Abstract:
The vascular injury induced by central venous catheter (CVC) indwelling is the basis for the occurrence and development of CVC-related complications, such as phlebitis, venous thrombosis, and catheter-related infections. Focal adhesion kinase (FAK) and FAK-protein kinase B (AKT) signaling pathway are of great significance in tissue repair after trauma. Here, we investigated the role and mechanism of the FAK inhibitor (1,2,4,5-phenyltetramine tetrahydrochloride (Y15)) in oxidative damage caused by CVC. EA.hy926 cells were divided into the control group (normal control), CVCs+scratches group (the intercepted CVC segments coculturing with scratched EA.hy926 cells), and CVCs+scratches+Y15 group (Y15 was added to the cell culture supernatant with CVCs + scratches at a final concentration of 50 μmol·L-1). New Zealand rabbits were randomly divided into the control group (normal control), CVC group (CVC was inserted through the rabbit's right jugular vein to the junction of the right atrium and superior vena cava), and CVC+Y15 group (CVC was immersed in a 50 μmol·L-1 Y15 solutions before insertion). The levels of markers and proteins related to oxidative damage in cells, cell culture supernatant, serum, and external jugular vein were measured by commercial kits and western blot, respectively. We found that Y15 treatment significantly decreased ROS and MDA levels and increased cell viability, NO, and SOD levels in a time-dependent manner in rabbit serum and cell culture supernatant. In addition, Y15 effectively reduced the CVC-induced pathological changes of damaged vascular tissues. Y15 also downregulated the levels of p-FAK Tyr 397 and p-Akt Ser 473 in damaged external jugular vein and EA.hy926 cells. These findings suggest that Y15 alleviated CVC-induced oxidative damage to blood vessels by suppressing focal FAK-Akt pathway activation.
Reference:
Wang Y, Lin S, Jiang P, Song Y, Zhao Y, Zheng Y. Focal Adhesion Kinase Inhibitor Inhibits the Oxidative Damage Induced by Central Venous Catheter via Abolishing Focal Adhesion Kinase-Protein Kinase B Pathway Activation. Biomed Res Int. 2021 Mar 1;2021:6685493. doi: 10.1155/2021/6685493. PMID: 33748278; PMCID: PMC7943296.
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