On cervical ribs : with example in living subject / by David Wallace.

With compliments
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ON CERVICAL RIBS,

WITH EXAMPLE IN LIVING SUBJECT.

By DAVID WALLACE, F.R.C.S. Ed.

(*Read before the Medico-Chirurgical Society of Edinburgh, 2nd December* 1891; *and reprinted from the Edinburgh Medical Journal for February* 1892.)

THE occurrence of cervical ribs in man is, I think, of sufficient rarity to justify me in laying before this Society a short note upon them from an anatomical point of view, before showing a patient who presents the peculiarity. Apart from variations in shape, anatomically three variations in ribs are specially referred to by anatomists, viz.,—(1) *Rudimentary*, (2) *Bicipital*, and (3) *Supernumerary*. The rudimentary and bicipital varieties are of less interest to the surgeon than the supernumerary; so I may dismiss them by merely stating that the highest and lowest ribs are apt to occur in an imperfectly formed condition, sometimes the first and sometimes the twelfth being so small as to represent, as said by Professor Struthers,[1] the rib shrinking into the transverse process of the dorsal vertebra, just as the supernumerary cervical rib may be said to represent the anterior tubercle of the transverse process expanded into a rib. Professor Turner,[2] writing of the bicipital rib, says,—"The anatomical peculiarity is not due to a bifurcation of the shaft of a single rib at its vertebral end into two heads, but to the fusion of what should have been the shafts of two distinct ribs into a common body. It invariably occurs at the apex of the thorax."

Supernumerary ribs occur as an addition on the seventh cervical

[1] *Vide Anatomical and Physiological Observations*, by Professor Struthers, 1854.

[2] *Vide Journal of Anat. and Phys.*, vol. xvii.

or first lumbar vertebræ, but undoubtedly they are much more frequently in relation to the seventh cervical vertebra than the first lumbar. Professor Struthers has described, in the *Journal of Anatomy and Physiology*,[1] a specimen of a lumbar pair of ribs constituting the lowest pair of thirteen pairs of ribs. The occurrence of supernumerary ribs had been observed by Galen, Fallopius, and others, but they, as Dr Dymock[2] writes, have forgotten to favour us with the details, and we are ignorant of the region in which they were met with. M. Hunauld,[3] 150 years ago, described nearly all the forms of cervical ribs which have in more recent years been noted; and further, as pointed out by Dr Dymock, he was the first to accurately describe their developmental formation.

Professor Grüber,[4] in 1869, published the results of an elaborate investigation into the question, and in a short statistical table shows that from the time of Hunauld (1740) down to that year, 76 examples had been recorded of cervical ribs occurring in 45 individuals. Since then numerous other cases have been put on record, notably by Sir William Turner[5] (7), Professor Struthers[6] (10), and Professor Shepherd[7] (4).

Professor Struthers, after reference to the variations in the shape and length of the seventh cervical transverse process, says that he believes the occurrence of cervical ribs is more frequent than supposed, but that in many instances they are merely rudimentary, and the part not being closely dissected, they escape notice.

The majority of specimens described have been discovered in the dissecting-room or after maceration; and although varying much in size, and on this account in relationship to other structures, it is found that they can be conveniently grouped under two divisions —1*st*, Those which are short and possess merely a head, neck, and tubercle—the short process beyond not being worthy the name of shaft; and, 2*nd*, Those which, in addition to the above, are so developed that they possess a shaft, and it may be extended so far as to articulate by cartilage with the sternum. For a long while no such perfect cervical rib was found, and Sir George Humphrey, in his book *The Skeleton*, published 1858, states that this does not in any case he knows of happen. Professor Struthers mentions a case where on the left side the shaft was prolonged to the sternum, but the cervical rib in that case joined the cartilage of the thoracic rib nearly an inch from the sternal margin. Through the kindness of Sir William Turner, I am able,

[1] *Vide Journal of Anat. and Phys.*, 1875.
[2] *Vide Edinburgh Medical and Surgical Journal*, 1833.
[3] *Vide Mémoires de l'Academie Royal des Sciences*, 1740.
[4] Grüber, *Memoirs of the Imperial Academy of St Petersburgh*, 1869.
[5] *Op. cit.* [6] *Op. cit.*
[7] *American Medical Journal*, 1883.

however, to show you a perfect cervical rib in position, and it articulates directly with the sternum by a broad strong cartilage.[1]

The true morphology was first pointed out by Hunauld. It is, Quain states, "very generally admitted that the part in front of the vertebrarterial foramen of the cervical vertebra corresponds in series to the first part of a rib;" and thus the anterior tubercle of the transverse process of the seventh cervical vertebra may, remaining separate from the vertebra, shoot beyond its ordinary dimensions and run parallel, or very nearly parallel, with the first thoracic rib, and end half-way to the sternum as a floating or free rib resembling the asternal ribs of birds. It may, however, join the first rib, or, as in the specimen above referred to, pass forwards and articulate directly with the sternum. This excessive ossification, though usually restricted to the seventh cervical, may be seen in the sixth also, as in a preparation described by Struthers "as showing the rudiments of cervical ribs on the sixth and seventh vertebræ." This was in a male subject aged four years.

