THE
IRISH JOURNAL OF
MEDICAL SCIENCE

FORMERLY
THE DUBLIN JOURNAL OF MEDICAL SCIENCE.

THE OFFICIAL ORGAN OF THE ROYAL ACADEMY
OF MEDICINE IN IRELAND

FIFTH SERIES. No. 4. JUNE, 1922

Original Communications.

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INTRATHECAL TUMOUR OF THE
CERVICAL SPINAL CORD.*

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PRIMARY intraspinal tumours are comparatively rare, even in the experience of neurologists. In 1887 Gowers and Horsley¹ first successfully diagnosed and operated on a case, and Krauss² collected 96 cases operated on up to 1906. They are often collectively termed tumours of the spinal cord, but may be divided into extrathecal, intrathecal and medullary growths. Of these, intrathecal tumours are usually encapsulated, readily enucleated and clinically benign, though the majority have been described as sarcomata by pathologists. Surgically they are perhaps the most favourable of all tumours of the nervous system.

The following case is one of intrathecal tumour of the cervical region, and as it presents some unusual and interesting features, I will give the history in detail :

R.M., an unmarried woman, aged 50, was first treated in hospital in February, 1918, for what she described as "a stiff neck." She stated that six months previously (August,

* Read before the Section of Surgery, Royal Academy of Medicine in Ireland, March 10, 1922.

1917) she had twisted her right arm when putting it suddenly behind her back, and she thought she had "sprained a muscle in her neck." Since then she had had occasional attacks of pain along the right sterno-mastoid muscle. These attacks had become more frequent until they occurred about twice daily, lasting from $\frac{1}{2}$ to 3 hours, and being accompanied by spasmodic torticollis, the neck being drawn down towards the right shoulder and remaining so until the attack subsided. I believe the condition was regarded as functional or hysterical. After a month's treatment she remained well for two years, when pain returned and she experienced "feelings of cold" and "a tightening and contraction" in the neck.

In July, 1920, she came under Dr. Speares' care suffering from severe paroxysmal pains in the right pinna, neck and shoulder, sometimes accompanied by muscular spasm which was usually tonic but occasionally clonic in type. Skiagrams of the neck showed some calcified lymph nodes in the right posterior triangle. No other abnormality was detected, and after some weeks she improved and returned home.

She remained fairly well for nearly four months, when severe pain returned and persisted up to her readmission to hospital on January 21st, 1921. Further medical treatment failing to relieve her, Dr. Speares kindly asked me to see the case with a view to operation. Examination showed that the pain was referred accurately to the areas of distribution of the small occipital, great auricular, transverse and descending superficial cervical nerves on the right side; that is, to an area supplied by the anterior primary divisions of the 2nd, 3rd and 4th cervical spinal nerves. There were no other nervous symptoms save the wry-neck, and the case was regarded as one of cervico-occipital neuralgia.

The choice of surgical treatment lay between (1) laminectomy with division of the 2nd, 3rd and 4th cervical posterior nerve roots, and (2) neurectomy of the affected nerves in the posterior triangle of the neck. I chose the latter for three reasons: (1) It was less serious; (2) the symptoms were strictly confined to the *anterior* primary divisions of the nerves, which suggested the probability of a peripheral cause; and (3) it seemed at least possible that the symptoms might be dependent on the presence of the calcified nodes. Consequently, on

February 28th, 1921, I performed a block dissection of the posterior triangle, dividing the cutaneous branches of the 2nd, 3rd and 4th nerves as high up as possible, and sparing only the spinal accessory and phrenic nerves. Convalescence was uneventful, her pain was relieved and her condition remained satisfactory up to March 17th when she left hospital.

Some days previously she was exhibited at a meeting of the Surgical Section of the Royal Academy of Medicine in Ireland.

On July 15th she returned again as pain had recurred towards the end of April. She stated that it was not the same kind of pain as before, and described it differently at various times. Her symptoms varied much from day to day, and often from hour to hour. On one occasion she complained that she was unable to raise the right arm, but with encouragement she did so, though she said it increased the pain. Again no further nerve symptoms were present. After full consideration I decided to divide the posterior roots of the 2nd, 3rd and 4th cervical nerves on the right side. These roots may be exposed and identified with certainty by laminectomy of the upper three cervical vertebræ (see fig. 1), and a dissection on the cadaver suggested that the chief difficulty in the operation would probably arise from venous bleeding from the numerous branches in the suboccipital region.

