The Cervical Spine

Grégoire Lason & Luc Peeters
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1. Introduction

The cervical spine is the region of the body that is best used to illustrate the concept of osteopathic integration. Not only do dysfunctions in this region influence other body regions via mechanical, neurological and vascular pathways but the opposite also occurs – the cervical spine is often influenced by other regions via mechanical, neurological and vascular pathways.

The cervical spine has both a static, supportive function for the head and associated organs and a dynamic function for the head and associated special senses. The combination of these two functions leads to a biomechanically complex region and as a result the upper cervical spine has a different biomechanical function than the middle and lower cervical spine.

This e-book explains the different biomechanics of these zones within the cervical spine as well as providing written and visual description of relevant functional tests and techniques.

The anatomy of the cervical spine can be found in standard anatomy books and is only repeated here when there is specific relevance.

For those readers not familiar with the typical osteopathic terminology, read chapter 10.

For didactic reasons, the Fryette model is used. The relativity and utility of this model is explained in the e-book ‘Integration and applied Principles in Osteopathy’ of the same authors (http://osteopedia.iao.be).

The cervical spine is divided into two separate zones for biomechanical description:

- The occiput-atlas-axis (OAA) complex.
- The C2-C7 region.
2. Biomechanics


2.1. Normal Posture

The cervical lordosis Occ-C7 averages 40°.

This normal lordotic curvature is necessary to transfer the weight of the head in an economic way. Too little lordosis will lead to disc compression and too much lordosis to facet compression, and therefore to dysfunction.

![Figure 1 - Normal cervical lordosis](image)

Most of the lordosis occurs at the C1-2 segment.

2.2. Normal Motion

Normal range of motion:

<table>
<thead>
<tr>
<th>Motion</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>50°</td>
</tr>
<tr>
<td>Extension</td>
<td>60°</td>
</tr>
<tr>
<td>Sidebending</td>
<td>45°</td>
</tr>
<tr>
<td>Rotation</td>
<td>80°</td>
</tr>
</tbody>
</table>

Approximately 50% of the flexion-extension motion occurs at occiput-C1 (atlas) level. Approximately 50% of the rotation occurs at C1-2 (atlas-axis) level.

Motion at the occiput-C1 segment is restricted primarily to flexion-extension due to bony structures, ligamentous constraints, and the absence of an intervertebral disc.

Sidebending is also possible with some rotation added.
4. Cervical Pain

4.1. General
Cervical pain is a common cause for office visit. 34% of the people suffer from cervical pain sometimes during their life, most of them are females.

The cause of cervical pain can be very different. Therefore it is important to find the structure that causes the pain.

Is the pain caused by a muscle and if so which muscle(s)?

Is the pain caused by a ligament strain, and if so which ligament(s)? Are the ligaments that cause the pain overstretched or are they retracted?

Is the pain caused by an inflamed joint and if so which joint?

Is the pain caused by an inflamed disc and if so at which level?

Is the pain caused by an inflamed nerve and if so which nerve and at what level is the inflammation?

Is there spinal stenosis, fracture or tumour in the vertebral canal?

Are there specific bone diseases or rheumatic factors?

Are there local infections present?

Is there a visceral afference towards the segment occiput – atlas – axis (OAA)?

Is there a postural overload caused by lesions in other spinal areas?

Local cervical pain can originate from:
- The anterior longitudinal ligament.
- The posterior longitudinal ligament.
- The outer annulus.
- The dura mater.
- The facet joint capsule.
- The muscles.
- The ligaments.

The osteopath starts his/her investigation with a 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 immobilisation (sitting or standing).
- Sharp pain on specific movements can be caused by muscle strain or inflammation.
• Decompress the cervical canal by mobilising gently towards flexion without irritating eventual fused segments.
• Decompression can also be achieved by manual axial traction of the cervical spine.

Let’s not forget that the structural damage that has been made by the canal stenosis can’t be cured. This doesn’t mean that the suggested treatment is worthless, it will often improve the symptoms and prevent the problem progressing.

