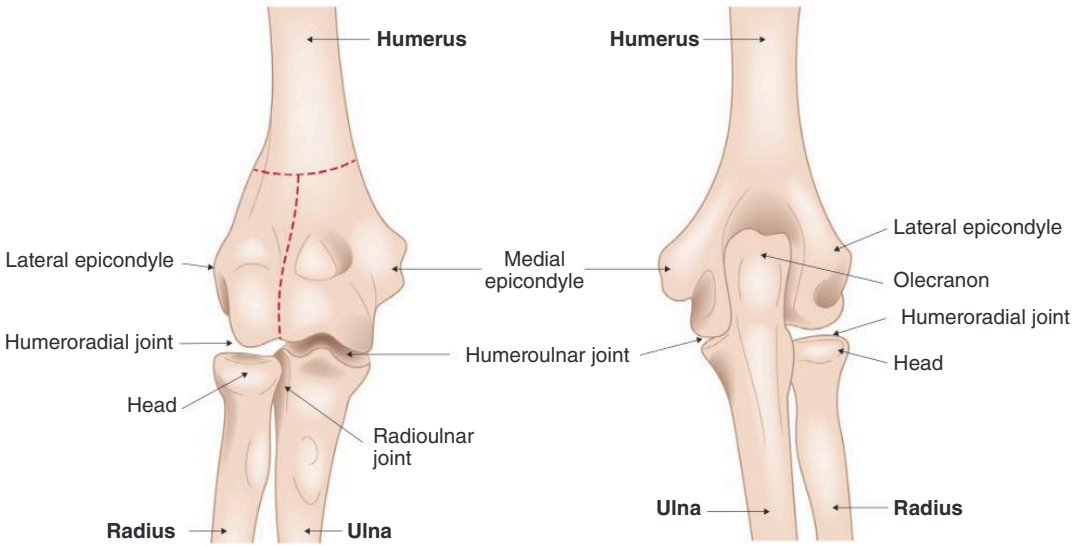

Fig. 3.1 The elbow anatomy: anterior and posterior view.

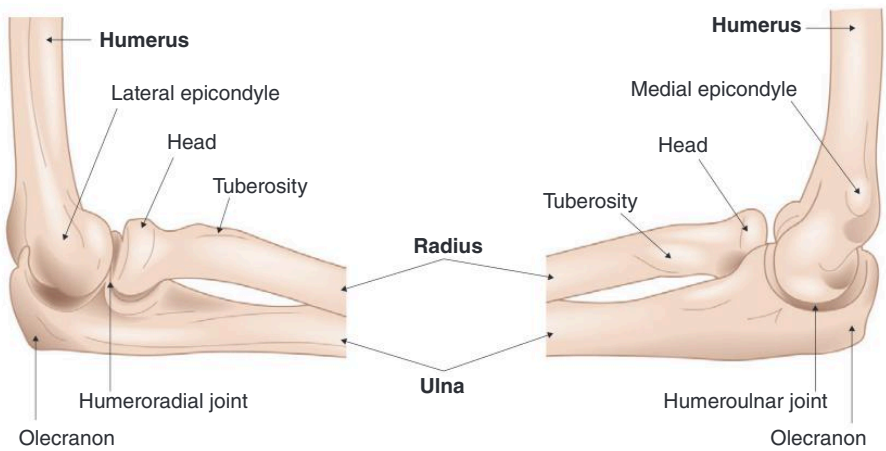

Fig. 3.2 The elbow anatomy: lateral and medial view.

When describing the muscles of the elbow, several criteria may be used to identify them, thus resulting in a functional (elbow flexors and extensors, forearm pronators and supinators) or topographical (anterior, posterior, medial and lateral) classification.

ANATOMICAL LANDMARKS

The most useful anatomical landmarks are listed in the following (Figs. 3.3 and 3.4):

- Lateral epicondyle: it is an eminence located on the lateral side of the elbow, at the distal end

