NOTES ON DOUBLE CERVICAL RIB, WITH AN ILLUSTRATIVE CASE,

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As some attention has recently been paid, especially abroad, to this condition, probably stimulated thereto by the availability of Roentgen rays as an aid towards diagnosis, the following case which came under my notice is not without interest as showing some of the evils attendant on this condition, and the benefit to be derived from operation.

The patient, an unmarried female, aged 22, residing in the North of Scotland, complained of a dull, aching pain in the left shoulder and armpit, weakness in the left arm, and numbness after prolonged use. She also complained of a deformity in the neck, due to the presence of a lump.

History.

The family history presented nothing of interest; so far as the patient knew no other member of the family was afflicted with any similar abnormality. There was nothing in her previous history of importance beyond the fact that she had suffered from enlarged glands in the neck, probably tuberculous, since she was 6 years old, and had been operated on once for this condition.

Eight years previous to the present operation, she discovered quite by accident a small hard lump in the neck about the size of a marble. It was situated just above the left collar bone, and although palpable could not be seen. Pressure over the lump caused pain. Medical advice was sought, and an enlarged gland was diagnosed. Iodine was ordered to be painted over the site of the swelling; this was persevered in for some considerable time, but no benefit was derived.

The patient remained in this condition with occasional bouts of pain in the shoulder till twelve months before I saw her. Then she noticed that the little lump was gradually getting bigger. The dull, aching pain felt round the shoulder had now become constant and was occasionally felt down the arm. It was unrelieved by anything the patient could do, and was always more pronounced after any slight exertion. There had never been any cramp, tingling sensations, or numbness in the hand or arm. The left side of the neck felt hotter than the right side. She made no complaint, however, about the right side of the neck or about the right arm.

Condition on Admission.

On examining the patient, the contour of the left side of the neck was notably altered by the presence of a swelling or prominence, visible above the mid-point of the clavicle. Its upper border appeared to the eye to be on a level with the cricoid cartilage, while its lower border came within a fingerbreadth of the left clavicle. Its inner margin was separated from the outer border of the left sterno-mastoid muscle by a slight hollow, but its outer limit merged insensibly into the anterior border of the trapezius.

The left external jugular vein was seen to cross the swelling, but perhaps the most noticeable feature was the very marked pulsation over this prominence, so that on superficial examination aneurysm might have suggested itself. On the right side a slight fullness was observed about 2 in. above the right clavicle and in a position corresponding to that on the left side. The only other point to be noted in the examination of the neck was the presence of a few enlarged glands on the left side. There was also present a scar denoting the site of a previous operation for the removal of enlarged glands.

On palpation, etc., strong pulsation was felt over the prominence on the left side of the neck. The very slightest pressure

downwards and slightly backwards over the bony mass was sufficient to obliterate completely the left radial pulse at the wrist. Comparison of the two radial pulses showed that the left was much weaker and lagged slightly behind the right. Pressure over the area of fullness on the right side did not detect pulsation. On the left side a very distinct thrill was communicated to the fingers, while, with the stethoscope over the prominence, a loud systolic bruit was heard. There were no other signs of vascular disturbance.

The slightest digital pressure over the prominence elicited tingling sensations, while, with firmer pressure, very severe pain was complained of. Further, by selecting certain spots over the prominent area, pain could be induced either in the axilla, down the front of the chest, or down the inner side of the arm. There was no wasting of any of the muscles of the hand or of the arm, but the patient's grip was slightly weaker on the left side than it ought to have been.

The hard, bony mass could be traced upwards, inwards, and backwards on very deep palpation, as far as its origin from the seventh cervical vertebra. This could also be done on the right side, but with greater difficulty. The most anterior point of the prominence was about 2½ in. from the middle line of the neck, while about 3½ in. intervened between the middle line of the neck and the outer border of the swelling. The upper limit of the prominence was about 2 in. above the middle of the left clavicle, as already noted, and the lower limit was separated from the upper border of the clavicle by a fingerbreadth. The greatest breadth of the prominence was thus about 1½ in., and the centre of this was situated about midway between the posterior border of the sterno-mastoid and the anterior border of the trapezius. On the right side the upper limit of the hard

mass detected on deep palpation was about 2 in. above the right clavicle, and deep pressure over it caused numbness and tingling down the right arm.

