AVASCULAR NECROSIS OF HUMERAL HEAD WITH CONCOMITANT CUFF INJURY

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Abstract:

Atraumatic avascular necrosis (AVN) of the humeral head is a less common pathology compared to the femoral head and is generally a part of polyarticular disease. A high index of suspicion is required in diagnosing the condition since symptomatology mimics other commoner pathologies in the shoulder like rotator cuff or biceps pathologies. Early diagnosis and treatment avoid the progression of the disease. Treatment options are generally based on the Cruess staging system and core decompression is a viable option in precollapse stages of disease. AVN can coexist with rotator cuff pathology and this association is rarely reported in the literature. In such cases, early diagnosis and addressing both AVN and cuff pathologies surgically can yield satisfactory outcomes and we report one such case managed successfully.

Introduction:

Avascular Necrosis (AVN) of humeral head is usually following trauma and atraumatic AVN is less common. Though AVN humeral head is the most common site after the femoral head, isolated atraumatic AVN is rare and generally part of multifocal AVN [1]. They are generally underdiagnosed and under-reported and therefore thorough examination and workup is required to diagnose the condition. Causes for atraumatic AVN humeral head include sickle cell anaemia, Gaucher Disease, systemic lupus erythematosus, Caisson disease, alcohol consumption, corticosteroids and also following shoulder surgeries either open or arthroscopic[2]. Diagnosis is largely based on radiological findings since clinical findings

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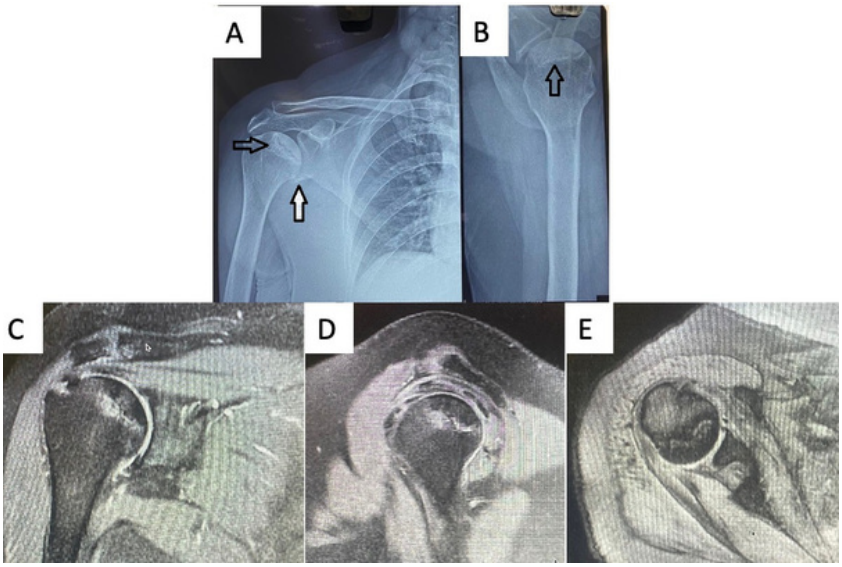

Fig 1: Pre-operative imaging: A, B: Plain radiographs with wedge shaped sclerotic lesion suggesting AVN (black arrow) with glenoidal inferior osteophyte (white arrow), C,D,E: MRI (a- coronal b-sagittal c-axial) sections showing small supraspinatus tear with upper subscapularis tear with sclerotic lesion without subchondral collapse (Cruess stage 2 AVN).

mimic other commoner pathologies in the shoulder like rotator cuff tears, adhesive capsulitis or biceps tendinitis. Management of AVN humeral head depends on the stage of disease according to Cruess staging system where stage 1 and 2 can be managed with core decompression after conservative management fails and arthritic stages (stage 4 and 5) needs arthroplasty. Stage 3 can be opted between partial resurfacing or core decompression. However, there is no consensus on managing AVN humeral head with concomitant rotator cuff injury. Here, we report one such case wherein the patient had AVN humeral head with concomitant supraspinatus tear with upper subscapularis tear with adhesive capsulitis which was managed successfully with arthroscopic and medical management.