Operation was performed on August 18th under open ether anaesthesia with the patient in the prone position. There was surprisingly little bleeding experienced in performing laminectomy. On opening the subarachnoid space it was found that the spinal cord was displaced laterally, and so rotated that its posterior surface looked backwards and to the left; the right posterior nerve roots appeared to enter its mid-posterior line, while the roots on the left side were not visible. To the right of and closely applied to the cord, a smooth, shining dark red tumour was seen, lying in front of the posterior nerve roots which ran across its posterior surface. The cord and tumour so filled the subarachnoid space that no cerebro-spinal fluid escaped and the tumour passed from view upwards through the foramen magnum and downwards in the spinal canal. It was intimately connected with the lateral aspect of the cord, and felt so soft and elastic

that it suggested a cyst, but puncture with a needle yielded nothing. The arches of the 4th, 5th and 6th vertebræ were then removed in turn, and the cord exposed down to this level where the tumour was found to be narrowing, though its lower pole was not reached. In order to attempt removal of the tumour the 3rd and 4th posterior nerve roots were divided, and it was then found possible to separate the tumour

Fig.1.

Showing the parts displayed by laminectomy of the 1st, 2nd, and 3rd Cervical vertebræ. The posterior roots of the 2nd, 3rd, and 4th cervical spinal nerves are seen entering the cord on either side. Passing upwards in front of these may be seen the spinal root of the spinal accessory nerve.

a = postr. root of 2nd cervical nerve.
 b = " " 3rd " "
 c = " " 4th " "
 d = spinal root of spinal accessory nerve.

from the cord easily and cleanly by blunt dissection. Working towards the lower end and rotating the tumour outwards from the cord, the lower pole suddenly delivered itself cleanly into the wound. By blunt dissection up to the foramen magnum, combined with gentle traction and rotation, the

upper pole was finally delivered in a similar manner, and the tumour removed intact without any bleeding. The anterior nerve roots could then be seen in front, so that the tumour had occupied the triangular space bounded by the anterior and posterior nerve roots and the lateral column of the cord. After removal the tumour was of an elongated ovoid shape, with bluntly round ends, the upper pole being the larger and blunter of the two (see fig. 2). It was deep red in colour, with two areas which were dark purple and almost black, while its surface was smooth and shining as though covered by endothelium. Some hours later it measured 6.5 cm. x 2.5 cm. x 1.5 cm., but when in situ it was more slender and considerably longer, occupying the entire length of the cervical spinal canal

Fig. II.

a = Upper pole. *b* = Lower pole. *c, c* = Constriction corresponding to margins of foramen magnum.

and extending up through the foramen magnum. The dura mater, muscles and skin were closed in tiers, a small drain being placed down to the deep intermuscular space for 48 hours.

The further history of the case is interesting and disappointing. There was no post-operative shock, and there was naturally complete relief of pain, but she was unable to move the right upper limb, and the left arm was very weak. For the first four days her condition and progress were excellent. On August 23rd she complained of headache, was somewhat restless and irritable, and was incontinent; the temperature rose to 101.4° and the pulse to 110. Next day her condition was similar, and on August 25th she was sleepy and dull,

but irritable when roused ; temperature 102° , pulse 120, and she was evidently suffering from pressure. The wound looked perfect, but there was some slight fulness and deep fluctuation. By lumbar puncture 39 c.c. of clear faintly pink cerebro-spinal fluid was withdrawn, and on reopening the drainage track in the incision a considerable amount of fluid, apparently a mixture of blood and cerebro-spinal fluid, was evacuated and a fine drain reinserted. Both fluids proved sterile on culture. She immediately improved and on August 30th her condition was excellent ; temperature normal ; pulse 96 ; power in arms returning. The wound was soundly healed throughout save at the fine drainage opening through which some clear sterile cerebro-spinal fluid discharged at intervals. From this date onwards, owing to my absence, my senior colleague, Mr. Gordon, kindly took charge of the case, and I am indebted to him for details of the subsequent history. Briefly, fever and pressure signs returned almost immediately. They were relieved by evacuating more cerebro-spinal fluid from the wound, only to recur again later. For a time the patient improved, but then continued in a more or less irritable and drowsy state, with irregular fever and usually incontinent, until September 30th, when she died—43 days after operation. At autopsy the wound was found perfectly healed throughout. The brain and spinal cord were removed in one and appeared normal ; there were no adhesions, inflammation or signs of infection at the site of operation, and there were no other tumours or metastases. The cause of death could not be determined.