Figure 48 - Cervical stenosis

Figure 49 - Wasting of small muscles in hands
5. Examination


5.1. Safety Tests

5.1.1. Neurological

5.1.1.1. Babinski Reflex

This test is used when a patient has combined neck and lower limb complaints. For example, a cervicomedullary problem as a result of a disc hernia.

**Procedure:** the osteopath uses a sharp edge to strike along the plantar surface of the foot in a curve - beginning laterally from posterior to anterior and then continuing transversally to the 1st metatarsal head.

**Pathological reaction:** a slow stretching of the hallux together with a spraying of the other toes. This reaction is normal for babies.

**Physiological reaction:** curling of the toes.

If the Babinski reflex is positive, a central neurological problem is present and manipulation contra-indicated.

![Video 1 - Babinski reflex](image)
5.3. Mobility Tests

5.3.1. Active Test: Flexion and Extension (all levels)
First the normal cervical lordosis is observed: Is the curve 40°?
The patient bends the head forwards and backwards.
Is the curve even and regular?
Is the range of motion sufficient?

5.3.2. Passive Test in Flexion and Extension (sitting) (all levels)
Opening and closing (increasing and diminishing distance) of the spinous processes.
Do the vertebrae glide anteriorly and posteriorly?
6. Techniques


6.1. Mobilisations

6.1.1. General

The aim of a mobilisation is:

- Correction of the false axis in the joint by stretching retractions in the capsule and surrounding ligaments. This is done with enough specificity so that it is appropriate even in a joint that is hypermobile in other directions. In this way the biomechanical quality of the joint can be repaired and the overstretched soft tissues can be relaxed.
- Via rhythmical mobilisations and use of long lever techniques drainage of all soft tissues around the joint will occur. Local to the false axis a congestion of all tissue will still occur.
- The mobilisation is done in a pain free and rhythmical manner. The aim is to normalise any hyperactivity of the sympathetic system in the surrounding tissues. Pain will increase this sympathetic activity further.
- Via rhythmical compression/traction the synovial production is stimulated which is a desirable reaction when treating arthrotic joints. This is also the reason why mobilisations of an arthritic joint are not suggested.
- Range of motion increase is not necessarily the primary aim of mobilisation. It can even be relatively contra indicated so as not to cause instability (especially of concern in arthrotic joints).

The mobilisation must be pain free so as to avoid increasing sympathetic activity further, which is contradictory to the aim.

The mobilisation must occur on the end of range so that a light tension is maintained in the tissues being treated.

The mobilisation is rhythmical and with circumduction where possible. If the aim is to stimulate synovial production, a light push/pull (compression/traction) technique is indicated.

The mobilisation is always done in the direction of the false axis and according to the normal biomechanics of the joint. The hyper mobile directions are avoided.

Contra indications

- Inflammation or infection.
- A joint with intra-articular swelling. Mobilisation will only increase and worsen the swelling.
- Painful end of range.
- In the direction of a structurally damaged capsule.
- Directly following recent trauma.
6.1.2. Lesion in Extension (All levels)
The patient is supine. The osteopath supports the patients’ head on his knee.

With the fingers of one hand he or she palpates two spinous processes. With the other hand on the frontal bone, he or she translates each cervical level towards posterior versus the underlying level.

The technique is done rhythmically and at the barrier of motion.

![Image](video42.jpg)

Video 42 - Lesion in extension

6.1.3. Lesion in Flexion (all levels)
The patient is supine.

With the radial side of the index fingers, the osteopath contacts each cervical level (at the height of the facet joints) and mobilises in anterior translation.

The technique is done rhythmically and at the barrier of motion.

![Image](video43.jpg)

Video 43 - Lesion in flexion
8. About the Authors

Grégoire Lason
Gent (B), 21.11.54

Luc Peeters
Terhagen (B), 18.07.55

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 organisations, including the American Academy of Osteopathy (AAO), the International Osteopathic Alliance (IOA) and the World Osteopathic Health Organisation (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 three systems: the musculoskeletal, visceral and craniosacral systems.
This e-book is a product of Osteo 2000 bvba.

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Mail: ebooks@osteopathie.eu
Fax: +32 55 70 00 74
Tel: +32 9 233 04 03

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