



Physiotherapy of Thoracic Outlet

Saloua Khalfaoui*, Abdellah El Marbough, El Mustapha El Abbassi

Department of Physical Medicine and Rehabilitation of the Military Instruction Hospital Mohammed V, Rabat, Morocco

Email: *salaouine@hotmail.com

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Abstract

The thoracic outlet syndrome is a pathology due to the compression of the vasculo-nervous package arising in the cervico-scapulo-thoracic area. The functional signs, the clinical picture as well as the complication can in some cases be a diagnostic and therapeutic problem from the necessity of a careful dismemberment of this pathology before establishing an adapted and specific protocol of reeducation. The main purpose of the coverage of this entity is to avoid the recurrence, to improve the quality of the treatment as well as the quality of life.

Subject Areas

Pathology

Keywords

Thoracic Outlet Syndrome, Clinical Diagnosis, Physiotherapy

1. Introduction

Cervico-thoraco-brachial procession syndrome or cervico-thoraco-brachial crossing is a set of signs functional and clinical related anatomical or functional varieties occurring in the cervico-scapulothoracic region. The clinical manifestations are different due to the compression of the vasculo-nervous package for structures osteo-muscular of this crossing. The causes are multiple and can be a ligamentous, muscular, fibrous or simply functional bone origin [1].

As a result, the clinical picture and the complications can in some cases constitute a diagnostic problem and therapeutic [2].

Support for this entity is based essentially on rehabilitation and on the surgical treatment [3].

In a study conducted on a cohort of 59 patients, it has been shown that rehabilitation is more beneficial if the initial symptomatology of the patient is mi-

nimal and if treatment is started early. Thus, surgery remains the treatment of choice in front of complicated forms or rebels to conservative treatment [3].

Since 1956, most of the protocols for rehabilitation were based on the method of Peet who used stereotypical exercises and poorly adapted causing either the compression of the vascular bundle (abduction and retropulsion) or the tension and irritation of the brachial plexus (strengthening of the upper trapezius and fixators of the scapula) [4].

There are two separate entities, including

Support differs:

* The plexic syndrome by irritation of the brachial plexus due to a static disorder the cervical spine.

* Vascular compression syndrome dynamic interesting clip costoclavicular, paraspinal scalenus or pectoralis minor muscle.

Before starting rehabilitation, it is necessary to establish a balance sheet and a morphostatic analysis and dynamics of the column cervical and scapular girdle.

The principle of this reeducation is to avoid compressive movements at 110° of joint amplitude (abduction, retropulsion, anterior elevation and superior), and favor the antepulsion and the relaxation of the shoulder.

To be global and especially precise in the proposed treatment, it would be recommended to integrate the results of exams physical and complementary. The life hygiene and correction tips posture are integral parts of conservative treatment that must be explained and respect.

The continuation of home sessions causes improvement of pain felt by the patient with a decrease of the value of the visual analog scale three times more than those who stopped self-education [1].

Kenny described in eight patients who have done some antileptic exercises shoulder, a clear improvement in neck pain and radiculalgia upper limbs [5].

2. Morpho-Static Report and Dynamics of Cervical Column and the Scapular Belt

The purpose of the static report is to determine:

- The disorders of the morphotype (hyper or hypotonia)

Postural imbalances (reversal of curvatures, rear projection of the head, antejection of the head, hyperlordosis cervical or lateral deviation of the cervical spine), causing a modification of the biomechanics of the cervico-scapular region triggering or aggravating neurovascular disorders.

The cutaneo-trophic balance at the research:

Circulatory disorders such as edema intermittent upper limb, cyanosis, collateral circulation and possibly a supraclavicular murmur of trophic disorders to type of amyotrophy of the muscles concerned and intrinsic muscles of the hand and thermal disturbances to type of cold hand feeling.

The palpatory report:

- The palpation of the superior trapezius, sterno-cleido-mastoid and scalene

allows appreciating the muscular tone involved in postural disorders.

- Irritation of the brachial plexus is sought after by the pressure of the roots, primary, secondary and branch trunks terminal.

The dynamic balance sheet:

It consists of measuring the amplitudes articular assets and liabilities of different joints, noting the biomechanical imbalances and compensations resulting therefrom [1].

This assessment is completed by tests specific with tensioning of the plexus Brachial without and with compression.

*Specific tests for implementation tension or compression of the brachial plexus:

- Open pliers dynamic: abduction of the limb greater than 90° without constraint.

- Clamp closed, with compression dynamic: Chandelier test: arm in abduction/external rotation at 90°, elbow bent at 90° and pushed back.

The importance and intensity of irritation of brachial plexus can be estimated by the number of repeated movements during two tests.

- Search for Morley Sign: compression of the transverse process of C7 reproduces the symptoms of the syndrome of the cervico-thoraco-brachial crossing.

- Watch sign research: brachial plexus compression in the supraclavicular region causes distal neuralgia (**Figure 1**).

*Functional tests of Arterial compression: low sensitivity, nonspecific and non pathognomonic. They are all looking for an abolition of the radial pulse:

- The Adson 1 test: closing the space inter-scapular by the retropulsion of upper limb associated with a rotation cervical homo or contralateral (**Figure 2**).