The case was diagnosed as one of double cervical rib, and radiographs were kindly taken for me by Dr. Thurstan Holland, Liverpool. These confirmed the diagnosis and showed beautifully the presence of the abnormal ribs.

Operation.

As the patient was anxious to get rid of her symptoms and to submit to operation for the relief of the same, she was sent into hospital. Mr. Robert Jones made an incision in one of the natural creases of the neck with its centre over the bony prominence. The subclavian artery, as is usual in these cases, was higher in the

neck than normal because of its passing over the supernumerary rib. It was found to be adherent by its sheath to the periosteum of the rib, as was also one of the cords of the brachial plexus. These naturally required careful dissection from the rib, part of which was then removed so as to obviate all further pressure on the nerves and to allow the artery to occupy a less constrained position. The only anxiety experienced during the operation was on account of the persistent cyanosis and the extreme shallowness of breathing, which, even after the operation was over, gave some cause for alarm.

After-History.

When last seen the patient was able to use her left arm freely without experiencing any of the tired aching feeling she complained of at first. The arm appeared to be as strong as ever. There was still a slight fullness in the neck, but the marked prominence had gone and no pulsation was visible. The radial artery at the wrist was now equal in volume and time with that at the right wrist.

More or less well-developed ribs are liable to be met with in connexion with the seventh cervical or with the first lumbar vertebrae. According to Turner¹ and Grüber, "cervical ribs may be either the unusually developed rudiments of the anterior transverse process or rib of the seventh vertebra, or merely unusually developed epiphyses." There is an independent development of the costal element on the anterior limb of the transverse process of the seventh cervical—that is, on the anterior root of the transverse process we get an independent centre of ossification,

which may develop and assume the importance of a cervical rib. There are, according to Turner, four types of cervical rib—namely, three incomplete varieties, and one complete, so-called according to the extent of development:

1. Cases in which the costal element is represented by a small projection not much larger than a transverse process.
2. Those in which the costal element is still longer, and whose end is free or attached to the first rib.
3. Those in which the cervical rib is long enough to find attachment to the costal cartilage of the first rib.
4. Those in which the cervical rib actually joins the manubrium sterni, either alone or in conjunction with the first rib.

The first causes no symptoms and the fourth is extremely rare. The majority, therefore, of cervical ribs which cause symptoms, fall into either the second or third groups of incomplete cervical ribs.

As regards the etiology of this condition, opinion is divided. According to Planet,² all animals possessed at one time as many ribs as vertebrae, but in course of time these have dwindled down to the number of twelve in man with only rudiments in the cervical region. Some writers accordingly class the condition as a species of atavism. Others have laid stress on the frequency with which several members of the same family are affected. For instance, Israel³ is of opinion that heredity plays some part, and that there is sometimes a history of degeneracy in some member of the family. Occasionally also the condition is associated in the same person with some other congenital malformation.

Formerly the condition was looked upon as rare, but with the advent of Roentgen rays and greater precision in diagnosis the condition has now come to be recognized as comparatively common. The majority of cases probably pass unrecognized during life because no symptoms manifest themselves. Of those which cause symptoms, the majority appear to be found in young females, the reason for this being undetermined. The age at which symptoms are noticed is generally between 12 and 20, owing probably to the activity of the skeletal growth between these ages.

In those cases which do not cause symptoms, the supernumerary rib probably is not large enough to project into the posterior triangle and there cause symptoms due to pressure or deformity.

Cases which do present symptoms, however, are very frequently diagnosed wrongly, because the neck is not examined for a possible extra rib to account, for example, for the symptoms of a neuritis in the arm. Hence, before the introduction of radiography, the condition was frequently discovered only accidentally, or, if attention was by any chance directed to the neck, the condition was as often mistaken for something else. The condition is now more often recognized, and it becomes possible to relieve pain and to obviate further complications such as possible aneurysm of the subclavian, gangrene, or paralysis of the muscles of the hand. In some cases it is possible, by simple palpation, to diagnose the condition and even to trace the ribs upwards and backwards to the spine. The patient generally complains of the presence of a swelling in the neck, or of symptoms referable to pressure on the artery or on the nerves, or on both. As regards the blood vessels, the vein, owing to its position low down and in front of the scalenus anticus muscle, escapes the injurious effects of pressure, as it is pushed out of the way. The scalenus anticus, in these cases, is generally attached to the cervical rib, either in part or altogether, with the result that the subclavian artery which lies behind it, is lifted high up in the neck by the extra rib over which it dips abruptly and is pressed on by the muscle. It is thus pulled upon and is unable to get away from the pressure. Hence, the more prominent the rib in the neck, the more pronounced will be the pulsation, and hence the mistake sometimes made of taking the pulsating tumour for an aneurysm. Aneurysm has formed sometimes in cases of cervical rib, owing to trauma or to injury to the vessel from continual pressure in the strained position.

