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OLGU SUNUMU

Black Disc During Lumbar Spinal Surgery: Two Case Reports with Ochronosis

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Abstract
Ochronosis is a disease that shows autosomal recessive transition that develops due to homogenistic acid oxidase enzyme deficiency and progresses with the accumulation of HA metabolites in connective tissues. It is characterized by a gray-black pigmentation in the tissues. This accumulation is more common especially in connective tissues. The most affected segment is the lumbar region in the spine. Homogenistic acid and its metabolites accumulate at disc distance, causing narrowing at disc distance, calcifications and instability in the intervertebral disc. It should be kept in mind in the differential diagnosis of lumbar spondylosis in younger cases. In our study, 2 ocronotic cases with lumbar involvement were presented. Especially in the 2nd case, the effects of accumulation on spondylotic disruption in lumbar spine segment were clearly seen. Studies with larger patient series are needed to prevent the development of spondylosis in ocronotic cases and to develop effective treatment methods.
Key Words: ochronosis, lumbar, black disc

Lomber Omurga Cerrahisi Sirasinda Siyah Disk: Okronozisli İki Olgu Sunumu

Özet
Okronozis, homojenistik asit oksidaz enzim eksikliğine bağlı olarak gelişen ve bağ dokularında HA metabolitlerinin birikmesi ile ilerleyen otozomal çekinik geçiş gösteren bir hastalıktır. Dokularda gri-siyah pigmentasyon ile karakterizedir. Bu birikim özellikle bağ dokularında daha sıktır. En çok etkilenen segment omurgadaki lomber bölgedir. Homojenistik asit ve metabolitleri disk mesafesinde birikerek disk mesafesinde daralmaya, kalsifikasyonlara ve intervertebral diskte instabiliteye neden olur. Daha genç olgularda lomber spondiloz ayırıcı tanısında akılda tutulmalıdır. Çalışmamızda lomber tutulumu olan 2 adet okronozisli olgu sunuldu. Özellikle 2. olguda lomber omurga segmentinde birikimin spondilotik bozulma üzerindeki etkileri net olarak görüldü. Okronozisli olgularda spondiloz gelişimini önlemek ve etkin tedavi yöntemleri geliştirmek için daha geniş hasta serili çalışmalara ihtiyaç vardır.
Anahtar Kelimeler: Okronozis, lomber, siyah disk

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Introduction

Alkaptonuria is a rare disease caused by hereditary disorder in the metabolism of phenylalanine and tyrosine amino acids. Autosomal recessive mutation in the homogenistic acid oxidase (HGO) gene in the 3q chromosome is responsible for the disease (1-2). HGO enzyme deficiency increases the homogenistic acid (HA) and metabolites in the blood. It causes ochronosis due to the accumulation of HA in connective tissues such as skin, eyes, ears, tendons, discs, durameters, teeth and nails. This accumulation is characterized by a gray-black pigmentation in the tissues. Although clinical findings are seen in the peripheral joints and axial skeletal system, the lumbar segments of the spine are mostly affected. HA and its metabolites accumulate in the disc, causing narrowing in the disc distance,

calcification and decrease in spinal immobilization (3). Apart from the accumulation in connective tissues, it may also accumulate in the genitourinary, respiratory and cardiovascular system (4). It is common in adults in 4-6 decades. Although HA determination in urine is important in making a diagnosis; diagnosis is usually made with degenerative arthritis, ochronotic pigmentation, and color change due to alkalization of urine color (2-5).

The diagnosis of our cases was made by seeing black disc material during the operation. It has been published with the aim of contributing to the literature since it is rarely encountered in spinal surgery practice, and because there are very few patients who underwent stabilization in reported cases.

