Can standard central venous catheters be used for CT contrast injection? | 1

No CVCs failed under dynamic loading with injection of contrast at flow rates (4.5 and 7 mL/s) high enough to support computed tomographic angiography. This suggests 16-cm triple-lumen CVCs can be used safely” Beckingham et al (2017).

Abstract:

INTRODUCTION: Central venous catheter (CVC) access is commonplace in intensive care units. Patients undergoing computed tomographic angiography require injection of contrast at high flow rates (4.5 mL/s), often CVC access is not used due to safety concerns. The CVC might rupture at high flow rates, resulting in CVC fragmentation and embolization or contrast extravasation. The objective of this study is to determine the pressure required to burst a CVC under static load and compare this to the pressure generated by injection of contrast at high flow rates (dynamic load) through the distal (16-g) lumen of a triple-lumen CVC.

METHODS: We gathered 16-cm long triple-lumen CVCs (n = 14) from patients with an average dwell time of 5.2 days (±2.7 days). Half the CVCs (n = 7) were subjected to static testing, where the distal lumen was occluded with the guidewire and super glue at the distal end of the catheter. The CVC was then placed into a 10-cm deep water bath at 37°C to simulate in vivo conditions and water was injected until catheter rupture. Dynamic pressure testing was done with the remaining catheters, with radio-contrast injected through the unoccluded distal lumen at flow rates of 4.5 mL/s, then 7 mL/s. Pressures were recorded throughout injection.

RESULTS: During static testing, 6/7 CVCs burst at the distal lumen where the glue was applied, the remaining CVC burst proximal to the hub. PSI at burst during static testing was 184.2 PSI (95% confidence interval [CI] 174.3-194.1 PSI). During dynamic testing the mean peak pressures at 7 mL/s was 81.1 PSI (95% CI 73-89.2 PSI). At 4.5 mL/s the mean peak pressure was 47.9 PSI (95% CI 42.9-52.9 PSI).
CONCLUSIONS: No CVCs failed under dynamic loading with injection of contrast at flow rates (4.5 and 7 mL/s) high enough to support computed tomographic angiography. This suggests 16-cm triple-lumen CVCs can be used safely.

Reference:


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