- The Adson 2 test: neck in extension and contralateral rotation associated with pulling backward shoulders, hands on the thighs and ask the patient a forced inspiration (**Figure 3**).

- The Allen test: arm in abduction, external rotation at 90°, elbow bent at 90°, associated with contralateral cervical rotation and elevation of the chin (**Figure 4**).



Figure 1. Compression of the brachial plexus in the supraclavicular region.



Figure 2. Adson test 1.



Figure 3. Adson test 2.



Figure 4. Allen test.

- The Sanders maneuver: inspiration deep with shoulder blades in adduction (**Figure 5**).

- The Wright maneuver or test of the static candlestick: corresponds to degree of abduction where the radial pulse disappears (**Figure 6**).

The maneuver of Falconer and Weddel or “watch over you” test: closure of the costoclavicular fornice by asking the patient to raise the chin and lower shoulders (**Figure 7**).



Figure 5. Sanders Maneuver.



Figure 6. Wright maneuver.



Figure 7. Falconer and Weddel maneuver.

Roos stress test or candlestick test dynamic: arms in abduction, rotation external to 90°, elbow flexed and pushed back into back and the patient is asked to repeat for 3 minutes (or at least 40 times), flexion-extensions of the fingers (**Figure 8, Figure 9**).

3. Paraclinical Balance Sheet

It confirms the diagnosis positive clinical by highlighting permanent injury. If negative, the balance sheet brings this entity into the frame functional pathologies.

- The standard radiograph of the spine cervical, allows objectifying a rating cervical, transverse apophysomegaly C7, a malunion of the clavicle or a non-union. Magnetic resonance imaging, visualizes the brachial plexus, the fibrous strips, the masses muscle and any suspicious deformity of the region.

- The electro-myogram detects in the pure neurological forms, abnormalities of amplitude, motor conduction and sensitive peripheral nerves as well as root pain and denervations.



Figure 8. Stress test of Roos (flexion of the fingers).



Figure 9. Roos test stress (finger extension).

- The arterial Doppler resting and dynamic: orientation examination in vascular forms.
- The Doppler echo allows visualizing the level of compression and its reports.
- The digitalized dynamic angiography: gradually replaced by spiral angioscan or angio-MRI, considered indispensable original compression diagnosis arterial, making it possible to objectify stenosis or stopping the arterial flow.
- The phlebography in case of edema of the hand.

4. Rehabilitation

At the end of this assessment, we propose three types of rehabilitation:

Cervical rehabilitation based on:

- Property or reprogramming neuromuscular: the patient learns to integrate into his life activities daily, a normal posture without contracture, neither stress nor pain and avoid a pathological posture.
- Hygiene of life on the innocuous postures and painkillers of the cervical spine and decontracting postures.

Cervical rehabilitation and upper limbs: in case of plexic syndrome of the upper limb:

- Teach to avoid all postures putting stress or irritating the plexus Brachial (maximum anterior elevation greater than 110°, abduction and retropulsion greater than 80°), taking into consideration any pathology of shoulder.
- Relaxation and muscle relaxation.
- Proprioception of the cervical spine and of the shoulder.
- To eliminate tensions and normalize the state mechanic-sensory of the chain neuromeningeal.
- Health of life with learning of useful postures, guarantors of economy muscular daily gestures.

Specific Rehabilitation: if cervico-thoracobrahial traversal syndrome or neurovascular compression dynamic.

Muscle relaxation (superior trapezius, scapular, sternocleidomastoid and scalene).

- Mobilization of acromioclavicular joints, sternoclavicular, scapulothoracic joints joint play cervicothoraco-scapular.
- Neuro-meningeal mobilization if syndrome important plexic.
- Special property and spine shoulder.
- Normalization of the temporomandibular joint and the thoracolumbar spine in some complex cases.

Rehabilitation should be done 3 times per week during at least eight weeks with the physiotherapist. Obtaining good results largely depends on motivation and perseverance of the patient.

On the other hand, the method of Peet or his derivatives with stereotypical exercises as well than muscle building, are only more recommended because not all exercises have not the virtues of opening the clamp costoclavicular [4].



Figure 10. Exercise of proprioception of the shoulder.

The principle is to look for a certain balancing muscle tension in particular the upper trapezium (described as a parasitic muscle of the region cervical and scapular) and a reharmonization of the cervicothoracic articular scapular.

A cervical cushion adapted with variable foam densities is proposed in any case, looking for a position of relaxation of the column cervical and regional muscles.

Self-rehab sessions:

In chronic and severe forms, and during critical periods (cold, overwork, stress...), sessions maintenance are recommended to optimize and maintain the results obtained. They are performed at a frequency of one session per week for six weeks, based essentially on:

- Muscle relaxation.
- The proprioception of the shoulder (**Figure 10**).
- The correction of postures in static and in dynamics.
- The hygiene of life.
- The work of abdominal breathing is an integral part of the protocol so to open the costoclavicular forceps.

5. Conclusion

The complexity of the crossing syndrome Cervico-thoraco-brachial careful dismemberment of this pathology before establishing a protocol for adapted and specific rehabilitation is to avoid recurrence, and to improve the quality of treatment as well as the quality of life.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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