

Joanna WOJCZAL

Current Opinions in Etiopathogenesis of Headaches Caused by Cervical Spine Pathology

Współczesne poglądy na etiopatogenezę bólów głowy związanych z patologią kręgosłupa szyjnego

Headaches of occipital and nape region, which repeat paroxysmally and are concerned with cervical spine disorders cause many problems in everyday medical practice. This review article presents problems of classification, clinical features and current opinions in etiopathogenesis of headaches caused by cervical spine pathology.

Headaches of occipital and nape region, which repeat paroxysmally and are concerned with cervical spine (it means dependent on its movements or caused by its overload) cause a lot of problems in everyday medical practice. In the latest edition of "Classification and Diagnostic Criteria for Headache Disorders, Cranial Neuralgias and Facial Pain" this type of headache has been coded to the 11th group: "Headache or facial pain associated with disorder of cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cranial structures" (7). According to the comment of this classification "Cervical headaches are associated with movement abnormalities in cervical intervertebral segments. The disorder may be located in the joints or ligaments. The abnormal movement may occur in any component of intervertebral movement, and is manifested during either active or passive examination of the movement". However, because of a broad character of above mentioned classification, being the result of its imperfection, in present specialistic literature specific forms of headache are distinguished, which are concerned nosologically, etiopathogenically and clinically with cervical spine pathology. These are:

- 1) so-called Barré-Liéou syndrome,
- 2) anteflexion headache,
- 3) retroflexion headache.

1. BARRÉ-LIÉOU SYNDROME

This syndrome has many synonyms (among others: cervical migraine, cervicogenic headache) and in the opinion of most of the authors (1, 4, 5, 11, 12, 13, 14, 16) has a typical clinical picture, which is composed of:

- 1) headaches of the occipital region with different projection (generally to the forehead);
- 2) pains of the nape with limitation of cervical spine movements;
- 3) vegetative symptoms: nausea, vomitings, excessive sweating, pollakiuria, palpitation;
- 4) vestibulo-auditory symptoms: dizziness, ear buzzing, hypoacusia;
- 5) symptoms from the organ of vision: pains of the eyeball, photophobia, lacrimation, visual acuity impairment;
- 6) cervical radicular symptoms;
- 7) pains of precordial region with pseudocoronary symptoms;
- 8) symptoms from the throat: feeling of a foreign body, pain of the throat;
- 9) signs of depressive-hypochondriac neurosis.

Describing a location of the pain, most of the patients make a very characteristic gesture of "taking off a helmet" moving hand from the occiput to the forehead (5, 12, 14, 16).

Many factors are considered in etiopathogenesis of Barré-Liéou syndrome, such as:

1. Degeneration processes of cervical spine, which may cause:
 - a) irritation of sympathetic fibers of the vertebral arteries adventitia, caused by vasomotor disorders in the field of blood supply of vertebral and basal arteries;
 - b) ischemia of the superior cervical ganglion, caused by compression of its nutrient artery (a branch of the vertebral artery);
 - c) compression of the vertebral artery and secondary impairment of the blood flow in the vertebro-basilar system;
 - d) compression of cervical roots of spinal nerves.
2. Vascular factor:
 - a) atheromatosis of arteries of the vertebro-basilar system;
 - b) "migraine constitution";
 - c) vasomotor disorders;
 - d) venostasis.
3. Cervical spine and cranio-vertebral junction disorders, issuing from dysfunction of nape muscles and long muscles of the neck.
4. Cervical spine injury (whiplash injury, microinjuries concerned with professional activity).
5. Hormonal disorders.

It has not been decided till now, which of these factors is the most important.

Most of the authors emphasize the importance of degenerative changes of the cervical spine. The fact, that the cervical migraine appears in forties when the degenerative changes of the cervical spine start, is to be an evidence of this statement. But in great number of the patients these changes do not produce any neurological symptoms (2, 8, 11). Some of the authors think that they are only an adventitious factor and they have no connection with the cervical migraine (2).

