Cannulation Strategy Impacts Perioperative Safety in Acute Type A Aortic Dissection: Results from a National Multicenter Database

Objective: We compared perioperative outcomes of four common cannulation strategies in acute type A aortic dissection (ATAD) repair from a large multicenter national cohort

Methods: Patients undergoing ATAD repair with circulatory arrest (2002-2021) were included from a national aortic database of 9 cardiac surgical centers. Cannulation strategy was divided among the following groups: Direct Aortic, Axillary, Innominate, Femoral, and Multiple (defined as any combination of the previous four strategies). Type B and chronic presentations were excluded. Primary outcomes included in-hospital death, stroke, and perioperative complications. Continuous and categorical variables were compared with ANOVA and Chi square tests, respectively. Differences were subsequently elucidated with Tukey’s post-hoc comparisons. Multivariable logistic regression was performed for the primary outcomes to adjust for baseline and intraoperative differences, year of operation, and center.

Results: 941 patients underwent Type A repair with the following cannulation strategies: Axillary (N=442, 49%), Femoral (N=213, 23%), Multiple (N=145, 15%), Aortic (N=88, 9%), Innominate (N=53, 6%). Overall, 30% were female (N=282) and the mean age was 60.4±12 years. Femoral patients were slightly younger than Aortic (61±14 vs 66±13, p=0.012). Malperfusion presentation occurred in 35% (N=330) and was significantly more common among Femoral patients (48% N=102), [Aortic: (N=12, 24%), Axillary: (N=152, 34%), Innominate: (N=10, 19%), Multiple: (N=45, 31%), p<0.001]. Aortic valvular pathology, presentation with rupture, and highest preoperative lactate were similar between groups. Cardiopulmonary bypass times were significantly shorter among Innominate patients: 162±63min [Axillary (219±87min), Femoral (217±76min) patients, Multiple: 212±91min, Aortic: 190±80min, p ≤0.001]. Duration of circulatory arrest varied by cannulation strategy [Axillary: 33±22, Femoral: 32±20, Multiple: 32±22 Aortic: 26±17, Innominate: 26±18, ANOVA p=0.03 post-hoc p=NS]. Antegrade Cerebral Perfusion was significantly more common among Axillary (N=412, 93%), Multiple (N=115, 79%), and Innominate (N=52, 98%) patients, compared to [Femoral: (N=86, 40%), Aortic: (N=40, 46%), p<0.001]. Unadjusted postoperative outcomes identified that rates of death, stroke, ICU length of stay, hospital length of stay, and prolonged ventilation were significantly worse among Femoral patients. After adjustment for baseline and intraoperative differences, Axillary cannulation was independently protective against death and stroke [death OR: 0.59 (95%CI 0.40, 0.87) p= 0.02; stroke OR 0.58 (95%CI 0.40, 0.83) p = 0.01, relative to Femoral], Figure 1.

Conclusions: Cannulation strategy is an independent predictor of hospital outcomes in ATAD. Axillary cannulation is commonly performed and may reduce risk of death and stroke.

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