

DEFORMITY OF THE SCAPULÆ ASSOCIATED WITH A CERVICAL RIB AND A SPINA BIFIDA

BY GLOVER H. COPHER, M.D.

OF ST. LOUIS, MISSOURI

(From the Surgical Service of the Barnes Hospital and Washington University School of Medicine)

THIS case is reported particularly because of the unusual congenital malformation of the scapulæ and shoulder girdles. There is associated an anomaly of the cervical and upper dorsal vertebræ. A survey of the literature does not show a similar case.

The patient, M. E. B., No. 10,822, a white female, age twenty-two years, entered the Barnes Hospital because of a left pes cavus. Her family history and past history are negative. She complains of pain about the ankle and great toe of her deformed foot, which pain has been present since birth. General physical examination is negative except for her shoulder girdles and the left foot. The patient's appearance is striking. She holds herself with shoulders thrown forward, with a marked prominence of the suprascapular musculature (Figs. 1 and 2). The supraclavicular fossæ are obliterated and there is only a very shallow suprasternal notch. The neck is thick and short and she is unable to bend her head backwards. The movements of the arms are normal but there is restriction in rotation of the scapulæ in that she cannot fully elevate her arms. The trapezii and levator scapulæ muscles are active, the former being hypertrophied. The rhomboid muscles give no response on Faradic or Galvanic stimulation. There is marked prominence of her seventh cervical vertebra, just below which there is a depression, marking the site of a spina bifida occulta. There is an impulse over this area on coughing. At the edge of the sternum, below the sternoclavicular joint, there is a nodule which appears to be in the cartilage of the first rib. The left foot has some shortening of the tendo Achillis, with marked shortening of the plantar fascia, causing a curvature of all toes of the foot. Urine negative. Blood Wassermann negative. Temperature and pulse normal.

X-ray plates show the scapulæ in an abnormal position (Figs. 3 and 4, No. 3); they are symmetrically placed near the vertebral column and are two ribs higher than in a normal individual. In this case the root of the spine of each scapula is at the level of the superior angle. The spine is overdeveloped, terminating in a very broad acromion. The coracoid appears normal. At the vertebral border of the scapulæ, reaching over to the defective vertebræ, is an extra plate which seems to be articulated with the scapulæ (Fig. 4,



FIG. 1.—Position in which patient holds her shoulders.



FIG. 2.—Position in which patient holds her shoulders.

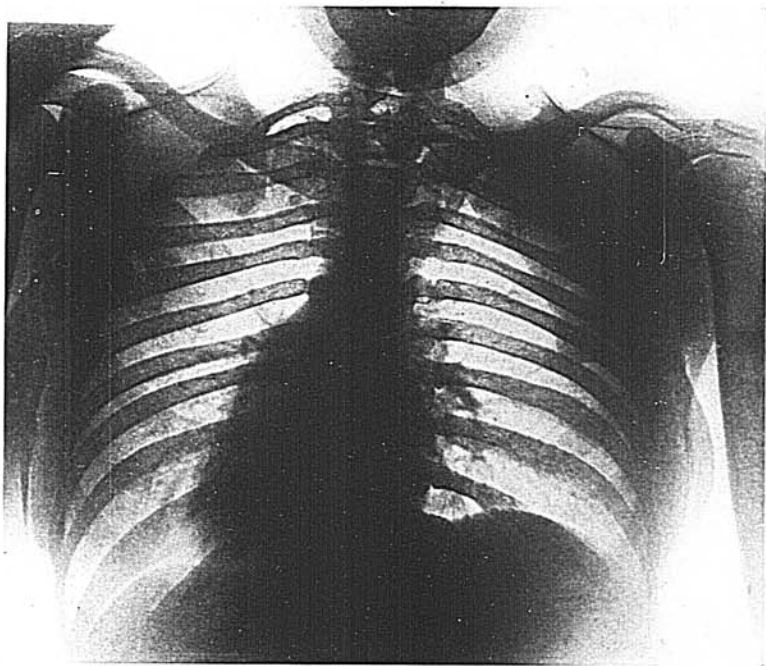


FIG. 3.—Reproduction from stereoscopic X-ray plate showing anomalous bony plate, cervical rib and spina bifida. Plates taken in supine position.

