

# Post-traumatic Elbow Osteoarthritis in a Paralympian: A Case Report

Daniel Blatz M.D., Carson Creamer B.S.

Shirley Ryan AbilityLab and Chicago College of Osteopathic Medicine

## INTRODUCTION

Osteoarthritis (OA) and its pathogenesis is well understood and affects a large portion of the adult population. While OA classically targets larger weight-bearing joints with a multiplanar range of motion, OA of the elbow can be encountered in young professional athletes due to continuous training and overuse, sometimes with a history of trauma<sup>1,2,3</sup>. Repetitive microtraumas lead to chondrocyte destruction that continues to undergo insult after insult. Over time, the articular cartilage becomes non-existent, and its precursor cells are lost leading to bone-on-bone articulation. Patients will eventually present with “pain at the extremes of motion, loss of terminal flexion and (especially) extension, functional limitations, mechanical symptoms such as catching or locking, and radiographic signs of degenerative arthrosis (osteophytes, loss of joint space, and loose bodies).”<sup>1</sup> Management of elbow OA is typically done conservatively making surgical intervention a last resort. The goal of treatment is to minimize pain and preserve adequate motion range and function, while keeping future surgical options open and delaying elbow arthroplasty to the furthest extent possible.<sup>2</sup> Surgical intervention works well for the older demographic due to lifestyle flexibility to minimize further damage and shorter life expectancy at diagnosis. However, we present a case of a patient who does not fit this demographic and currently suffers from advanced bilateral elbow OA at the age of 21. This paper will examine his case as well as management options available for treatment of his disease.

