

## CLINICAL REVIEW

# Shoulder Pain in the Older Patient

Yaqoot Khan, DO

### *Introduction*

Shoulder pain is a common musculoskeletal complaint in adults. It may be due to intrinsic pathology or referred pain and can be further classified based on the acuity of pain as acute or chronic. This review will focus on the non-traumatic causes of shoulder pain in older patients.

### *Discussion*

When shoulder pain is atraumatic, it is important to distinguish between intrinsic and extrinsic causes of shoulder pain. Extrinsic causes include cervical nerve root compression, herpes zoster, hepatobiliary disease, diaphragmatic irritation, pulmonary embolus, pneumonia and myocardial ischemia amongst others. Careful history and examination should enable the clinician to distinguish between intrinsic and extrinsic causes of atraumatic shoulder pain.

The differential diagnosis of intrinsic atraumatic shoulder pain in the elderly includes osteoarthritis, polymyalgia rheumatica, crystalline arthritis, septic arthritis, inflammatory arthritis such as rheumatoid arthritis and spondyloarthropathy, adhesive capsulitis, rotator cuff tendinopathy, dialysis associated arthropathy, avascular necrosis and regional pain syndromes. This can be further differentiated into acute versus chronic pain, with unilateral versus bilateral involvement. It is essential to evaluate additional joint involvement.

### Osteoarthritis

Osteoarthritis is the most common cause of glenohumeral arthritis.<sup>1</sup> It often presents in patients over the age of seventy and is more common in women. The pain is gradual in onset, with morning stiffness, associated gelling, and restricted movement being common clinical signs. The pain typically worsens with activity and can involve the entire shoulder. Adhesive capsulitis presents similarly but is more subacute in nature. Physical examination and imaging are helpful in making the diagnosis.

### Polymyalgia Rheumatic (PMR)

PMR is an inflammatory condition characterized by symmetrical pain and stiffness affecting the shoulder and hip girdle. Symptoms are worst in the morning with associated prolonged stiffness seen in adults above age fifty. It is typically abrupt at onset with peak incidence between ages 70 and 80. Prevalence

increases progressively with advancing age.<sup>2</sup> Acute phase reactants are elevated in almost all patients with PMR.<sup>3</sup> This condition responds to low doses of corticosteroids. Typically oral prednisone 15- 20 mg, will result in a brisk and dramatic response.<sup>4</sup>

### Rheumatoid Arthritis (RA)

RA is a chronic, inflammatory, autoimmune systemic disorder that involves the joints. If poorly controlled it can lead to erosive disease, eventually causing joint deformities. RA is typically seen in middle aged and older patients, with peak incidence between the age of 65 and 80 years.<sup>5,6</sup> "Elderly onset RA " is usually diagnosed after the age of 60-65, and is accompanied by constitutional symptoms and proximal joint involvement.<sup>7</sup>

The shoulder is typically involved later in the disease. Lehtinen et al prospectively followed 74 patients with RA for 15 years. They reported more than half the patients with RA showed definite shoulder involvement with 25% having severe destruction of bilateral shoulder joints.<sup>8</sup> Shoulder erosions were most commonly seen in the superolateral aspect of the humerus. This can mimic adhesive capsulitis, with pain typically worse at night when the patient lies on the shoulder. Effusions are rare, but associated rotator cuff injury is common with RA. There is a restrictive range of motion.

### Seronegative Spondyloarthropathy (SpA)

This family of arthritis shares a group of clinical features, including inflammation of axial joints, asymmetric oligoarthritis, dactylitis, and enthesitis, with psoriasis, ocular disease and inflammatory bowel disease being part of the spectrum. Compared with the general population, patients with SpA have higher frequencies of HLA- B27.<sup>9</sup>

Peripheral arthritis in SpA often predominantly involves the lower extremities, especially the knees and ankles, and is associated with swelling, typically asymmetrical and oligoarticular. The reported sensitivity and specificity of asymmetric oligoarthritis for SpA are 41% and 87 %, respectively and asymmetric oligoarthritis should raise suspicion for SpA.<sup>10</sup> The involvement of the shoulder joint varies from 7-15%. Severe disease can be noted on imaging but it is rarely disabling.

