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CHAPTER 29

Cervicogenic headache

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Pain arising in the cervical region, particularly in the craniocervical junction, frequently refers to the occipital region. This type of headache has been defined by the 'Ad Hoc Committee on Classification of Headache' (1962) as 'headache due to the spread of pain by noxious stimulation of other structures of the cranium and neck (periosteum, joint, ligament, muscle or cervical root)'.

The diagnosis of 'cervicogenic headache' is therefore justified only if irritation of the cervical region is the most important cause and not a secondary symptom. This can be confirmed, for example, by the effect of specific therapy as well as by specific pain-provoking maneuvers (Williams and Elkins 1942; Wolff 1972; Caillet 1977; Lewit 1984). Marked morphological changes in the cervical spine and in structures of the neck leading to headache should be separated from functional disorders of the cervical spine. The literature often describes osteochondrosis, disk lesions and osteoarthrosis as the main causes for neck pain. Clinical reports compared with X-ray studies show no correlation between pain and degenerative lesions (Reischauer 1955; Friedenberg et al. 1959; Morscher 1980). Degenerative lesions are more commonly found in the lower cervical spine than in the upper part, and disks do not exist in the segments C0/C1 and C1/C2. This chapter will deal with headache of cervical origin caused by *functional* disorders of the cervical spine.

Headache of cervical origin is most frequently felt in the occipital region and may radiate unilaterally or bilaterally, its intensity varying from a sensation of pressure to a severe headache. Pain is frequently provoked by movement, position or load. There may be concomitant symptoms of dizziness and of temporarily or even persistently disturbed autonomic nervous function.

Migraine-like symptoms of visual and acoustic disturbances, and accompanied by a disturbed autonomic function, should be distinguished from this basic symptomatology of cervicogenic headache. Barré (1925, 1926) called it 'le syndrome sympathique cervical postérieur' and believed it to be due to irritation of the vertebral nerve. Bärtschi-Rochaix (1968) described similar cases mainly caused by injury to the cervical spine, used the term 'migraine cervicale', and believed that the cause lay in a compression of the vertebral artery in the cervical region. Such cases frequently have unilateral but may have bilateral pain.

Sjaastad (1983) described a subtype of 'cervical headache', which he termed 'cervicogenic headache'. The headache was a frontal and occipital unilateral chronic one which was accompanied by disturbed autonomic nervous function and relieved by local anesthesia of the C2 root. Pain

could be provoked by local pressure and/or specific movements of the neck. Bogduk (1981, 1984) reported on occipital headache and local anesthetic blocks of the C2 root.

THE BIOMECHANICS OF THE CERVICAL SPINE

Head motion is the result of the complex mobility of individual cervical vertebrae. For lateral flexion, rotation and combined head movements, a three-dimensional movement of each cervical vertebra is necessary (Jirout 1972, Kapandji 1974). The movement is controlled by the biomechanics of the articulations and ligaments and is actively performed by the complex function of the intrinsic musculature of the cervical spine. The long muscles of the spinal column and the shoulder also have a stabilizing function (Basmajian 1978).

The muscles which are attached to the base of the skull and the upper cervical spine (Mm. trapezii, Mm. scaleni, Mm. sternocleidomastoidei, etc.) fix the cervical spine, the head and the upper part of the thorax and also control movement (Travell and Simons 1983).

The craniocervical junction should be distinguished from the rest of the cervical spine.

1. The most frequent movement of the head, i.e. rotation to each side, up to about 25 , and nutation, are carried out in the segments C0/C1 and C1/C2 without significant participation by the rest of the cervical spine (Gray 1973).
2. The craniocervical junction also compensates the obliquity originating in the lower cervical spine during head rotation greater than 25 and lateral flexion, in order to maintain the required position of the head (Kapandji 1974). A disturbed function at one point may change the entire motor pattern of the affected parts and produce changes causing pain. The complexity of this movement is shown in Figure 1.
3. Proprioceptors from articulations, tendons, muscles, etc. in the craniocervical junction play a great part in the control of posture by their impact on the postural musculature tone (McCouch et al. 1951; Wilson and Maeda 1974).
4. There is a close relationship between the upper cervical spine, A. vertebralis and radices, and peripheral nerves, i.e. N. sinuvertebralis.

The great number of functions performed by the neck muscles and the complexity of the function of the cervical spine easily explain the high incidence of disturbed function of the craniocervical junction.