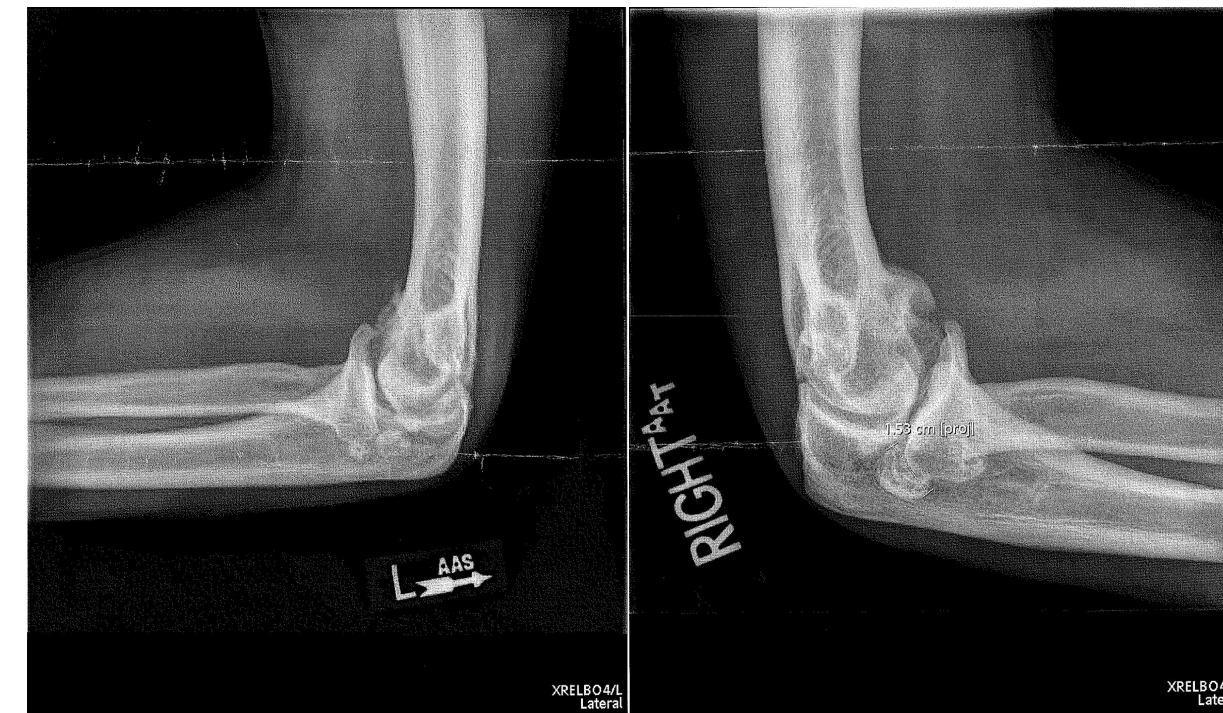
## CASE DIAGNOSIS and DESCRIPTION

We present a case of a 21-year-old male Paralympic athlete with chronic, severe secondary bilateral elbow osteoarthritis due to a history of a congenital bilateral lower limb deficiency, which has led to excessive overuse and constant upper limb stresses leading to macro- and micro-trauma.

This athlete is a two-time Paralympic gold medalist and two-time World Championship gold medalist in sled hockey who presents with bilateral elbow pain and decreased range of motion. His bilateral upper extremities are his primary weight-bearing extremities responsible for mobility, transfers, and development of power during sled hockey and other sports. Past medical history consists of bilateral elbow traumas and left elbow articular cartilage repair. Both elbows are limited to 115° flexion, 45° extension, with a total flexion/extension arc of 65° (normal arc of motion is 145°). X-rays of both elbows reveal globally decreased joint space, extensive osteophyte formation, and subchondral cyst formation.

A recent x-ray in February 2020 with views of bilateral skeletally mature elbows demonstrates globally decreased joint space in the bilateral radiocapitellar and ulnohumeral joints with extensive osteophyte formation, and subchondral cyst formation. No acute fracture or dislocation is observed. The clinical and radiological findings are consistent with severe bilateral secondary osteoarthritis from repetitive trauma.