Involvement of the shoulder joint correlates with involvement of peripheral joints.<sup>11</sup>

### Septic Arthritis

Patients with septic arthritis usually present with acute monoarthritis. Joint swelling, pain, warmth with restricted range of motion are typical findings in the setting of fever. However older patients may be afebrile.<sup>12</sup> With acute inflammatory monoarthritis it is important to rule out infection, especially in elderly and immunocompromised patients. The most common route of joint involvement is hematogenous with staphylococcus aureus the most common organism. The synovial fluid is usually inflammatory with high neutrophil predominant white cell count and positive gram stain. Culture is positive in more than 60% of patients with nongonococcal bacterial arthritis.<sup>13</sup> Prompt diagnosis is essential to prevent polyarticular involvement.

### Crystal Induced Arthritis

Crystalline arthritis includes gout (monosodium urate) classically involving the 1<sup>st</sup> MTP as podagra, and Calcium pyrophosphate deposition disease (CPPD) disease (pseudogout).

Basic Calcium Phosphate (BCP) crystals are associated with several types of arthritis including OA and Milwaukee Shoulder Syndrome (MSS). BCP arthritis can also occur with Calcium pyrophosphate deposition disease (CPPD) disease and End Stage Renal Disease (ESRD).

MSS is a chronic type of shoulder arthritis, presenting as chronic shoulder pain and loss of function. It occurs in older adults, especially women, and is often associated with large, noninflammatory shoulder effusions.<sup>14</sup> Physical examination may reveal a large cool glenohumeral joint effusion, crepitation, and joint instability. Routine laboratory studies are usually normal, radiographs will show classic severe joint destruction, cartilage loss, and extensive rotator cuff damage.<sup>15</sup>

### Amyloid Arthropathy

Amyloid deposits can manifest as rheumatic symptoms. The arthropathy is typically slowly progressive and symmetric. There is predilection for the shoulders, knees and then the smaller joints. There is minimal tenderness or morning stiffness which help distinguish it from RA.<sup>16,17</sup> A biopsy demonstrating Congo red birefringent material will clearly distinguish these lesions from rheumatoid nodules.<sup>18</sup> Joint fluid is usually bland compared to the inflammatory fluid noted in rheumatoid arthritis.

Another significant musculoskeletal finding associated with amyloid is the "shoulder pad sign." Soft tissue swelling may be prominent in up to 75% of cases due to a nodular hypertrophied synovium directly infiltrated by amyloid. Swelling may be

particularly prominent around the glenohumeral joint, resulting in a characteristic "shoulder pad" sign.<sup>19</sup>

### Shoulder Pain in the Diabetic Patient

Two main types of shoulder pain are described in patients with diabetes. These include adhesive capsulitis and rotator cuff tendinopathy.

Adhesive capsulitis or frozen shoulder is more common in patients with diabetes than those without it. The pain can vary in intensity. Clinically, the patient presents with limitations in both passive and active range of motion. Imaging is typically normal. Frozen shoulder can occur in up to 30% of diabetic patients as compared to 5% of controls.<sup>20</sup> Adhesive capsulitis is also associated with poorly controlled diabetes.<sup>21</sup>

Rotator cuff tendinopathy is also more common in patients with diabetes. Patients typically complain of pain with overhead activity. They may also have localized pain, pain over the deltoid and pain when lying on the shoulder at night. A subacromial injection of lidocaine is useful to determine if the pain is secondary to tendinopathy versus a tear. Tendinopathy pain typically resolves temporarily after lidocaine injection.

### Dialysis Associated Arthropathy

Dialysis related amyloidosis (DRA) occurs after deposition of amyloid fibrils made up of beta 2 microglobulins. These can be deposited in various areas including in and around the joints. The joints are typically involved after the patient has been on dialysis for 5 years or longer.

