

Role of “non real-time” ultrasound localization in central venous catheterization of hemodialysis patients

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INTRODUCTION

In China, about 90% of patients started hemodialysis with central venous catheters, so it is very important to increase catheter insertion success rate and lower its complications. Real-time ultrasound guided catheterization was recommended in many practice guidelines, but in China, many blood purification centers had no access to it. In that situation we had to depend on “blind” landmark method which had many shortcomings, so we assumed “non real-time” ultrasound localization before catheterization maybe a good alternative solution.

OBJECTIVES

Our aim was to assess the value of non real-time ultrasound localization method in central venous catheterization(CVC) for hemodialysis patients compared with real-time ultrasound guidance method and the traditional “blind” landmark method.

METHODS

We designed a prospective randomized controlled study, and 300 patients requiring hemodialysis treatment and catheterization of the internal jugular vein(IJV) as a timely vascular access were included between January 1st,2013 to January 1st,2014 in our blood purification center. They were randomly divided into three groups using three different methods(the traditional “blind” landmark method, real-time ultrasound guidance method and “non real-time” ultrasound localization method) for IJV catheterization, the endpoint events was attempt puncture failure for five times or arterial puncture or guide wire insertion not smooth for twice.

CONCLUSIONS

“Non real-time” ultrasound localization method in CVC for hemodialysis patients was better than landmark method in aspect of success rate on catheterization, success rate on first attempt, overall complication rate and needle punctures, which was very close to real-time ultrasound guidance. “Non real-time” ultrasound localization could be an alternative method for real-time ultrasound guidance.

RESULTS

“Non real-time” ultrasound localization method was almost equal to real-time ultrasound guidance (3% versus 1%, $P>0.05$), and lower than landmark method(3% versus 15%, $P<0.05$) on the failure rate of catheterization. The failure rate on first attempt by “non real-time” ultrasound localization method was 6%,which was very close to real-time ultrasound guidance(1%, $P>0.05$) and far lower than landmark method(35%, $P<0.05$).The overall complication rate in “non real-time” ultrasound localization group was 5%,higher than real-time ultrasound guidance(1%, $P>0.05$) and lower than landmark method(10%, $P>0.05$).7% of patients required attempt puncture more than triple under “non real-time” ultrasound localization, while 2% under real-time ultrasound guidance and 26% by landmark method according to statistics. In addition, average number of attempts and operation time required for successful catheterization by “non real-time” ultrasound localization method were (1.19±0.14) and (21.34±0.25 minutes), and there was no difference compared with real-time ultrasound guidance method(1.13±0.11,19.22±0.17 minutes)($P>0.05$).

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