
Abstract:

BACKGROUND: The effects of maneuvers to increase intrathoracic pressure and of Trendelenburg position on the cross-sectional area (CSA) of the subclavian vein (SCV) and the relationship between the SCV and adjacent structures have not been investigated.

METHODS: In ultrasonography-guided SCV catheterization (N = 30), the CSA of the SCV and the distance between the SCV and pleura (DSCV-pleura) were determined during 10-second airway opening, and 10-second positive inspiratory hold with 20 cm H2O in the supine position (S-0, and S-20) and the 10° Trendelenburg position (T-0, and T-20). In addition to a statistical significance of P < 0.05, CSA and DSCV-pleura differences of ≥15% were defined as clinically relevant changes.

RESULTS: CSA (mean [95% confidence interval]) in S-20, T-0, and T-20 (1.02 [0.95–1.14] cm², 1.04 [0.95–1.15] cm², and 1.14 [1.04–1.24] cm², respectively) was significantly larger than a CSA in S-0 (0.93 [0.86–1.00] cm², all P < 0.001). However, only the increase of CSA in T-20 vs S-0 (0.21 cm², 23.2%) was clinically meaningful (≥15%). The number of patients who showed CSA increase ≥15% was more in S-0 to T-20 (57%) compared with those in S-0 to S-20 (23%) and S-0 to T-0 (27%). DSCV-pleura measurements (mean) in S-20 and T-20 (0.61 and 0.60 cm) were significantly shorter than those in S-0 (0.70 cm, all P < 0.001), but the reductions of DSCV-pleura were not clinically meaningful (≥15%).

CONCLUSIONS: The combined application of inspiratory hold and Trendelenburg position provided a greater and more relevant degree of CSA increase without compromising DSCV-pleura, which may facilitate SCV catheterization. Further investigations are needed to determine whether these results affect the success rate of catheterization and the risk of procedural injury.
Effects of the Trendelenburg position and intrathoracic pressure on the subclavian cross-sectional area