Shoulder pain is one of the most common presentations of DRA. It occurs due to amyloid infiltration around the shoulder joint. There is also periartthritis around the scapulohumeral area.<sup>22</sup>

The shoulder pain is typically bilateral, worse with abduction, with limited range of motion. The pain is worse during dialysis, as well as at night. It often improves with sitting or standing. The shoulder appears hypertrophied because of deposition of amyloid between muscles and tendons of the rotator cuff ("shoulder pad sign").<sup>23</sup> Ultrasound is preferred over MRI for diagnosis. In addition to dialysis modification, arthroscopic or open surgery of the shoulder with removal of synovium often provides dramatic pain relief.<sup>24</sup>

### Complex Regional Pain Syndrome (CRPS)

CRPS is a regional pain syndrome characterized by pain disproportionate to the usual course following trauma or other lesions. The pain is not restricted to a dermatome. There are typically abnormal sensory, vasomotor and or skin findings, with unclear etiology. The inciting event can be a fracture, soft tissue injury or a surgical procedure.

Clinical symptoms include pain, motor and sensory impairment, autonomic symptoms and trophic changes. Bone scintigraphy, plain film and autonomic testing are helpful in making the diagnosis. Upper extremity involvement following stroke, or myocardial infarction can be seen. The clinical manifestations for shoulder involvement include limited range of motion, frozen shoulder, contracture of the fingers and trophic, waxy skin changes. Management of CRPS includes patient education, physical and occupational therapy, and medications.<sup>25,26</sup> Unless diagnosed and treated early, CRPS can be difficult to manage.

#### Avascular Necrosis (AVN)

The etiology of AVN is complicated. Reduced blood flow followed by ischemia, death of the bone cells and eventually mechanical failure is the proposed etiology of AVN. This is a progressive disease that can lead to joint destruction in a few years.<sup>27</sup> Risk factors for AVN include trauma, medications such as glucocorticoids, bisphosphonates, diseases such as SLE, sickle cell disease and radiation treatment as well as other causes. Bones that are more likely to be prone to AVN include the femur head, knee, humeral head, talus and scaphoid, but any bone can be involved. The patient may be asymptomatic or can present with intense pain.

For a patient suspected with AVN, initial plain radiograph can be followed by MRI. A radiographic staging system has been developed to help guide treatment decisions.<sup>28</sup>

#### **Conclusion**

Chronic shoulder pain is a common presenting complaint in clinical practice, especially in older patients. Diagnosis requires a thorough history and clinical examination, followed by appropriate imaging and laboratory evaluation. The imaging may include basic modalities such as radiographs, followed by MRI, ultrasound and other imaging options. The laboratory evaluation may vary depending on the clinical context and other musculoskeletal and systemic manifestations.

Most presentations can be successfully managed with a multidisciplinary approach.

#### **REFERENCES**

1. **Macías-Hernández SI, Morones-Alba JD, Miranda-Duarte A, Coronado-Zarco R, Soria-Bastida MLA, Nava-Bringas T, Cruz-Medina E, Olascoaga-Gómez A, Tallabs-Almazan LV, Palencia C.** Glenohumeral osteoarthritis: overview, therapy, and rehabilitation. *Disabil Rehabil.* 2017 Aug;39(16):1674-1682. doi: 10.1080/09638288.2016.1207206. Epub 2016 Jul 14. PMID: 27416338.
2. **Salvarani C, Gabriel SE, O'Fallon WM, Hunder GG.** Epidemiology of polymyalgia rheumatica in Olmsted County, Minnesota, 1970-1991. *Arthritis Rheum.* 1995

Mar;38(3):369-73. doi: 10.1002/art.1780380311. PMID: 7880191.

