The Telemedicine Elbow Exam

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In this chapter, we will discuss the physical examination of the elbow via tele medicine. Beginning with patient history, going through the physical exam itself, and concluding with differential diagnosis and management.

Chief Complaint/Patient History

The clinician should take a detailed history of the elbow pain. This should include duration, intensity, severity, presence of radiation, presence of neurological symptoms, aggravating and alleviating factors, and previously attempted therapies. In addition, one should note the patient's occupation, history of trauma, surgical history, and general medical history.

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M. Zakhary et al. (eds.), *Telemedicine for the Musculoskeletal Physical Exam*, https://doi.org/10.1007/978-3-031-16873-4_8

Physical Exam

Initial Setup

Place the camera at approximately 4–5 feet off the ground, which for many is about the height of a table or counter. Have the patient stand approximately 6 feet away from the camera. Have the patient adjust the camera so the physician can appropriately visualize the elbow, the proximal arm, and the distal forearm [1].

As with every examination, ensure proper lighting for the room, along with sufficient space.

Ask the patient to wear a short sleeve shirt, tanktop, or any other top without sleeves. Long sleeves which roll past the elbow make adequate examination difficult.

Inspection/Observation

Visually inspect the elbow joint structural alignment, and for any signs of asymmetry, take note of the muscle contour.

Observe for any skin changes such as effusion, erythema, or ecchymosis. Also look for scars, occupational injuries, signs of physical abuse and drug use. Take particular note of the muscle mass of the surrounding muscles, such as the triceps, biceps, and forearm muscles. An example of biceps tendon tear (Fig. 8.1).

Palpation

Ask the patient to point, with one finger, the area of maximal pain. And then proceed to palpate over the affected area. Afterwards ask the patient to palpate the medial, lateral, and posterior bony aspects of their elbow; reporting pain when felt.

Fig. 8.1 Biceps tendon tear [2]

Active Range of Motion

For flexion and extension, ask the patient to face the camera and abduct the arms to 90°; with palms facing upward. Ask the patient to flex and extend their arm at the elbow. A web-based goniometer can be used to measure the range of motion (Fig. 8.2).

For supination and pronation, ask the patient to face the camera with arms adducted to their sides and elbows bent at 90°. A web-based goniometer can measure the range of motion by assessing hand/finger movement. Normal elbow range of motion values can be referenced at (Table 8.1).

Fig. 8.2 Elbow flexion

Table 8.1 Normal range of motion of the elbow [3]

Movement	Degrees
Flexion	140–160
Extension	0–10
Pronation	80–90
Supination	90

Neurological Examination

Muscle Strength

Strength testing can be performed against gravity and with objects of known weights. Take note of the muscle contour of the bicep during flexion and the triceps during extension.

Reflex Testing

To elicit reflexes the clinician should demonstrate reflex testing for the patient by striking the opposite elbow. Both the triceps and biceps tendon reflex should be tested. Household objects can be used such as the side of the hand, a rubber headed spatula or using the edge of a smartphone [1].

Sensation

In order to test for sensation, ask the patient to follow the provider's lead and lightly press on five different points of the arm. Including the medial and lateral elbow, along with the palmar aspect of the first, third, and fifth digit. The patient should touch one point on one arm, and then compare the sensation on the contralateral arm.

Special Tests

The chair push-up test. Ask the patient to turn 90° with the injured elbow closest to the camera.

With the forearm in supination ask the patient to push off from a chair. This tests for posterolateral stability. Pain and/or apprehension during this maneuver would indicate a positive finding [4].

Provocative Lateral and Medial Epicondylitis Testing

Lateral epicondylitis: Ask the patient to repeatedly extend the wrist and supinate while holding a weighted object.

Medial epicondylitis: Ask the patient to repeatedly flex the wrist and pronate while holding a weighted object.

Examination of Related Areas

Please refer to Chaps. 8 (Shoulder Exam) and 10 (Hand and Wrist Exam), respectively, for additional details.

