Case Series

Case Series on Ochronotic Arthropathy: An Incidental Finding in Osteoarthritis Hip, Review of Literature

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Abstract

Ochronotic arthropathy, an infrequent ailment characterized by the buildup of oxidized and polymerized metabolites of homogentisic acid, presents a distinctive challenge in the medical realm. The affinity of homogentisic acid for collagen, a vital constituent of connective tissues, underpins the pathogenesis of this condition. Joints, crucial components of the body's architecture, become the primary focus of this disorder. Invariably, the axial spine joints are its initial target, followed by a subsequent involvement of the knees, shoulders, and hips, ultimately ushering in degenerative transformations. The objective of this article is to cast a spotlight on the infrequently encountered ochronotic arthropathy, with specific emphasis on its manifestation in the femoral head. This report showcases two incidental cases wherein the head of the femur becomes an unforeseen site of affliction. The intricacies of ochronotic arthropathy extend beyond its rarity, as it challenges conventional understanding and diagnostic approaches. By examining its manifestation within the femoral head, we strive to unravel the nuances of its impact on this particular joint. This exploration not only expands our comprehension of the condition itself but also underscores the critical importance of recognizing its potential to manifest in atypical locations. As medical practitioners, a deeper understanding of such unconventional occurrences equips us to better diagnose, manage, and treat ochronotic arthropathy, ultimately enhancing patient care and outcomes.

Keywords:

Ochronosis, arthropathy

Introduction

Ochronosis is an inherited autosomal recessive rare disorder which affects connective tissue leading to arthropathy which presents as degenerative joint disease [1,2] Ochronotic occur due to inactive gene mapped on chromosome 3q21-23, coding for the enzyme homogentisate 1,2 dioxygenases. This enzyme is involved in phenylalanine and tyrosine catabolism [3] leading to accumulation of homogentisate – a colorless phenol that degrades to benzoquinone which irreversibly bind with collagen. Also, polymerization of this molecule gives iridescent dark hue to the affected tissue and its deposition causes degradation, degeneration, and developmental problems in all types of collagens.[4] Usually present with skin or eye discoloration, although joint and back pain are common initial complaints. If heart valves are involved, heart murmur could be the presentation [5]

Case Report

A 63-year-old male patient and a 53 old male patient presented with complaints of Hip pain and difficulty in walking. X-ray showed Degenerative changes in hip joint diagnosed as Grade 4 osteoarthritis and underwent total hip replacement surgery and resected head of femur was sent for histopathological examination.

Grossly, we received the head of femur measuring 6.0 X 6.0 X 6.0 cm. External surface shows focal brown to black pigmentation. The cut surface shows focal brown, black area.

Microscopy showed fibrocartilaginous and bony trabeculae enclosing fatty marrow with areas of congestion and congested vessels. Scattered hyalinized collagen bundles and golden-brown sickle and round shaped ochronotic bodies are seen. (Fig 1) Special stains with methylene blue and Verhoef's van-Gieson showed black colored stained ochronotic bodies. (Fig 2)

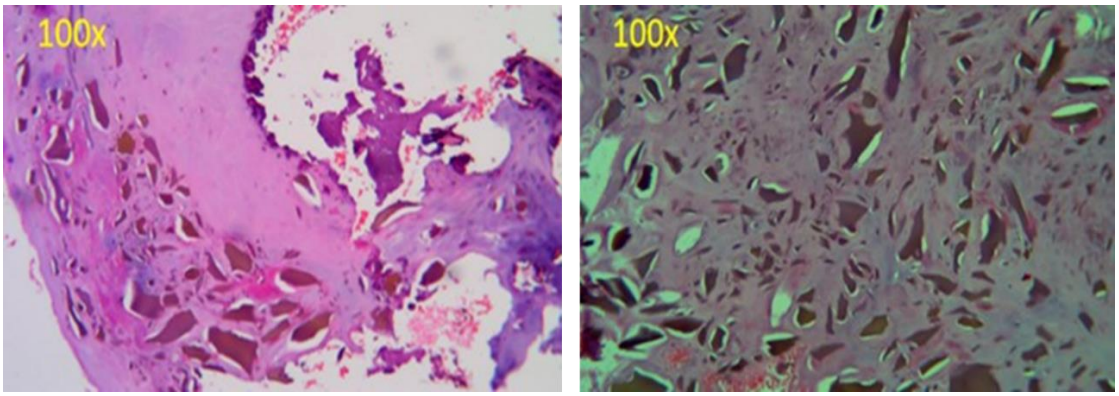

Figure 1 Fibrocartilaginous tissue with hyalinized collagen bundles (left) and many golden-brown sickles (right) and irregular shaped ochronotic bodies are seen.

