***Case Report***

# Alkaptonuric Ochronosis; Hip Arthropathy - A Rare Case Treated with Total Hip Replacement

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**ABSTRACT**

Alkaptonuria is a rare autosomal-recessive metabolic disease caused by congenital homogentisic acid (HGA) oxidase enzyme deficiency which affects one in 100,000 to 250,000 individuals. Circulating HGA pass into various tissues through-out the body, mainly in cartilage and connective tissues, where its oxidation products polymerize and deposit as a melanin-like pigment. Currently, there is no specific treatment for alkaptonuria. A 63-year-old male patient presented to our clinic, complaining of chronic hip pain that had worsened over the previous 3 years. The patient also had darkly stained sclera and pinnae characteristic of ochronosis. A cementless right total hip replacement was performed. At the 5-year follow-up, the patient had returned to full activities, reported no hip pain, and was very satisfied with the outcome.

***Keywords:*** *Alkaptonuria, Ochronosis, Joint, Arthroplasty, Hip.*

**ÖZET**

**Alkaptonürik Okronozis; Kalça Artropatisi - Total Kalça Protezi ile Tedavi Edilen Nadir Bir Olgu**

Alkaptonüri konjenital homogentisik asit (HGA) oksidaz enzim eksikliğinden kaynaklanan, 100.000 ila 250.000 bireyden birini etkileyen nadir görülen bir otozomal resesif geçişli metabolik hastalıktır. Dolaşan HGA, oksidasyon ürünlerinin polimerize edildiği ve melanin benzeri bir pigment olarak çöktüğü başta kıkırdak ve bağ dokularında olmak üzere çeşitli dokulara geçmektedir. Alkaptonuri için spesifik bir tedavi yoktur. 63 yaşındaki bir erkek hasta kliniğimize önceki 3 yıl içinde kötüleşen kronik kalça ağrısı yakınmasıyla başvurdu. Hastada okronozisin koyu renk lekeli sklera ve pinna karakteristiği vardı. Çimentosuz total kalça protezi uygulandı. 5 yıllık izlemde hasta tüm aktivitelere geri döndü, herhangi bir kalça ağrısı bildirmedi ve sonuçtan oldukça memnundu.

***Anahtar Sözcükler:*** *Alkaptonüri, Okronozis, Eklem, Artroplasti, Kalça.*



Alkaptonuri is a rare metabolic disease caused by the lack of hemoglobinic acid oxidase (HGO) (homogentisic acid 1, 2 dioxygenase) enzyme which plays a role in the metabolism of tyrosine and phenylalanine. An autosomal recessive mutation of the HGO gene on chromosome 3 causes the disease (1). It affects one in 100,000 to 250,000 individuals (1, 2). As a result of this deficiency, clinically, homogentisic acid and its oxidation products accumulate in the connective tissue, associated with an increased pigmentation and the attenuation of the connective tissue. As the disease progresses, the chronic inflammation in the damaged tissue can cause degeneration and osteoarthritis (3). A blue-black colour change in tissue and the urine together with degenerative arthritis is known as ochronosis (4). In this report we present an excellent outcome with total hip replacement in a patient with significant degenerative arthritis secondary to ochronotic arthritis.

## CASE REPORT

A 63-year-old male patient presented to our clinic, complaining of chronic hip pain that had worsened over the previous 3 years. On physical examination, the right hip was neutrally aligned. There was a mild effusion, with tenderness over joint lines. The range of movement was limited and painful (extension was 0 degrees, flexion was 80 degrees, internal rotation was 10 degrees and external rotation was 30 degrees). Radiographically, the right hip showed degenerative osteophytic changes and osteophytes with narrowing and sclerosis of the joint space (Figure 1). The patient also had darkly stained sclera, pinnae and darkening of the urine characteristic of ochronosis (Figure 2). There was also blue-dark pigmentation of the hip joint (Figure 3). There was no pathology in biochemical parameters or urinalysis. The patient had no history of continuous drug use and no chronic disease history.

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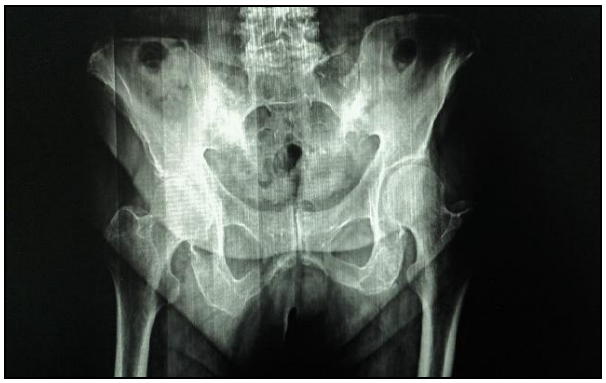

***Figure 1:*** *XRay rontgenogram showing degenerative osteophytic changes and osteophytes of the right hip and sclerosis of the joint space.*

***Figure 2:*** *Patient's darkly stained sclera and pinnae and darkening of the urine; characteristic of ochronosis.*

No other family members had similar complaints. Total hip replacement was decided to be performed due to the degenerative osteoarthritis. Informed consent was obtained from the patient.