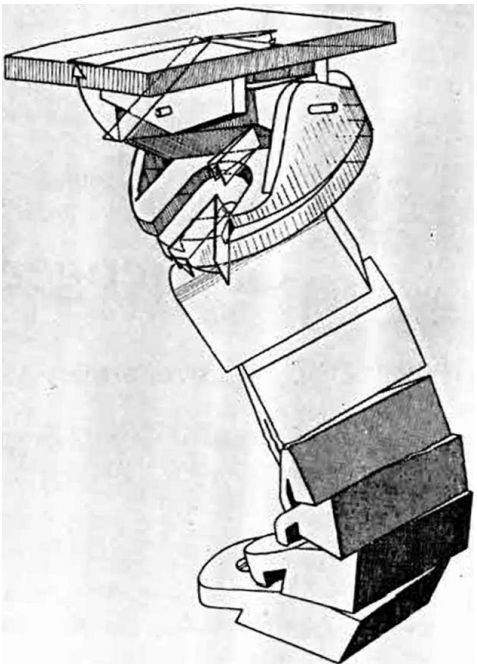

Fig. 1. Biomechanics of the cervical spine. Compensation in the suboccipital vertebral column: pure lateral flexion of the head and neck occurs simultaneously with flexion and rotation in the lower cervical column. In order to get the required position of the head, compensation ensues in the suboccipital vertebral column (rotation, extension, lateral flexion). (Reproduced from Kapandji 1974, by courtesy of the Publisher.)

FUNCTIONAL PATHOPHYSIOLOGY OF THE CERVICAL SPINE

Neck pain seems to be often caused by dysfunction of the intrinsic suboccipital muscles and the long neck muscles (Fig. 2), and by functional lesions of the joints of the upper cervical spine. The primary reasons often can be faulty movement patterns of the head, and bad posture of the head, neck and thorax, probably often caused by low quality of motion control. Increased tension of the muscles can be caused by psychological

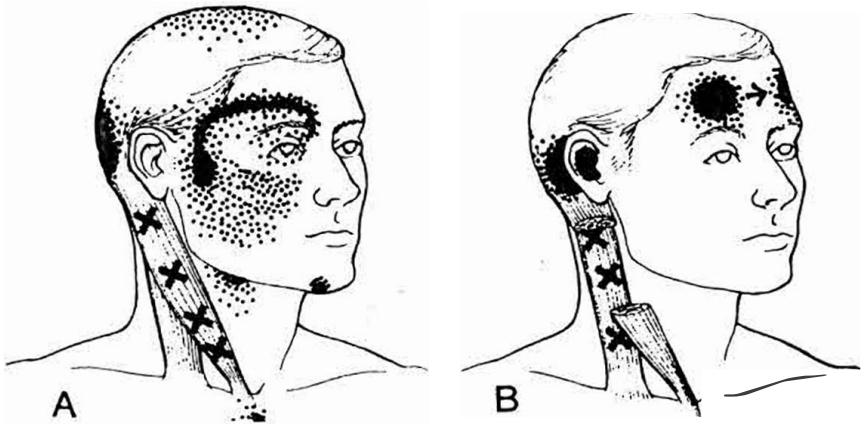

Fig. 2. Referred pain patterns of the sternocleidomastoid muscle (solid areas show essential zones and stippling shows the spillover areas) with location of corresponding trigger points (X). A: The sternal (superficial) division. B: The clavicular (deep) division. (Reproduced from Travell and Simons 1983, by courtesy of the Publisher.)

factors (Jirout 1972, 1981; Travell and Simons 1983; Gutmann 1984; Lewit 1984).

The most important faulty movement patterns are:

1. Hyperactivity and increased tension of the upper fixators of the shoulder girdle, i.e. the upper part of the M. trapezius and the M. levator scapulae, and weakness of the lower fixators, i.e. the lower part of the M. trapezius, the M. serratus lateralis and the M. rhomboideus (Janda 1974).
2. Forward-drawn head position (i.e. the meatus acusticus externus lies in front of the upper anterior edge of the vertebral body of C7, if the head is held in the erect position). This is compensated for by increased lordosis of the craniocervical junction (Lewit 1971).
3. Faulty respiration, accompanied by overactivity of the Mm. scaleni and the Mm. sternocleidomastoidei, producing increasing strain on the cervical spine (Brügger 1977; Lewit 1978; Travell and Simons 1983).

