

A COMPARISON OF THE ANOMALOUS PARTS OF TWO SUBJECTS, THE ONE WITH A CERVICAL RIB, THE OTHER WITH A RUDIMENTARY FIRST RIB. By LEWIS E. HERTSLET, Student of Medicine. WITH NOTES ON THE CASES, by ARTHUR KEITH, M.D., *Demonstrator of Anatomy, London Hospital Medical College.*

THE first case (Case A) is that of an ordinary seventh cervical rib, the subject being a small and ill-developed woman, aged about 60; the rib appears on both sides, that on the right being a little the longer.

There is nothing extraordinary about this case, but it is interesting from its similarity to the second.

Case B, which presents the rare abnormality of a rudimentary first dorsal rib, is of rather more than ordinary interest.

The rib on both sides, which articulates with the body and transverse processes of the 8th vertebra, does not extend as far as the sternum in front, but has a pointed extremity about 5 or 6 c.c. from the upper angle of the sternum.

This subject was a male about 35 or 40 years of age, and from his appearance was probably of Magyar origin. He died from tuberculosis of the lumbar vertebrae.

On comparing these two cases in the following tabular form, it at once becomes evident that there is very little difference in the arrangement of the abnormal parts of the two subjects, except, of course, that in Case A the rudimentary rib is placed one vertebra higher up.

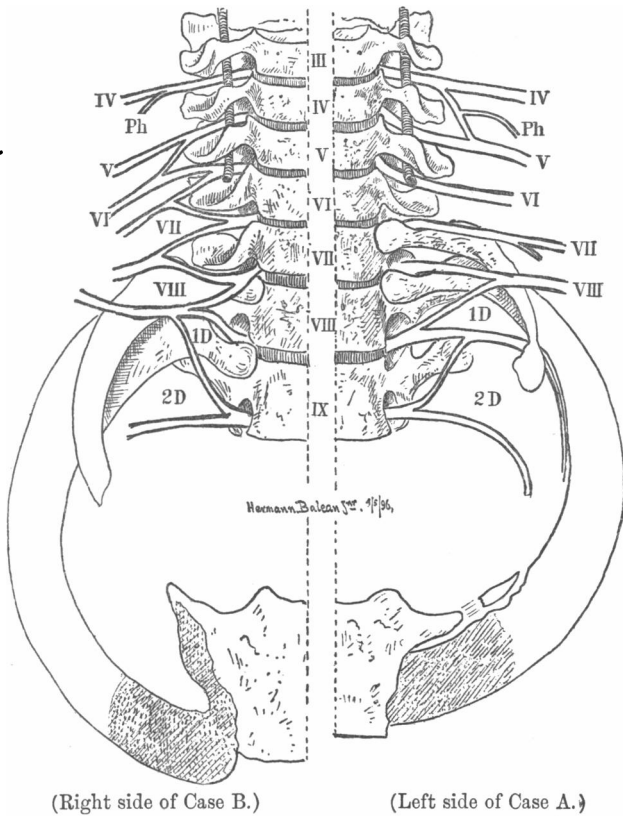
Case B possesses three other rather important abnormalities: they are:—

(1) A sterno-scapular muscle, which represents the subclavius, being inserted into the upper border of the scapula, over the supra-scapular notch, the outer end of the clavicle, and the trapezoid ligament; it appeared on both sides.

(2) The styloid ligament on the right side is ossified, and from it a small muscle, probably a segmentation of stylo-

pharyngeus, takes origin, and is inserted into the great horns of the hyoid bone, and also into the deep cervical fascia.

(3) The levator anguli scapulæ arises with the scalenus medius from the transverse processes of the 1st, 2nd, 3rd, and 4th cervical vertebræ, but the slip taking origin from the 3rd is



abnormal, and is inserted into the upper border of the 2nd rib, at its angle, on a level with the insertion of the serratus posticus superior.

#### NOTES.

Either the 6th, 7th, or 8th segments of the body may carry rudimentary ribs; the 6th very rarely, the 7th (of which Case A is an example) frequently; the 8th (which Case B exemplifies)

NAMES OF PARTS.	CASE A.		CASE B.	
	Left Side.	Right Side.	Left Side.	Right Side.
<i>First Rib,</i> Articulates with	Bodies of VI. and VII. vertebræ and intervertebral disc.	Vertebræ and intervertebral disc.	Bodies of VII. and VIII. vertebræ and intervertebral disc.	Vertebræ and intervertebral disc.
Anterior end.	Fairly large tuberculated process.	Smaller do.	Pointed.	Do.
Dimensions.	Neck, 4 cm. Shaft, 3 cm. Head to tip, 6 cm. Tip to sternum, 8 cm.	3.5 cm. 4 cm. 4.5 cm. 7 cm.	4 cm. 5 cm. 5 cm. 8.5 cm.	4 cm. 8 cm. 6 cm. 8.5 cm.
Cartilage.	Small piece attached to sternum by ligaments. Calcified.	Do., forming part of sternum. No ligaments.	Do.	Do., only continuous with that of 2nd rib (see diagram).
<i>Second Rib,</i>	Resembles a 2nd (true) rib.	Do.	Resembles a 1st rib.	Do.
Cartilage.	Joined to whole of side of manubrium.	Joined to junction of manubrium and meso-sternum.	Joined to junction of manubrium and meso-sternum.	Do., only continuous with that of 1st rib.
<i>Eighth Rib,</i> Total No. of ribs,	Ends 4 cm. from sternum. 12	Reaches sternum. 12	Ends 4 cm. from sternum. 12	Do. 12
<i>Scalenus Anticus,</i> Origin.	Anterior transverse processes of V. and VI. vertebræ.	Do.	Do.	Do.
Insertion.	1st true rib and Thoracic membrane.	Becomes continuous with muscular band between neck of cervical rib and sternum.	Part becomes continuous with Scalenus medius, and part is inserted into Thoracic membrane.	Do., and also part is inserted into 1st rib.
Relation to Subclavian Artery.	Passes over artery.	Do.	Chiefly under, slight slip over.	Over.
Height of Pleura,	Disc between VII. and VIII.	Do., a trifle higher.	Level of middle of body of VIIIth vertebræ.	
Subclavian Artery.	Passes above fibrous tissue prolonged from the rudimentary rib.	Passes above fibrous tissue prolonged from the rudimentary rib.	Passes above fibrous tissue prolonged from rudimentary rib.	

