Structured Approach to Venous Access Associated with Zero Risk of Pneumothorax During Cardiac Device Implant Procedures

Iatrogenic pneumothorax, an acute serious complication, is reported to occur in 0.1% to 2% of permanent trans-venous cardiac device implant procedures.[1,2] A National Cardiovascular Data Registry analysis of data between January 2006 and December 2008 found that pneumothorax incidence after a new defibrillator implant was 0.5%.[1] Among 4355 Danish patients undergoing a new device implant, 0.9% experienced pneumothorax requiring drainage and 0.7% had pneumothorax treated conservatively.[2] Studies have shown a higher risk of complications when procedures were performed at low-volume centers compared with the highest volume quartile (odds ratio, 1.26; 95% confidence interval, 1.05-1.52) or when procedures were performed by low-volume operators.[1]

Methods. At 2 community hospitals, a project to reduce pneumothorax risk related to new device implants was implemented. This project consisted of obtaining a pre-procedure venogram (right anterior oblique [RAO] view, 12–18 degrees, 42 cm magnification), creating a subcutaneous pocket first and then obtaining axillary venous access with a 4Fr micro-puncture needle, and obtaining a post-procedure chest radiograph. During venous access, the needle was never advanced beyond the inner border of the first rib. This new process was fully implemented by January 2015. A chart review of all patients who underwent a new device implant between January 2015 and July 2017 at the 2 community medical centers was performed.

Results. Seventy patients received new implants during the review period (31 female, 39 male). The median age was 78 years (range, 34–94 years), median body mass index was 29.05 (range, 17.3–67.9), median procedural time was 70 minutes (range, 26–146 minutes), and median fluoroscopic time was 6.4 minutes (range, 0.5–35.7 minutes). A total of 131 independent venous accesses were obtained to implant 42 pacemakers and 28 defibrillators (10 single, 54 dual, and 6 biventricular devices). Of these accesses, 127 were axillary and the remainder were cephalic. There was no incidence of pneumothorax reported during these venous accesses.

Discussion. A structured approach to venous access during device implants was associated with zero incidence of pneumothorax in a low-volume center where implants were performed by a low-volume trained operator. The venogram eliminates "blind attempts," and the RAO view reduces the likelihood of going too posterior. Using caudal fluoroscopy and targeting the axillary vein, other groups have reported a 0% to 0.2% risk for acute pneumothorax in larger patient groups.[3,4] Creating a subcutaneous pocket first allows the needle to be aligned more longitudinally along the course of the vein. The 4Fr needle increases the ratio of vein-to-needle surface area, reducing risk for pneumothorax.

Standardization of venous access can potentially reduce iatrogenic pneumothorax risk to a never event, similar to the approach used to prevent central line–associated blood stream infections.[5]

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