
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 $\geq 15\%$ 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 ($\geq 15\%$).

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.