Positioned in supin position, the right hip was reached via the anterior approach with standard Watson-jones incision. After the skin incision and reaching the hip joint extreme black pigmentation was seen in the capsule, femoral head and acetabulum (Figure 3).

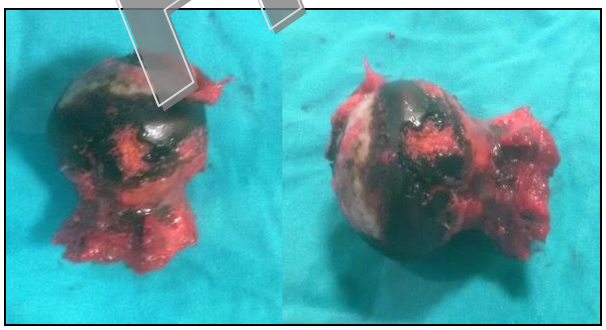

***Figure 3:*** *Blue-dark pigmentation of the hip joint.*

Femoral head was sent to pathology for examination. Cementless right total hip replacement was performed (Figure 4). No complications were encountered peri or postoperatively.

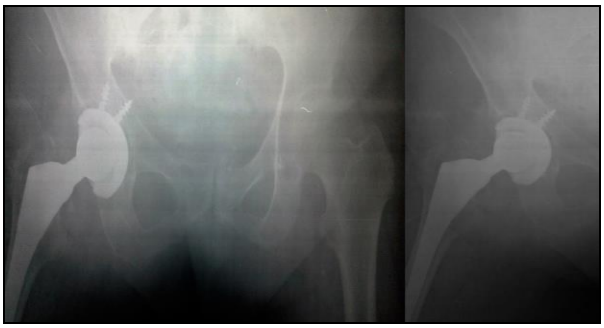

***Figure 4:*** *XRay rontgenogram showing cementless right total hip replacement.*

The patient progressed well postoperatively, maintaining a good range of motion and achieving independent ambulation 4 weeks after surgery. At the 5-year follow-up, the patient had returned to full activities, reported no hip pain, and was very satisfied with the outcome.

## DISCUSSION

Alkaptonuria is an autosomal recessive metabolic disorder characterized by joints and spine involvement, ochronosis and presence of homogentisic acid (HGA) in urine and its deposition in cartilage, and other connective tissues, leading to disabling arthritis in elderly individual (5). It affects one in 100,000 to 250,000 individuals (1, 2). It is caused by the lack of HGO enzyme deficiency due to an autosomal recessive mutation of the HGO gene on chromosome 3 which plays a role in the metabolism of tyrosine and phenylalanine. The defective enzyme leads to an accumulation of HGA in tissues and blood over the years, and polymers of HGA are deposited in the tissues, causing the dark pigmentation encountered in these patients (6, 7). The first finding is a colour change in the urine (4). Ochronotic arthropathy is seen most between the ages of 40-60 years and in weight-bearing joints which is a particularly troublesome feature (8). Typically, involvement of the large peripheral joints occurs several years after spinal involvement (9). Usually, involvement of these joints is severe and often requires joint replacement (4, 9) .

In the current case who was aged 63 years, there was right hip joint involvement. Apart from colour changes associated with joint involvement, the characteristics resemble primary osteoarthritis (10). The intraoperative visualisation of the blue-black colour change in the joint tissue of the current case is typical.

In the literature the treatment regimes were described due to the complaints of degeneration of especially hip and knee joints (11, 12). In the late stages of arthritis, orthopedic surgery is prominent. In our case, hip arthroplasty were performed after the failure of conservative treatment modalities. We could obtain extremely good results with arthroplasty after 5 year follow up.

Arthroplasty is effective for treating severe arthritis of the knee ascribable to ochronosis. We report an excellent outcome with total hip replacement in a patient

with significant degenerative arthritis secondary to ochronotic arthritis. Alkaptonuria is an inherited disease which can lead to severe consequences. Early diagnosis and new treatments can enhance the quality of life of patients suffering from this disease.



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