Case Report:

55 year old female patient presented with pain in right shoulder with difficulty in lifting since one year. Pain was insidious onset , gradually progressive , dull aching and disturbing sleep. There was no history of trauma. There were no comorbidities , however there was a history of bilateral hip core decompression done 8 years back and there was history of steroid intake prior to that for nearly six months. Presently she was asymptomatic for hip. On examination , all movements at shoulder were painful particularly forward flexion, abduction and external rotation. Whipple's test , O Brien's test and Empty can test were positive and Belly Press, lift-off tests were negative but painful. There were no distal neurovascular deficits and the Constant shoulder score was 18. On radiography, there was wedge-shaped sclerotic lesion on the humeral head and a small osteophyte on the inferior glenoidal margin. Magnetic Resonance Imaging(MRI) showed a small tear in the supraspinatus with an upper one-third tear in the subscapularis with joint effusion (Fig 1). There was a clear wedge-shaped sclerotic lesion on the humeral head without subchondral collapse indicating AVN humeral head. Hence the diagnosis of humeral head AVN (Cruess system stage II) with supraspinatus tear with upper one-third subscapularis tear with adhesive capsulitis was made. She was planned arthroscopic assisted core decompression with capsular release with cuff repair. Intraoperatively we found severe capsulosynovitis with rotator interval tightness with small complete supraspinatus tear with upper subscapularis tear. Humeral head cartilage was intact with minimal flattening in the contour and glenoidal cartilage showed small defect of less than centimetre without exposing sub chondral bone (Fig 2). Initial thorough capsular release with rotator interval release with biceps tenotomy was done. Using anterior cruciate ligament (ACL) tibial drill guide, core decompression was done using 4 mm cannulated drill bit with entry from lateral side of humerus (Fig 2). After making 3 tracts under vision with arthroscope, subscapularis repair with no. 2 fibre wires and knotless one

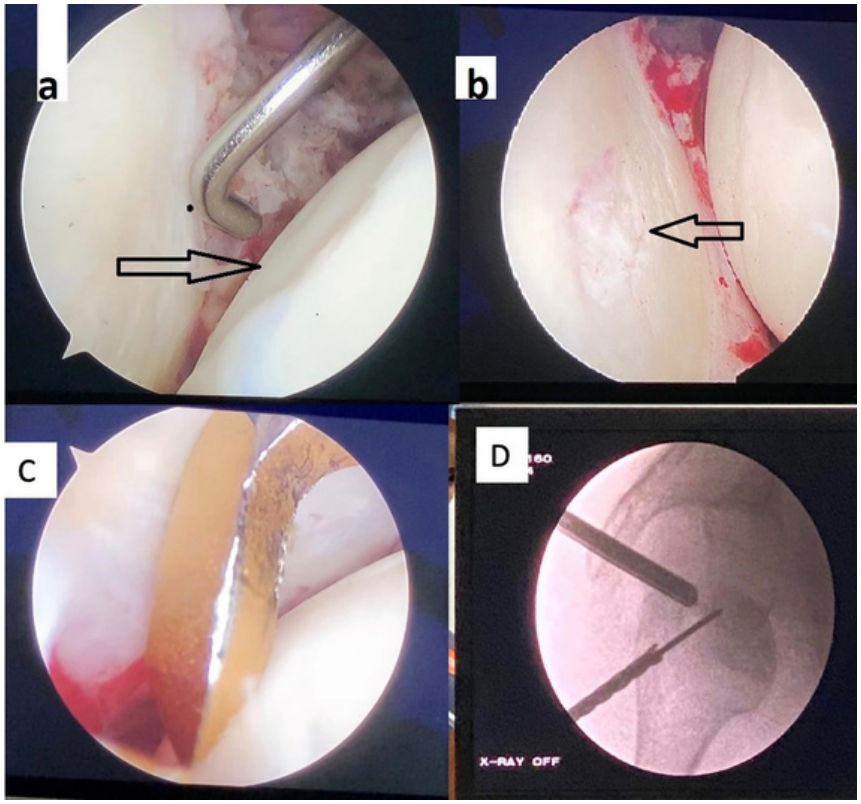

Figure 2:Intraoperative images showing intact humeral head cartilage with minimal flattening in the contour and glenoidal cartilage showed small defect of less than centimetre without exposing sub chondral bone. C, D: Core decompression using ACL tibial drill guide with intraoperative fluoroscopic picture

5.5 PEEK anchor and supraspinatus repair with double loaded 4.5 mm titanium anchor was done . Postoperatively patient was put on sling for 6 weeks and rehabilitation protocol for rotator cuff repair was followed. She was also put on Tab. Alendronate 70 mg once a week for 6 months . At one year follow up , patient was doing house hold activities with near complete range of painless movements with Constant Shoulder Score increasing significantly to 71 (Fig 3). MRI at one year showed well healed rotator cuff with sclerotic AVN lesion marginally reduced size with areas of lucency around lesion suggesting revascularization (Fig 4).

