Sonoanatomy of the muscles of facial expression

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Summary. Primary anatomic studies served for identification and differentiation of the individual mimetic muscles. As a second step, we investigated the clinical potential of ultrasound imaging to visualize the mimetic musculature in 15 volunteers. This examination technique was used to diagnose pathological alterations, especially associated with facial palsy. The excellent sonographic visualization of the mimetic musculature indicates that this technique may be a valuable adjunct in the diagnosis and differentiation of facial palsy, as well as in planning plastic surgery and reconstructive procedures, and in follow-up care.

Key words: Sonography — Mimetic musculature — Anatomic clinical study — Facial palsy

No reports are available on visualization of the muscles of facial expression with high-resolution sonography. Pathologic alterations of the mimetic musculature, e.g., after facial palsy, posttraumatic hematoma, muscular rupture etc. are commonly diagnosed from the history combined with inspection and palpation. In these instances electromyography (EMG) is one of the few additional diagnostic tools available (Scholz in press).

The mimetic musculature may be visualized using other imaging techniques such as CT (Hesselink 1978; Braun 1984; Harnsberger 1985) and MRI. Both methods have specific drawbacks: the sectional planes cannot be individually adjusted and do not always correspond to the direction of the mimetic musculature; CT involves radiation exposure, and CT and MRI are costly. With real-time sonography the mimetic musculature is visualized in its entirety due to flexible adjustment of the sector head.

Material and method

Following comparative anatomic studies (Gray 1980; Hafferl 1969; Pernkopf 1980), the mimetic muscle groups were sonographically visualized in 15 volunteers. Preliminary sonograms were used to identify the various muscles, and then 37 clinical pathological cases were investigated.

All patients were examined in the supine position (Fig. 4). To avoid artifacts in the near field of the sector head, a hypo-echoic interface of 2.5 cm in diameter was used. For reasons of hygiene, a sterile fleece was interposed between skin and interface. Pure water was used to avoid irritation of the conjunctivae by contact gel. A high-frequency sector head with 10 MHz (System Ultra Mark 8, ATL) was employed.
Fig. 1
Orbicularis oculi muscle a Direction of ultrasound imaging (sagittal plane) b sonogram, eye closed c schematic drawing d orbicularis oculi muscle, maximal contraction e schematic drawing of maximal contraction
1 Orbicularis oculi muscle, upper eyelid 2 orbicularis oculi muscle, lower eyelid 3 anterior chamber of the eye 4 lens 5 vitreous body 6 upper eyelid 7 lower eyelid 8 palpebral fissure 9 globe

M. orbiculaire de l’œil a Direction du pinceau d’ultrasons (plan sagittal) b échogramme, œil fermé c représentation schématique d contraction maximale du muscle e représentation schématique de la contraction maximale
1 M. orbiculaire de l’œil, paupière supérieure 2 paupière inférieure 3 chambre intérieure de l’œil 4 cristallin 5 corps vitré 6 paupière supérieure 7 paupière inférieure 8 fente palpebrale 9 globe oculaire