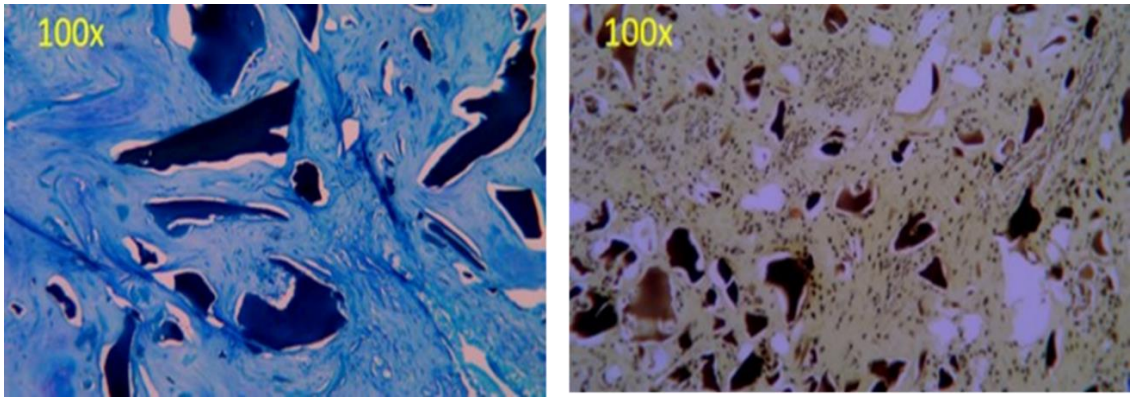

Figure 2 Special stains with methylene blue (left) and Verhoef's van-Gieson (right) showed black colored stained ochronotic bodies

Discussion

Ochronosis is named for its reddish-brown hue of tissue "ochre-like". It was first described in 19th century by physician Archibald Garrod. He called an "inborn error of metabolism," Archibald Garrod changed history when he coined that term for "black urine" disease, alkaptonuria.[4]

Ochronosis is a very rare disease with a prevalence of 1/250,000–1,000,000 [6]. It was first described by Virchow in a 67 year-old patient in 1866. Clemens reported pigmentation of joint cartilage in 1907. Ochronotic pigment can accumulate in hyaline cartilage, tendon, skin, teeth, nail, sclera, tympanic membrane, heart valves, renal tubular cells, duramater, pancreas and walls of great arteries.[7] Radiologically it differs from osteoarthritis by presenting with less osteophytes and subchondral cysts.[8]

There are two types of Ochronosis Endogenous ochronosis- Autosomal recessive loss of function mutations in HGD / HGO, and Exogenous ochronosis- which occurs due to prolonged use of topical hydroquinone and fewer common associations are found with antimalarials, resorcinol, phenol, quinine injections and picric acid. Exogenous ochronosis is more common in sub-Saharan Africa, due to common use of phenols such as antimalarials and depigmentation agents are used in higher frequencies, concentration, and duration.[9]

Ochronosis is a rare disease, only 22 cases have been definitively diagnosed in the United States for the past five decades, but it is more common in few populations In the Dominican Republic and Slovakia it has a prevalence of 1 in 20,000 [10]

Chromatography assay in the urine for homogentisate is the diagnostic test for alkaptonuria. [11] A genetic test can determine the existence of autosomal recessive disease in an individual and those who are heterozygous carriers. These genomic databases are maintained by the genetic testing registry. Diagnosis of exogenous ochronosis is based on history of past medications. Skin biopsy with histological confirmation is the gold standard. Confocal microscopy is an emerging option for noninvasive diagnosis. [12]

Treatment options include tyrosine and phenylalanine dietary restrictions and vitamin C mega dosing. Nitisinone, is an approved first-line treatment for the hereditary tyrosinemia, which has proven to modify disease progression. Though it is the mainstay of treatment, it should be used judiciously and carefully.[13]

Arthralgia and arthritis are seen almost in all affected patients, and surgical intervention with joint replacement from ochronotic arthritis are found as young as age 30. The cartilage involvement increases the bone symptoms as seen in osteoarthritis. The involvement of the spine, especially the intervertebral discs, causes debilitating back pain.[14] Life expectancy is almost normal for alkaptonuria patients, but the quality of life needs to be monitored. Gene mapping can be beneficial for hopeful couples.

Conclusion

This case of ochronotic arthropathy is published for its rarity and to consider ochronotic arthropathy as one of the rare causes for degenerative arthritis. So that apt treatment option can be given post diagnosis.

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