

OSTEO-ARTHRITIS OF THE PARAVERTEBRAL JOINTS OF THE SECOND AND THIRD CERVICAL VERTEBRAE AS A CAUSE OF OCCIPITAL HEADACHES

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Lord Brain¹ has drawn attention to the frequent occurrence of headaches in cases of cervical spondylosis. He emphasizes that it is frequently the presenting symptom, and states that 'although these headaches are of a distinctive character and readily diagnosed, no adequate explanation as to their cause has yet been offered.' This paper is an attempt to elucidate the cause of this phenomenon on the basis of clinical and surgical observations made in Salisbury, S. Rhodesia, where about 200 cases, referred by physicians, ear nose and throat surgeons, and the neuro-surgeon, were treated, 3 of them by operation. The applied anatomy is based on the dissections of 50 bodies in the Department of Anatomy, Medical School, University of Cape Town.

History and Symptoms

In most of the cases occipital headaches had been present for many years. History of a previous injury was seldom elicited, although some patients related the onset of symptoms to a minor strain. A history of associated and frequent attacks of 'fibrositis' of the shoulder and neck muscles was frequently given.

The headaches appeared at any time. They were often present on waking and either got worse or were relieved as the day wore on. They were frequently aggravated by sewing, typing, motoring, working at a desk, or watching the cinema. Some patients stated that the headaches began after they had started to wear bifocal glasses.

The headache was usually of a dull nagging character. It commenced over the occipital region of the neck and head, passing upwards and forwards over the occipital, parietal, frontal and even as far as the supra-orbital region. It was usually unilateral but when bilateral was frequently worse on one side than the other. On occasions the headaches were associated with vertigo, migraine-like symptoms, and symptoms of trigeminal neuralgia.

Clinical Findings

The patients were usually middle-aged, but very young persons or older persons were often encountered. Very few

obvious clinical signs were evident. The cervical lordosis was often exaggerated and the patients carried the head well forward with the chin jutting out. The muscles of the neck were appreciably weak when tested against manual resistance, especially in flexion and extension.

In some cases a tender area in the occipital triangle was indicated as the site of the commencement of the headache. In all cases a tender area was detected at the level of the paravertebral joint between the second and the third cervical vertebrae on the right or left side. Pressure on this area frequently reproduced the kind of headache complained of. In some instances the greater occipital nerve was tender to pressure.

Extension of the cervical spine was always free, but hyperextension caused pain at the tender area over the paravertebral joint between the second and third cervical vertebrae or along the course of the greater occipital nerve. Flexion was limited but gave symptomatic relief. Lateral bending of the cervical spine away from the tender area frequently increased the pain, whereas lateral bending towards the tender area relieved it. Rotation of the head on flexed cervical spine relieved the symptoms, whereas rotation of the head on the extended cervical spine aggravated them, especially when performed in a direction opposite to the tender area.

Radiological Findings

The radiologists, using the routine views, never reported any abnormality at the tender area, whereas they frequently described an osteo-arthritis of the cervical spine at a lower level, as well as a 'loss of the normal cervical lordosis'. Despite this, certain radiological findings besides these are frequently associated with the condition.

The normal cervical lordosis. In the lateral view of such a cervical spine the lordotic curve is diminished at the level of the fourth or fifth cervical vertebra, by a flexion of the vertebra above while the vertebra below still retained the cervical lordosis, even in spite of the presence of intervertebral disc degeneration.

The paravertebral joints between the second and third



Fig. 1. Radiological appearances of unaffected para-vertebral joints.

cervical vertebrae. In good-quality X-ray plates these joints appear as slit-like apertures set at about 45° off the vertical. In osteo-arthritis of these joints this slit-like appearance is obliterated, and in advanced cases the osteo-arthritic changes extend onto the dorsal aspects of the adjacent lamina. This finding was frequently the only radiological abnormality found in the cases seen (Figs. 1 and 2).

Treatment

The diagnosis was confirmed by injecting a small quantity of local anaesthetic, often with 'hydrocortone', into the painful area. This injection frequently gave not only temporary but complete relief. In many cases it was repeated after 2 weeks.

