Osteopathic Medicine

The Shoulder

Luc Peeters & Grégoire Lason
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ISBN: 9789074400800

The International Academy of Osteopathy – I.A.O.
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1. Introduction

The shoulder is a highly complicated region of the body. It is a complex of joints with a high degree of mobility but with rather poor stability.

The joint complex is involved in many movements, both in daily life as well as in sports and therefore is susceptible to several repetitive and overuse type of injuries.

The shoulder is well designed and the joint mechanisms permit the placement, functioning and control of the hand in front of the body where we have our visual workspace. The shoulder is well suited for this purpose because of the minimal bony constraints and elaborate soft tissue attachments that allow a large degree of freedom and multiplanar range of motion at the joint. This premium on shoulder motion is accomplished by sacrificing inherent stability, which explains why instability is a common feature of shoulder pathology.

The shoulder complex consists of three joints and one articulation that function in a precise, coordinated and synchronous manner.

For those who are not familiar with the typical osteopathic terminology, we refer to chapter 10 at the end of this e-book.
2. Biomechanics and Important Anatomical Features


2.1. General

The shoulder or shoulder complex/girdle consists out of 3 joints and 1 articulation:

- The sternoclavicular joint.
- The acromioclavicular joint.
- The glenohumeral joint.
- The scapulothoracic articulation.

2.2. Anatomic Position of the Shoulder Girdle

The clavicle is lying 20° posterior to the frontal plane.

The scapular plane lies 35° anterior to the frontal plane.

The glenohumeral joint is retroverted 30° posterior to the medial-lateral axis of the elbow.

![Figure 1 - Anatomical position of the shoulder girdle](image)
2.3. Mobility of the Shoulder Complex

<table>
<thead>
<tr>
<th>ARTICULATION</th>
<th>MOVEMENT</th>
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<tbody>
<tr>
<td>The sternoclavicular joint</td>
<td>Elevation &amp; depression</td>
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<td>Protraction and retraction</td>
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<td>Rotation of the clavicle</td>
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<tr>
<td>The acromioclavicular joint</td>
<td>Rotation of the scapula (acromion)</td>
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<td>Protraction/abduction &amp; retraction/adduction</td>
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<td>Upward &amp; downward rotation</td>
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<td>The glenohumeral joint</td>
<td>Flexion &amp; extension</td>
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<td>Abduction &amp; adduction</td>
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<td>The scapulothoracic articulation</td>
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<td>Upward/downward (medial &amp; lateral) rotation</td>
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2.4. Normal Range of Motion of the Shoulder Complex

*Figure 2 - Flexion and extension*  
*Figure 3 - Abduction and adduction*
2.5. Joint Specifications

2.5.1. The Sternoclavicular Joint

The sternoclavicular joint is a diarthrodial saddle joint. It is a rather shallow joint and relatively incongruous. It is the only joint that connects the arm to the thorax.

The joint has an intra-articular disc.

The sternoclavicular capsule is strong and supported by ligaments:

- The costoclavicular ligament: resists upward and posterior motion.
- The sternoclavicular ligament: resists anterior, posterior and superior motion.
- The interclavicular ligament: resists superior motion.
3. Possible Functional Lesions

3.1. General
With the arm as a large lever and little stability, the shoulder is very mobile in all planes but also very vulnerable for injury.

In this chapter we describe the functional lesions for each joint in the shoulder complex.

3.2. The Sternoclavicular Joint

3.2.1. Anterior Lesion of the Clavicle
The medial head of the clavicle is in an anterior position.

This lesion uncommonly presents itself as loss of mobility but rather as hypermobility in anterior direction. The posterior capsule can however be shortened.

*Figure 105 - Anterior lesion of the clavicle*
3.2.2. Posterior Lesion of the Clavicle
The medial head of the clavicle is in a posterior position against the sternum.

This lesion goes together with an anterior shoulder position.

This lesion is important since the posteriorly placed medial head of the clavicle can compress veins, even the oesophagus and the trachea in severe cases of subluxation.

The lesion narrows the thoracic outlet.

The anterior capsule is shortened.