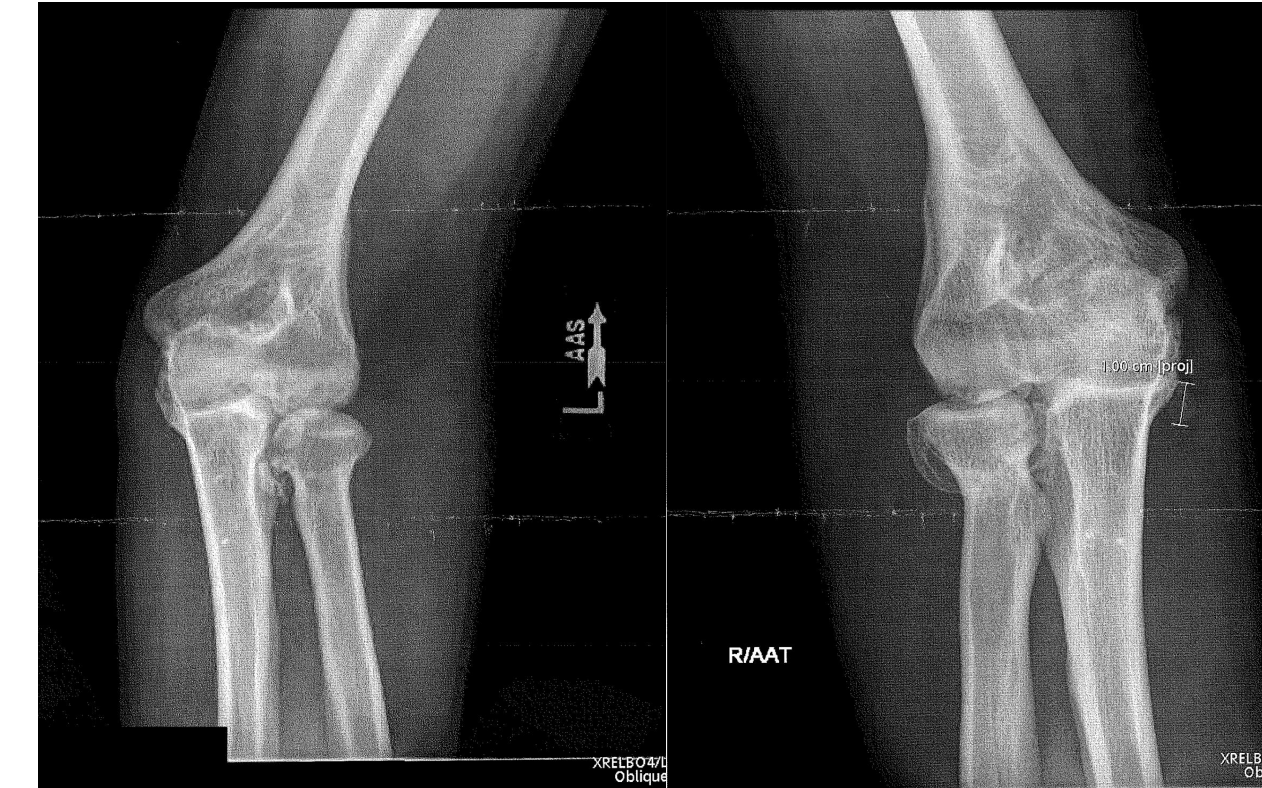
## IMAGES



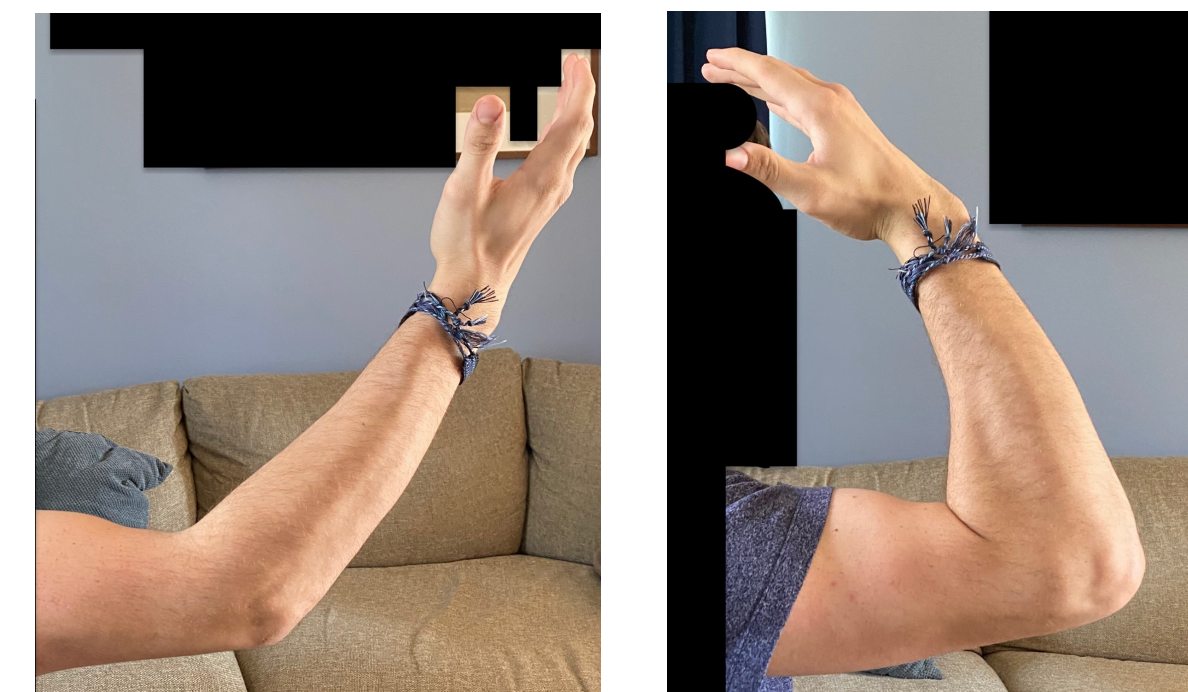
**Figure 1:** Lateral radiograph of both elbows showing globally decreased joint space, extensive osteophyte formation, and subchondral cyst formation.



**Figure 2:** AP radiograph of both elbows showing globally decreased joint space, extensive osteophyte formation, and subchondral cyst formation.



**Figure 3:** Oblique radiograph of both elbows showing globally decreased joint space, extensive osteophyte formation, and subchondral cyst formation.



