsiflexor muscles was moderately weak, and there was hypoaesthesia along with the L3 and L4 dermatomes on the left side in physical examination.

The radiographic studies revealed significant degenerative changes and disc space narrowing with sclerosis of endplates (Figures 1 and 2). Lumbosacral magnetic resonance imaging (MRI) revealed degenerative changes, disc space narrowing, and disc herniation at the level L3-L4 (Figure 3). The patient was operated, and L3-L4 discectomy was done. Macroscopically, no abnormality of the skin, muscles or ligaments was observed during surgery. After incision of the annulus in level L3-L4, surprisingly the excised nucleus pulposus tissue was black (Figure 4). The microscopic histologic examination

revealed melanin-like deposition in the chondrocytes cytoplasm of the degenerated disc material (Figure 5).

Afterwards, the patient was re-examined for possible diagnosis of alkaptonuria, but there was no obvious color change in sclera, cornea, and skin. Furthermore, the patient did not mention any discoloration of urine or any stain on her underwear, and there was no family history. After detection of homogentisic acid in the urine, the diagnosis was confirmed by thin-layer chromatography. The postoperative course was uneventful, and she was free from low back and leg pain after surgery. She was discharged with oral ascorbic acid (1000 mg per day) treatment and dietary restrictions. Six months after surgery, the patient did recover full motor and sensory functions, and only complained of mild back pain.

3. Discussion

Ochronosis is the accumulation of homogentisic acid in tissues leading to dark bluish pigmentation of connective tissues including the joints, eyes, skin, and cardiovascular and genitourinary systems. Auricular cartilage is commonly involved [9]. The most common manifestation of alkaptonuria is ochronotic arthropathy [1, 5, 9, 10], which affects large weight-bearing joints and typically manifests in the third or fourth decade of life. The lumbar spine is affected initially and will often present with low back pain and stiffness with limited lumbar range of motion [6, 11, 12].

The main cause of symptoms manifestation after middle age is the reduction of renal clearance of homogenistic acid by aging. In most of symptomatic cases, the first physical signs of ochronosis presents during the third decade of life. The usual signs are slight bluish-black or grayish-blue pigmentations of the pinnae of the ears, sclera, cornea, and conjunctiva of the eyes [3]. Arthropathy occurs in patients with alkaptonuria due to ochronosis in connective tissues, and the lumbar spine is usually involved before the other joints, but future involvement of knees, hips and shoulders is possible [13].

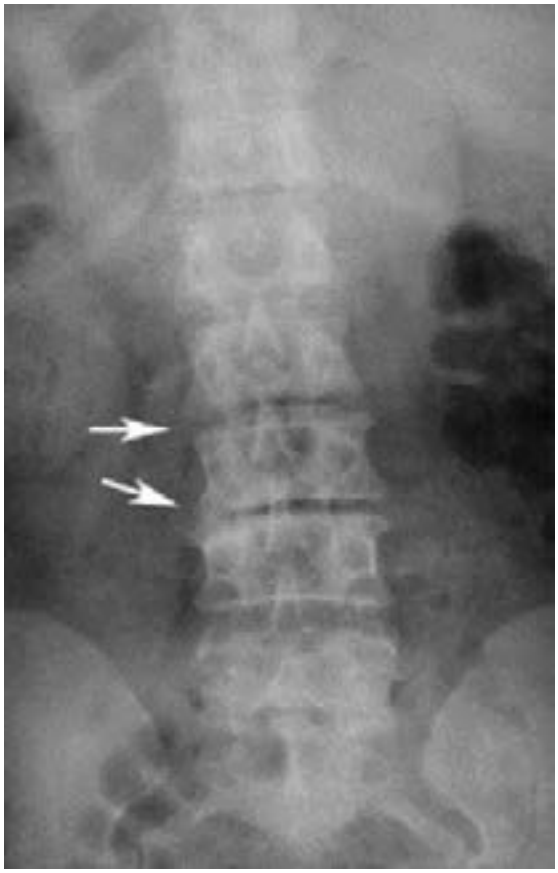

Figure 1. Anteroposterior radiograph of the lumbar spine demonstrating degenerative changes and disc space narrowing at the level L2-L3 and L3-L4