Considerations for Certain Populations

Acute Elbow Injuries in Children

Nursemaid's Elbow

- Usually caused by a sudden pull on a child's arm (typically ages 2–5 years old).
- Injury pathology is that the radial head is pulled out of the joint with the humerus, trapping one of the ligaments around the elbow.
- PE: Typically no swelling/erythema, but the child can only bend their arm slightly at the elbow and will be guarding.
- Reduction will have to take place in a hospital/doctor's office, but it is easily corrected with a simple maneuver.

Chronic Elbow Injuries in Children

Little League Elbow

- Overuse injury that is typically caused by repeating throwing in sports, without resting between throws.
- Overhead throwing causing the cartilage growth plate in children to become irritated.
- Pain can occur after one hard throw or gradually over the course of a baseball season.
- Swelling, redness of warm can be seen on the elbow.

– Treatment depends on extent of the injury to the growth plate but can range from rest and ice to cast or surgical pinning.
– Physical therapy is also crucial in these injuries once healing is complete to gradually return to throwing.

Osteochondritis Dissecans

– Occurs when lack of blood flow causes bone and cartilage to separate from the surface of a joint.
– Can occur suddenly due to trauma (e.g., fall) or over time from repetitive stress on a joint.
– Most common in athletic active children over age 10 (baseball pitchers, gymnasts, swimmers, quarterbacks).
– The repetitive motion with compressive forces across the lateral part of the elbow can cause a lot of pain and can lead to catching, locking, grinding, or a loss of motion.
– Treatment is typically resting, possible splint/cast and physical therapy.
– Slow progression back to the sport is essential with the help of a physical therapist to reduce the risk of future osteoarthritis to the joint [5].

Differential Diagnosis

The location and quality of elbow pain can generally localize the injury to one of the four anatomic regions: anterior, medial, lateral, or posterior.

Anterior Elbow Pain

Bicep's Tendinopathy

Inflammation of the tendon around the long head of the biceps muscle.

– History often includes repeated elbow flexion with forearm supination or pronation (dumbbell curls).

Physical exam = The Hook Test: Ask the patient to place the palm of his or her hand in front of their face as if you were reading a book. Try to hook the index finger of their opposite hand behind a cord (tendon) in front of your elbow. Pain can indicate biceps tendinopathy.

Medical Elbow Pain

Medial Epicondylitis (Golfer's Elbow)

Flexors and pronators of the wrist insert on the medial epicondyle. Repetitive flexion of the wrist (a golfer's swing) can cause pain and inflammation around this bony prominence.

Physical exam = pain after patient repeatedly flexes the wrist and pronates while holding a weighted object.

Ulnar Collateral Ligament Injury

Medial elbow tenderness and pain during the acceleration phase of motion.

- Occurs in athletes who play sports that involve overhead throwing (baseball, volleyball, javelin).
- Patients with an acute UCL injury usually report the sensation of a pop followed by the immediate onset of pain and bruising around the medial elbow.
- Key to diagnosis is assessment of the medial joint space laxity or instability against valgus forces. The medial joint space of the symptomatic elbow should be compared with the asymptomatic side for the amount of opening and the subjective quality of the end point while a valgus force is applied across the joint.

Physical Exam

Moving Valgus Stress Test: Patient should place the shoulder in 90° of abduction and external rotation. While constant valgus torque on the elbow is maintained, the elbow is quickly flexed and extended. A positive result is defined as pain between 70° and 120° degrees of flexion.

Cubital Tunnel Syndrome

Compressive or traction neuropathy of the ulnar nerve as it passes through the cubital tunnel of the medial elbow.

- The pain is usually associated with numbness and tingling in the ulnar border of the forearm and hand, and in the ring and little finger of the hand.
- Weakness of the intrinsic muscles of the hand may develop.
- Patients may have nighttime pain from sleeping with the elbow fully flexed.

Physical Exam

Tinel sign at the cubital tunnel: Ask patient to find the groove on the medial sign of the elbow, between the olecranon process and medial epicondyle, and repeatedly tap the groove using their other hands index finger. Reproduction of numbness/tingling is a positive sign.