3.2.3. Superior Lesion of the Clavicle
The medial head of the clavicle is in a superior/medial position against a normal position.

This lesion does not always present itself as loss of mobility, but more commonly as hypermobility in this superior/medial direction.

This is commonly seen together with a “dropped” shoulder.
3.2.4. Inferior Lesion of the Clavicle
The medial head of the clavicle is in an inferior and lateral position.

This lesion is rarely found.

3.3. The Acromioclavicular Joint

3.3.1. Superior Lesion of the Clavicle
The lateral head of the clavicle is in a superior position against the acromion.

This is also called the piano-touch lesion or when the superior capsule is ruptured.
4. Shoulder Pain

4.1. General
The complaints in the shoulder girdle will be divided in the following possible problems:

- Mechanical.
- Vascular.
- Neurological.
- Metabolic.
- Degenerative.
- Rheumatic.
- Infectious.

4.2. Mechanical Problems

4.2.1. The Sternoclavicular Joint
The sternoclavicular joint can be injured by a sprain caused by a force onto the shoulder (fall). In adults dislocations can occur or fractures of the clavicle. In children the injury is almost always a fracture.

The dislocations can be in different directions, depending on the direction of the initial force onto the shoulder.

Posterior dislocation is particularly dangerous because trachea, oesophagus, veins, etc. are located behind the joint.

Figure 116 - Posterior and superior dislocation
4.2.2. The Acromioclavicular Joint

Most injuries of this joint are caused by a lateral force onto the acromion (fall on the shoulder). This type of trauma is also known as shoulder separation.

The injuries range from a mild sprain of the acromioclavicular ligament to a complete dislocation with possible tearing of the clavicular attachments of deltoid, trapezius or a complete rupture of the coracoclavicular ligament.

The injury presents as a displacement of the acromion mostly in anterior and inferior directions while the clavicle doesn’t move as such. This mechanism occurs in 95% of the dislocations of this joint.

The transmitted force can be through a direct fall on the acromion or an impact transmitted through the humerus.

The symptoms are:

- Pain and deformity at the AC joint.
- Pain with shoulder movement. (especially cross arm abduction test).

![Severe acromioclavicular joint separation](figure117.jpg)

**Figure 117 - Severe acromioclavicular joint separation**

Grades

- Grade 1: no displacement.
- Grade 2: clavicle elevated 50%.
- Grade 3: clavicle elevated 100%.

The treatment:

- When there is only ligamentary and capsular overstretch: rest arm in a sling (mitella).
- When there is total rupture of ligaments and capsule: surgery.
- Surgery in grade 3.
Clavicular Fracture

Most commonly caused by a fall onto the shoulder.

Although several important structures lie close to the clavicle, these tissues are rarely damaged.

A fall onto an outstretched arm can also cause a clavicular fracture. In babies, these fractures can occur during the passage through the birth canal.

Clavicle fractures can be very painful and cause difficulty in moving the arm.

The symptoms are:

- Shoulder positioned downward and forward.
- Inability to lift the arm because of the pain.
- Grinding sensation if attempt is made to lift the arm.
- Deformity or “bump” visible.
- Bruising, swelling and pain over the clavicle.

The treatment is:

- Pain medication.
- Arm sling (figure of eight).
- Sometimes surgery (in the case of displacement).
- Sometimes the fracture heals in what is called “malunion”. This means that the bones fuse in a non anatomical position.

Figure 118 - Clavicular fracture
5. Examination


A lesion refers to a loss of mobility.

Dysfunction of the shoulder complex can cause complaints. Dysfunction can refer to hyper- as well as hypomobility.

5.1. Case History

In the case history, the osteopath tries to identify the nature of the pain:

- **Aching pain** can be from a ligament, especially when occurring in the morning with morning stiffness. Also when it occurs after a longer period of immobility. Ligament complaints are also often associated with osteoarthritis. Transient morning pain that subsides after the patient has moved, but which reappears with exercise is typical of degenerative shoulder disorders.

- **Sharp pain** on specific movements can be caused by a muscle strain or inflammation, tendinitis or bursitis.