The relationship between a cervical rib and the soft parts in great part depends on the length of the rib, and it has been pointed out that if the rib be short, consisting of head, neck, and tubercle, the anterior scalene muscle is, as ordinarily, attached to the scalene tubercle on the first thoracic rib, while the subclavian artery lies anteriorly to the cervical rib. On the other hand, if the cervical rib be longer and join the cartilage of the first thoracic rib, the anterior scalene muscle may be attached to it, and the subclavian artery groove its upper surface posteriorly to the muscle. No definite rule, based on the length of the rib, can, however, be laid down for these relationships. The brachial nerves may also pass over the cervical rib; and in a specimen shown by Dr Symington to this Society in 1883, the eighth cervical and first dorsal nerves passed over the rib, the others passing under it over the first thoracic. Dr Symington's specimen was a short rib ending in a well-marked tubercle, but attached to the thoracic rib by a strong bony process just at the scalene tubercle.[2]

A few months ago I observed, when examining a patient's chest at the Royal Public Dispensary, that there was present a prominence above the right clavicle, which, on palpation, was hard

[1] Unfortunately in this specimen, in which the spinal column and ribs are in position, there is an abnormality in the vertebræ—one, possibly a cervical, being absent. Professor Turner explains the peculiarity by the view that the last lumbar vertebra is anchylosed to the sacrum.—*Vide op. cit.*

[2] At this point in the paper Dr Wallace showed specimens from the Anatomical Museum of the University. These specimens, which he was enabled to show by the kindness of Sir William Turner, Curator of the Museum, were chiefly a series collected by Dr Robert Knox, which was described and figured by that anatomist in the *London Medical Gazette* of 1843 in a series of papers on "Transcendental Anatomy."

and bony. On examination of the prominence, I concluded that it was a supernumerary rib. I showed the case to Professor Chiene and Sir William Turner; and as they corroborated me in the view I held, I thought it might interest the members of the Society to see the patient.

The patient, Hugh M., æt. 60, is a labourer, who states that he never received any injury to the right shoulder, and has not previously had his attention attracted to a swelling situated in the right supra-clavicular region. He has no pain nor discomfort in the right arm.

Present State.—Comparison of the supra-clavicular regions reveals the presence of a prominence on the right side, which is situated opposite the middle of the clavicle, with its centre 4 inches from the mesial plane of the body, and its highest point $1\frac{3}{4}$ inches above the clavicle. The prominence is immediately under the skin, which moves freely over it. It is a rounded, hard, bone-like swelling, the outline of which can be felt at the upper, inner, and inferior margins. Externally, however, it is continuous with a hard flat surface which passes outwards, upwards, and backwards until it is lost under the anterior edge of the trapezius muscle. On drawing the arm down, the prominence, which is about the size of a walnut, does not move, but can be more distinctly felt; while, on the contrary, if the arm be pushed upwards, the prominence is hidden by the clavicle. To the most internal part of the prominence a band is attached, but whether this is muscular or fascial it is difficult to say.

Subclavian Artery. — The subclavian artery is felt pulsating most distinctly immediately in front of the extremity of the cervical rib, *i.e.*, it lies exactly in the angle formed by the clavicle and anterior end of the rib. No pulsation can be detected externally to the point of rib, and the artery seems to dip under the point of the rib, and then under the clavicle. Pulsation is felt as high as a line drawn horizontally through the point of the rib. Probably this portion of the artery is the third part of the subclavian.

The *anterior scalene* cannot be felt to be inserted into the cervical rib.

Immediately above the extremity of the supernumerary rib a smaller bony prominence is detected, which seems to curve backwards in a direction parallel to the cervical rib, and suggests the possible presence of a second supernumerary rib from the sixth cervical vertebra.

On the left side there is nothing similar to *the cervical* rib, but a process similar to the second process is felt, and this has precisely the same relations.

Anatomists having drawn attention to the presence of cervical ribs, clinical observers have from time to time had their attention directed to the peculiarity during life, and numerous cases are

recorded where mistakes in diagnosis have been made. Professor Turner refers to this possibility in his paper in the *Journal of Anat. and Phys.*, 1870, vol. iv., and describes, among others, a case he saw in Sir J. Paget's Wards at St Bartholomew's Hospital, and quotes as follows from a letter he received from Sir J. Paget:—

"In each case the imitation of aneurism was close enough to deceive an unwary surgeon; but to one who examines closely, and has in his mind what the case may be, the mistake seems scarcely possible so long as the artery is healthy. I can well believe, however, that great difficulty of diagnosis would exist in any case in which the unusual arrangement of parts is combined with a morbid state of the artery, especially with that state in which arteries, not evidently diseased in texture, have more than natural pulsation. This state is common in the abdominal aorta, and I have seen it two or three times in subclavian arteries and in carotids."

Sir G. Humphrey and Professors Struthers and Shepherd[1] also refer to possible mistakes in diagnosis; and I think, from the specimen No. 1, which I have shown to-night, there can be no doubt but that the possibility of an aneurism would occur to one if he had been called on to examine the case during life. While in the patient I have had the honour to show you the resemblance to an exostosis is very close, and the mistake might easily have been made.

In those cases where the rib is short, and ends in a tubercle or knob, but in which the subclavian artery does not pass superficially to it, the resemblance to an exostosis is a marked one; while, on the other hand, when the artery passes over the cervical rib, it is so high, and the pulsation is so superficial, the mistaken diagnosis of an aneurismal swelling is highly probable.

The presence of a cervical rib ordinarily is not troublesome to the possessor, but where the artery is high, an injury to the vessel might very readily occur.

[1] Shepherd, *American Medical Journal*, 1883.

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