THE ROLE OF THE MUSCLES IN THE AETIOLOGY OF HEADACHE

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Persistent or recurrent headache in the absence of demonstrable organic disease is one of the commonest clinical problems and an important cause of disability. Unfortunately there is a tendency among doctors to fight shy of objective clinical analysis of headaches, so that diagnoses are apt to be nebulous and treatment a combination of placebos and platitudes. This is the more regrettable because such analysis is not difficult and is often therapeutically rewarding. However, I do not intend in this article to expound the systematic diagnosis and treatment of headaches, but simply to draw attention to a common aetiological factor which is often overlooked: that is, pain in the muscles.

Lewis (1942) states that muscles may become painful and tender as a result of prolonged contraction, and Wolff (1948), quoting his own and other workers' observations, shows that pain of this nature may arise in any of the groups of muscles about the head and neck, including the nuchal muscles, the scalp muscles, the muscles of mastication, and even the pharyngeal and ocular muscles. Every doctor is familiar with the sustained spasm of muscles in the region of an injured joint or over an inflamed viscus, but many forget that the same reflex spasm may occur as a result of painful lesions of the head and neck, and that this spasm may in itself give rise to further pain in due course. Similarly the general increase in muscular tone that accompanies emotional tension, anxiety and apprehension is common knowledge, but the significance of this mechanism as a cause of headache tends to be forgotten.

Prolonged muscular contraction about the head and neck may result from a great many causes which may be classified on a clinical basis as follows:

1. Reflex spasm secondary to any painful lesion in the vicinity, e.g., migraine or other headache, sinusitis, pharyngitis, otalgia, ocular disease, adenitis, arteritis, lesions of mouth, teeth, jaws, skull, cervical spine, etc.

2. Disorders of the muscle itself, e.g., fibrositis, sprains, bruises, scars, etc.

3. Physiological disturbances of muscular action and balance, e.g., faulty or unaccustomed posture, fatigue.

4. Neurological conditions, e.g., neuritis, neuralgia, pressure on nerves, many intracranial conditions (e.g., meningitis, posterior fossa tumour), tetanus, etc., the majority of little importance for the present purpose.

5. Emotional tension.
This list is not, of course, exhaustive, but it includes the causes of clinical importance.

It is important to be able to recognize the presence of a significant muscular component in a headache because it is usually amenable to simple therapy, in contrast to some of the other factors involved. Let us therefore, by way of illustration, consider some representative case-histories.

Case 1.—Lieutenant-Colonel, retired, U.S. Army, aged 58. This heavily-built man had pain and limitation of movement in the cervical and lumbar spine as a result of fractures of vertebrae sustained several years previously. While in hospital for review of these disabilities he remarked that in addition to backache, to which he was accustomed, he had recently started to have severe occipito-vertical headaches. His blood-pressure was 160/100, and he had been told by his doctor at home that his headaches were due to hypertension; this information had made him mildly neurotic about his new symptom.

Physical examination revealed marked spasm of the upper nuchal muscles and the occipitalis, and radiography showed that there was gross osteoarthritis of the upper half of the cervical spine, in the region of an old fracture. Though his blood-pressure was moderately raised, his heart, peripheral vasculature, optic fundi and urine were all normal. His headaches were therefore attributed to muscle spasm secondary to the painful spinal condition; it is possible, of course, that direct pressure on nerves may have played a part. At all events, spasm and headache were relieved by local heat treatment, but more lasting benefit would have necessitated extensive orthopaedic procedures which the patient did not wish to submit to.

Comment: This is an example of reflex spasm in the vicinity of a painful lesion. Although treatment was not very satisfactory, the patient was much relieved to learn that his new symptom was merely part of his old trouble and not hypertensive in origin, and his iatrogenic neurosis was nipped in the bud.

Case 2.—Captain, W.R.A.C., aged 28. This patient complained of headache for several months. It started in the temples as a dull throbbing, spread back to the occiput, down the neck and often into the shoulders. It was worst when she was worried or working especially hard; recently the radiation to the back of the head had become more pronounced and tended to persist even when the temporal throbbing died away. She was otherwise well, but admitted that the headache had begun to impair her efficiency at work and her enjoyment of life generally.

On examination she was athletic, highly intelligent and a little tense. Her blood-pressure was 115/70 and she showed no evidence of organic disease. At the time of first examination she had a moderately severe headache, partly relieved by manual obliteration of the temporal pulses, leaving a duller pain extending to the occiput and down the neck. There was considerable limitation of movement of the neck by muscle spasm, and innumerable tender nodules in the neck muscles, the trapezii, deltoids, and elsewhere. On a subsequent visit,
when she was without headache, a deep subcutaneous injection of 1 mg. of histamine acid phosphate reproduced her "usual" headache perfectly.

