A RADIOLOGICAL EXAMINATION OF THE SUBCLAVIAN VEIN IN VIVO

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INTRODUCTION

Subclavian vein (SCV) cannulation carries risks of pneumothorax and arteriopuncture¹. Conflicting techniques described in the literature² are primarily based on one cadaver study³. To determine the safest technique, SCV anatomy in vivo was examined radiologically.

METHODS

With Human Investigation Committee approval, 20 consecutive archived chest radiographs, 10 subclavian venograms, and 10 computed tomograms of the thorax were examined on an LCD screen. Exclusion criteria were: pathology involving the clavicle or underlying soft tissue, age less than nineteen, and clavicle unidentifiable on venogram. Measurements (mean $\pm$ standard deviation) were made using the cursors in the archive program: distance from the medial end of the clavicle to the point of intersection with the SCV (frontal and transverse planes); from midclavicle 90 degrees caudad to the axillary vein (frontal); and the angle between the clavicle and the transverse plane (frontal).

RESULTS

At midclavicle, the superior edge of the axillary vein is 2.0 ± 0.8 cm caudad to the inferior edge of the clavicle with the clavicle elevated 15-20 degrees. It runs toward the suprasternal notch, passing under the clavicle to become SCV slightly medial to midclavicle (0.4 ± 0.02 of the length of the clavicle from its medial end). It continues adjacent and deep to the medial third of the clavicle, parallel to its long axis. This portion of the SCV abuts the anterior pleura, and is parallel but caudad and superficial to the subclavian artery. Lateral to midclavicle, the axillary vein and pleura diverge.

DISCUSSION

The optimal needle puncture site is 1-1.5 cm inferior to the clavicular midpoint. The findings suggest that the needle should be advanced medially and slightly caudad toward the suprasternal notch, just deep to the medial third of the clavicle and parallel to the long axis of the clavicle. This direction should minimize subclavian arteriopuncture. The needle tip will intersect the SCV medial to midclavicle. Advancing the needle tip past the junction of the middle and medial thirds of the clavicle will increase the risk of pneumothorax.

REFERENCES

1. Arch Intern Med 1986; 146:259-261.
2. Clinical Procedures in Anesthesia and Intensive Care. Lippincott, 1992, p 360.
3. Arch Surg 1956; 72:179-181.