A difference in the pulses may often be detected. In the case above recorded the left radial at the wrist was slightly delayed, and of smaller volume when compared with that of the right side. This diminution in the radial pulse is due to compression in the way above described, and, after operation has removed the cause, the pulse generally becomes normal. It is therefore not due to any permanent obliterative condition within the vessel. A

bruit, systolic in time, can often be heard quite distinctly over the site of the rib in the neck, due probably to the acute bend of the artery over the supernumerary rib. Other vascular phenomena, such as pallor, coldness, oedema, or even gangrene of the hand, may be present, due to interference with the blood supply, but were absent in my own case.

The symptoms attributable to nerve pressure vary from slight tingling and other paraesthesiae to intense neuralgic pains felt along the distribution of the nerve fibres pressed upon. Pain, if not present, can nearly always be elicited, or if present, aggravated by digital pressure over the bony prominence, and may be made to radiate in different directions according to the fibres pressed on. The effect on the muscles as a result of pressure on the nerves, varies. There may be no apparent effect, or there may be a very appreciable feeling of weakness. This weakness may in turn merge into more or less paralysis of the muscles, generally of the hand, which undergo a certain amount of atrophy.

In the case described above the symptoms were mainly sensory, as the effect of pressure, although causing weakness, had not gone on to paralysis. The symptoms generally point to involvement of the first dorsal nerve root.

The tendency is for matters to get worse either in the direction of increased nerve disturbance or of vascular mischief. Cases, therefore, which complain of progressive nerve or of vascular trouble ought to be subjected to early operation. The longer this is deferred the more serious are the lesions likely to become. The operation, which is not by any means devoid of risk, consists in obtaining free access to the parts, thorough isolation of the artery and nerves by blunt dissection, and removal of as much as is necessary of the rib, to obviate the possibility of further pressure on these structures.

Some surgeons recommend the removal of the entire rib; others are content with a less ambitious and at the same time less dangerous operation, removing just enough to relieve the pressure. Whichever method is adopted, the periosteum must be removed as well. The special dangers are injury to the subclavian artery, to the nerve cords or to the pleura, and on the left side to the thoracic duct.

The result in cases operated on, to judge from reports in the journals, is uniformly good.

REFERENCES.

- ¹ *Journ. Anat. and Physiol.*, vol. iv, 1870. ² *Tumeurs osseuses du cou*. Thèse, Paris, 1890. ³ Israel, *Berl. klin. Woch.*, li, 1901; *Archiv für Kinderheilkunde*, Stuttgart, 1905, xli, 205.

A NOTE ON FORMALIN IODINE CATGUT.

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I HAVE now used iodine catgut prepared in various ways for more than three years, and for the last two and a half years I have been using that prepared by the method I am about to describe for all purposes and with uniform success. When I say with uniform success, I mean that (1) it has not in any case been known to be absorbed too soon; (2) it has not been known to cause any irritation; (3) it has not caused any stitch abscess, showing that it is uniformly sterile.

My experiences as regards the use of iodine catgut are as follows:

In the first place, Claudius iodine catgut was used—that is, ordinary raw catgut steeped in 1 per cent. iodine for ten days. This was given up because it soon became brittle, and because the surface was rough and uneven. In other respects it was satisfactory.

Next, catgut prepared by the method suggested by Salkindsohn was tried—that is, ordinary raw catgut steeped in iodine dissolved in spirit and water. This was also given up, as the catgut swelled to an inconvenient size, and also became much too elastic. In other respects it also was satisfactory.

I then began to prepare, and have, as I have said, used continuously for about two and a half years, formalin iodine catgut. This is ordinary commercial formalin catgut, obtainable from any instrument maker, made up into short skeins (each skein containing about the right