On the other hand, in some patients with cervical migraine there are no degenerative changes in X-ray films (2, 8, 10). According to the current opinions, only changes in the so-called vertebral artery canal, and particularly in unco-vertebral joints may be of essential significance in pathogenesis of Barré-Liéou syndrome. The osteophytes in these joints may irritate and exert pressure on running near the vertebral artery, accompanied by the sympathetic plexus. The changes may be revealed only at oblique projections, tomograms or in computed tomography, which are far less frequently taken than plain films (7, 10).

The opinion of particular significance of "de Sèze's node" (nodule discoosteophytique) in pathogenesis of Barré-Liéou syndrome dominates among French authors. This node is a combination of protruded intervertebral disc and osteophytes in the region of unco-vertebral joints, and may be a cause of compression on cervical roots and vertebral arteries (quotation according to 11).

Many of the authors think that many of symptoms of the syndrome may be explained only by vasomotor disorders concerned with irritation of the vegetative system by above mentioned degenerative changes of the cervical spine. Because of a great number of links between the vegetative plexus of vertebral arteries and the same plexus of carotid arteries, and also with the cervical plexus', the field of irritation may expand far beyond the territory of the vertebro-basilar system of blood supply. This may explain the variety of clinical symptoms (1, 4, 6, 11, 16).

The problem of ischemia of the superior cervical ganglion is often neglected in the discussion of cervicogenic headaches. This ganglion, located on the level of C-2 — C-3, is supplied in blood by one of the direct branches of vertebral artery. Therefore the ischemia, which is caused by the compression of this small vessel in the place of branching off from the vertebral artery, may produce an irritation of the ganglion and the headache in consequence (5).

In estimation of other investigators the compression of vertebral arteries, which leads to ischemia of vertebro-basilar system is the intrinsic factor (12, 15). This opinion is confirmed by studies on hearing disorders, which are found in patients with Barré-Liéou syndrome. They are greater on the side with greater degenerative changes and they become more intense at rotatory movements of the neck. This may produce the ischemia of the internal ear (1, 11).

Do mańska - K alecka (3) noticed for the first time the possible importance of Kimmerly's anomaly in pathogenesis of Barré-Liéou syndrome. Kimmerly's

anomaly has been considered as a developmental disorder of the first cervical vertebral without any clinical significance. The point is that the vertebral artery groove on the posterior arch of the atlas transforms into a short, osseous canal, because of an arcuate bridge built up upon it. The disorder may be on one side or on both sides. The vertebral artery, which is accompanied by the periarterial sympathetic plexus runs then in the canal and may be compressed.

The ischemia of the vertebro-basilar system does not seem to be the main pathogenic factor of Barré-Liéou syndrome, however. First of all, the focal symptoms from the brain stem (for example dysphagia) are not characteristic of the syndrome. Studies of Niewodniczy (11) did not reveal in a large number of patients during many years that symptoms of ischemia of brain stem appeared in these patients.

Many of the authors think, that Barré-Liéou syndrome is one of the clinical forms of brain atheromatosis (11). The compression of the arterial wall by osteophytes is to promote creation of atheromatous plaques in the vertebral artery (15). But the above mentioned studies of Niewodniczy do not confirm a supposition, that patients suffering from Barré-Liéou syndrome develop in the future distinct symptoms of brain atheromatosis (11).

According to Prusiński (13, 14) Barré-Liéou syndrome should be considered a form of the classic migraine, which refers to the vertebro-basilar system, not the carotid one. The muffled "migraine constitution" is to be at the base of this disease. The syndrome may appear because of the influence of additional factors, such as humoral, degenerative or vascular changes, muscular contraction etc. The constellation of these factors creates a clinical picture of the disease, but it is not its essence. In support of this opinion Prusiński reports the frequent positive family history of the classic migraine or suffering from migraine in one's young days and beneficial effect of ergot alkaloids treatment and of other antimigraine drugs (13, 14).

