Three-dimensional reconstruction of a levator claviciule muscle

J Fasel1, P Gailloud1 and F Terrier2

1 Department of Anatomy and 2 Department of Radiology, University School of Medicine, 1, rue Michel-Servet, CH-1211 Geneva, Switzerland

Summary. During routine radiological examination of a 72 year-old woman a soft-tissue shadow in the left posterior triangle of the neck was observed. Three-dimensional reconstruction of this structure suggested that it might be a muscular variant: a levator claviciule muscle. In our case it took origin from the upper part of the cervical column and was inserted into the lateral third of the clavicle. With this example as a background, the general significance of anatomical muscular variants for modern imaging techniques is discussed.

Reconstruction tridimensionnelle d’un muscle élévateur de la clavicule

Résumé. Lors d’un examen radiologique de routine (TDM, IRM) pratiqué chez une femme de 72 ans, une image tissulaire molle fut mise en évidence dans le triangle cervical postérieur gauche. La reconstruction tridimensionnelle de cette structure a suggéré qu’il pouvait s’agir d’une variante musculaire, en l’occurrence d’un muscle élévateur de la clavicule. Dans notre cas, l’origine musculaire était située au niveau de la colonne cervicale supérieure et son insertion distale sur le tiers latéral de la clavicule. Cette exemple nous amène à rappeler l’aspect général des variantes anatomiques musculaires dans le contexte des techniques d’imagerie moderne.

Key words: Myology — Three-dimensional reconstruction — Computed tomography — Magnetic resonance imaging

The examination of a 72 year-old woman by computed tomography and magnetic resonance imaging revealed an unilateral soft-tissue shadow in the left posterior triangle of the neck. The differential diagnosis of this finding included several pathological conditions, such as a cyst, a haemangioma, a glomus tumour or a neurofibroma. The commonest cause of such an appearance in this region is, however, some kind of lymphadenopathy [5]. In the present case, analysis of the axial and frontal tomographs made it possible to demonstrate a course of this structure, which corresponded to a muscular variant: the levator claviciule. The frequency of such muscular variants is generally underestimated.

In view of the increasing precision with which modern radiological procedures are able to identify the soft tissues, it is important that the significance of anatomical variations in the musculature be kept in mind. Taking these facts into consideration, we have reconstructed this levator claviciule and considered it in terms of the whole field of muscular soft-tissue shadows.

Methods

The three-dimensional reconstruction was based on a continuous series of 73 2-mm-axial CT sections (Somatom-HiQ, Siemens). No contrast medium was used. The axial and frontal MR tomographs were obtained with a field strength of 1 Tesla (Magnetom 42SP, Siemens). The following parameters were selected: section thickness 5 mm, repetition time 500 ms, echo time 10 ms (spin echo, T1 weighted).
The imaging process was divided into two main sections, segmentation of the pictures and the three-dimensional reconstruction. First, the CT images were separated into two groups. The first group included those structures which had to be reconstructed, the second group those which had not to be considered (such as skin, subcutaneous fat and background). The number of the images was increased (1.741x) by interpolation, in order to arrive at the same resolution in the axis of the sections as in the sections themselves. Three-dimensional reconstruction was carried out with a procedure based on voxels (pre-buffer), which permits any desired spatial section to be reproduced from the volume dataset.

Results

Figure 1 shows axial and frontal views of the muscle. It takes origin from the upper part of the cervical column (probably from the atlas and axis). In the first part of its course it lies directly on the anterior surface of the levator scapulae. It then becomes increasingly separated from this muscle to run laterally through the neck. Its belly bulges forwards to reach the body surface between the sternocleidomastoid and trapezius muscles, where it can be palpated manually. Thereafter it passes deep to the trapezius, and crosses the inferior belly of the omohyoid ventrally to reach its insertion into the lateral third of the clavicle.

Discussion

The variant observed here encloses a muscle which may be described as the levator clavicular. It has various names in the anatomical literature, including m. cleidotransversarius, m. cleidoatlanticus or m. claviotrachélien [1, 4, 7]. It can certainly appear in many forms, but all have in common an origin from one or more of the transverse processes of the upper six cervical vertebrae, and an insertion into the clavicle or acromion. The appearance of the muscle in our case has been reconstructed in Figure 2. Because of the limited number of mentions in the literature, its frequency is largely a matter of guesswork, probably lying between 1 and 3% [1, 4, 7]. From an embryological