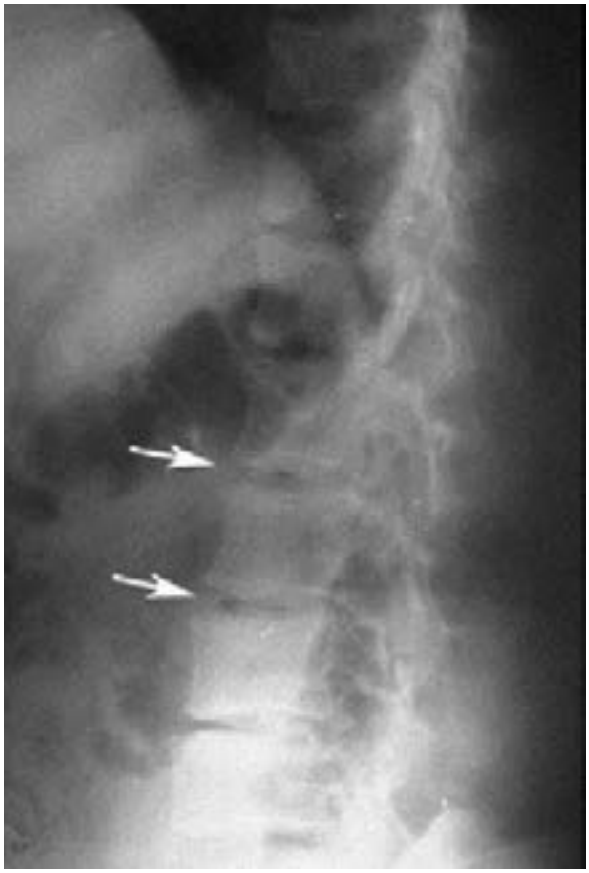

Figure 2. Lateral radiograph of the lumbar spine demonstrating degenerative changes and disc space narrowing at the level L2-L3 and L3-L4

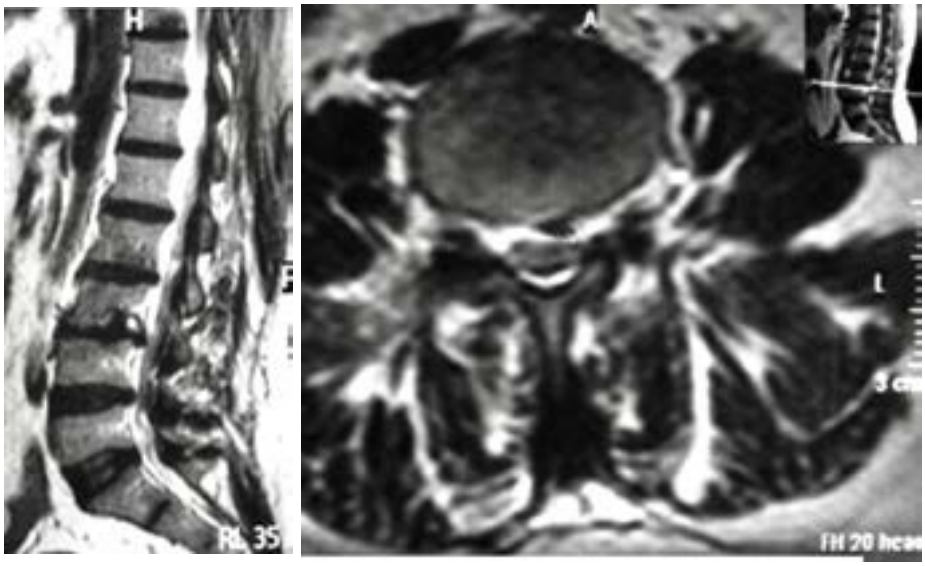

Figure 3. T2 weighted lumbar spine sequence MRI at the level L3-L4

A. Sagittal demonstration of disc extrusion; B. Axial demonstration of central canal stenosis due to central disc extrusion

Disc spaces reduction and wafer-like calcification in radiographic studies are characteristic findings for diagnosis of ochronosis with lumbar involvement [13]. Our patient's radiographic evaluation revealed these aforementioned findings, but it was not assumed as ochronosis until the visualization of pigmented nucleus pulposus was provided. Our patient presented with no systemic manifestations in her fourth decade. It has been reported that most of the patients do not seek medical attention until symptomatic ochronotic arthropathy occurs [14].

Early diagnosis and being aware of alkaptonuria are advantageous in patients as symptomatic treatment of it can be initiated. The therapeutic regimen includes a megadose of vitamin C for the degradation of HGA [15].

Figure 4. Degenerated disc material with black pigmentation

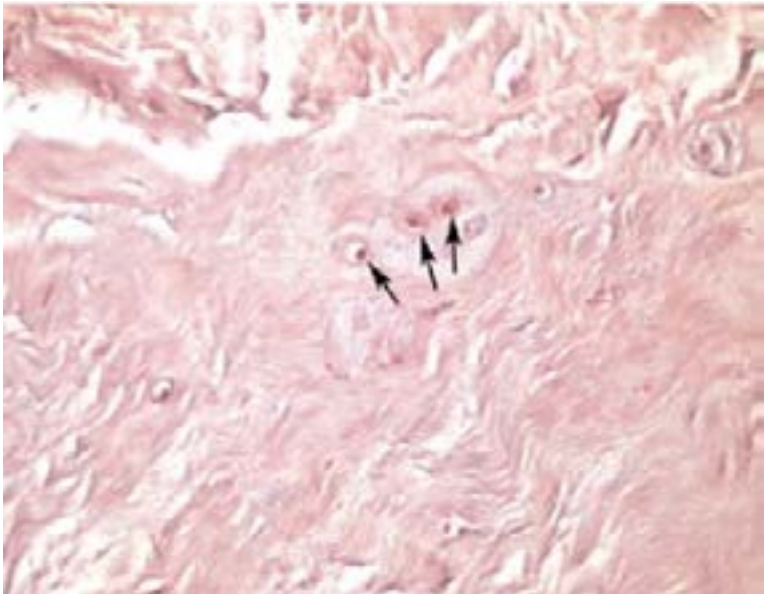

Figure 5. The histopathological feature of the black disk material demonstrating melanin-like deposition in chondrocytes cytoplasm

Evaluation of other systemic organs such as cardiovascular and urinary organs should also be done in the early stages.

