SCIATICA *

With Particular Reference to its Causes and Treatment

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Sciatica (as vulgarly call'd) or Hip Gout ; the Ach in the Hip, for there is the chief Seat of it, tho' by consent of Parts the lower parts of the Back, the Loyns (whence call'd, when upon both sides, the Lumbago) the Groin, the Thigh, and outside of the Leg and Foot also have their share of Pain, and are sometimes convulst withal.

Robert Peirce, Bath Memoirs, 1697.

Sciatica may be defined as pain in the course of the sciatic nerve. Until recently, ideas regarding its nature and cause have been many and confused. Its signs and symptoms are so well known that I do not propose to enumerate or discuss them except to say that in about a third of the cases, pain is felt first in the back, in another third in the buttock and in the remaining third it begins in the thigh or leg. The pain tends to occur in attacks, to be relieved by rest in bed and is exacerbated by coughing, sneezing and straining. We must not forget that sciatica may be the result of advanced malignant disease in the pelvis or elsewhere, but it is not with such symptomatic sciatica that I am here concerned, but with the commoner idiopathic variety, so called because of the absence of any obvious cause but as to which in the past there has been much speculation.

Mankind has suffered from the affliction for a long time. The word sciatica is derived from the Latin, 'Sciaticus,' a corruption of the Greek word for the hip which was at one time thought to be the origin of the condition so that seventeenth-century writers called it hip gout. Shakespeare was aware of the association with the hip, for a gentleman in 'Measure for Measure' (Act I, Sc. II) greets Mistress Overdone with, 'How now, Which of your hips

has the most profound sciatica ?' and Timon of Athens makes the uncharitable remark (Act IV, Sc. I), 'thou cold sciatica, Cripple our senators, that their limbs may halt as lamely as their manners.'

Views as to Pathogenesis

It has been called Cotunio's disease after the Neapolitan physician, Domenico Cotunio, who in 1764 described it as *ischias nervosa postica*. In more recent times it was thought that the sciatic nerve itself was inflamed, but although the nerve used often to be explored, it was not seen to be so inflamed, and in 1927 Wiedhoff noted that anaesthetic blocking of the nerve failed to relieve the pain but that sacral anaesthesia did, indicating that the lesion was high up. In addition to the hip joint, the sacro-iliac, the lumbo-sacral and the intervertebral articular joints have been held responsible, the piriformis muscle (Yeoman, 1928) and bands of fascia at the exit of the nerve from the pelvis (Rendle Short, 1936) and elsewhere. Quite recently, however, we have begun to regard the nerve roots as the origin of sciatica rather than the great sciatic nerve itself or the joints, muscles or fascial bands to which it is related.

Radiculitis

If sciatica is really due to radiculitis, a lesion in any part of the course of one or more of the long roots comprising the great sciatic nerve, anywhere between the origin of the root from the conus medullaris and its entry into the formation of the sciatic nerve itself should be capable of producing typical sciatica, whether such lesion is a tumour, a foreign body or an extruded intervertebral mass and whether the

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root is involved within the theca or in its extradural course.

I have had examples in my practice of typical sciatica, caused by both intra and extrathecal tumours, and by a foreign body (a piece of sewing needle) involving a root or roots of the sciatic nerve as well as by extruded intervertebral discs, by far the commonest cause of sciatic radiculitis. The conclusion is irresistible that so-called idiopathic sciatica is in reality lumbar or sacral radiculitis, one or more of the roots of the lumbo-sacral plexus being involved before the formation of the great sciatic nerve.

Examples

Case 1. Foreign body causing sciatica. An Army gunner, aged 21, reported sick with backache and sciatica. X-rays showed the eye end of a sewing needle inside the spinal canal behind the body of the fifth lumbar vertebra. This had entered his back 17 years before but had not previously caused symptoms, and he was not aware of its presence. The sciatica was cured on removing the needle which was adherent to the cauda equina (Rogers, 1942).

Case 2. Intrathecal tumour causing sciatica. A spinster, aged 39, had complained of backache and sciatica for 15 years, and had been regarded as hysterical. The sphincters were normal. At operation a tumour the size of a hazel nut was disclosed within the dura; the fourth and fifth lumbar roots being adherent to it. Her sciatica was cured on removing the tumour which proved to be a meningioma.