Case 1

A 42-year-old woman complained of pain in her waist and in both hip areas for about 5-6 years, and she had pain that especially radiated to her right leg for the last 1 year. She was treated several times in a physical therapy clinic for these complaints and received medical treatment, but her complaints did not improve. There was no feature other than receiving medical treatment for hypertension and giving birth with cesarean 7 years ago in patient's history. Her systemic query was natural. In her neurological examination, it was observed that the laseuge test in the right lower extremity was significant and there was no motor or sensory deficit. There is no significant finding in routine laboratory tests.

In X-ray and lumbar computed tomography (CT) examination, a decrease in disc heights, osteophyte formations in the vertebra end-plates, a multisegmented vacuum phenomenon, and lumbar degenerative changes accompanied by suspected L5-S1 spondylolisthesis were observed (Figure 1). In lumbar MRI, it was observed that there was a pronounced multi-level disc protrusion especially in the L5-S1 distance and especially bilateral neural foramen affecting the right S1 root (Figure 1).

In the case, spondylolisthesis was thought to cause compression especially in the right S1 foramen, so decompression and short segment stabilization were planned. In the operation, bilateral L5 and S1 transpedicular screws were inserted, followed by bilateral laminectomy and bilateral facetectomy. During flavectomy, the flavum was normal-looking. During discectomy, black color change was noticed in disc material (Figure 2). The screws were then stabilized with the help of bilateral rods and closed in an anatomical plan. Neurological deficit was not observed in the patient in the postoperative period. Screw malposition was not seen in the postoperative control CT scan (Figure 3).

