SONOGRAPHY-GUIDED INJECTIONS IN THE NECK MUSCLES: IS IT REALLY THE GOLD STANDARD?

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INTRODUCTION

It is generally accepted that sonography-guided injections of Botulinum neurotoxin (BoNT) improve the precision of muscle targeting and potentially the treatment outcomes. However, the exact accuracy of this procedure has never been assessed in the neck.

OBJECTIVE

To determine the accuracy of ultrasound-guided injections of BoNT in the superficial and deep cervical muscles.

METHODS

A liquid solution (mix of water, dye and iodized contrast agent) was injected bilaterally in nine neck muscles of six human cadavers: the Sternocleidomastoid, Trapezius, Splenius capitis, Scalenus medius, Scalenus anterior, Levator scapulae, Semispinalis capitis, Longissimus capitis and Obliquus capitis inferior. The injections were performed by a trained physician with sonographic-guidance (Figure 1). CT-scan was performed before the necks were cut in 1-cm thick slices (Figures 2 and 3). The accuracy of the injections was consensually determined on anatomic slices by three investigators (AK, CG and XD). If the accuracy of an injection was unclear, the localization of the contrast agent was determined on CT-scan.

RESULTS

One hundred and two muscles were injected. The global accuracy was 88.24%. The errors were observed mainly with the Obliquus capitis inferior (41.67% accuracy), mistaken for Rectus capitis major. Some errors were also observed with the Scaleni (85% accuracy): one Scalenus anterior was mistaken for Scalenus medius; one Scalenus medius was mistaken for the Levator scapulae. At least, in one cadaver the Splenius capitis was injected instead of the Levator scapulae. The accuracy was 100% in all the other muscles.

DISCUSSION

The accuracy of sonography-guided injections was excellent in most muscles. However, our results reveal some pitfalls in sonographic-guided injections. In particular, the Obliquus capitis inferior, injected as medially as possible to avoid the vertebral artery, was confused with the Rectus capitis major. Other mismatches are rather explained by the use of cadavers. For example, the low accuracy in the Scaleni muscles was explained by technical difficulties: the injection of formaldehyde required a large cut in the anterior, laterocervical region.

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