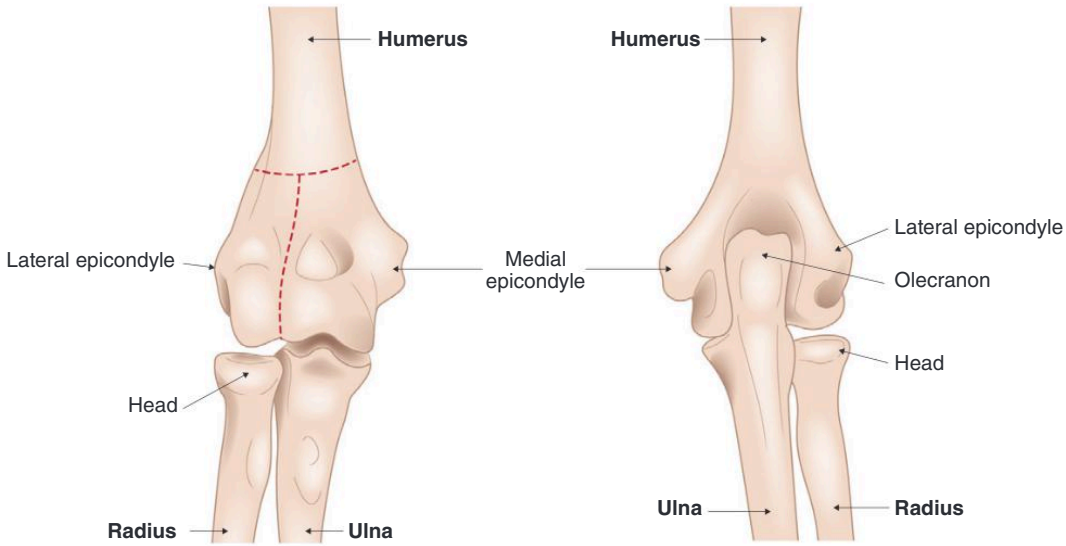

Fig. 3.3 Anatomical landmarks: anterior and posterior view.

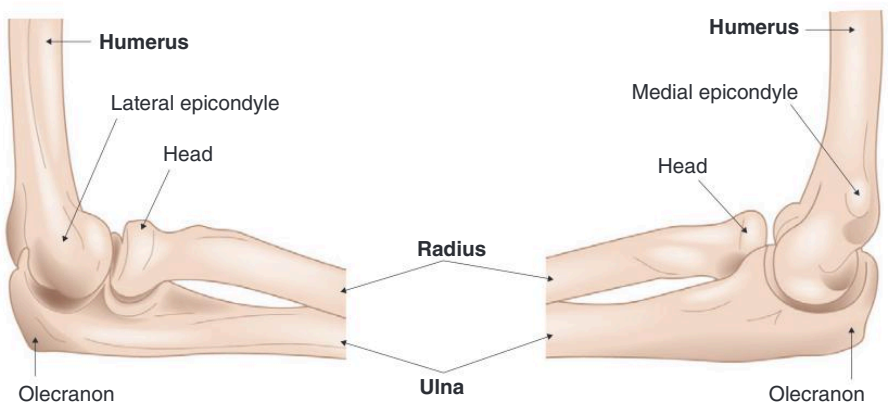

Fig. 3.4 Anatomical landmarks: lateral and medial view.

of the humerus and close to the humeroradial joint.

- Radial head: it is the proximal end of the radius located on the lateral side of the elbow. It is disk shaped with a flattened end that articulates with the distal end of the humerus.
- Medial epicondyle (epitrochlea): it is an eminence located on the medial side of the elbow, at the distal end of the humerus and close to the humeroulnar joint.
- Olecranon process: it is a bony prominence characterizing the posterior and superior portions of the proximal ulna. It is nothing but the bony tip that can be palpated on the posterior aspect of the elbow.

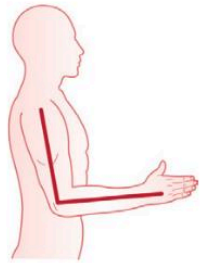

Fig. 3.5 Neutral position.

Fig. 3.6 Extension.

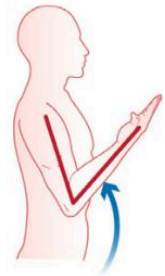

Fig. 3.7 Flexion.

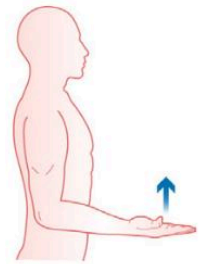

Fig. 3.8 Supination.

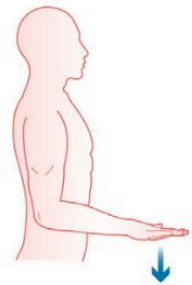

Fig. 3.9 Pronation.