These disturbed motor patterns (stereotypes) may also cause derangement of individual cervical articulations (Gerstenbrand et al. 1974; Gutmann 1983) and of the corresponding short intrinsic neck muscles, as well as of the long neck muscles. Myofascial trigger points develop in these muscles by direct overload, overwork fatigue, chilling, gross trauma, or indirectly from other trigger points, visceral disease or joint dysfunction (Travell and Simons 1983). Irritation of trigger points by pressure may even produce headache, while local anesthesia may relieve it (Travell 1955).

Gutmann (1968) described anteflexion headache and headache in schoolchildren ('Schul-Kopfschmerz') believed to be due mainly to overstrain of the ligamentum transversum atlantis. Headache occurs after head anteflexion of long duration, especially at school, after knitting, etc. According to Gutmann (1968) and Lewit (1971, 1977a, b), articular movement restriction at the craniocervical junction may greatly increase this type of strain at the junction.

SYMPTOMS OF CERVICOGENIC HEADACHE

Type of headache

There is no single characteristic for cervicogenic headache. There may be no more than a diffuse sensation of pressure, or there may be splitting headache, but very intense throbbing or chronic unilateral occurrence is not a typical feature of headache caused by functional disorders of the cervical spine and may indicate complications or the presence of another cause.

Concomitant symptoms

Disturbed function of the upper cervical spine may also cause disturbances of equilibrium in

addition to headache, with symptoms of dizziness and even of vertigo dependent on movement and head position. Such disturbances of balance may also persist during pain-free intervals (Hülse 1983; Lewit and Berger 1983). Neck pain as well as disturbance of autonomic function, such as nausea, vomiting, acoustic phenomena and disturbance of vision, may occur in what Bärtschi-Rochaix (1968) called 'cervical migraine' and have also been described by many other authors. Unfortunately, they included migraine cases in their material. Concerning the various symptoms of so-called 'cervical migraine', its pathogenesis and clinical features are difficult to define (Sjaastad 1983) and, further, cervical migraine is probably a misnomer since it is not a migraine.

Anamnestic features

The following anamnestic features of cervicogenic headache are characteristic:

1. A chronic relapsing course.
2. The simultaneous appearance of other painful disorders of the locomotor system, such as shoulder pain, and low back pain.
3. Trauma of the cervical spine, bearing in mind that head injury usually involves injury of the cervical spine as well.
4. The relevance of position, movement and load. Pain starting during the night or first thing in the morning may be due to a faulty position while sleeping; pain may be provoked by movement; school headache is provoked by anteflexion of the head over long periods.
5. In typical cases, the headache is paroxysmal; headaches of marked and constant intensity are not characteristic of cervicogenic headache produced by functional disorders of the cervical spine.
6. Cervicogenic headache as a rule is asymmetrical. Pain radiates more frequently from the region of the neck to the ear, the temples and the eyes, but there may also be frontal and facial pain.

There is hardly any localization of pain which would exclude cervicogenic headache. From the site of the headache, it is possible to draw conclusions as to the site of the cervical irritation,

Fig. 3. Apparatus and electronic equipment for the measurement of the movement of head and neck (Reproduced from Berger 1984, by courtesy of the Publisher.)

but not its exact location (Onkelinx 1972; Eder and Tilscher 1978).

DIAGNOSIS

The diagnosis of cervicogenic headache should only be made if typical signs of irritation and disturbed function of the cervical spine are found at examination, and if pain can be either provoked or alleviated by acting on the lesioned structures at the upper cervical roots (Bogduk 1981; Sjaastad 1983; Bogduk 1984).

The most important diagnostic method of examination in cervicogenic headache is manual examination. Routine examination of overall mobility of the head is not sufficient to determine that a segment is affected (Berger 1984). For this purpose it is necessary to examine the passive mobility of each segment and its resistance to displacement of the end position. It is of great help that the disturbances of mobility are accompanied by typical pain points (trigger points) in muscles (Travell 1955; Travell and Simons 1983) and their attachments to the occiput and to the cervical vertebrae, as well as at the joint capsules or ligaments. By stimulation of these trigger points, radiating pain in the head and forehead can be observed (Travell and Simons 1983) (Fig. 2). Local anesthesia or 'dry needling' of trigger points may often decrease the pain (Lewit 1979). In addition, there are characteristic changes in the skin and the subcutaneous tissue, which appears 'thicker' at the site of the hyperalgesic zones, i.e. it is less easily folded or stretched, and the patient himself frequently experiences a degree of dysesthesia.

