Percutaneous versus open surgical cannulation for minimal invasive cardiac surgery

Objective: Femoral cut down / open surgical cannulation (SC) is traditionally used for cardiopulmonary bypass cannulation in minimal invasive cardiac surgery. Percutaneous cannulation (PC) technique using arterial closure devices has also been used in select centers. The aim of this study was to compare outcomes between patients undergoing PC or SC approach, with a particular focus on cannulation-related groin complications.

Methods: Retrospective analysis of patients undergoing minimal invasive surgery at our institution between January 2018 and November 2021 was performed. Starting from June 2020, three surgeons at our institution started using the PC approach. A 21-25 Fr venous cannula and 16-20 Fr arterial cannula were used for cannulation in both groups. For patients in the PC group, a primary suture-based technique (ProGlide) complemented by a small-sized plug-based closure device (AngioSeal) was used. The primary endpoint of the study were groin complications following the procedures.

Results: A total of 483 patients underwent minimal invasive surgery through a right lateral minithoracotomy during the study time period. Of these, 55 patients (11%) were cannulated using PC approach and 428 (89%) using SC approach. The type of surgical procedures included mitral valve surgery in 413 patients (86%), tricuspid valve surgery in 16 patients (3%), combined mitral and tricuspid valve surgery in 40 patients (8%) and tumor resection in 14 patients (3%). No significant intergroup differences were found regarding patient age (PC: 59 ± 10 yrs vs. SC: 59 ± 12 yrs, p=0.7), female sex (PC: 31% vs SC: 30 %, p=0.9), history of diabetes mellitus (PC:9% vs. SC: 9%, p=0.9) or BMI (PC: 26 {23-29} vs. SC: 25 {23-28}, P>0.9). The PC approach was successful in all cases except for one patient, who was converted from PC to SC approach. Intraoperative retrograde type A dissection occurred in 1 patient from each group (2 % vs 0.2%, p=0.2). Total surgery time was 170 min {152-214} in PC group vs. 188 min {158-220} in SC group (p=0.5). Median length of hospital stay at index hospitalisation was 10 days {9-14} in PC vs. 9 days {8-13} in SC group (p=0.08). All postoperative groin complications (n=8, 2%) occurred in the SC arm, while none occurred in the PC arm (p = 0.6). The following complications were observed in the SC group: wound infection in 2, lymph fistula in 4, and seroma in 2 patients. In-hospital mortality was comparable between groups (2% PC vs 0.2 % SC, p=0.5).

Conclusions: The PC approach is a safe cannulation technique for patients undergoing minimal invasive cardiac surgery. It minimizes postoperative groin complications with no obvious negative impact on outcomes.