Case 3. Extrathecal tumour causing sciatica. A Royal Marine, aged 22, complained of backache and sciatica of some years' duration. There were no sphincter disturbances. At operation a neurofibroma was removed from the extra-theal part of the fifth lumbar root and his sciatica was cured.

Case 4. Nuclear extrusion causing sciatica. A laboratory worker, aged 31, complained of backache and sciatica with numbness in the left calf and foot of some months' duration. At operation the fifth lumbar root on the left side was found to be displaced laterally by a protruding mass to which it was adherent. This proved to be a degenerating intervertebral disc and was removed with relief of his pain.

Incidence of Spinal Tumours causing Sciatica

In a series of 35 patients with sciatica upon whom I have operated, there were three cases of cauda equina tumour, one of foreign body and 31 of intervertebral disc lesion. At the

Mayo Clinic when 100 consecutive patients underwent operation for protruded intervertebral discs, eight cases of spinal tumour were encountered (Love, 1944).

Differentiation of Tumour from Disc Lesion

It would appear, therefore, as if about 8 or 9 per cent. of suspect intervertebral disc lesions are in reality spinal tumours and as the outstanding symptom, sciatica, is the same in either case it is as well to enquire whether we have any ready means of differentiating the two conditions.

If an intervertebral disc lesion is the cause of the sciatica, the sufferer may obtain relief from his pain by lying in a particular position or even by merely resting in bed; if a tumour is the cause, however, like Job, 'He is chastened also with pain upon his bed' (Job, 33-19). While this distinction may be helpful it is only suggestive and by no means absolute. Much help may, however, be obtained from lumbar puncture.

The colour of the fluid or the absence, or modification of the Queckenstedt phenomenon may indicate that spinal block is present. If so, this is probably due to a tumour. It may, of course, be due to a massive prolapse of intervertebral material which is then to all intents and purposes a tumour, but the fact remains that in most disc cases causing sciatica there is no block as the extrusion is lateral and affects the issuing nerve rather than the main mass of the dural contents. In the cerebrospinal fluid investigation the protein content is highly important. In my tumour cases it was 240, 200 and 115 mgms. per cent. respectively, whereas in disc cases it rarely rises above 60. In one massive disc herniation it was, however, 170, and in another 160.

Congenital Abnormalities of the Spine

These have been thought by some to cause sciatica and various procedures have been carried out, such as removal of a sacralizing lateral mass from the fifth lumbar vertebra, a procedure usually quite futile as the following case shows:

Case. A carpenter, aged 44, fell and injured his back 2½ years ago and some six months later began

to have pain in the back and sciatica. An orthopaedic surgeon discovered a sacralized lumbar lateral mass and removed this without giving him relief. The pain became so severe that he could not lie down and for some weeks slept sitting in a chair. Lumbar puncture yielded yellow fluid and a very high protein content (over 2,000 mgms.). I removed an intrathecal tumour about the size of a large cherry surrounded by the cauda, to certain of the roots of which it was adherent. His sciatica disappeared and he returned to work.

With the exception of certain cases of spondylolisthesis, congenital abnormalities should not be regarded as a cause of sciatica. Brailsford (1928) reviewed 3,000 X-ray films of the lumbo-sacral region and found developmental abnormalities in 26 per cent., usually without any symptoms whatever.

Intervertebral Disc Lesions

What is the story of our knowledge of intervertebral disc lesions?

As long ago as 1859 Luschka is said to have noted posterior nodal protrusions of intervertebral discs and correctly interpreted these as chordal remnants. In 1896 Theodor Kocher of Berne dissected the body of a young man who had succumbed to multiple injuries after falling 100 feet from the top of a building and landing on his feet. Between the first and second lumbar vertebrae there was an extrusion of nuclear material from a ruptured intervertebral disc, but no fracture of the spinal column. In 1887 the first successful removal of a spinal tumour was performed by Victor Horsley at Queen Square.* After this the diagnosis and removal of spinal tumours gradually became common practice and by 1925 Charles Elsberg of New York had published a series of over 100 cases of spinal tumour which he had operated upon. Among these were several of doubtful pathology, classified as chondromas, myxomas, myxochondro-fibromas, etc., and when later these were re-examined it became apparent that some of them were in reality extruded nuclear masses from ruptured discs. In Elsberg's second series of 108 operations for tumour compression (1932) of the cord, ventral