So far, it has not been possible to measure three-dimensional head movement dynamics, the dysfunction of segmental motility and active movements of the cervical spine. We developed a method for 6-axis movement measurement of the head and neck (Berger 1984) (Fig. 3), which allows the investigation of disturbed segmental and multisegmental motional disorders of the neck (Fig. 4).

X-ray pictures taken under standard conditions may provide useful pointers to disturbed posture producing overstrain; X-ray pictures in anteflexion, retroflexion (Arlen 1979) and lateral flexion may show signs of segmental lesions (Jirout 1972; Gutmann 1984). Restricted rotation, which is a very frequent clinical finding, is difficult to prove by X-ray. So-called degenerative lesions should not be considered automatically as the cause of cervicogenic headache (Heyck 1982).

If there is any suspicion of inflammatory or other serious pathology, further examination, of course, is indicated. To uncover significant causative as well as perpetuating factors it is important not to miss faulty posture, movement or breathing, and to bear in mind the possibility of overstrain at work, as well as the patient's leisure activities.

TREATMENT

In the first place, specific pathogenic therapy should be applied to treat those disturbances of the cervical spine found during examination. After treatment of local lesions, rehabilitation may be required. The effect of specific treatment often confirms the first diagnosis or reveals inadequacies in it.

The principal methods of treatment consist of:

1. Improvement in segmental movement restriction, mainly by mobilizing techniques which may be performed by the patient himself (self-mobilization).
2. Techniques of muscle relaxation can abolish lesions of the intrinsic, as well as the long spinal, muscles. Postisometric relaxation is particularly useful: isometric resistance of little force for about 10 seconds is followed by relaxation and spontaneous stretching for the next 10 seconds. There are specific techniques for each muscle with increased tension (trigger points) which are also effective if the point of attachment is painful. Travell and Simons (1983) described a technique for muscular relaxation using a vapocolant ('spray and stretch').
3. If there is hyperalgesia of skin, subcutaneous tissues or periosteum, local application of anesthetics or simple needling of the trigger points may be useful.
4. If there are strong signs of irritation, as after whiplash injury or in local inflammation, immobilization with a firm (plaster) collar is indicated. If the patient improves, a soft supporting collar should be worn when travelling by car or train, or whenever there is irregular shaking.