Clemes (quotation according to 5) thought that the most important reason of the headache in the cervical migraine was the venostasis. He noticed that in the vertebral canal there were often thin-walled phlebectasis, which might be revealed by contrast radiological examination. The compression of the cervical vertebrae and constriction of intervertebral foramina produced an overfilling of these varices, difficulty in blood outflow and in consequence the venostasis in the vertebral canal. In support of this statement he reported a fact of immediate regression of the pain after hand extension of cervical spine, which was to lead to facilitating of venous outflow through "opening" the intervertebral foramina.

One of the characteristic symptoms of Barré-Liéou syndrome is the increased nape muscles tone. At the same time the muscles are painful. Therefore, for a long time a muscular factor has been taken into account in pathogenesis of the disease. The evidence of this is beneficial therapeutic effect of muscle hypotonic drugs treatment (for example mydocalm, metocarbamol) and of physio- and kinesi-

therapeutic methods, beneficial influence of infiltrationary blocades of the nape muscles (1, 5, 11, 16).

The headache of the occiput is the main sign of Barré-Liéou syndrome. But it has not been decided till now if the increased muscle tone is a cause or a consequence of the pain. It is not excluded that the muscle symptoms are secondary phenomenon, which is produced by forced maintaining the head in a motionless position to avoid the pain. It is known that in the cervical migraine head movements intensify the pain, like in other types of headache (11).

Heyck notices (5), that the pain disappears after using cervical spine traction. In his opinion this contradicts the possibility of muscle origin of the pain and this evidences the connection of the pain with constriction of the vertebral foramina and irritation of neural structures, which are responsible for the pain.

The electromyography findings are an objective confirmation of increased nape muscles tone. But at the same time, the reflex contracture of nape muscles may also be found electromyographically in the cases of degenerative changes of the cervical spine without signs of cervical migraine (11).

Recently, cranio-vertebral junction disorders, those of upper cervical vertebrae function and of muscles are thought to be of great significance (2, 6, 12). These changes may cause secondary distortion of head kinetic patterns, may lead to incorrect position of the head and to overloading of some of the cervical auxiliary muscles, which cause their increased tone. This mechanism, however, does not explain all of disease symptoms (11).

Bärtschi-Rochaix (1), who created "cervical migraine" conception thought in his first reports, that whiplash injury was the essential pathogenic factor of the disease. Then he changed his mind (1). But there is no doubt that microinjuries which are concerned with professional activity are of great importance in arising degenerative changes of the cervical spine and symptoms connected with them. According to studies of Niewodniczy (11) many of patients with Barré-Liéou syndrome carry on such profession as dressmaker, weaver etc. The practice of these professions is concerned with immobile maintenance of the head in non-physiological, slanted position (1, 11, 13).

Apart from the above mentioned factors in the opinion of some of the authors, an increased vegetative and vasomotor lability must be taken into account, which is caused by hormonal disorders connected with climacterium. But these disorders are so widespread that they cannot be considered themselves as an essential pathogenic factor (1, 11, 13, 16).

In the light of presented information for the present, the opinion of multifactorial etiopathogenesis of Barré-Liéou syndrome seems to be the most appropriate (11, 13, 14). It is impossible to decide, which of the mentioned factors is the most important. May be the further progress in this field will be concerned with development of studies on pathogenesis of vasomotor headaches and particularly on biochemical aspects of this problem.

2. ANTEFLEXION HEADACHE

In 1968 Gutman has described an independent form of the headache, so-called anteflexion headache. The syndrome is composed of the headache, which appears only during work with the head in anteflexed position (reading, writing, sewing). The pain passes after lying down. It often occurs in children and young people ("school headache"), sometimes after cranial injuries, it may also occur in adults, particularly in some professions such as the dentist.

It is to be produced by relaxation of the transverse ligament of the atlas, which is caused by prolonged straining of this ligament. Then the ligament compresses the dura mater. Afterwards, the painful contracture of nape muscles and that of epicranial aponeurosis occurs (5, 12, 13). It is believed, that in some children the transverse ligament of the atlas is hypoplastic (5).