On further questioning she admitted that she had been subject to headaches most of her life, though they had never interfered with her activities. She had also had a good deal of muscular rheumatism, especially in the shoulders.

The diagnosis made was (1) vascular headache brought on by emotional stress, and (2) painful muscular spasm secondary to the foregoing, and aggravated by pre-existing fibrositis. Histamine "desensitization" and various other procedures had little effect on the vascular headache, but the muscular component responded excellently to physiotherapy. The final outcome was that she continued to have throbbing temporal headaches when under stress, but these responded fairly well to aspirin and caused her little concern; the muscular component went and did not return. She remarked that her neck must have been stiff for months, but she did not realize it until treatment restored normal mobility.

Comment: This is an example of the two-component headache, and also of the importance of fibrositis in this type of headache. It shows that even when the ultimate cause of a headache resists treatment a useful degree of improvement can often be achieved by dealing with the more amenable muscular component.

Case 3.—Officer candidate, U.S. Infantry, aged 21. This athletic man, during physical training at an Officer Candidate School, was doing a series of leaps into the air from a crouching position; after some seventy of these he experienced sudden excruciating pain in the occiput, radiating over the vertex and down his neck. He felt sick, weak, and blinded by pain, and fell out of the class. However, he was due to be commissioned in a week or two, and being of a resolute character he somehow made light of his pain and after a rest carried on with his training. The pain remained very severe, though it eased a little when he lay down; nevertheless, in three days he was so worn out by pain that he had to see the Medical Officer, who sent him to hospital with a diagnosis of subarachnoid hæmorrhage.

On examination he was an intelligent and unemotional man of excellent physique, who looked tired and drawn and held his head stiffly. He had no fever and his blood-pressure was 125/75. The nuchal muscles were in tight spasm, especially on the left, and there was an acutely tender point deep in the muscle just to the left of the third cervical spine; pressure here caused agonizing and sickening headache which radiated in all directions and made him feel faint. There was, of course, marked stiffness of the neck, but none of the lumbar spine and Kernig's sign was negative. There were no abnormal findings in the central nervous or other systems, and X-rays of the skull and neck showed no bony abnormalities.

His symptoms and signs pointed to a tear in the nuchal muscles, and treatment consisted of rest in bed, local heat, and analgesics. His symptoms improved promptly, and in three weeks he was able to return to full duty.

Comment: This form of physical training appears to be popular in the
American Army, and not unnaturally produces a good deal of skeletal trauma, especially tears of various extensor muscles. Nuchal sprains from other causes can give rise to a clinical picture similar to the foregoing, and are by no means rare as a result of falling over backwards and other misadventures in the course of parachuting, military training and Rugby football.

**Case 4.—** Wife of Sergeant, U.S. Infantry, aged 30. This lady had suffered from severe headaches since the age of 20. The pain started at the base of the skull and spread in all directions, into the face as well as the temples, vertex and neck. Though there were no obvious precipitating factors, she noticed that she had more and worse headaches in some localities than in others: she had been relatively free from them in Colorado, but since coming to Georgia they had become increasingly frequent and severe. She had been treated by many doctors all over the world, and five years previously had attended a well-known headache clinic in New York, where she had been told she had migraine and treated accordingly; however, at no time had she obtained significant relief from ergot, caffeine, nicotinamide, histamine, hormones or barbiturates, though compound codeine tablets temporarily allayed the pain. Despite her wide and unsuccessful patronage of the medical profession, she was not at all neurotic about her complaint.

On further questioning she admitted that fibrositis was “in the family,” and that she often had bouts of muscular pain and stiffness coinciding with her headaches. Physical examination revealed no abnormality beyond innumerable tender nodules in the muscles of the head, neck, shoulders and back. A diagnosis of fibrositic headache was made and physiotherapy and salicylates prescribed. The headaches improved and vanished after two weeks’ treatment; they returned a few months later and were again dispelled by the same treatment.

Comment: This is an example of severe headache due to fibrositis alone. As Cyriax (1938) points out, such headaches often persist for years with little change in pattern or severity. It must be noted that fibrositis can rarely be eradicated though it is usually easily alleviated, so that treatment may have to be repeated from time to time.

It should perhaps be explained that the last patient’s aggravation of symptoms coincided with her arrival in a part of Georgia which is low-lying and damp, with an evil reputation for evoking rheumatic tendencies.