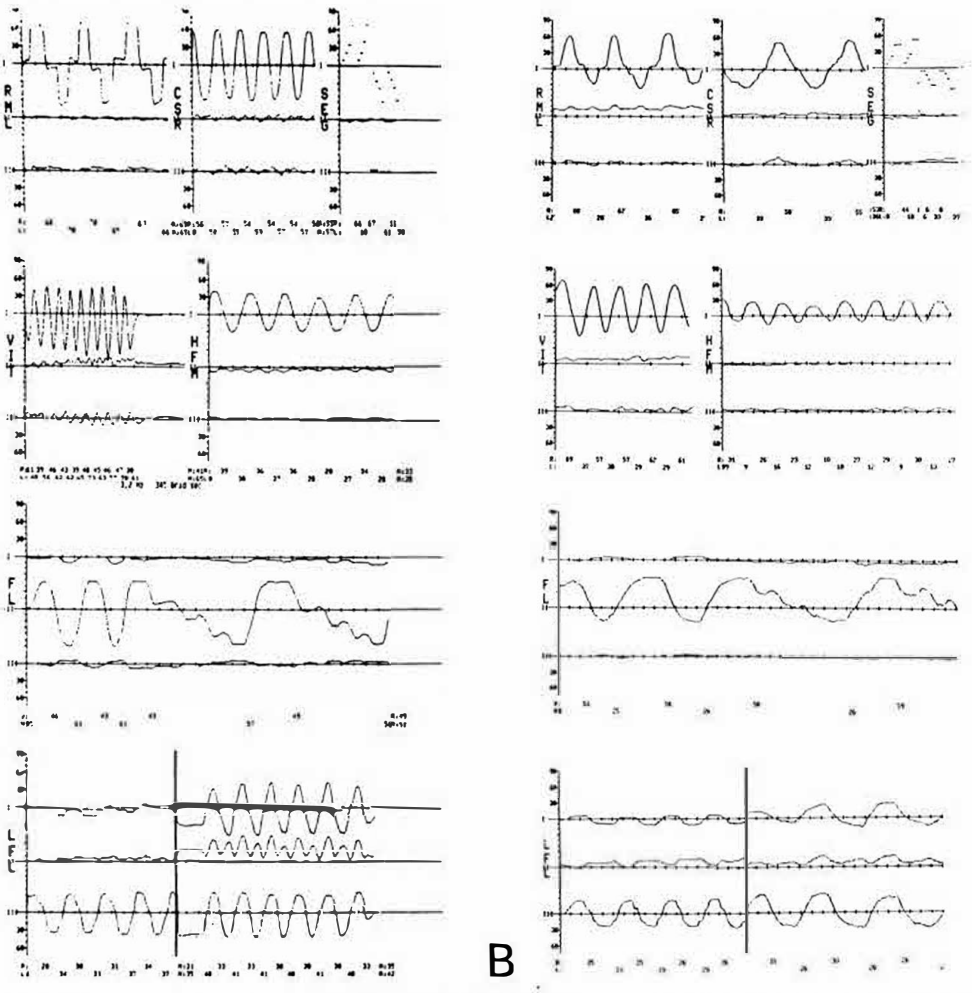

Fig. 4. Three-dimensional measurement of standardized test movements of the head and neck using cervicomotography (Berger 1984).
A: Cervicomotogram of a 35-year-old healthy person. I: rotation; II: flexion/extension; III: lateral flexion; RML: rotation with 1 step per second to right-middle-left (eyes closed); CSR: only rotation of the cervical vertebral column; SEG: segmental rotation motility; VIT: rapid rotation; HFM: movement of the head following a swinging pendulum; FL: ante- and retroflexion; LFL: lateral flexion.
B: Cervicomotogram of a 31-year-old patient (2 years after whiplash injury) suffering from cervicogenic headache. Restricted and irregular active rotation to the left (RML, CSR), restricted rotational segmental mobility of the upper cervical spine to both sides (SEG), reduced rotational speed (VIT) and painful restricted retroflexion (FL) and lateral flexion to both sides with erratic movement (LFL).

5. Physical therapy, with traction, massage, the application of heat (by short waves or microwaves) or of cold (ice bags), may relieve local symptoms.

6. Pharmacotherapy: nonsteroid antirheumatic analgesics may be useful in cervicogenic headache, but side effects have to be taken into consideration. In some cases, particularly if there are signs of tension headache, myorelaxant drugs may help. If there are signs of autonomic nerve disturbance, antimigraine drugs may be tried with caution, since there are possible negative effects.

In more severe and chronic cases, motor rehabilitation is usually essential. This includes making adaption easier at work, for instance, providing a sloping writing desk or a correct

back support. Even more important is the correction of faulty posture, faulty motor patterns, and faulty breathing, which are factors in causing and perpetuating cervicogenic headache.

Surgery may be indicated for headache of cervical origin if there is morphological damage of the nerve root, A. vertebralis, or other structures of the neck, and such can be diagnosed as the primary cause of pain (Hunter and Mayfield 1949; Kehr et al. 1976; Pasztor 1978; Gronbaek 1982).

SUMMARY

The literature often describes osteochondritis, disk lesions and osteoarthrosis as the main causes for neck pain. Clinical experience and X-ray studies compared with clinical reports show no correlation between pain and degenerative lesions. Degenerative lesions are more commonly found in the lower cervical spine than in the upper part, and disks do not exist in the segments C0/C1 and C1/C2. Excluding, of course, the morphological process causing a lesion of the medulla spinalis, radix, peripheral nerves, A. vertebralis and sympathetic (plexus), intermittent neck pain (and cervicogenic headache) seems to be caused more often by functional disturbances (disorders) of the muscles, joints and tissues, wherever contributing factors can lead to the increase or perpetuation of pain and dysfunction.

We have to be aware that the same pathophysiological causes (reasons) occur in the cervical spine as in the spine and the locomotion system.

Neck pain is often caused by dysfunction of the intrinsic suboccipital muscles and the long neck muscles, and by functional lesions of the joints of the upper cervical spine. The primary reasons are often faulty movement patterns of the head, and bad posture of the head, neck and thorax, often caused by low quality of motion control. Increased tension of the muscles can be caused by psychological factors.

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