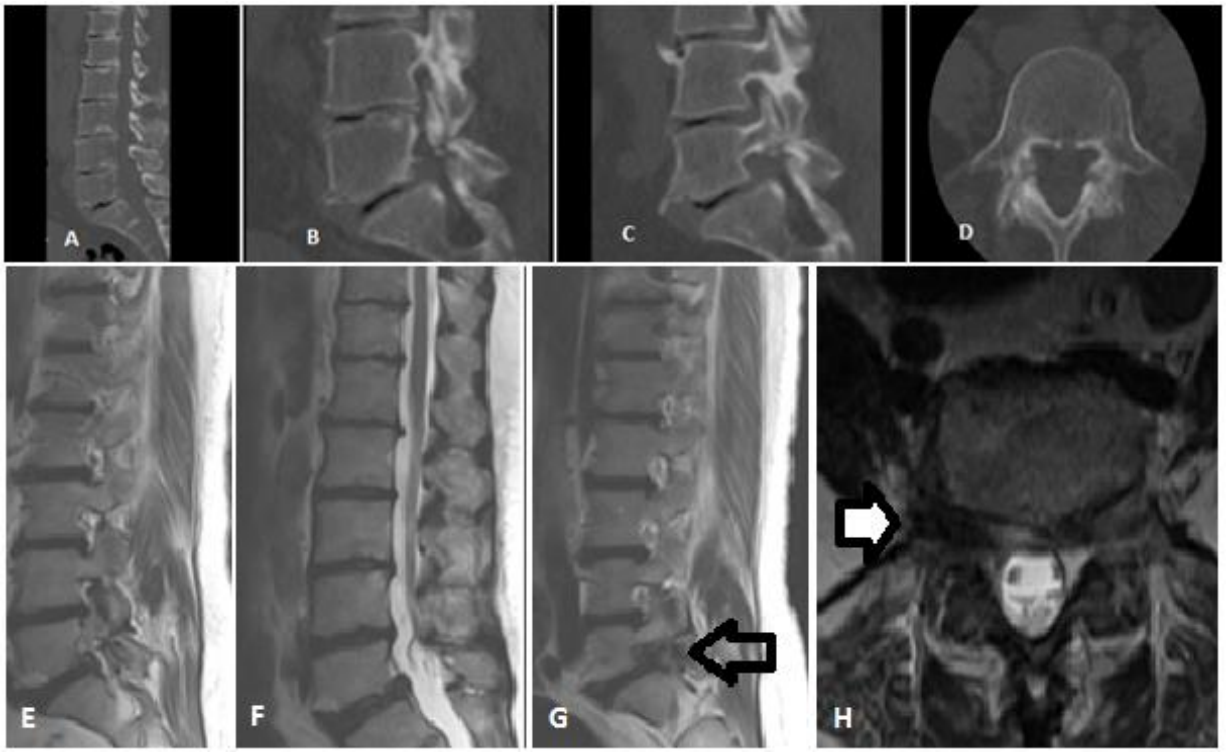

Figure 1. Sagittal lumbar CT images of Case 1; A; osteodegenerative changes in the vertebral segments and vacuum phenomenon, B-C-D; pars interarticularis defects,E-F-G-H: Lumbar sagittal and axial T2 MRI images of Case 1; arrows indicate stenosis in the right neural foramen.

In the operation, the patient's anamnesis was questioned again in the postoperative period after the black disc was seen. The patient stated that her underwear had black-gray spots due to sweating. It was learned that this situation was similar with her mother and 3 siblings. Systemic examination was normal. Urine sample was taken from the patient and alkalized with NaOH. It was observed that urine sample was turned black after waiting 6 hours (Figure 2). In the pathological examination; microscopically, the accumulation of ochronotic matter has been shown (Figure 2).

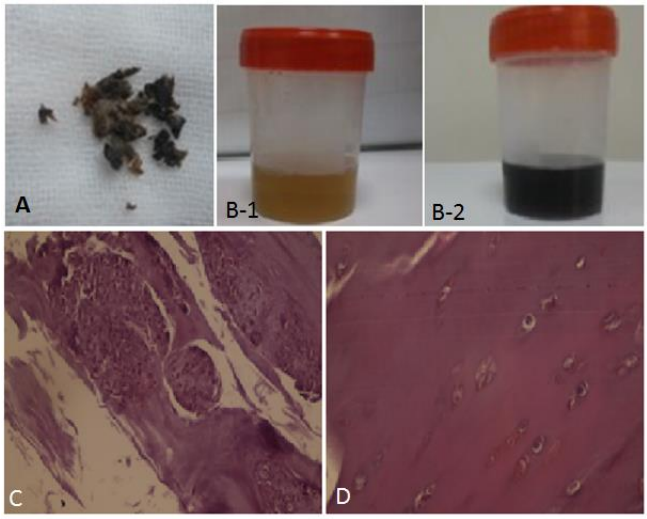

Figure 2. A: Macroscopic view of the disc material of case 1, B1-2: Color change after 6 hours by adding NaOH to the urine sample of Case 1, C-D: Ochronotic deposits of microscopic examination of case 1.

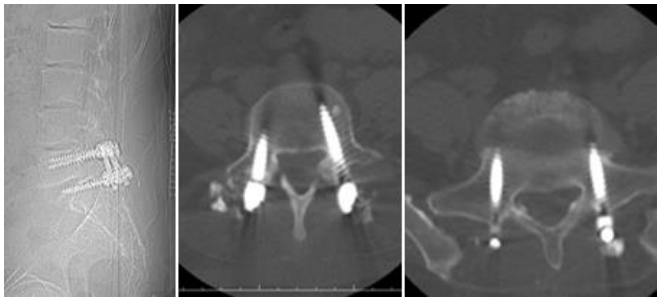

Figure 3. Postoperative lumbar CT examination of the case 1.

Case 2

A 30-year-old man has been complaining of low back pain for a long time, but the pain has spread to his left leg and has developed over the past fifteen days. There was no feature in his background and family history. In his neurological examination, on the left leg, lasegue was positive at 45°, there was no motor deficit, and described hypoesthesia in the left L5-S1 dermatome.

On anterior-posterior radiography of the patient, it was observed that there was a bending to the right (thought to be due to pain) and lumbar CT showed minimal air distance between the L5-S1 and L3-4 discs (Figure 4). In his lumbar MRI examination, a sequestered disc hernia was detected in the left L5-S1 distance (Figure 4).