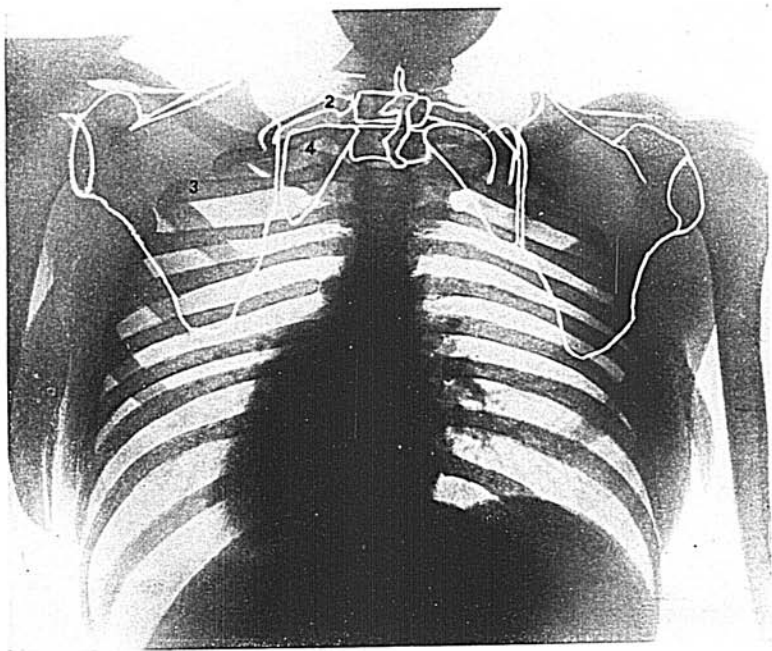


FIG. 4.—Same picture as Fig. 3, with the prominent features outlined. 1, spina bifida; 2, cervical rib; 3, scapula; 4, extra bony plate; 5, white spot—small nodule of bone.

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No. 4). Extending upwards the apex of the plate reaches nearly to the first thoracic vertebræ. There is a hiatus in the seventh cervical, first, and second dorsal vertebræ (Fig. 4, No. 1). The clavicles are curved in their lateral third and, being broadly expanded there, present a more robust development than is typical in women. There is present a cervical rib (Fig. 4, No. 2) which curves around and seems to be attached at the edge of the sternum below the sternoclavicular joint, at the site of the nodule of bone (Fig. 4, No. 5) which was palpated there.

The abnormalities of position and form in the shoulder girdle may be attributed to the spina bifida and the triangular bony plate. The normal rhomboid musculature arises in part from the spinous process of the first thoracic vertebra, which vertebra in the present instance is absent. Apparently, the rhomboids are defective also; it may be that the triangular plate has replaced them. One important function of the rhomboids is support of the shoulder blades. In their absence, or if defective in development, the weight of the shoulders may be expected to fall somewhat on the other muscles which share with the rhomboids the maintenance of the normal position of the shoulder girdle, *i.e.*, the upper portion of the trapezii and the levator scapulæ. These two groups of muscles seem to have compensated well for the additional work thrown upon them by the absent or non-functioning rhomboids, and have drawn the shoulder girdles above their usual level. Contrary to the above interpretation, the elevation of the shoulder girdles may be regarded as a persistence of the cervical relation of the girdle as found in the embryo; the spina bifida as an arrest of the development of the vertebræ, with no influence on the position of the girdle, and the triangular plate as a "Reversion of Type."

The scapula is rarely absent and rarely malformed. The most common variation met with is a separated acromion process. Very much rarer are the cases in which the coracoid process is separated from the rest of the bone. There is a chief centre of development for the scapula proper and one for the coracoid, besides an indefinite number of accessory ones. The first centre appears about the eighth week at the neck and forms nearly the whole bone, including the spine, the root of the acromion, and the dorsal part of the root of the coracoid. The coracoid centre appears in the first year; it forms also the top of the glenoid cavity, and at fourteen or fifteen fuses with the first centre, beginning to unite on the ventral surface. At about fifteen years many nuclei appear in the acromion and fuse. A year later the mass so formed joins the body—sometimes this remains connected by fibro-cartilage. About seventeen or eighteen years nuclei appear; one in a strip along the posterior border, and one at the lower angle. Both are fused by twenty years of age, but the lower one is one of the last to fuse in the skeleton. The occurrence of a special primary centre for the coracoid process is of

morphological importance, in that the process is the representative of a distinct coracoid bone in the lower vertebræ.

The anomalous triangular plate of bone appears in the spot where a precocious development of the normally occurring epiphysis could account for it. It might be regarded as an ossification of an abnormal suprascapular cartilage. A suprascapular cartilage is not an uncommon part in the scapular in mammals, and is the rule in the lower vertebrates. However, a supraclavicular bone is developed in very few mammals beyond an epiphysis, or as an incomplete calcification of the suprascapular cartilage.

In medical literature there are reported numerous cases of extra ribs found in adults, both at the cervical and lumbar ends of the thoracic ribs, but more often at the latter site. Pillings reports a case of seventh cervical ribs that joined the sternum in the manner of true ribs. Persistent ribs are more frequently incomplete and fail to make a sternal attachment. The first pair of thoracic ribs are sometimes incomplete. The X-ray plates of this patient show an incomplete cervical rib extending about two-thirds of the way to the sternum. A small bony nodule previously described, lies at the site where the rib would apparently be attached were it complete. Possibly the rib is joined to the sternum by a ligamentous or cartilaginous band, with ossification of a small portion of the sternal end.

This case is of some interest phylogenetically. The elevation of the shoulder girdle recalls Gegenbaur's Gill Arch theory and the more modern Balfour's Fin Fold theory for the origin of the lower group of vertebræ. The cervical rib suggests the reptilian origin of mammals.

BIBLIOGRAPHY

- Cunningham, D. T.: *Text Book of Anatomy*, 1916, 187-190.
 Piersol, G. A.: *Human Anatomy*, 1913, 149-153, 247-253.
 Gray, H.: *Anatomy*, 1910, 172-178.
 Morris's *Human Anatomy*, 1914, 126-132, 141-146.
 Walter, H. E.: *The Human Skeleton*, 1918, 91-92.
 Gegenbaur, Carl: *Verleichende Anatomie Der Wirtbelthiere*, i, Leipzig, 1918.
 Balfour, F. M.: *Comparative Embryology*, 1880.