Physiotherapy. All the patients were given physiotherapy consisting of short-wave diathermy and exercises to build up the neck muscles and to improve the posture. These exercises aimed at reducing the exaggerated cervical lordosis.

Manipulation, with or without a general anaesthetic, was performed if the injection failed to give relief, as follows: The patient was lying on his back. Gentle traction was applied to the head in an attempt to elongate the cervical spine. The cervical spine was then gently flexed and finally the flexed cervical spine was gently rotated to the right and to the left, the head being used as a lever.

Operation. In 3 cases conservative treatment produced no relief and the patients agreed to an exploratory operation. Under a general anaesthetic the upper cervical vertebrae were exposed through a midline dorsal incision. There was considerable venous bleeding. In all three, osteo-arthritic lipping was demonstrated between the para-vertebral joints of the second and the third cervical vertebrae. This was more extensive than the radiological findings had led one to believe, and extended medially

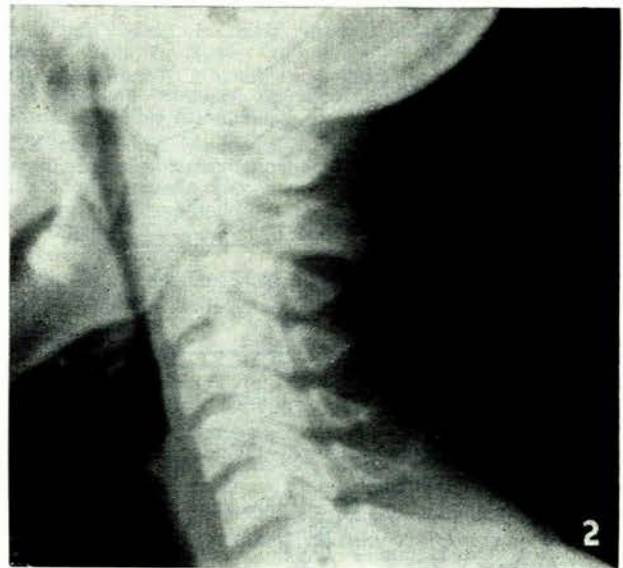


Fig. 2. Radiological appearances of osteo-arthritic para-vertebral joints.

and dorsally onto the lamina of the third cervical vertebrae. The third cervical nerve was demonstrated and found curling across the osteo-arthritic paravertebral joint. In this position the nerve was flattened and lying in a groove in the osteophytic mass. The osteophytes were nibbled away to allow the nerve to lie freely. These patients were all relieved of their symptoms.

Anatomical Findings

The relationship of the third occipital nerve to the paravertebral joints between the second and the third cervical vertebrae is shown in Figs. 3 and 4.

The posterior primary ramus of the second cervical nerve is a large nerve emerging on the inferior aspect of the inferior oblique muscle about 3/8ths of an inch dorsal and medial to the atlanto-axial joint. It then curves dorsally and is referred to as the Greater Occipital nerve.

The posterior primary ramus of the third cervical nerve is also a large nerve and is called the Third Occipital nerve. It emerges from the intervertebral foramen between the second and third cervical vertebrae on the dorsal aspect of the vertebral artery. It then curves dorsally, laterally and finally medially across the paravertebral joint between the second and the third cervical vertebrae. This is the only posterior primary ramus of the cervical nerves that runs across a paravertebral joint. All the lower nerves curve dorsally below the paravertebral joints. In osteo-arthritic specimens a sulcus was frequently found where the third nerve crossed the paravertebral joint.

