

# Arthroscopic Management of Elbow Osteoarthritis

Leo T. Kroonen, MD,\* Samantha L. Piper, MD,\* Andrew C. Ghatan, MD\*

The incidence of osteoarthritis in the general population is low, but it can be seen in manual laborers, throwing athletes, and people dependent on crutches and wheelchairs. Patients often complain of pain at the terminal extents of motion, and imaging shows osteophyte formation at the tips of the coronoid and olecranon processes as well as thickening of the bone between the coronoid and the olecranon fossae. Recent advances in arthroscopic instrumentation and techniques have led to a growing interest in the arthroscopic treatment of elbow osteoarthritis. This article provides a review of basic arthroscopic elbow anatomy and the most common procedures, including diagnostic arthroscopy, loose body removal, and arthroscopic osteocapsular and ulnohumeral arthroplasty. As techniques advance, there might be interest in further procedures including arthroscopic-assisted interpositional arthroplasty. Although complications such as persistent drainage and nerve injury are frequently mentioned with elbow arthroscopy, the actual incidence of such complications remains low. (*J Hand Surg Am.* 2017; ■(■): ■–■. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

**Key words** Elbow osteoarthritis, ulnohumeral arthroplasty, osteocapsular arthroplasty, elbow arthroscopy.

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**P** RIMARY ELBOW OSTEOARTHRITIS IS rare, affecting only 2% of the population.<sup>1</sup> Manual laborers, overhead-throwing athletes, and people dependent on crutches or manual wheelchairs experience greater joint reactive forces at the elbow and are at increased risk for primary osteoarthritis.<sup>1,2</sup> The condition is 4 times more common in men and tends to affect the dominant extremity.<sup>1,2</sup> The average age at presentation is 50 years, but degenerative changes have been diagnosed in patients as young as 20 years.<sup>2,3</sup> A history of elbow trauma, osteochondritis dissecans, or

synovial osteochondromatosis also increases the risk for osteoarthritis. There may be a genetic contribution to the development of primary elbow osteoarthritis; however, this has not been well characterized.<sup>4</sup>

## PATHOANATOMY OF ELBOW OSTEOARTHRITIS

Muscles crossing the elbow produce large joint reactive forces during load. These forces can reach 3 times body weight with heavy lifting and can exceed 6 times body weight with dynamic loading.<sup>1</sup> The surface area of contact is relatively small, resulting in substantial compressive force on the hyaline cartilage during load application, especially with axial loading in extension.<sup>5</sup> Repetitive supraphysiological loading leads to wear and cartilage fragmentation, which can produce intra-articular loose bodies and result in the formation of peripheral osteophytes.<sup>6</sup> The central ulnohumeral joint is often preserved. Trauma and osteochondritis dissecans are also associated with osteoarthritis.<sup>2</sup> Posttraumatic arthritis occurs not only from direct cartilage injury but also from malunion or persistent

From the \*Department of Orthopaedic Surgery, Southern California Permanente Medical Group, San Diego, CA.

Received for publication August 8, 2016; accepted in revised form May 22, 2017.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

**Corresponding author:** Leo T. Kroonen, MD, Department of Orthopaedic Surgery, Southern California Permanente Medical Group, 4650 Palm Ave., San Diego, CA 92154; e-mail: [leo.t.kroonen@kp.org](mailto:leo.t.kroonen@kp.org).

0363-5023/17/ ■ ■ -0001\$36.00/0  
<http://dx.doi.org/10.1016/j.jhsa.2017.05.023>

elbow instability that alters elbow mechanics and increases cartilage wear. Overhead throwers can develop laxity of the medial elbow resulting in repetitive hyperextension stress of the lateral elbow, which leads to characteristic posteromedial osteophytes and loose bodies.<sup>7</sup>

The radiocapitellar joint experiences the greatest load concentration and is the first to show radiographic signs of degeneration.<sup>1</sup> This occurs at the posteromedial radial head and the crest separating the trochlea from the capitellum.<sup>8</sup> The posteromedial ulnohumeral joint generally follows.