- **Fatigue** can be caused by bad posture and poor muscular balance (especially of the rotator cuff). It can also be associated with arteriosclerosis, rheumatoid arthritis or cancer.

- **Radiating pain** indicates a neurogenic factor and can be radicular or pseudo radicular (referred pain). Detailed neurological tests will have to be done.

- **Numbness or muscle weakness** indicates compression or damage of a nerve.

- **Bilateral pain** in the shoulders can be associated with cervical myelopathy or rheumatic disease.

- **Nocturnal pain** often indicates cancer, inflammation, infection or rheumatic disease.

The type of patient (child, adult, elderly, pregnant, peri-menopausal woman) is helpful for differential diagnosis.

The onset of shoulder pain is important. Was there a trauma? How did it happen? Was the onset sudden or progressively worsening? What makes it worse or better?

Is there a popping sensation? Is it painful or not?

Is there any trouble lifting, reaching, throwing, etc.?

Is there a painful arc?

Have there been any recent infections?
Have symptoms increased? Is there psychological distress? (superficial or non-anatomical pain distribution, non-anatomic sensory or motor disturbance, inconsistent neurological signs, inappropriate or excessive verbalization of the pain).

The differential diagnosis should be narrowed down by 80% with a proper history taking.

5.2. Observation

5.2.1. General

The purpose of a general observation is to identify:

- Muscular contours (asymmetry).
- Muscular atrophy.
- Swelling and/or erythema.
- Other deformities.
- Differences between sides.
- Location of somatic dysfunctions. (more details are in the e-book “Integration and Applied Principles in Osteopathy” by the same authors)
- Observation of other joints such as the elbows and hands (position and eventual deformations).

5.2.2. Observation of the Shortened Structures

The osteopath observes the position of the shoulders and the spine contours while the patient is standing. It is important that the osteopath observes the location of the shortened structures.

The aim of this observation is to determine where these shortened structures are and to treat them locally. Local treatment can only be done on the shortened side (mobilisation or manipulation).

The patient can complain of symptoms on both the shortened side as well as the overstretched side.
It is important to understand that the osteopath doesn’t only try to improve the amplitude (range of motion – ROM) of the joint, but also aims to improve quality of movement.

In this example (Figure 145) rotation between the two structures remains possible. However, independent of any changes to the range of motion the biomechanics are abnormal and require correction.

The retracted peri-articular structures will create the non physiological 3-dimensional axis.

This concept is one of the significant differences between osteopathy and other manual therapies where the range of motion is considered to be the dominant evaluation for joint mobility.

**Figure 145 - Shortened structures or non physiological joint axis**
6. Techniques

6.1. Manipulations

6.1.1. General
A manipulation or HVLAT (High Velocity Low Amplitude Thrust) is a short, specific and rapid thrust applied to a joint.

The aim of a manipulation is variable depending upon the lesion and the joint being treated.

The aim of manipulation is:
- Repositioning of a joint subluxation.
- Alleviation of muscular spasm in short musculature.
- Stretching of a capsulo-ligamentous retraction (correction of a non physiological axis – shortened structures).

Manipulations are in some situations a necessity, most notably in cases of an articular blockage or subluxation. This is often difficult to differentiate from a restriction (mobility loss with elastic end feel).

A manipulation is, in some cases, a more efficient treatment for a restriction. Where elastic end feel is present mobilisations can be used but, if no contra indications exist, then a manipulation is also an option. A manipulation can break down cross-links.

Before 20 years of age, “real” articular blockages rarely occur.

Contra indications
Before an osteopath decides to use a manipulative technique he must be sure that no contra indications are present.

The following are examples of contra indications:

- Medication
  - The osteopath will not manipulate if the patient takes anticoagulants or corticosteroids.
- Trauma
  - The osteopath should not manipulate directly after a trauma, without radiological testing showing any osseous lesions or tissue damage.
  - The osteopath should not manipulate after an operation (risk of bleeding) and wait some 6 weeks.
• **Lever use**
  o If the patient has pain or neurological symptoms during the positioning of the body and use of levers for the technique, the osteopath should not manipulate.