Discussion and Conclusions

These findings warrant the conclusion that the direct cause of the occipital headache associated with cervical spondylosis is in fact implication of the third occipital nerve by paravertebral osteo-arthritis between the second and the third cervical vertebrae. It must be accepted that some degree of paravertebral osteo-arthritis is an almost

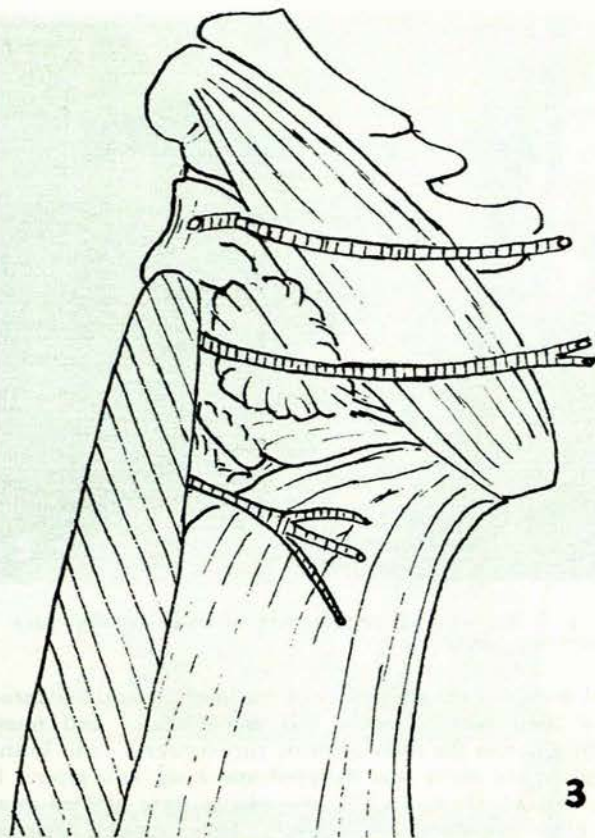


Fig. 3. Lateral view.

inevitable accompaniment of cervical spondylosis. The implication of this nerve appears to reflect, not necessarily an especially high incidence of osteo-arthritis at this level (this possibly requires further investigation), but a peculiarly intimate and very constant relation of the third occipital nerve to the paravertebral joint connecting the second and the third cervical vertebrae. It does not of itself indicate that the condition of spondylosis is itself limited to or most strongly developed at this particular articulation.

Summary

The clinical features of headaches from osteo-arthritis

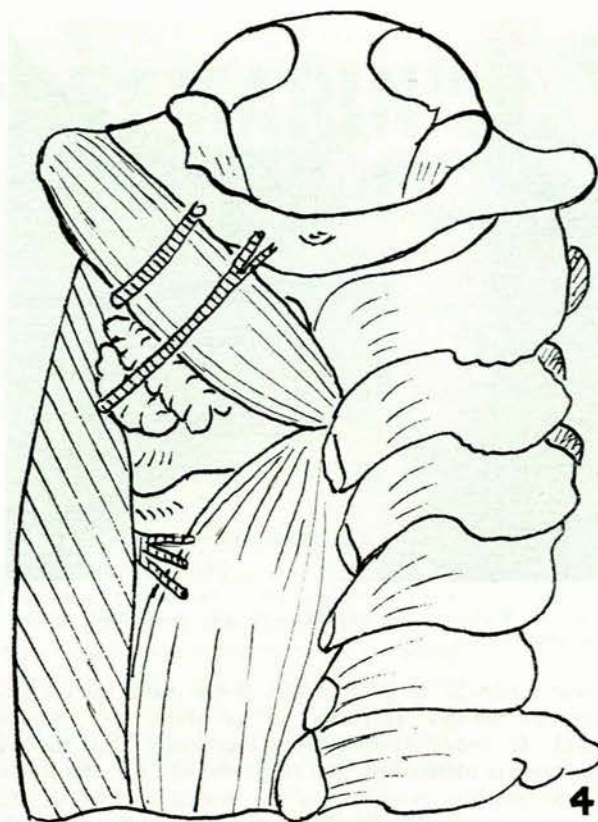


Fig. 4. Dorsal view.

of the paravertebral joints between the second and the third cervical vertebrae are described. Three forms of treatment are detailed and the importance of muscular and postural rehabilitation are stressed. The anatomical basis for the cause of this and the rationale of its surgical treatment are illustrated.

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REFERENCE

1. Brain, R. (1963): *Brit. Med. J.*, 1, 771.