3. **Cantini F, Salvarani C, Olivieri I, Macchioni L, Ranzi A, Niccoli L, Padula A, Boiardi L.** Erythrocyte sedimentation rate and C-reactive protein in the evaluation of disease activity and severity in polymyalgia rheumatica: a prospective follow-up study. *Semin Arthritis Rheum.* 2000 Aug;30(1):17-24. doi: 10.1053/sarh.2000.8366. PMID: 10966209.
4. **Catoggio W, Soriano ER, Imamura PM.** Treatment of polymyalgia rheumatica: lower initial dose. *Br J Rheumatol.* 1991 Oct;30(5):393-5. doi: 10.1093/rheumatology/30.5.393-a. PMID: 1913020.
5. **Myasoedova E, Crowson CS, Kremers HM, Therneau TM, Gabriel SE.** Is the incidence of rheumatoid arthritis rising?: results from Olmsted County, Minnesota, 1955-2007. *Arthritis Rheum.* 2010 Jun;62(6):1576-82. doi: 10.1002/art.27425. PMID: 20191579; PMCID: PMC2929692.
6. **Eriksson JK, Neovius M, Ernestam S, Lindblad S, Simard JF, Askling J.** Incidence of rheumatoid arthritis in Sweden: a nationwide population-based assessment of incidence, its determinants, and treatment penetration. *Arthritis Care Res (Hoboken).* 2013 Jun;65(6):870-8. doi: 10.1002/acr.21900. PMID: 23281173.
7. **Pease CT, Bhakta BB, Devlin J, Emery P.** Does the age of onset of rheumatoid arthritis influence phenotype?: a prospective study of outcome and prognostic factors. *Rheumatology (Oxford).* 1999 Mar;38(3):228-34. doi: 10.1093/rheumatology/38.3.228. PMID: 10325661.
8. **Lehtinen JT, Kaarela K, Belt EA, Kautiainen HJ, Kauppi MJ, Lehto MU.** Incidence of glenohumeral joint involvement in seropositive rheumatoid arthritis. A 15 year endpoint study. *J Rheumatol.* 2000 Feb;27(2):347-50. PMID: 10685795.
9. **Sepriano A, Ramiro S, van der Heijde D, van Gaalen F, Hoonhout P, Molto A, Saraux A, Ramonda R, Dougados M, Landewé R.** What is axial spondyloarthritis? A latent class and transition analysis in the SPACE and DESIR cohorts. *Ann Rheum Dis.* 2020 Mar;79(3):324-331. doi: 10.1136/annrheumdis-2019-216516. Epub 2020 Jan 24. Erratum in: *Ann Rheum Dis.* 2020 Jun;79(6):e78. PMID: 31980546.
10. **Dougados M, van der Linden S, Juhlin R, Huitfeldt B, Amor B, Calin A, Cats A, Dijkmans B, Olivieri I, Pasero G, et al.** The European Spondylarthropathy Study Group preliminary criteria for the classification of spondylarthropathy. *Arthritis Rheum.* 1991 Oct;34(10):1218-27. doi: 10.1002/art.1780341003. PMID: 1930310.
11. **Will R, Kennedy G, Elswood J, Edmunds L, Wachjudi R, Evison G, Calin A.** Ankylosing spondylitis and the shoulder: commonly involved but infrequently disabling. *J Rheumatol.* 2000 Jan;27(1):177-82. PMID: 10648036.
12. **Margaretten ME, Kohlwes J, Moore D, Bent S.** Does this adult patient have septic arthritis? *JAMA.* 2007 Apr 4;297(13):1478-88. doi: 10.1001/jama.297.13.1478. PMID: 17405973.