The patient was operated due to a lumbar disc hernia. Left L5 hemilaminectomy and flavectomy were performed. Black color change was observed in the intraoperative disc distance and black disc materials were sent for pathological examination (Figure 5).

After it was observed that the disc materials were black, the postoperative anamnesis was deepened. The patient stated that there was no color change in urine or no spot in his underwear. He also did not describe complaints of joint pain. His systemic examination was also natural. The skin color of the patient was dark, there was a black color change in his ear cartilage (Figure 5). Clinical symptoms of ochronosis were not observed during interrogation of patient’s relatives.

The urine sample, which was taken considering the possibility of ochronosis, was alkalized with NaOH, and it was observed that the urine color darkened for 6 hours (Figure 5). However, the color change was only in the form of darkening. In the pathological examination of the disc materials of the patient, a diagnosis of ochronosis was made (Figure 5).

In the 5th year clinical follow-up of our case, the patient stated that low back pain and radicular complaints were continuous at certain periods. Lumbar MRI imaging of the case, it was observed that spondylotic change increased and a new foraminal disc hernia developed in the left L3-4 distance compared to MRI examination 5 years ago (Figure 6). Urine extract was taken, and it was observed that there was a color change after waiting 6 hours (Figure 14). As his complaints were not compatible with the clinic finding, he was not operated again. Diet program was organized with analgesic and anti-inflammatory therapy and the clinical follow-up of the patient continued.

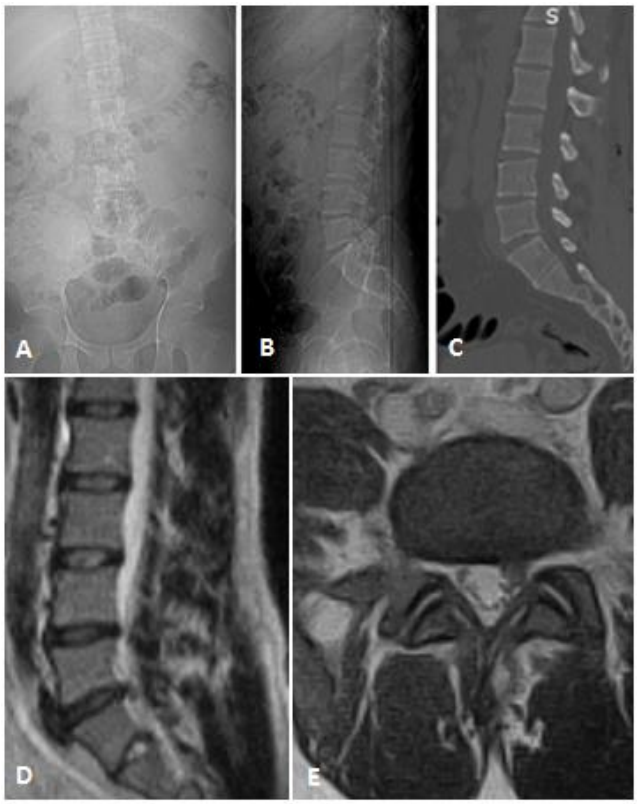

Figure 4. A-B-C: 2. Case lumbar radiographs and sagittal lumbar CT view, D-E: Lumbar MR examination of Case 2-Left L5-S1 disc herniation.