JOINT MOVEMENTS

The Physiological Movements of the Proximal Radioulnar Joint

The radius pivots around the ulna to produce movement at the radioulnar joint. The neutral position of the elbow is with the upper limb close to the trunk. The starting positions to assess the physiological movements of the elbow are two:

- The forearm is in neutral position (Fig. 3.5), elbow at 90 degrees, the palm of the hand neither turned up nor turned down.
  - Extension: the forearm moves away from the arm (Fig. 3.6).
  - Flexion: the forearm moves towards the arm (Fig. 3.7).
  - Supination: the forearm rotates externally which means the hand is turned so the palm is upward (Fig. 3.8).
  - Pronation: the forearm rotates internally which means the hand is turned so the palm is downward (Fig. 3.9).
- The forearm is supinated with incomplete elbow extension; if it was complete, the following joint movements would be locked.
  - Adduction (passive): the forearm moves medially towards the patient (Fig. 3.10).
  - Abduction (passive): the forearm moves laterally away from the patient (Fig. 3.11).

The normal range of motion of the elbow:

- Full extension to full flexion is 0 degrees to about 150 degrees

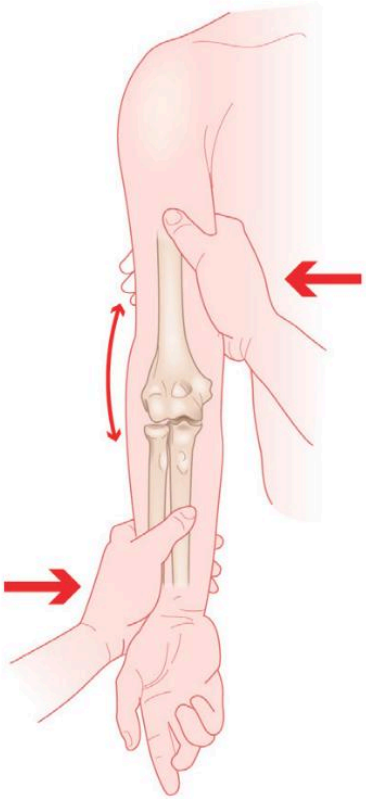

Fig. 3.10 Adduction.

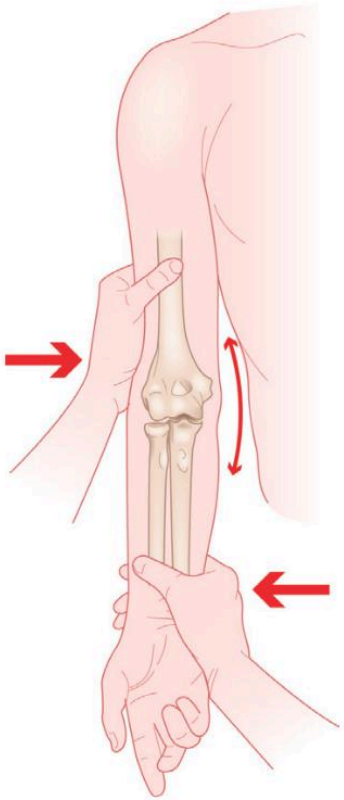

Fig. 3.11 Abduction.

- Full supination to full pronation 0 degrees to about 180 degrees

Range of motion required for most daily activities is:

- 30 degrees of flexion to 130 degrees of extension (with the elbow flexed to 90 degrees)
- 50 degrees of supination to 50 degrees of pronation (with the forearm in neutral position or thumb up)

Success of treatment may be defined as the achievement of at least these clinical outcomes.

Diagnosis in Western Medicine

LATERAL EPICONDYLITIS

Lateral epicondylitis is a tendinopathy injury, either inflammatory or degenerative (tendinosis), often involving the extensor digitorum communis and extensor carpi radialis brevis originating from the lateral epicondyle, i.e. the bony prominence on the lateral side of the elbow. In most cases, insertional tendinitis is diagnosed in the lateral epicondyle.

Lateral epicondylitis may be the result of gradual wear and tear to the tendon from overuse or work- or sport-related repetitive strain injury; however, pain may also be sudden and severe and occur after excessive muscular effort or local trauma.

The most common symptoms are the following:

- Lateral elbow pain, either well localized or radiating to the extensor muscles of the forearm
- Tenderness on palpation on the lateral epicondyle
- Pain when grasping small objects or performing certain tasks (e.g., screwing a lid to a container,

Fig. 3.12 Cozen test.