### CLINICAL EXAMINATION

Patients with elbow osteoarthritis present with decreased elbow range of motion and loss of terminal extension.<sup>1–3</sup> They may also complain of pain at the extremes of motion, loss of terminal flexion, and painful locking or catching. Pain in the midrange of motion is less common, although it may occur in the presence of large central osteochondral lesions. Night pain or pain at rest is rare and suggests an inflammatory etiology.<sup>1</sup> Symptomatic ulnar neuropathy is present in 26% to 55% of patients.<sup>1</sup>

A complete history should include an assessment of hand dominance, vocation, recreational activities, prior trauma or surgery (including ulnar nerve decompression or transposition), presence of mechanical symptoms, and presence of pain at night or rest.

Examination begins with evaluation of skin integrity, noting prior incisions or healed wounds. Palpation along the joint may elicit tenderness or reveal an effusion. Range of motion should be quantified, noting crepitus and blocks to motion. The integrity of the medial and lateral ulnar collateral ligaments should be evaluated because instability may need to be addressed with an open surgical approach. A thorough neurovascular examination, especially of the ulnar nerve, is essential.

### IMAGING

Plain radiographs are usually sufficient to evaluate elbow arthritis.<sup>1,9</sup> Standard anteroposterior and lateral radiographs will usually demonstrate osteophyte formation at the anterior and medial coronoid process, posteromedial olecranon, and radial head if present (Fig. 1). Complementary osteophytes may be present in the coronoid and medial olecranon fossae. Joint space narrowing may not be significant even in advanced disease.<sup>1</sup> Loose bodies may be noted, although up to 30% may not be apparent on plain radiographs, especially in the posterior elbow and proximal radioulnar joints.<sup>10</sup>

If extensive degenerative disease or posttraumatic deformity is present, 3-dimensional imaging can be useful to aid in surgical planning. Computed tomography (Fig. 2) provides the best picture of bony architecture and can be used to create a 3-dimensional reconstruction.<sup>9</sup> The 3-dimensional reconstruction (Fig. 3) is useful in identifying specific impinging osteophytes, which can guide arthroscopic debridement and has been shown to result in more successful range of motion outcomes.<sup>11</sup>

The role of magnetic resonance imaging in the evaluation of elbow arthritis has not been thoroughly investigated, although it may aid in assessing cartilage integrity and locating nonosseous loose bodies.

### INDICATIONS/CONTRAINDICATIONS FOR ARTHROSCOPIC MANAGEMENT

Indications for surgical treatment of elbow osteoarthritis are pain and impaired function that have failed to respond to nonsurgical treatment. Arthroscopic management is indicated in the patient with mild to moderate disease with pain at extremes of motion and stiffness due to impingement or loose bodies.<sup>9,10,12</sup> Preoperative range of motion should be at least 90°. <sup>1,13</sup> If a patient has an arc of flexion-extension less than 90°, arthroscopic debridement has been shown to be less successful at restoring a functional 100° arc after surgery.<sup>13</sup> In such cases, open release of the posterior bundle of the medial collateral ligament is usually required.

An unstable or previously transposed ulnar nerve can be injured while establishing the anteromedial portal and is a relative contraindication for use of that portal during elbow arthroscopy. This risk may be reduced by making a small incision for the portal, allowing visualization and avoidance of the nerve. Elbow arthroscopy is generally contraindicated following submuscular or intramuscular transposition.<sup>12</sup> If ulnar neuropathy is present, the surgeon may choose to do an open release of the nerve, although simultaneous arthroscopic decompression has been described.<sup>14</sup>

Obesity has been shown to be associated with substantially increased rates of complications after elbow arthroscopy and is a relative contraindication to arthroscopic treatment of elbow osteoarthritis.<sup>15</sup>

### BASIC SETUP AND PORTALS

Elbow arthroscopy can be performed in the supine, lateral or prone position (Videos A-B; available on the *Journal's* Web site at [www.jhandsurg.org](http://www.jhandsurg.org)).<sup>a,b</sup> In the supine position, the extremity is suspended by a boom or held by a hydraulic arm holder. The suspended

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