Lateral Elbow Pain

Lateral Epicondylitis (Tennis Elbow)

Extensors and supinators of the wrist insert on the lateral epicondyle. Repetitive extension of the wrist (back hand motion in tennis) can cause pain and inflammation around this bony prominence. Lateral epicondylitis is actually 7–10× more common than medial epicondylitis.

Physical Exam = Pain after patient repeatedly extends the wrist and supinates while holding a weighted object.

Radial Tunnel Syndrome

Compressive neuropathy of the radial nerve.

- Pain in the lateral aspect of the elbow, and down the forearm and into the hand, without any motor symptoms.
- A history of repetitive forearm supination and pronation (twisting of the hand) (e.g., carpenters, mechanics).

Posterior Interosseous Nerve Syndrome

Compressive neuropathy of the posterior interosseous nerve, which is the deep branch stemming off the radial nerve.

Physical Exam = Middle Finger Test = Painless loss of the ability to extend the middle finger against resistance.

Posterior Elbow Pain

Olecranon Bursitis

Inflammation of the bursa over the olecranon.

- History could include trauma to the elbow or prolonged pressure on elbow (leaning on tabletop, plumbers who crawl on elbows and knees).
- Boggy nontender mass over the back of the elbow.
- If the bursa becomes infected, the skin becomes red, warm, painful.

Posterior Impingement

Impingement of the olecranon tip in the olecranon fossa, which may cause osteophyte formation and a fixed flexion deformity over time presents in younger athletes who perform repetitive valgus stresses while in hyperextension (i.e., javelin throwers).

Physical Exam

Posterior elbow pain when forced into full elbow extension.

Triceps Tendinopathy

Inflammation of the triceps tendon.

- Tenderness at the triceps insertion
- Pain at the posterior elbow with extensor use (pushing motions)
- Tenderness at the triceps insertion (AAFP)

Elbow Instability

Elbow locking, snapping, or subluxation when the elbow is extended and the forearm is supinated, i.e., a positive chair push-up test as above.

Management/Treatment

If history or physical exam is consistent with a history of trauma, arthritis, or loose fragments. Management typically begins with imaging such an X-ray.

As with many musculoskeletal injuries, once should follow a stepwise approach

1. Decreasing pain and inflammation
   (a) Tylenol
   (b) NSAIDS
   (c) Muscle relaxers
   (d) Modalities; heat and post activity icing
   (e) US guided local corticosteroid or platelet-rich plasma injection in refractory cases
2. Restoring normal symmetric range of pain
3. Normalize strength
4. Proprioceptive training
   +/− sport-specific training. Alter the mechanics leading to injury (depending on the patient)

Unique and Extra Considerations

Medial Epicondylitis

Stretching during the painful period is important. May use a tennis elbow counterforce strap.

Lateral Epicondylitis

Tennis elbow strap worn around the forearm, just distal to the elbow. Wrist splint to rest the common extensor tendons. A larger racquet grip and head and less string tension may be beneficial. PRP injection is more effective than steroid injection in refractory pain in medial epicondylitis [6].

Complications/Red Flags

Joint instability: Warrants surgical evaluation

Infection: Signs of infection include warmth, swelling, and erythema. Warrants fluid aspiration and culture.

Elbow dislocation: Often occurs posteriorly after a fall on an outstretched hand. Associated with fracture of the radial head, injury to brachial artery and median nerve, thus a thorough neurovascular evaluation is vital. Any deficit warrants immediate surgical evaluation. Complications include loss of ROM, ectopic bone formation, neurovascular injury, and elbow arthritis.

"Popeye Sign"—A deformity accompanied by swelling and ecchymosis. Suggestive of a biceps tendon avulsion. A tendon rupture and avulsion would require surgical intervention.

Follow-Up

After initial evaluation, it is important to provide follow-up within (4–6) weeks. Remember to provide sufficient referral to physical or occupational therapy as deemed warranted depending on the injury.

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