Fig. 3.13 Reverse Cozen test.

turning the key to lock the door, shaking hands or lifting objects with a pronated forearm)
- In chronic conditions, pain may be dull with a feeling of stiffness
- Positive Cozen test

Cozen Test

It is used to assess lateral epicondylitis (tennis elbow). The patient sits (Fig. 3.12; Video 3.1).

The practitioner stands opposite the patient. The right elbow is flexed at 90 degrees and the forearm is in pronation. The patient is asked to keep the wrist extended while the practitioner pulls the wrist into flexion with the right hand and palpates the lateral epicondyle with the left hand. The test is considered positive if the patient reports pain over the lateral epicondyle.

MEDIAL EPICONDYLITIS

Medial epicondylitis is a tendinopathy injury, either inflammatory or degenerative, involving the medial humeral epicondyle or epitrochlea, and more often the pronator teres, flexor carpi radialis and ulnaris, and palmaris longus muscles originating from the medial epicondyle, that is, the bony prominence on the medial side of the elbow. In most cases, insertional tendinitis is diagnosed in the medial epicondyle.

It is less common than lateral epicondylitis; in general, its onset is progressive and it results from overuse or work- or sports-related repetitive strain injury (golfer's elbow). However, pain may also be sudden and severe and occur after excessive muscular effort or local trauma.

The most common symptoms are the following:
- Medial elbow pain, either localized or radiating to the flexors and pronators of the forearm
- Tenderness on palpation on the medial epicondyle
- Pain when grasping small objects or performing certain tasks (e.g., unscrewing a lid to a container and turning the key to unlock the door)
- In chronic conditions, pain may be dull with a feeling of stiffness of the flexors and pronators
- Positive Reverse Cozen test

Reverse Cozen Test

It is used to assess medial epicondylitis (golfer's elbow). The patient sits (Fig. 3.13; Video 3.2).

The practitioner stands opposite the patient. The right elbow is flexed at 90 degrees and the forearm is in supination. The patient is asked to pronate the wrist while the practitioner holds the forearm with the right hand and palpates the medial epicondyle with the left hand. The test is considered positive if the patient reports pain over the medial epicondyle.

JOINT PAIN, ARTHRITIS, AND STIFFNESS

Patients with elbow arthritis and postsurgical outcomes usually complain of pain, weakness, and restricted range of motion. Among the most common causes of elbow arthritis are fractures, or rheumatoid arthritis, septic arthritis and primary osteoarthritis. Diagnosis is based on the patient's medical history, clinical findings, and radiographic examinations. The most common complications that may occur after surgery or as a result of fracture include:

- Elbow stiffness with possible loss of motion (flexion, extension, pronation and supination)
- Late-onset osteoarthritis
- Failed fusion
- Persistent pain

RED FLAGS IN WESTERN MEDICINE

The presence of heat (calor), redness (rubor), swelling (tumor), pain (dolor) and loss of function (function laesa) determines the need for diagnostic investigations.

Elbow trauma is a common occurrence. Among the signs and symptoms of fracture or dislocation are swelling and deformity of the limb. A fracture affects the continuity of a bone, whereas a dislocation involves a joint.

Patients with rheumatoid arthritis of the elbow usually complain of pain throughout the range of motion; the elbow is usually affected in the later stages the disease. Both fatigue and general discomfort can also be observed.

Special attention should be paid if concomitant symptoms are observed, such as numbness, tingling, paresthesia (abnormal sensation), muscle weakness, decreased tendon reflexes and pain, mainly at night.

Abnormalities uncovered on history taking or physical examination may require medical evaluation, laboratory tests, and imaging investigations, such as x-rays, US, CT, and MRI.

Diagnosis in Chinese Medicine

In Chinese Medicine, musculoskeletal pain results from the obstruction of Qì and Blood circulation or inadequate Qì and Blood for the nourishment of the secondary channels, especially the Muscle and Connecting channels.