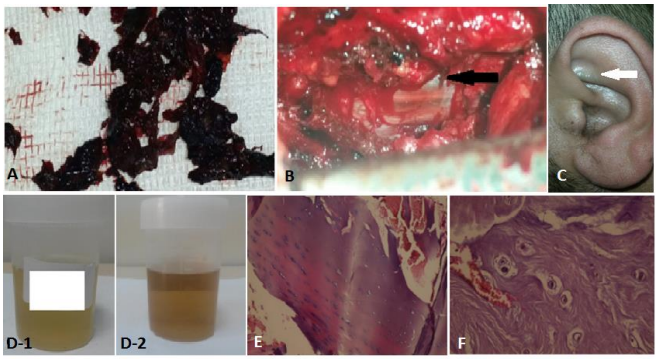

Figure 5. A-B: The color of the disc material in the case (left) and arrow shows the change in the color in durameter, C: Color change in ear cartilage (arrow) of case 2, D1-2: Color change by adding NaOH to the urine sample taken from the case 2. E-F: Microscopic examination of disc material; ochronotic pigment deposition is seen.

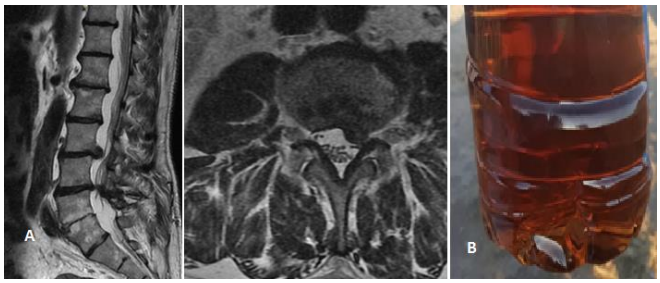

Figure 6. A- In case 2 of the lumbar MRI examination performed 5 years later; It was observed that there were spondylotic changes in all lumbar segments, fusion developed at L5- S1 disc distance, and a new disc hernia formed at the left L3-4-disc distance. B-the change in color in the urine of the patient is observed (postoperative 5th year).

Discussion

Ochronosis is a very rare disease caused by HGO enzyme deficiency. Enzyme deficiency causes HA to reach high levels in the blood (6). Findings arise due to the accumulation of HA in connective tissue in the body. These findings are seen in peripheral joints and axial skeletal system. The lumbar segments area of the spine was affected more (3). Although changes in the lumbar spondylotic process are not pathogonomic for the disease, they are characteristic features of this disease. Although color change of urine with alkalinization guides the diagnosis, ochronotic pigmantation in the organ or tissue is also important for the diagnosis (2).In ochronosis patients, color change is observed by keeping the urine outside. In cases where urine is acidic, no color change was observed; however, in this case, color change was observed when urine was made alkaline with substances such as NaOH (7).

In both of our cases, color change was observed when urine samples were alkalized with NaOH and kept for 6 hours. However, the color change in our first case was more significant. The first patient was older than the second one. The reason for the development of spondylosis may be longer exposure to metabolite or greater accumulation of metabolite due to the patient's age. In our second case, the fact that spondylotic changes occurred 5 years after the operation, which was performed due to a disc herniation, supports this, but larger patient series in which the accumulation levels are measured are required.

There is no specific treatment for ochronosis. To provide pain control in treatment, physiotherapy and surgical treatment can be applied in necessary cases. However, to prevent deformities due to accumulation of HA and metabolites in patients over time, restrictions on phenylalanine and tyrosine may be recommended in the diet, especially in young patients (8). As these amino acids are found in many nutrients, dietary restriction benefits in clinical practice are controversial (7-9). Ascorbic acid inhibits the oxygenation and polymerization of homogenistic acid as in vitro, but the condition in treatment is not certain, and the long-term results are unknown (2-5-10). There are also studies that N-acetyl cysteine and vitamin E inhibit polymerization and accumulation in vitro (11).

Conclusion

Ochronosis is a disease that shows autosomal recessive transition and progresses with the accumulation of HA metabolites in connective tissues as a result of enzyme deficiency in tyrosine metabolism. It should be kept in mind in the differential diagnosis of

lumbar spondylosis in younger cases. Due to the lack of specific treatment of the disease, larger patient series should be studied, and the prevention of spondylosis development should be targeted.

Ethics Committee Approval: O The consent form was filled out by all participants.
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Author Contributions:
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