**Case 5.—** Second-Lieutenant, U.S. Infantry, aged 22. This officer, who had recently transferred from regimental to staff duties, complained of almost daily occipital and nuchal headache, increasing in intensity for two months. It came on in the course of the morning and persisted until he went to bed; sometimes it was associated with a vague stiffness of the shoulders and upper part of the back. He seldom had it on days when he did not go to work. His work consisted of studying and marking large maps laid out on drawing-boards, over which he had to bend for hours at a time.
He was otherwise fit. His Medical Officer attributed the headaches to the strain of his staff duties, but the officer himself maintained that he liked his job, was competent at it, and not at all worried about anything except the headaches.

On examination he was in all respects normal, but there was spasm of the nuchal muscles and tender nodules in them and along the upper borders of the trapezius. The diagnosis was clearly headache due to postural muscle-strain. He was given a short course of physiotherapy to disperse the nodules and spasm, and advised to rearrange his map-boards so that he could work at them in comfort. His headaches went at once and did not return.

Comment: The diagnosis was self-evident once a careful history had been taken. This is a common type of headache in those who from habit or necessity sit hunched over their work, such as typists, draughtsmen, accountants, watch-repairers, and even pathologists.

Muscular headaches due to emotional tension are a heterogeneous group. Moench (1951) regards them largely as a legacy from our quadrupedal ancestors, who at times of stress and danger raised their heads and pricked their ears the better to employ their organs of special sense. In addition, it is useful to recall the clenched teeth and heavy frown of apprehension and determination.

Case 6.—Corporal, U.S. Infantry, aged 23. This highly-strung man complained of severe bitemporal headaches almost daily for several weeks. He had been subject to headaches at times of stress most of his life, and had often missed days at school because of them: he admitted that he had often used them consciously to dodge unpleasant duties. There was a history of a nervous breakdown before an important examination at college. He had a number of personal worries and for some weeks had been sleeping badly.

On examination he was nervous, fidgety, and bit his nails, but there was no evidence of organic disease. A diagnosis of anxiety neurosis was made, and he was treated for this in co-operation with a psychiatrist, but little progress was made and his headache persisted.

On re-examining him a little later I was struck by his tightly clenched teeth and iron-hard masseter and temporal muscles. He acknowledged that he usually clenched his teeth when anxious or apprehensive, and thought that it might have become a permanent habit. By encouragement and instruction in deliberate relaxation the habit was gradually overcome and his headaches improved greatly pari passu, though the underlying nervous tension remained unaltered.

Comment: In this case emotional muscle spasm seems to have been the only cause of headache, and the muscle groups affected were unusual. An impacted wisdom tooth or arthritis of the temporo-mandibular joint can cause temporal headache by a similar spasm of the muscles of mastication.

Case 7.—Captain, Royal Signals, aged 32. In the middle of the Egyptian summer this officer, who had sandy hair, a fair complexion and a worrying disposition, complained of frequent frontal headaches. These were worst when he was out in the sun, but also occurred at other times. The pain always
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commenced just above the bridge of the nose, spread gradually over the forehead, and at length involved the whole head. He said that he had always been sensitive to the sun, but had nevertheless spent many years in tropical countries without noteworthy headaches or other symptoms until recently. He admitted to much worrying over his work and private financial affairs.

On examination, the most impressive feature was the intense frown which contorted his whole forehead and even the upper part of his face. I asked him if he always frowned so heavily, and he replied somewhat sheepishly that only a few days previously his wife had taken him to task because he was never without a frown of late. The only significant physical abnormality was a mild chronic conjunctivitis.

The headaches appeared to be due to the intense and prolonged contraction of the procerus, frontalis, orbiculares and other neighbouring muscles, the frowning itself being partly emotional in origin and partly an attempt to protect his sensitive eyes. The habit was gradually broken by the mere fact of drawing his attention to it, by making him wear efficient sun-glasses and a peaked cap instead of a beret, and by helping him to adjust his attitude to his personal difficulties. His headaches became progressively less frequent and ceased to distress him.

Comment: The last case demonstrates how physical and psychological factors may be interwoven and reinforce one another.

Case 8.—Sergeant, U.S. Army, aged 38. This N.C.O., a temperamental cook of continental extraction, was an active, muscular man who claimed never to have had a day’s illness in many years’ service all over the world. In the course of a wordy argument with another N.C.O., while brandishing a saucepan the better to emphasize a point, he was seized with severe pain in the back of the head, whereupon he became hysterical and incoherent, rolling on the ground in agony. He was admitted to hospital.

