



OSTEONECROSIS OF BILATERAL HUMERAL HEAD – AN UNCOMMON CASE

Physical Medicine & Rehabilitation

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ABSTRACT

Non-traumatic osteonecrosis of the shoulder by itself is an uncommon condition. We report osteonecrosis of the bilateral shoulder in a 45 year old man with no particular risk factors accompanied by pain and range of motion restriction.

KEYWORDS

Osteonecrosis; Humeral head; Bilateral.

INTRODUCTION

Osteonecrosis or avascular necrosis is a condition characterised by the death of bone tissue secondary to a lack of subchondral blood supply.¹ Trauma is the commonest cause of shoulder osteonecrosis. Non-traumatic osteonecrosis of the shoulder has been reported but mostly in association with multifocal involvement. Irrespective of the aetiology, it remains a major cause of pain and limitation of range of motion, hence the importance of early identification in clinical practice.^{1,2,3}

Case Report

A 45 year old male presented in the Physical Medicine and Rehabilitation outpatient department with the complaint of severe pain in the bilateral shoulder joint and limitation of range of motion (ROM) which began one year ago. It was in insidious onset, progressive in nature and there was no history of trauma or fall. He is a chronic smoker for the past thirty years and smokes about fifty (50) bidis/day and was an occasional drinker (once in a week approximately 100 ml of country liquor) for fifteen years which he had stopped five years back owing to the financial crisis. He is a labourer by profession for the past thirty years and does ploughing of paddy fields with a heavy tool using both hands. On examination, there was tenderness on the glenohumeral joint line overall. Crepitus was present bilaterally which was accompanied by occasional clicks on overhead abduction, both internal, and external rotation. ROM assessed by goniometer was restricted in bilateral shoulder with more restricted movement in right than left (Table 1).

Table 1: Range of Motion (ROM) of bilateral shoulder joint by goniometry (in degrees).

	Flexion	Extension	Abduction	Adduction	Internal Rotation	External Rotation
Right	90	35	108	40	70	70
Left	93	53	160	30	75	72

There was no sensorimotor deficit around the shoulder. His Visual Analog Scale (VAS)⁴ was 8 on the right side, and 7 on the left, and the Shoulder Pain and Disability Index (SPADI)⁵ total was 60% on right, and 48% on left. On plain radiography, there was a curvilinear lucent sub-chondral line (crescent sign) in the humeral head bilaterally with sclerotic changes. Sclerosis in this area indicates an effort at healing. Additionally, on the right side, there was marked flattening of the humeral head (Figure 1).



Figure 1: Plain radiograph showing osteonecrosis of both shoulder (Right: Stage IV, Left: Stage III)

Considering a working diagnosis of osteonecrosis of the bilateral shoulder, further investigations were done. Laboratory investigations were normal. Magnetic Resonance Imaging (MRI) of the shoulder showed a geographical altered signal intensity area with a serpiginous rim in the proximal humeral epiphysis and metaphysis bilaterally and collapse of the articular surface of the humerus with a subchondral fracture on the right side (Figure 2).

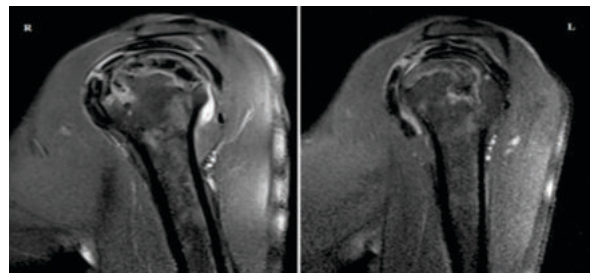


Figure 2: MRI of both shoulders showing osteonecrosis.

He was started with non-steroidal anti-inflammatory drugs for pain management and was asked to refrain from the heavy work he has been doing as well as cessation of smoking. The patient was counselled regarding surgery for which he refused.

