



Original Contribution

Locating the optimal internal jugular target site for central venous line placement[☆]



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Abstract

Study objective: Historically, the placement of internal jugular central venous lines has been accomplished by using external landmarks to help identify target-rich locations in order to steer clear of dangerous structures. This paradigm is largely being displaced, as ultrasound has become routine practice, raising new considerations regarding target locations and risk mitigation. Most human anatomy texts depict the internal jugular vein as a straight columnar structure that exits the cranial vault the same size that it enters the thoracic cavity. We dispute the notion that the internal jugulars are cylindrical columns that symmetrically descend into the thoracic cavity, and purport that they are asymmetric conical structures.

Design: The primary aim of this study was to evaluate 100 consecutive adult chest and neck computed tomography exams that were imaged at an inpatient hospital. We measured the internal jugular on the left and right sides at three different levels to look for differences in size as the internal jugular descends into the thoracic cavity.

Main results: We revealed that as the internal jugular descends into the thorax, the area of the vessel increases and geometrically resembles a conical structure. We also reconfirmed that the left internal jugular is smaller than the right internal jugular.

Conclusions: Understanding that the largest target area for central venous line placement is the lower portion of the right internal jugular vein will help to better target vascular access for central line placement. This is

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the first study the authors are aware of that depicts the internal jugular as a conical structure as opposed to the commonly depicted symmetrical columnar structure frequently illustrated in anatomy textbooks. This target area does come with additional risk, as the closer you get to the thoracic cavity, the greater the chances for lung injury.

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1. Introduction

Historically, the placement of internal jugular (IJ) central venous lines (CVL) has been accomplished by using external landmarks to help identify target-rich locations along with steering clear of dangerous structures such as the carotid artery or the lung [1]. Some of these landmarks include the laryngeal cartilage, the carotid pulse, the bifurcation of the sternocleidomastoid muscle, the sternal notch, and the ipsilateral nipple. This paradigm has largely been abandoned with the advent of ultrasound (US)-guided CVL placement [2,3], and now other considerations (including the plane of the US

probe, the approach angle of the needle, and the needle entry site) are emerging.

Measurement of the varying size of the IJ vein as it courses the neck has not been, to the best of our knowledge, previously investigated. The primary aim of this study was to measure the IJ on the left and right sides at three different levels, including cervical vertebra one, the hyoid bone, and the cricoid cartilage, by evaluating 100 consecutive adult neck computed tomography (CT) exams. These landmarks were chosen because radiologists frequently use these anatomical areas as points of demarcation for dividing and measuring. This knowledge should aid in elucidating the largest target area for IJ access

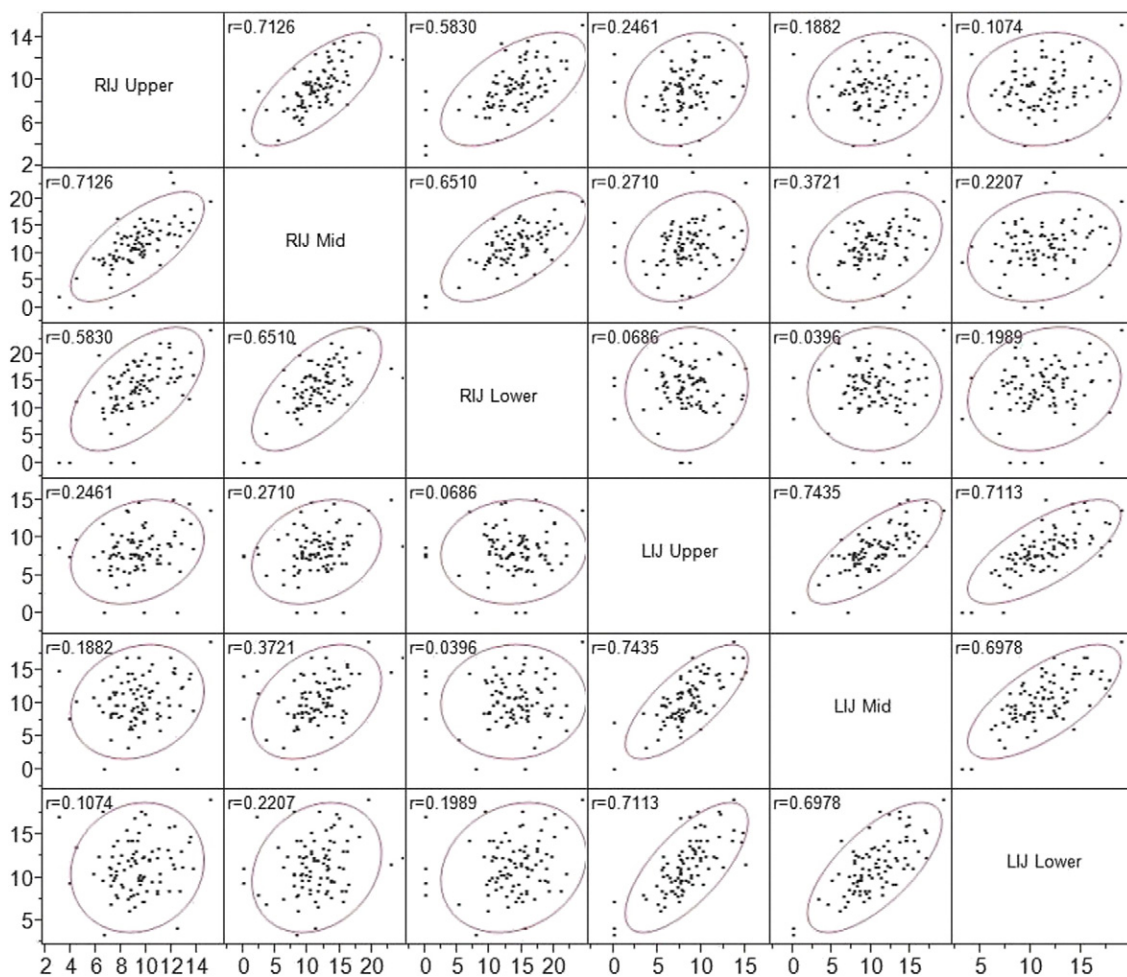


Fig. 1 Size of internal jugular versus side of neck. The right internal jugular diameter (11.39 mm, 95% CI 10.90–11.90 mm) was greater than the left side (9.95 mm, 95% CI 9.54–10.36 mm; mean difference 1.44 mm, 95% CI 0.79–2.09 mm, $P < .0001$).

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