Discussion:

AVN humeral head is more commonly seen in men than women and is generally seen between 20 to 50 years of age [3]. Though symptomatology's are non-specific they are characterized by deep seated shoulder pain aggravating during night times, poorly localized and often radiating to elbow. There may be clicking or locking sensations due to loose cartilage flaps coming in between articular surfaces. On examination, there will be deep tenderness with a range of movements particularly painful with more than 90 ^{0} abduction /forward flexion due to glenohumeral loading [4].

Anchor induced AVN is not new entity and have been described previously in the literature [2]. In fact, AVN humeral head have been seen following shoulder surgeries either open or arthroscopic. Kind of surgeries causing AVN are rotator cuff surgeries with or without anchors, acromioplasty and biceps tenodesis or tenotomy. When anchors are used , more number of anchors are likely to cause AVN[5]. Close relation to ascending branch of anterior humeral circumflex artery (AHCA) in the bicipital groove is responsible for disruption of vascular supply during biceps related procedures. However Keough et.al showed AVN could be multifactorial which can be due to either damage to anterolateral branch of ACA, anchor induced damages to intraosseous branches at greater tubercle or both concurrently [2].

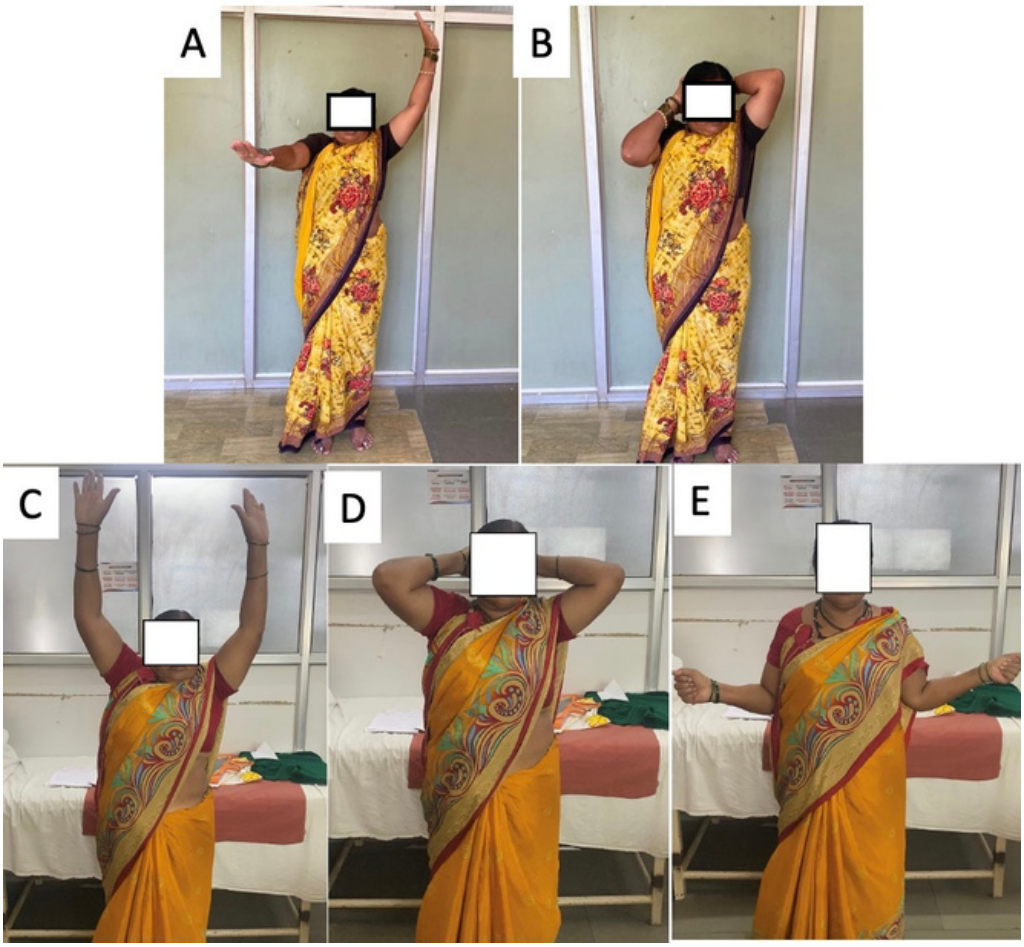

Figure 3: Pre-operative range of movement(A) & (B) and post operative improved range of movement(C), (D) & (E).

When core decompression is feasible in stage I with lesion more than 15% of humeral head or in stage II or in selected cases of stage III according to Cruess system, decompression methods are several. They can be either open conventional technique, percutaneous technique or arthroscopic assisted methods. In open core decompression method, single trephine of size 6-10 mm