Prof. A. C. O'Sullivan kindly examined sections of the tumour, and reported it to be a spindle-cell sarcoma.

A few points in the case deserve further comment. First with regard to diagnosis. In reviewing the history it is manifest that the symptoms presented were those of an ill-developed picture of intraspinal tumour. The outstanding feature was pain of severe and persistent type, extending over a long period, punctuated by free intervals and referred to the area of distribution of certain defined spinal segments. Such pains, commonly called "root pains," are usually the earliest and most prominent symptoms of these growths, but in the absence of other signs it is difficult to see how a correct pre-operative

diagnosis can be made. In a recent paper Sir W. Thorburn³ says, in reference to these pains: "Of somewhat vague nature, they are not often in themselves diagnostic until other symptoms supervene"; and again: "themselves, therefore, almost useless as a guide, they are of the utmost importance when other symptoms have developed." Though the history extended over a period of four years, the pain was strictly unilateral, showing no tendency to spread to other nerves; there were no changes in sensation; no paresis or paralysis (if we except one doubtful manifestation just prior to operation); and no paraplegic phenomena. Thorburn⁴ has observed cases in which pain has preceded the latter by two years, and Woolsey⁵ records a period of nine years in one instance, but in view of the size and extent of the tumour in this case it is difficult to reconcile the clinical facts. Especially remarkable was the precise limitation of pain to the anterior primary divisions of the nerves, and it was this fact in particular which led me to regard the case as one of peripheral origin.

The operation itself calls for little comment. On the whole it proved surprisingly easy. The most striking features were the absence of any troublesome bleeding; the large size and extent of the tumour which, with the cord, completely filled the cervical subarachnoid space; and the ease with which it was enucleated. The latter feature of intrathecal growths has been emphasised by various writers.

The cause of death is an interesting problem. One naturally considers sepsis, but against this hypothesis we have absence of all local signs of infection and the perfect healing of the wound; absence of signs of septic meningitis; cultures of cerebro-spinal fluid and fluid from the wound proved sterile; negative findings at autopsy. A more probable cause is increased intracranial pressure due to traumatic serous meningitis, oedema of the brain, or post-operative adhesions obstructing the outflow of cerebro spinal fluid from the cranial cavity. It is clear that serous meningitis did follow operation, but it is difficult to conceive that it persisted for a period of more than six weeks, especially as the escape of cerebro-spinal fluid from the wound ceased spontaneously. Adhesions may be ruled out in view of the post mortem findings. I can only

suggest that in some way the operative manipulations produced a disturbance of equilibrium of intracranial pressure, with consequent interference with the activity of the vital centres in the medulla.

Two lessons may be drawn from this case : Firstly, that in cases of severe persistent pain of segmental type, with negative neurological findings, lumbar puncture may be an aid to diagnosis. In this instance it would probably have revealed the fact that obstruction existed in the subarachnoid space. Secondly, that in such cases, unless clear evidence of a peripheral cause exists, exploratory laminectomy should be selected in preference to neurectomy in the first instance.

In conclusion, my thanks are due to Prof. T. E. Gordon for his assistance at the operation and for kindly taking charge of the case during my subsequent absence ; to Dr. S. Furlong for constructing a special rest to facilitate the operation and anæsthetic ; to Prof. Adrian Stokes for the photograph of the tumour ; and to Prof. O'Sullivan for examining and reporting on the microscopic sections.

References.

¹ *Medico-Chirurgical Transactions*, London, 1888, LXXI, 377.

² Quoted in *Keen's Surgery*, Vol. II., 836.

³ *British Medical Journal*, January 14th, 1922, p. 50.

⁴ *Ibid.*

⁵ *Keen's Surgery*, Vol. II., 838.