13. **Goldenberg DL.** Septic arthritis. *Lancet*. 1998 Jan 17; 351(9097):197-202. doi: 10.1016/S0140-6736(97)09522-6. PMID: 9449882.
14. **Halverson PB, Carrera GF, McCarty DJ.** Milwaukee shoulder syndrome. Fifteen additional cases and a description of contributing factors. *Arch Intern Med*. 1990 Mar;150(3):677-82. doi: 10.1001/archinte.150.3.677. PMID: 2155593.
15. **Rood MJ, van Laar JM, de Schepper AM, Huizinga TW.** The Milwaukee shoulder/knee syndrome. *J Clin Rheumatol*. 2008 Aug;14(4):249-50. doi: 10.1097/RHU.0b013e318181b47d. PMID: 18766131.
16. **Katoh N, Tazawa K, Ishii W, Matsuda M, Ikeda S.** Systemic AL amyloidosis mimicking rheumatoid arthritis. *Intern Med*. 2008;47(12):1133-8. doi: 10.2169/internalmedicine.47.0961. Epub 2008 Jun 16. PMID: 18552473.
17. **Fujishima M, Komatsuda A, Imai H, Wakui H, Watanabe W, Sawada K.** Amyloid arthropathy resembling seronegative rheumatoid arthritis in a patient with IgD-kappa multiple myeloma. *Intern Med*. 2003 Jan;42(1):121-4. doi: 10.2169/internalmedicine.42.121. PMID: 12583633.
18. **Wiernik PH.** Amyloid joint disease. *Medicine (Baltimore)*. 1972 Nov;51(6):465-79. doi: 10.1097/00005792-197211000-00003. PMID: 4565934.
19. **Edelson JG.** Amyloid shoulder pads. Two cases of multiple myeloma. *Acta Orthop Scand*. 1995 Jun; 66(3):292-4. doi: 10.3109/17453679508995545. PMID: 7604718.
20. **Balci N, Balci MK, Tüzüner S.** Shoulder adhesive capsulitis and shoulder range of motion in type II diabetes mellitus: association with diabetic complications. *J Diabetes Complications*. 1999 May-Jun;13(3):135-40. doi: 10.1016/s1056-8727(99)00037-9. PMID: 10509873.
21. **Juel NG, Brox JI, Brunborg C, Holte KB, Berg TJ.** Very High Prevalence of Frozen Shoulder in Patients With Type 1 Diabetes of  $\geq 45$  Years' Duration: The Dialong Shoulder Study. *Arch Phys Med Rehabil*. 2017 Aug;98(8):1551-1559. doi: 10.1016/j.apmr.2017.01.020. Epub 2017 Feb 17. PMID: 28219686.
22. **Koch KM.** Dialysis-related amyloidosis. *Kidney Int*. 1992 May;41(5):1416-29. doi: 10.1038/ki.1992.207. PMID: 1614057.
23. **Chattopadhyay C, Ackrill P, Clague RB.** The shoulder pain syndrome and soft-tissue abnormalities in patients on long-term haemodialysis. *Br J Rheumatol*. 1987 Jun;26(3): 181-7. doi: 10.1093/rheumatology/26.3.181. PMID: 3580713.
24. **Takenaka R, Fukatsu A, Matsuo S, Ishikawa K, Toriyama T, Kawahara H.** Surgical treatment of hemodialysis-related shoulder arthropathy. *Clin Nephrol*. 1992 Oct;38(4):224-30. PMID: 1424310.
25. **Harden RN, Oaklander AL, Burton AW, Perez RS, Richardson K, Swan M, Barthel J, Costa B, Graciosa JR, Bruehl S; Reflex Sympathetic Dystrophy Syndrome Association.** Complex regional pain syndrome: practical diagnostic and treatment guidelines, 4th edition. *Pain Med*. 2013 Feb;14(2):180-229. doi: 10.1111/pme.12033. Epub 2013 Jan 17. PMID: 23331950.
26. **Bussa M, Guttilla D, Lucia M, Mascaro A, Rinaldi S.** Complex regional pain syndrome type I: a comprehensive review. *Acta Anaesthesiol Scand*. 2015 Jul;59(6):685-97. doi: 10.1111/aas.12489. Epub 2015 Apr 22. PMID: 25903457.
27. **Moya-Angeler J, Gianakos AL, Villa JC, Ni A, Lane JM.** Current concepts on osteonecrosis of the femoral head. *World J Orthop*. 2015 Sep 18;6(8):590-601. doi: 10.5312/wjo.v6.i8.590. PMID: 26396935; PMCID: PMC4573503.
28. **Sultan AA, Mohamed N, Samuel LT, Chughtai M, Sodhi N, Krebs VE, Stearns KL, Molloy RM, Mont MA.** Classification systems of hip osteonecrosis: an updated review. *Int Orthop*. 2019 May;43(5):1089-1095. doi: 10.1007/s00264-018-4018-4. Epub 2018 Jun 18. PMID: 29916002.