**Figure 4:** Photographs of the Right elbow at extreme flexion and extension. 115° Flexion, 45° extension.

## DISCUSSION

Around half of all injuries evaluated in pediatric sports medicine are associated with overuse due to repetitive stress without time for adequate recovery.<sup>4</sup> Due to the vascular anatomy of the capitulum humeri and the state of growing bones in the youth, the capitellum is especially vulnerable to trauma.<sup>5</sup> Post traumatic osteoarthritis (PTOA) of the elbow in the young population is commonly caused by trauma and overuse or as a sequela of aggressive treatment of these conditions.

Management of elbow PTOA is primarily conservative and surgical options are only considered after non-operative options have been exhausted. The goal of treatment is to decrease symptoms, maintain or increase the range of motion to ensure long term functional mobility, preserve the joint for future surgical options, and delay elbow arthroplasty if possible. Conservative measures include activity, non-steroidal anti-inflammatories, oral analgesics, intra-articular steroid injections, viscosupplementation, static-progressive splinting, and physical therapy. These measures tend to work well in the acute setting but do not resolve disease or reverse pathological changes. Surgical interventions have been proven to reduce symptoms, delay progression, or definitively treat the disease.<sup>6</sup> Unlike conservative treatment, operative management considerations are distinct between younger and older patients. Surgical treatment may help the older, non-athlete population; however, it is not always an appropriate option in young athletes even after conservative management has failed.

## CONCLUSION

Due to the strenuous demand on his elbows for his activities of daily living, as well as required by his sport, our patient’s poor ROM continues to be a significantly limiting factor. Surgical treatment may help the older, non-athletic population; however, it is not always an appropriate option in young athletes even after conservative management has failed. Surgical interventions such as arthroscopic arthrolysis are often delayed until symptoms begin to significantly affect his functional level and activities of daily living. Therefore, management currently includes physiotherapy, static-progressive splinting, steroid injections, and possibly regenerative medicine treatments.

This case report is a call to action to research better management options for bilateral elbow post-traumatic osteoarthritis in young athletes.

## REFERENCES

1. Krishnan, Sumant G., et al. “Arthroscopic Ulnohumeral Arthroplasty for Degenerative Arthritis of the Elbow in Patients under Fifty Years of Age.” *Journal of Shoulder and Elbow Surgery*, vol. 16, no. 4, 2007, pp. 443–448.
2. Chammas, M. “Post-Traumatic Osteoarthritis of the Elbow.” *Orthopaedics & Traumatology: Surg Res*. 2014;100(1 Suppl):S15-S24.
3. Yan, Hui et al. “Arthroscopic debridement of osteoarthritic elbow in professional athletes.” *Chinese medical journal* vol. 124, no. 24, 2011, pp. 4223-4228.
4. Gregory, Andrew. “Overuse Injuries in Young Athletes.” *Overuse Injuries of the Musculoskeletal System, Second Edition*, 2003, pp. 373–392.
5. Bauer M, Jonsson K, Josefsson PO, Lindén B. “Osteochondritis dissecans of the elbow. A long-term follow-up study.”. *Clinical orthopaedics and related research*. 1992;(284):156–160.
6. Sears, Benjamin W, et al. “Posttraumatic Elbow Arthritis in the Young Adult: Evaluation and Management.” *The Journal Of The American Academy Of Orthopaedic Surgeons*, vol. 20, no. 11, Nov. 2012, pp. 704–714.
7. Broberg MA, Morrey BF. “Results of delayed excision of the radial head after fracture”. *J Bone Joint Surg Am*. 1986;68(5):669–674.
8. Phen, Huai Ming. "Minimizing Posttraumatic Osteoarthritis After High-Energy Intra-Articular Fracture." *The Orthopedic clinics of North America*. 2019; 50 (4), 433.
9. Willinger, Lukas, et al. “Arthroscopic Arthrolysis Provides Good Clinical Outcome in Post-Traumatic and Degenerative Elbow Stiffness.” *Knee Surgery, Sports Traumatology, Arthroscopy*, vol. 26, no. 1, Jan. 2018, pp. 312–317.

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