The Muscle and Connecting channels more often involved in elbow disorders are listed below:

- Large Intestine
- Small Intestine
- Heart
- Triple Energizer
- Lung

The channels affected vary according to pain location:

- Large Intestine: pain is on the lateral epicondyle, the pathology is epicondylitis (tennis elbow)

Red Flags	*Pain*	*Inspection*	*Other Signs*	*Neurological Signs*	*Recommendations*
Inflammation	Pain	Redness, swelling, and heat		Functional deficit	Physician evaluation Imaging investigations
Fracture	Spontaneous pain	Deformity and swelling	Movement beyond normal range of motion	Functional deficit	Physician evaluation Imaging investigations
Dislocation	Pain with movement	Deformity and joint swelling	Hematoma	Functional deficit	Physician evaluation Imaging investigations
Rheumatoid arthritis	Pain with or without movement	Redness and swelling	Fatigue and general discomfort	Functional deficit	Physician evaluation Imaging investigations Laboratory tests
Herniated disc or cervical radiculopathy	Cervical pain radiating to the elbow			Paraesthesia, hypoesthesia, tingling and lack of deep tendon reflexes	Physician evaluation Imaging investigations

- Small Intestine: pain is on the medial epicondyle, the pathology is medial epicondylitis (golfer's elbow)
- Heart: pain is on the medial volar aspect of the proximal forearm (golfer's elbow)
- Triple Energizer: pain is in the olecranon, the pathology is olecranon bursitis
- Lung: pain is in the anterior crease, the pathology is joint pain or biceps insertional tendinitis

What matters most is to identify the affected channel where pain is located.

Sometimes, it is not so easy to determine it and consequently, the following data concerning the Muscle channels involved in elbow movements should be acquired for a better identification.

- Extension: LI, TE, and SI
- Flexion: PC, LU, and HT
- Supination: LI
- Pronation: LU

The information so acquired on the channel which is likely to be involved, that is, pain location and related movement restriction, can also be integrated with the results from Western medicine orthopedic tests in order to identify which muscle, tendon, and joint is affected in case of

- Lateral epicondylitis
- Medial epicondylitis
- Olecranon bursitis
- Joint pain or biceps insertional tendinitis

ETIOLOGY

Elbow pain is usually caused by:

- *Overuse, repetitive strain injury*. Through work (jackhammer) or sports (tennis or golfer's elbow); performing the same movement over and over again causes local Qì stagnation or Qì and Blood deficiency.
- *Trauma, sport injuries*. If mild, they cause local Qì stagnation; if severe, they cause local Blood stasis.
- *Cold*. Local invasion causes Qì stagnation or Blood stasis.

Previous accidents often predispose the elbow to more frequent invasions of external pathogenic factors, especially Cold.

PATHOLOGY

The Muscle and Connecting channels are often affected by Qì stagnation and Blood stasis:

- Qì stagnation manifests itself with widespread pain radiating proximally or distally along the pathway of the Muscle channels and could be associated with muscle contracture and stiffness of the forearm, also perceived upon palpation.
- Blood stasis, usually occurring in the Connecting channels, manifests itself with more intense pain localized in the joint or, more frequently, at the site of muscle insertion with consequent limited range of motion or joint stiffness.

As already mentioned in the Fundamentals of acupuncture for MSK pain in the limbs (see Chapter 1), the term Connecting channels includes not only the Connecting channel "proper" but also the Connecting channel "area" that covers the whole pathway of the Main channel.

LATERAL EPICONDYLITIS (TENNIS ELBOW)

To identify the Muscle and Connecting channels affected, we check location and characteristics of musculoskeletal pain, palpate the affected area, test the range of motion for each elbow movement and perform orthopaedic tests to elicit pain.

The Pathways of the Large Intestine Secondary Channels

In case of lateral epicondylitis the Large Intestine Muscle and Connecting channels are involved (Fig. 3.14).

The pathway of the Large Intestine Muscle and Connecting channels explains pain on the lateral side of the elbow, which could radiate distally to the radial forearm.

MEDIAL EPICONDYLITIS (GOLFER'S ELBOW)

To identify the Muscle and Connecting channels affected, we check location and characteristics of musculoskeletal pain, palpate the affected area, test the range of motion for each elbow movement and perform orthopaedic tests to elicit pain.

The Pathways of the Small Intestine Secondary Channels

In case of medial epicondylitis, the Small Intestine Muscle and Connecting channels are involved (Fig. 3.15).