DISCUSSION

After the femoral head, humeral head is the most common site for non-traumatic avascular necrosis or osteonecrosis, but a very rare condition. Osteonecrosis is multifocal when three or more joints are involved. Many a time osteonecrosis is unrecognised clinically as symptoms are non-specific.¹

The exact mechanism of osteonecrosis is not known but the final pathway is disrupted blood supply to the head, increased intra-osseous pressure, and resultant bone death. The blood supply of the humeral head is complex and variable. It has both intra and extraosseous blood supply. Earlier it was considered that the anterolateral branch of the anterior circumflex humeral artery provided the main blood supply but recent cadaveric studies suggest that the posterior circumflex humeral artery supplies two-thirds of the humeral head. Due to the existence of only one principal artery and the tortuosity of subchondral arterioles they are vulnerable to thrombus and emboli.^{2,3} Risk factors and pathogenesis associated with non-traumatic osteonecrosis are corticosteroid therapy (fat embolism), hemoglobinopathies like Sickle cell disease and thalassemia (embolism), alcohol (fat embolism), dysbarism (air embolism), pregnancy (hypercoagulability; thrombosis), smoking (hypercoagulability) and radiation exposure (injury to vessel wall). Sometimes when the cause of osteonecrosis cannot be determined and is referred to as idiopathic.^{2,6,7} The superior central portion of the humeral head is mostly affected, due to its absent or highly deficient intra-osseous blood vessels. This site is more prone to flattening and collapse as this region comes in contact with the glenoid at 90 degree forward flexion and 60 degree overhead abduction. Hence to avoid collapse of this region the patients should be asked to refrain from overhead activities if osteonecrosis is detected

early.⁸ The imaging modalities used to detect osteonecrosis are plain radiography and MRI. Radiographs are useful for disease staging, while MRI is more sensitive for diagnosing early-stage by detecting changes in the bone marrow.^{6,7,8} The Cruess classification (stage I to V) is the most commonly used staging based on progression to collapse by plain radiography. Stage I with no radiographic evidence which can be detected only by MRI. If sclerotic changes are seen at the humeral head it is stage II, while stage III shows a crescent sign indicating subchondral fracture. Whereas stage IV is marked by flattening and collapse of the humeral head. The final stage is stage V showing advanced degenerative changes extending into the glenoid.^{9,10}

Conservative interventions are the treatment of choice for precollapse stages. It includes non-steroidal anti-inflammatory drugs for pain management and activity modifications to reduce the risk of collapse.^{6,7,8} Mesenchymal cells, adipose-tissue derived stem cells and platelet rich plasma therapy have been used in femoral head osteonecrosis in the precollapse stages with positive outcomes.^{11,12,13}

Core decompression surgery, humeral head resurfacing and shoulder arthroplasty (partial or total) are the surgical interventions decided based on the stage and integrity of the joint surface and subchondral bone.^{2,3,8}

In this patient the exact cause, pathogenesis and associated risk factors couldn't be fully identified. It may be due to smoking and the repetitive micro-trauma attributed to his job which exerts maximum a load on the bilateral shoulder, leading to disruption of blood supply. This patient has refused corticosteroid use or any herbal medication. At the time of presentation his Shoulder Pain and Disability Index (SPADI)⁵, pain scale- 74%; disability scale-51.25%; total-60% on right, and pain scale-66%; disability scale-36.25%; total- 48% on left. Isolated bilateral non-traumatic humeral head osteonecrosis is very rare (never reported) and has a high rate of hip involvement¹⁴ and so hip joint evaluation is necessary. It was interesting to note that this patient had no hip or knee involvement clinically and radiographically. According to the Cruess classification system, the lesion in our patient's right shoulder is stage IV and left side is stage III osteonecrosis. Based on these findings the patient should have undergone partial arthroplasty on the right side and core decompression on the left. As our patient refused any surgical interventions, he continues to be followed conservatively as an outpatient with ongoing physical and occupational therapy.

CONCLUSION

Though infrequent, shoulder osteonecrosis should be kept in mind while treating shoulder pain as it remains a significant source of pain and disability. If identified earlier the disease progression and disability associated with it could be reduced.

Conflicts of interest: None declared

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