The dilatation of a slit between anterior arch of the atlas and the dens of the epistropheus is found on functional X-ray films in these patients. Objectively there are the following findings: tenderness on deep palpation of a spinous process of C-1, contracture of nape muscles and painfulness during passive bending of the head to the chest and transitory holding the head in this position (12).

3. RETROFLEXION HEADACHE

This pain is also called the pain of the posterior arch of the atlas. It was described by Lewit (10) and it occurs after prolonged retroflexion of the head. In this position occipital squama is to irritate the posterior arch of the atlas. Objectively tenderness on deep palpation of a spinous process of C-1 occurs.

REFERENCES

1. Bärtschi-Rochaix W.: Headaches of Cervical Origin. [in:] Handbook of Clinical Neurology. T. V. Red. P. J. Vinken, G. W. Bruyn. North-Holland Publ. Comp., Amsterdam 1968, 192.
2. Bystrzanowska T.: Kilka uwag o zespole Barré-Liéou. Otolaryngol. Pol. 28, 89, 1964.
3. Domańska-Kalecka A., Gaj T., Bartecki B. F.: Anomalia Kimmerlego i migrena szyjna. [in:] II i III Sympozjum „Migrena i pokrewne bóle głowy”. Red. A. Prusiński, Łódź 1980.
4. Gietka J., Kozłowski P.: Zespół szyjny tylny Barré-Liéou. Pol. Arch. Med. Wewn. 30, 65, 1960.
5. Heyck H.: Headache and Facial Pain. Geor Thieme Verlag, Stuttgart 1981.
6. Janczewski G.: Zawroty głowy pochodzenia szyjnego. [in:] Otoneurologia kliniczna. Red. Z. Bochenek, PZWL, Warszawa 1977, 257.
7. Klasyfikacja i kryteria diagnostyczne bólów głowy, nerwobólów czaszkowych i bólu twarzy. Neurol. Neurochir. Pol., supl. 1, 1993.
8. Kun M., Niewodniczy A.: Wyniki badania zonograficznego kręgosłupa szyjnego w przypadkach tzw. migreny szyjnej. Neurol. Neurochir. Pol. 8, 37, 1974.
9. Latkowski B., Prusiński A.: Zawroty głowy. PZWL, Warszawa 1972.

10. Lewit K.: Leczenie manualne zaburzeń czynności narządu ruchu. PZWL, Warszawa 1984.
11. Niewodniczy A.: Migrena szyjna i współczesne poglądy na jej patogenезę. Pol. Tyg. Lek. **23**, 1003, 1976.
12. Niewodniczy A.: Bóle głowy pochodzenia kręgowego. [in:] Ostre bóle głowy. Red. A. Prusiński, PZWL, Warszawa 1990, 111.
13. Prusiński A.: Bóle głowy, ich przyczyny i leczenie. PZWL, Warszawa 1973.
14. Prusiński A.: Migrena. PZWL, Warszawa 1982.
15. Sałaskina W., Dymecki J., Kuligowski Z., Kozłowski P., Ostrowska D., Trzebicki J.: W sprawie związku między zmianami zwyrodnieniowymi kręgosłupa szyjnego a zaburzeniami krążenia w tętnicy kręgowej. Neurol. Neurochir. Pol. **17**, 11, 1967.
16. Stein W.: Bóle głowy. PZWL, Warszawa 1961.

Otrzymano 1995.08.27.

STRESZCZENIE

W codziennej praktyce lekarskiej częsty problem stanowią bóle głowy w okolicy potylicy i karku, powtarzające się napadowo i przyczynowo, związane z patologią kręgosłupa szyjnego. Przedstawiono problemy klasyfikacji, obraz kliniczny i współczesne poglądy na etiopatogenезę bólów głowy związanych z nieprawidłowościami kręgosłupa szyjnego.