<i>Vertebrae.</i> Transverse Processes.	Posterior.		Anterior.	
	Small. Fairly large. Very large.	Do.	Normal. Large. Normal.	Posterior. Normal. Large.
V C. VI C. VII C.		Do.		Do.
Spinous Processes.	Bifid. Bifid.		Not bifid. Same size as VII. Same size as VI.	
V C. VI C. VII C.	Most prominent. Change from Dorsal to Lumbar type between 11th Dorsal and 1st Lumbar.		?	?
Articular Processes.				
Number.	Cervical, 7. Dorsal, 11. Lumbar, 6. Sacro-coccygeal, 9.		Cervical, 7. Dorsal, 12. Lumbar, ? Sacro-coccygeal, ?	
Vertebral Artery pierces transverse process of	5th Vertebra.	5th Vertebra.	6th Vertebra.	5th Vertebra.
Deep Cervical Artery goes to back of neck between	7th and 8th Vertebrae.	Do.	Between 8th and 9th Vertebrae.	Do.
Subclavius Muscle.	Inserted into sternum and remnants of 1st cartilage.		Represented by sterno-scapular muscle.	
Brachial Plexus. IVth. Vth. VIth.	Gives branch to Vth; this branch gives off Phrenic. Joins with branch of IVth. Forms a separate trunk.		Gives off Phrenic; no branch to Vth. Sends branch to VIth. with branch of VIIth.	Two divisions, one joining with branch of VIth and other with branch of VIIth.
VIIth. VIIIth.	Sends branch to VIIIth. Forms trunk with branches of VIIth and IXth.		Two divisions, one joining with branch of VIIth and other with branch of VIIIth.	Two divisions, one joining with branch of VIIth and other with branch of IXth.
IXth.	Goes to 1st Intercostal space and gives branch to VIIIth.		Here is head of rudimentary 1st rib. Joins with division of VIIIth.	
Xth.	Goes to 2nd Intercostal space and gives branch to IXth.		Goes to 1st intercostal space and gives branch to IXth.	

Unfortunately no record was made of the lumbar and sacral nerves.

so rarely that this was the fifth case that had been recorded in Britain.

Helm, who had dealt exhaustively with this anomaly, and given full references to its literature (*Anat. Anz.*, 1895, B. x., p. 540-554), had been able to collect only sixteen recorded cases in the anatomical literature of the last twenty-five years.

It is remarkable that Zuckerkandl had found this anomaly four times in sixty Austrian subjects; Struthers had observed another specimen in an anatomical collection in Vienna, and before discovering a rudimentary first rib in Case B, the subject had been set down as a Magyar. It will probably be found that the frequency of this variation is a characteristic of the Magyars.

The opinions held as to the nature of rudimentary cervical and thoracic ribs are of some interest.

Wiedersheim, in his *Bau des Menschen* (of which there is an English translation, edited by Professor Howes), regards the occurrence of cervical ribs as an atavism, of rudimentary first dorsal ribs as a progressive variation, so that in Case A we see what we have been, and in Case B we see what we shall be.

It has still to be shown, however, that the first rib, in its most fully developed form, is not the fittest arrangement of parts for the human race.

Arbuthnot Lane (*Journ. of Anat. and Phys.*, 1886, vol. xx. p. 392) regards rudimentary first dorsal as cervical ribs, holding that there is in such cases an extra vertebra intercalated in the cervical series; so that, according to this author, Cases A and B are exactly similar, except that there is an extra and abnormal vertebra present in Case B.

An extra vertebra may come to be present by the subdivision of a normal segment, for partial segmentation of vertebræ and ribs into two is occasionally found; but the arrangement of nerves, arteries, muscles, and bones found in the cases recorded above, countenances neither this nor Arbuthnot Lane's theory.

In the language of Bateson (*Materials for Variation*), Cases A and B may be said to exemplify forward and backward *meristic* variations of a homœotic nature; that is to say, in Case A there is a transference forwards of some of the characters of the 8th segment to the 7th, while in Case B there is a transference

backwards of some of the characters of the 8th to the 9th segment.

Looking at these two specimens, there can be no doubt whatever that the costal characters of the 7th segment of Case A have been almost exactly reproduced in the 8th segment of Case B.

Perhaps the most useful manner of viewing variations of the cervical and dorsal ribs is to regard them as examples of what Galton would call deviations from the law of averages; that is to say, a fully developed rib on the 8th segment is the bull's-eye of the developmental energy, but its target extends from the 6th to the 9th segment.

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