chondromas (probably disc remnants) were found 14 times. In 1929 a clear description of two cases was given by W. E. Dandy, who recognized the nature of the cartilaginous masses and entitled his report, 'Loose cartilage from intervertebral disk simulating tumour of the spinal cord.' Compression of the cauda equina with sciatica was present and Dandy compared the loose cartilage which he successfully removed in either case with the loose cartilage found in osteo-chondritis dissecans described by König in 1888. In 1928 a case of disc extrusion causing symptoms was recorded in detail by Alojouanine and Petit-Dutaillis of Paris, and in 1934 Mixter and Barr in Boston drew general attention to the subject by reporting a series of such cases.

We now know that bulging or rupture of the annulus fibrosus and the extrusion of nuclear material is a commonplace occurrence and that the great majority of cases of so-called idiopathic sciatica are due to root irritation, i.e., a radiculitis caused by such extrusion.

Diagnosis

Recognition of the root involved in any particular case of sciatica may be obvious from the neurological pattern. The fourth and fifth lumbar and the first sacral are those most commonly affected. If the pain tends to radiate to the outer side of the foot and the ankle jerk is absent, the lumbo-sacral disc is probably the cause; if the pain radiates to the inner side of the foot the disc between L.4 and L.5 must be suspect. X-ray films may be helpful, especially a lateral view which may show some collapse of the intervertebral space between the two lower lumbar vertebra or between the last lumbar vertebra and the sacrum.

Lumbar puncture should include manometry and jugular compression to note whether the Queckenstedt phenomenon is present or modified, and chemical examination of the fluid withdrawn should be made. If the protein content is considerably raised we are at once confronted with a surgical problem. Operation is indicated to deal with a tumour or a massive extrusion of nuclear material and myelography may be desirable to show the precise position of the lesion.

* This tumour (specimen 5063-1) was unfortunately destroyed when the Royal College of Surgeons was hit by a high explosive bomb on May 10, 1941.

Treatment

It does not follow that because the common cause of sciatica is an intervertebral disc lesion, operation is indicated for its relief. It has been truly said, 'no one has ever died of sciatica and no one has ever had sciatica all his life.' In other words, the irritability of the root seems to subside or at least the sensory side of it to lose its excitability,* and if sciatica is endured for long enough, the patient is ultimately free from it. Any operative procedure, therefore, should be one that involves a minimum of risk to the patient. So far, in my series of cases, I have had no deaths from operations for sciatica, but one has always to consider that a patient may develop a fatal post-operative thrombosis with pulmonary embolism, bronchial pneumonia or other complication, and accidents have been reported such as perforation of the aorta or the inferior vena cava. We must not come to the conclusion that because a patient has sciatica we must therefore operate for the removal of an intervertebral disc protrusion. Some patients get relief by a manipulation which probably frees the nerve root from compression or relieves it of friction, or are given it by prolonged rest in bed or fixation in a plaster jacket; what a colleague of mine has called either medical or orthopaedic rest. Long ago that great exponent of rest, Silas Weir Mitchell, advocated and claimed good results from rest in bed with fixation of the limb by means of a long splint.

Many other procedures have from time to time been employed, often effectively. In 1929 Smith-Petersen claimed 88 per cent. cures of sciatica from arthrodesis of the sacroiliac joint, a practice founded on the incorrect assumption that the cause lay in this joint.

I recall a story told me by a friend who was a medical officer in the 1914-18 war. On his joining his unit he was greeted by his colleagues with, 'You won't be here long before the General sends for you to deal with his sciatica, so you had better make up your mind what you are going to do for him.' The newly-arrived medical officer, who was both enterprising and ingenious, told the General he

could cure his sciatica by an old-fashioned method if he would follow his instructions precisely. The treatment consisted of lying the old gentleman over on his face, putting a sheet of brown paper over his sciatic nerve and ironing it vigorously with a hot iron. This effectively relieved the sciatica with satisfaction to the General and credit to my friend.