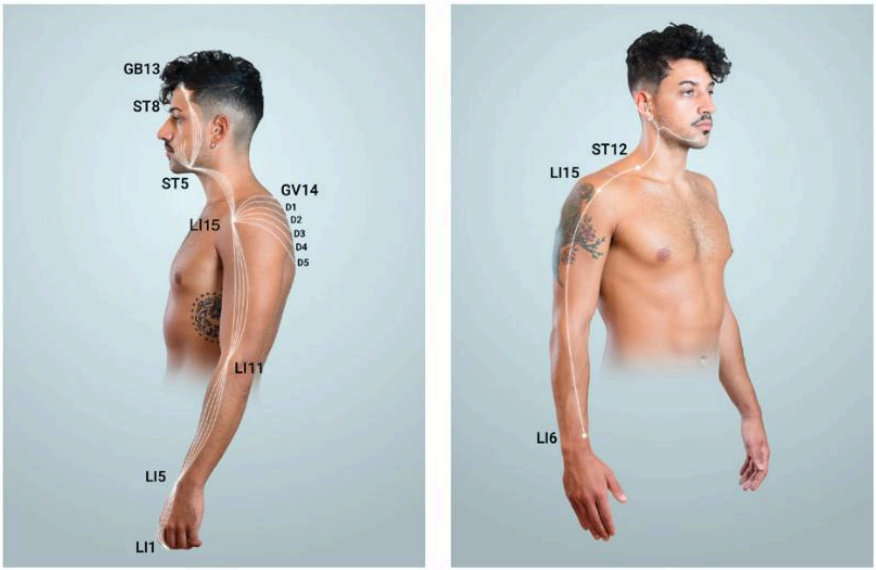

Fig. 3.14 The pathways of the Large Intestine Muscle and Connecting "proper" channels.

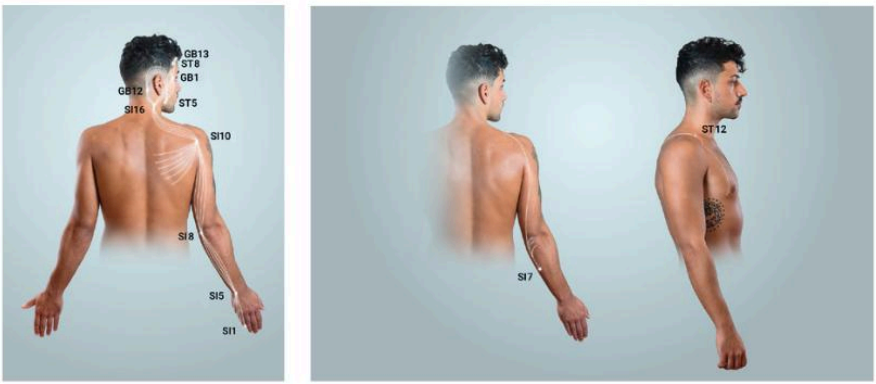

Fig. 3.15 The pathways of the Small Intestine Muscle and Connecting "proper" channels.

The pathway of the Small Intestine Muscle and Connecting channels explains pain on the posteromedial aspect of the elbow, which could radiate distally to the ulnar forearm.

The Pathways of the Heart Secondary Channels

In case of medial epicondylitis the Heart Muscle and Connecting channels may be involved (Fig. 3.16).

The pathway of the Heart Muscle and Connecting channels explains pain on the anteromedial aspect of the elbow, which could radiate distally to the anteromedial aspect of the proximal forearm.

Diagnosis in Osteopathic Medicine

The examination for "somatic dysfunction" is the central concept of the diagnostic process: palpation of

Fig. 3.16 The pathways of the Heart Muscle and Connecting "proper" channels.

the affected area and functionally/anatomically related components of the somatic system is the only way to assess it.

Consequently, the osteopathic diagnostic approach to musculoskeletal elbow pain is based on the identification of joint somatic dysfunctions not only of the elbow, but also of the shoulder and wrist.

Regardless of the condition to be treated, be it lateral or medial epicondylitis, arthritis of the elbow or surgical outcomes, all of the recommended tests should be performed to identify the dysfunctions that occur more frequently.

It is therefore evident that the osteopathic diagnosis is developed regardless of the condition to be treated and consequently, the osteopathic tests recommended for the shoulder, elbow, and wrist will not be repeated when the "injuries" are treated.

TESTS FOR THE MAIN SOMATIC DYSFUNCTIONS

The only way to diagnose somatic dysfunctions of a joint is to assess the passive movements of its articular ends in relation to one another and compare them with the same movements of the joint on the healthy side. Testing of all elbow joints is required.

On the same plane of motion, there is passive mobility quantitatively and qualitatively equal on both sides of a theoretical neutral point that represents the reference point.

When the balance is lost and range and quality of motion are not the same in both directions, then there is somatic dysfunction.

