

Anatomical relationship between the common carotid artery and the internal jugular vein during head rotation: an ultrasonographic study

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Argomento: Altro

Introduction: Injury to common carotid artery (CCA) is a frequent complication of internal jugular vein (IJV) catheterisation. We suggest there exists an optimal angle for head rotation to minimise arterial puncture.

Aim: To identify head rotation angle for optimal and safe IJV catheterisation.

Methods: We conducted a prospective study in the university hospital intensive care unit. 82 patients admitted during two-month term were included. Ultrasound examination of right IJV and CCA was performed with patients in supine position. Vessels were visualised in transversal plane, middle-triangle level. Ultrasonographic images were taken at 0°, 30° and 60° head rotation angle at end-point of tidal volume exhalation. Internal jugular vein puncture angle (θ_{IJV}), common carotid artery puncture angle (θ_{CCA}), overlapping angle (OA), real puncture angle (RPA), flattening of IJV (vein's shape; height and width's difference divided by width) were evaluated.

Results: 46 out of 82 patients were male, 31 were mechanically ventilated. Mean patient age - $65,46 \pm 17,19$ yrs. θ_{IJV} was largest at 60° rotation ($87,33 \pm 21,71^\circ$), differed statistically significantly from 0° ($63,69 \pm 19,07^\circ$; $p=0,000$) and 30° rotation ($77,27 \pm 20,78^\circ$; $p=0,001$). θ_{IJV} at 0° and 30° rotation differed statistically significantly ($p=0,001$). OA was largest at 60° rotation ($41,62 \pm 13,56^\circ$), differed statistically significantly from 0° ($20,76 \pm 11,41^\circ$; $p=0,000$) and 30° rotation ($22,88 \pm 12,27^\circ$; $p=0,000$). OA at 30° and 0° rotation differed statistically significantly ($p=0,00$). RPA at 30° was largest ($57,39 \pm 18,91^\circ$), differed statistically significantly from 0° ($42,93 \pm 17,5^\circ$; $p=0,002$) and 60° rotation ($45,71 \pm 20,94^\circ$, $p=0,049$). Flattening was smallest at 60° rotation ($0,2 \pm 0,17$), differed statistically significantly from 0° ($0,39 \pm 0,17$; $p=0,000$) and 30° rotation ($0,31 \pm 0,16$; $p=0,000$). Flattening at 0° and 30° rotation differed statistically significantly ($p=0,017$). There were no other differences between patients.

Conclusions: While IJV becomes more rounded and puncture angle increases with head rotation, peaking at 60°, CCA covers larger area of vein, consequently RPA peaks at 30° head rotation, indicating safest position for catheterisation.