When I saw him a few hours later he was quiet and rational though very nervous, and complained of severe left-sided occipital headache and stiffness of the neck. The only physical abnormality was a large tender nodule in the muscle one inch to the left of the spine of the axis; pressure upon it caused severe aggravation of the headache. The nodule was forthwith infiltrated with 1 per cent. procaine solution, which caused transient increase in pain followed by relief. An hour later he asked to be discharged from hospital as he was now quite well. The pain did not return.

Comment: Despite his emotional disturbance, I believe that the real cause of his pain was an organic disorder of his nuchal muscles, possibly a localized area of cramp. Prolapse of a high cervical disc can give rise to a clinical picture like this, but lasting relief by procaine infiltration is against this diagnosis here.

DISCUSSION

Many further examples could be quoted, but the foregoing case-histories suffice to illustrate the more important clinical pictures met with in headache...
of muscular origin. The important part played by that obscure but ubiquitous entity known as fibrositis is obvious: sometimes it is already there as a pre-disposing factor, sometimes it appears only after prolonged muscular contraction and seems to be secondary to it.

It is important to emphasize that in all the examples quoted the muscular component was at least as prominent as any other that might have been present, and it is in such cases that simple therapy of the muscular pain may be expected to bring much relief; but when the muscular pain is secondary and subordinate to pain of some other origin (for instance, muscle spasm secondary to severe migraine) therapeutic success depends almost entirely upon conquest of the latter. A large proportion of headaches that last for more than a few hours acquire a secondary muscular component.

Psychogenic headaches are usually of mixed pathogenesis, partly vascular, partly muscular, and perhaps partly due to psychological conversion mechanisms. Worry about the headache, or about the loss of working efficiency that it produces, very often increases and perpetuates the headache itself: sympathetic but authoritative reassurance will often break the vicious circle and send the patient on his way smiling and confident.

The diagnosis of muscular headache depends upon the physician's stock-in-trade: careful history-taking, thorough physical examination, and an ability to think of the patient as a person and not just a lot of "systems" in fortuitous juxtaposition. It should not be necessary to point out that the head and neck should not be omitted from the physical examination, yet patients not infrequently state that this has not been done by their previous doctors.

Some mention must be made of intracranial tumours, because the suspicion that he may have one often causes the headache patient to become neurotic, and the possibility that he might miss one causes many a doctor to lose his judgment and sense of proportion. Intracranial expanding lesions are commonly accompanied by headache, of course, and some (especially those in the posterior cranial fossa) may directly or indirectly cause muscle spasm; but it behoves the physician to preserve a sense of proportion and remember that headaches are exceedingly common, whilst intracranial tumours are rather rare.

Treatment is largely common sense. Where practicable the cause should be eradicated, but often this is impracticable if not actually impossible. Emotional factors are very common, and by and large we cannot change a patient's obsessional or worrying temperament or solve all his personal problems, though we can do much to help him to acquire the right attitude towards these things. Instruction in relaxation is important, for many tense persons do not know how to relax, even in sleep. Local application of heat, massage, manipulation and active exercises help to relieve muscle spasm and disperse fibrositic nodules, and an intelligent patient may be taught to apply these simple remedies himself. Injections of procaine into painful spots are sometimes effective in breaking a vicious circle of pain—spasm—pain. Mild sedation by barbiturates and the like helps relaxation, and specific muscle relaxants such as myanesin have also been used for this purpose. Friedman
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(1951) recommends vasodilators such as nicotinic acid in large doses for the relief of muscle spasm and fibrositis. Finally, such time-honoured remedies as aspirin and compound codeine tablets are not to be despised.

Too often the problem of headache is approached by doctors in a pessimistic and defeatist spirit; too often the patient with persistent headache is regarded as an incubus to be passed dexterously to an unwary colleague. Nevertheless, as I have attempted to show, there is much clinical interest in this field, and much satisfaction to be gained from the results of treatment; in the common variety of headache discussed, moreover, diagnosis depends upon no more than ordinary clinical ability and therapy upon only the simplest of procedures. The whole subject is of great practical importance and merits more attention than it at present receives. For those who may wish to pursue it further Moench (1951) gives a succinct and balanced account.

SUMMARY

1. Muscles about the head and neck, as elsewhere, can become painful and tender as a result of prolonged contraction. This may occur clinically through a variety of common causes, giving rise to headache.

2. Detailed case-histories are quoted illustrating the more important features of muscular headache.

3. The general principles of diagnosis and treatment of muscular headaches are briefly discussed.

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REFERENCES