is passed just lateral to bicipital groove using deltopectotal approach confirming location of lesion using fluoroscopy. In percutaneous, multiple (two or three) perforations are made using 3.2 steinman pin or 2.7 drill bit into the lesion under fluoroscopic guidance [6]. However entry is same as open technique wherein it is kept lateral to bicipital groove to prevent damage to ascendingbranch of AHCA. In arthroscopic assisted technique , first described by Chapman et.al, use of arthroscopy helps in addressing other articular issues like synovial/cuff and /or chondral pathologies at the same time [7]. It also helps in avoiding iatrogenic chondral damages while making drill holes. Advent usage of ACL tibial drill guide while performing arthroscopic assisted core decompression helps in proper triangulation of humeral head lesion and avoids unncesessary drilling [8]. Coexistent pathologies of rotator cuff and AVN are less known in the literature and have been described only few times as case reports[9]. There is no proper consensus on the treatment algorithm in combined pathologies.

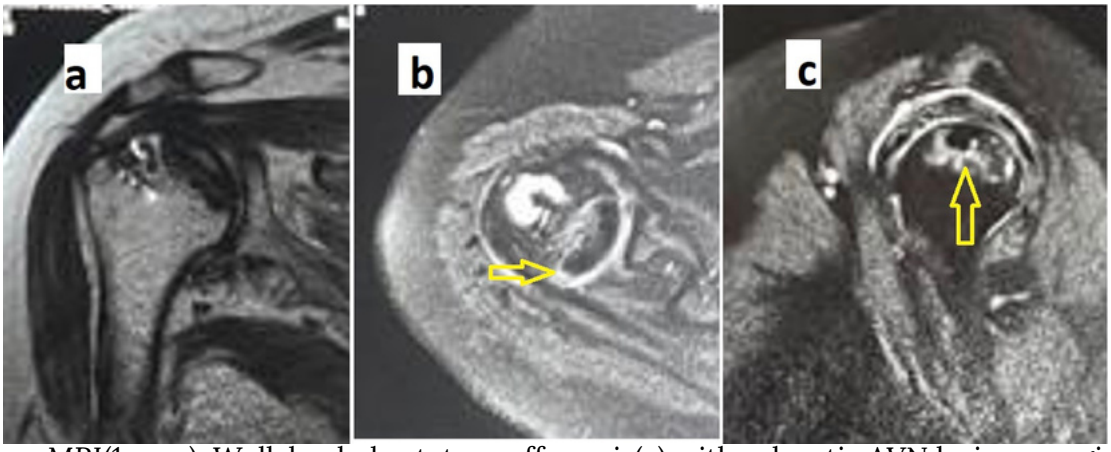

Fig 4: Follow-up MRI(1 year): Well-healed rotator cuff repair(a) with sclerotic AVN lesion marginally reduced size with areas of lucency around lesion suggesting revascularization (yellow arrow)(b) &(c)

Hereby we report one such rare case wherein both pathologies (rotator cuff) and AVN humeral head were addressed surgically along with medical management involving tab. Alendronate post operatively with successful outcome.

Conclusion:

AVN is rare and generally part of polyarticular disease. High degree of suspicion is required for proper diagnosis of condition . It can be coexisting with rotator cuff pathology and early diagnosis and addressing both AVN and cuff pathologies surgically can yield satisfactory outcome.

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