
Abstract:

PURPOSE: To evaluate a widely used nontunneled triple-lumen central venous catheter in order to determine whether the largest of the three lumina (16 gauge) can tolerate high flow rates, such as those required for computed tomographic angiography.

MATERIALS AND METHODS: Forty-two catheters were tested in vitro, including 10 new and 32 used catheters (median indwelling time, 5 days). Injection pressures were continuously monitored at the site of the 16-gauge central venous catheter hub. Catheters were injected with 300 and 370 mg of iodine per milliliter of iopamidol by using a mechanical injector at increasing flow rates until the catheter failed. The infusion rate, hub pressure, and location were documented for each failure event. The catheter pressures generated during hand injection by five operators were also analyzed. Mean flow rates and pressures at failure were compared by means of two-tailed Student t test, with differences considered significant at P < .05.

RESULTS: Injections of iopamidol with 370 mg of iodine per milliliter generate more pressure than injections of iopamidol with 300 mg of iodine per milliliter at the same injection rate. All catheters failed in the tubing external to the patient. The lowest flow rate at which catheter
failure occurred was 9 mL/sec. The lowest hub pressure at failure was 262 pounds per square inch gauge (psig) for new and 213 psig for used catheters. Hand injection of iopamidol with 300 mg of iodine per milliliter generated peak hub pressures ranging from 35 to 72 psig, corresponding to flow rates ranging from 2.5 to 5.0 mL/sec.

CONCLUSION: Indwelling use has an effect on catheter material property, but even for used catheters there is a substantial safety margin for power injection with the particular triple-lumen central venous catheter tested in this study, as the manufacturer’s recommendation for maximum pressure is 15 psig.