• **Osteoporosis**
  o The osteopath should not manipulate in cases of obvious osteoporosis such as Sudeck's atrophy.

• **Children**
  o Real articular blockages are uncommon in children, so manipulation is not necessary.

• **Pregnancy**
  o Manipulation of lesions during pregnancy is not an absolute contraindication but does deserve extra vigilance. Hypermobility is common so any manipulative technique must be carried out very specifically.

• **Elderly**
  o In older patients, arthrosis is a frequent reality and changes the joint surface congruency. Manipulation is not absolutely contraindicated but extra care must be taken. Manipulation is only needed in cases of subluxation.
  o When treating arthritic joints the aim is not to drastically improve the range of motion. This will only lead to joint instability. When a joint is arthritic the general loss of mobility is seen as a normal protective mechanism of the body. Therefore the aim is not to improve the general loss of mobility but to prevent a non physiological axis to develop and to maximise circulatory factors.

• **Cardiac patients**
  o Manipulations that can have a potential autonomic effect upon the heart are contraindicated. These patients are not the ideal patients for a total osteopathic treatment because osteopathy works so effectively on the circulatory system. Cardiac patients have a faulty ‘motor’ in their circulatory system and an improvement in their circulation may well create an overload for the heart.

• **Cancer patients**
  o It is also strongly suggested to avoid manipulation of cancer patients. Osseous metastasis is always a possibility.
  o These patients are not the ideal patients for a total osteopathic treatment because osteopathy works so effectively on the circulatory system, which can allow rapid spread of any metastasis. Post-operative treatment for a complaint is possible if approved by the consulting specialist. This must be considered case by case.

• **Psychiatric patients**
  o Great care must be taken with these patients as manipulation can result in unexpected emotional reactions. With this patient group this is not desired as the appropriate reaction to osteopathic treatment.

• **Prosthesis**
  o Joints that have undergone a prosthetic replacement are not manipulated.
6.1.2. Manipulation of a Superior Lesion of the Medial Clavicular Head against the Manubrium

The patient is supine.

The osteopath brings the shoulder to 120° abduction.

He applies traction to the arm and thruts the medial head of the clavicle in lateral and caudal directions.

*Video 32 - Manipulation of a superior lesion of the medial clavicular head against the manubrium*

6.1.3. Manipulation of an Anterior Lesion of the Medial Head of the Clavicle

The patient is supine.

The osteopath brings the shoulder anteriorly.

With the pisiform on the anterior part of the medial head of the clavicle he thrusts the clavicle in posterior direction.

*Video 33 - Manipulation of an anterior lesion of the medial head of the clavicle*
6.1.4. Manipulation of an Inferior/Lateral Lesion of the Medial Head of the Clavicle

The patient is supine.

The osteopath brings the shoulder caudally.

With the pisiform on the inferior part of the medial head of the clavicle he thrusts the clavicle in cranial and medial directions.

Video 34 - Manipulation of an inferior/lateral lesion of the medial head of the clavicle

6.1.5. Manipulation of an Anteriorly Rotated Clavicle

The patient is sitting.

The osteopath supports the shoulder in 90° abduction.

With the medial hand he holds the clavicle in a posterior rotation position.

With the arm as lever, he brings the shoulder into internal rotation and at the motion barrier he manipulates the acromion into anterior rotation.

Video 35 - Manipulation of an anteriorly rotated clavicle
8. About the Authors

Both authors are holders of university degrees, namely the Master of Science in Osteopathy (MSc.Ost. – University of Applied Sciences), and are very active with the promotion and academic structuring of osteopathy in Europe. In 1987 they began The International Academy of Osteopathy (IAO) and are, to this day, the joint-principals of this academy. The IAO is since several years the largest teaching institute for osteopathy in Europe. Both osteopaths are members of diverse professional organizations, including the American Academy of Osteopathy (AAO), the International Osteopathic Alliance (IOA) and the World Osteopathic Health Organization (WOHO), as part of their mission to improve osteopathic development.

This osteopathic encyclopaedia aims to demonstrate the concept that a proper osteopathic examination and treatment is based upon the integration of all body systems.