While the majority of cases of sciatica are without doubt due to a disc lesion, and we have a short cut to treatment by removing the offending intervertebral disc, simpler and safer measures should first be tried, provided always that there is no spinal block present and the protein content of the cerebrospinal fluid is low. In such cases manipulation is often effective in giving immediate and lasting relief to the patient, probably by freeing the nerve root, possibly in some cases by actually dislocating the sequestered part of the disc from beneath the root.

Cause of Disc Lesion

Why the disc degenerates or ruptures is an interesting question. Patients do not always present a history of injury and, as is well known, sciatica may follow immersion or exposure to cold. I have operated on a Royal Marine, aged 28, who had fallen into a river only six weeks before. The fall had been a gentle one and he did not twist or injure his back in any way, but it was in January and the water was very cold. The sciatica was consequently ascribed to exposure as it has so often been in the past. He had such a clear-cut disc syndrome and such intense and persistent pain that as it failed to yield to lesser measures I did not hesitate to operate. There was a large extrusion forcing up the fifth lumbar nerve root and he was relieved at once by the removal of the disc and the freeing of the root. There are probably other causes of rupture of the discs in the lumbo-sacral region than some form of violence. The upright posture and possibly also, as Professor F. L. Golla has suggested, dietetic factors may play a part. The upright posture may account for the fact that sciatica is rarely caused by bands under the nerve roots in the way that pain in the arm may be produced by a rib or band under the lowest trunk of the brachial plexus. In the case of the arm, the upright posture

*Harvey Jackson has removed pieces of the posterior root in some cases and demonstrated degenerative changes in them.

tends to stretch the lowest trunk of the plexus over any such rib or band as the trunk is thrown back and the arm hangs down, a mechanism which would be undone by walking on all four limbs. The upright posture in the case of the lumbo-sacral plexus, however, must free it from any such effect of bands. It should not be forgotten that the lumbo-sacral plexus with the sciatic nerve, like the brachial plexus, is on the flexor side of the limb and extension of the limb as in the upright position therefore tends to undo any kinking or stretching over structures with which the plexus may be in contact on its flexor aspect when all four limbs are on the ground.

Some animals have an ossified nucleus pulposus. The vertebrae and the intervening discs of the swordfish must be put under great compressive strain when it drives the sword home, but as the nuclear or central parts of this fish's discs are bony, extrusion cannot occur. Sir Edward Home (1809) commented that when he was examining the internal structure of a large fish, *squalus maximus*, he met with a peculiarity in the intervertebral substance—'a limpid fluid gushed out with so much velocity that it rose to the height of four feet.'

Summary and Conclusions

Sciatica has been ascribed to many and various causes and some of the views regarding its pathogenesis have been here briefly reviewed.

The evidence is indisputable that sciatica is the result of a radiculitis. Any lesion of a root

of the great sciatic nerve anywhere in the course between its origin from the spinal cord and its union with its fellows to form the nerve trunk is capable of producing sciatica. Foreign bodies and neoplasms occurring on the course of a sciatic nerve root, either within the dural tube or outside it may do so, and extruded nuclear material from intervertebral discs is a common cause. In persistent sciatica, lumbar puncture should be performed and an analysis made of the cerebro-spinal fluid. If the protein content is high a tumour or large disc extrusion should be suspected and operation is indicated. If the protein content is normal or only slightly raised, conservative measures, e.g., rest and manipulation are indicated; operation should only be performed in these cases if such measures have failed and the pain is severe and persistent.

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LAY CLINICIANS

No. 6

Often when reading a book or play one comes across an excellent description of some disease, which though written by a layman, is probably more happily phrased than any doctor could achieve. We hope to introduce some of these 'case records' in subsequent issues and for those who would like to try their hand at naming the author and book this information will be given at the end of the extract.

TWO MONTHS' SICK LEAVE

1913
April 26

In a horrible panic—the last few days—I believe I am developing locomotor ataxy. One leg, one arm, and my speech are affected, i.e. the right side and my speech centre. M— is serious. . . . I hope the disease, whatever it