Ethical Considerations Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information. Moreover, they were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them.

Funding

This study was supported by Alborz University of Medical Sciences, Karaj, Iran.

Authors' contributions

Conceptualization and methodology: Ali Baradaran Bagheri; Data collection: Farsad Biglari; Data Analysis: Salman Azarsina; Drafting the article, Critically revising the article, reviewing the submitted version of manuscript, and approving the final version of the manuscript: All authors.

Conflict of interest

The authors declared no conflicts of interests.

References

[1] McCollum DE, Odom GL. Alkaptonuria, ochronosis, and low-back pain: A case report. The Journal of Bone and Joint Surgery. 1965; 47(7):1389-92. [DOI:10.2106/00004623-196547070-00013] [PMID]

[2] Lal M, Thakur M, Kashyap S. Alkaptonuric ochronosis. Orthopedics. 2014; 37(12):e1141-e9. [DOI:10.3928/01477447-20141123-94] [PMID]

[3] Thapa M, Bhatia M, Maurya VK. Alkaptonuria. Medical Journal, Armed Forces India. 2018; 74(4):394-6. [DOI:10.1016/j.mjafi.2017.06.006] [PMID] [PMCID]

[4] Ahmed S, Shah Z, Ali N. Chronic low backache and stiffness may not be due ankylosing spondylitis. The Journal of the Pakistan Medical Association. 2010; 60(8):681-3. [PMID]

[5] Farzannia A, Shokouhi G, Hadidchi Sh. Alkaptonuria and lumbar disc herniation: Report of three cases. Journal of Neurosurgery: Spine. 2003; 98(1):87-9. [DOI:10.3171/spi.2003.98.1.0087] [PMID]

[6] Kopeć K, Kusz D, Wojciechowski P, Cieliński L, Laszczyca M. Orthopaedic problems in patients affected by alkaptonuria: A case report. Ortopedia, Traumatologia, Rehabilitacja. 2007; 9(2):206-14. [PMID]

[7] Feild JR, Higley GB, DeSaussure R. Ochronosis with ruptured lumbar disc: Case report. Journal of Neurosurgery. 1963; 20(4):348-51. [DOI:10.3171/jns.1963.20.4.0348] [PMID]

[8] Krishnan P, Chowdhury SR. Lumbar disc herniation in a patient of alkaptonuria: Case report and review of literature. Neurology India. 2012; 60(6):667-9. [DOI:10.4103/0028-3886.105218] [PMID]

[9] Etzkorn K, Oliver AM. Not just another case of low back pain. BMJ Case Reports. 2014; 2014:bcr2014204085. [DOI:10.1136/bcr-2014-204085] [PMID] [PMCID]

[10] Sharma A, Sharma SK, Wanchu A, Kumar M, Singh S, Bambery P. Lower-back pain, intervertebral-disc calcification and scleral pigmentation. The Medical Journal of Australia. 2006; 184(12):643. [DOI:10.5694/j.1326-5377.2006.tb00424.x] [PMID]

[11] Kalevski SK, Haritonov DG, Peev NA. Alcaptonuria with lumbar disc prolapse: Case study and review of the literature. The Spine Journal. 2007; 7(4):495-8. [DOI:10.1016/j.spinee.2006.06.399] [PMID]

[12] Al-Mahfoudh R, Clark S, Buxton N. Alkaptonuria presenting with ochronotic spondyloarthropathy. British Journal of Neurosurgery. 2008; 22(6):805-7. [DOI:10.1080/02688690802226368] [PMID]

[13] Gil JA, Wawrzynski J, Waryasz GR. Orthopedic manifestations of ochronosis: Pathophysiology, presentation, diagnosis, and management. The American Journal of Medicine. 2016; 129(5):536.E1-E6. [DOI:10.1016/j.amjmed.2016.01.010] [PMID]

[14] Kahveci R, Ergüngör MF, Günaydin A, Temiz A. Alkaptonuric patient presenting with "black" disc: A case report. Acta Orthopaedica et Traumatologica Turcica. 2013; 47(2):134-8. [DOI:10.3944/AOTT.2013.2767] [PMID]

[15] Phornphutkul C, Introne WJ, Perry MB, Bernardini I, Murphey MD, Fitzpatrick DL, et al. Natural history of alkaptonuria. New England Journal of Medicine. 2002; 347(26):2111-21. [DOI:10.1056/NEJMoa021736] [PMID]