Tests of the Humeroulnar Joint

Tests are performed to assess the most common ulnar dysfunctions:

1. Adduction of the ulna
2. Abduction of the ulna
3. Internal rotation of the ulna
4. External rotation of the ulna

Adduction Test of the Ulna

The patient is supine close to the bed edge with incomplete elbow extension. The practitioner stands close

Fig. 3.17 Adduction test of the ulna.

Fig. 3.18 Abduction test of the ulna.

to the patient's right side. The practitioner stabilizes the patient's wrist under the left axilla and the elbow by placing the left hand on the lateral aspect of the elbow.

The adduction test is then performed by pushing the elbow laterally with the margin of the first intermetacarpal space of the right hand placed on the medial joint line. The practitioner appreciates adduction range and quality of motion and then compares them with abduction. If the elbow slides more easily in adduction, then there is ulnar adduction dysfunction (Fig. 3.17; Video 3.3).

Abduction Test of the Ulna

The patient is supine close to the bed edge with incomplete elbow extension. The practitioner stands close to the patient's right side. The practitioner stabilizes the patient's wrist under the right axilla and the elbow by placing the right hand on the medial aspect of the elbow.

The abduction test is then performed by pushing the elbow medially with the margin of the first intermetacarpal space of the left hand placed on the lateral joint line.

The practitioner appreciates abduction range and quality of motion and then compares them with adduction. If the elbow slides more easily in abduction, then there is ulnar abduction dysfunction (Fig. 3.18; Video 3.4).

Internal Rotation Test of the Ulna

The patient sits with elbow flexed at 90 degrees and forearm in neutral position. The practitioner stands opposite the patient. The practitioner holds the patient's elbow with the left hand and the wrist with the right hand: the internal rotation test is performed by rotating the forearm from supination to pronation with the right hand.

The practitioner appreciates range and quality of motion for internal rotation and compares them with external rotation. If the ulna slides more easily in internal rotation, then there is internal rotation dysfunction (Figs. 3.19 and 3.20; Video 3.5).

Fig. 3.19 Internal rotation test of the ulna: starting position.

Fig. 3.20 Internal rotation test of the ulna: final position.

Fig. 3.21 External rotation test of the ulna: starting position.

External Rotation Test of the Ulna

The patient sits with elbow flexed at 90 degrees and forearm in neutral position. The practitioner stands opposite the patient. The practitioner holds the patient's elbow with the left hand and the wrist with the right hand. The external rotation test is performed by rotating the forearm from pronation to supination with the right hand. The practitioner appreciates range and quality of motion for external rotation and compares them with internal rotation. If the ulna slides more easily in external rotation, then there is external rotation dysfunction (Figs. 3.21 and 3.22; Video 3.6).

Test of the Proximal Radioulnar Joint

A test is performed to assess the most common radial dysfunctions:

- Anterior radial head
- Posterior radial head

Fig. 3.22 External rotation test of the ulna: final position.

Fig. 3.23 Anteroposterior test of the radial head.

Anteroposterior Test of the Radial Head

The patient is supine close to the bed edge with incomplete elbow extension.

The practitioner stands close to the patient's right side with the patient's wrist under the right axilla and the right hand holding the ulna, while the left thumb and index finger are in front of and behind the radial head, respectively:

- The anterior test is performed by pushing the radial head forward with the index finger to assess anterior sliding.
- The posterior test is performed by pushing the radial head backward with the thumb to assess posterior sliding.

The practitioner appreciates range and quality of motion of anterior sliding and posterior sliding to compare them with posterior and anterior sliding, respectively.

If the radius slides more easily anteriorly, then there is anterior dysfunction, and vice versa (Fig. 3.23; Video 3.7).

Treatment With the AcuOsteo Method: The Choice of an Integrated Approach

The therapeutic approach of the AcuOsteo Method aims to treat those musculoskeletal injuries which do not require consultation with a surgeon or a physician.

Once this fundamental aspect has been defined, treatment envisages the use of acupuncture and osteopathy according to their diagnostic and therapeutic approaches.

We would like to stress that at this point in diagnostic assessment, we do not have to follow the rules of Western medicine, except for some specific cases, such as arthritis of the elbow, posttraumatic and postsurgical pain, and stiffness, which will be covered later.

In addition, we should not be misled by diagnostic imaging investigations and should rely only on the rules of Chinese and osteopathic medicine, which means selecting points according to symptoms and channel pathways and treating all of the somatic dysfunctions encountered.