



Axillary artery versus femoral or central arterial cannulation in thoracotomy mitral surgery: Is there a difference in early outcomes?

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ABSTRACT

BACKGROUND: Axillary artery cannulation techniques continue to improve and find application throughout cardiac surgery. Yet, the early outcomes are not well documented for right axillary artery cannulation versus femoral or central arterial cannulation in right mini-thoracotomy mitral surgery.

METHODS: 3076 consecutive adult patients undergoing mitral valve surgery via right thoracotomy from 1963 to 2022 were examined from a prospectively maintained database. Outcomes from arterial cannulation using axillary versus femoral versus central aortic approaches were compared using multivariable regression analysis.

RESULTS: Arterial cannulation was axillary (769/3076(25%)), versus femoral (174/3076(6%)) or central aortic (2133/3076(69%)). In this series, femoral arterial cannulation was predominantly from 1997-2007, central aortic cannulation from 2005-2015, and axillary artery cannulation from 2014-2022. Axillary v aortic v femoral patients were older (62 ± 13 v 61 ± 13 v 56 ± 13 y, $P<0.001$), more often redo (228(30%) v 286(13%) v 56(32%), $P<0.001$), were more urgent (137(18%) v 218(10%) v 28(16%), $P<0.001$), had more mitral stenosis (141(18%), v 270(13%) v 29(17%), $P<0.001$), and had more frequent severe tricuspid regurgitation (204(26%), v 289(14%), v 28(16%), $P<0.001$). Intraoperatively, axillary patients had more mitral replacement (421(55%) v 721(34%) v 77(44%), $P<0.001$) and tricuspid procedures (212(28%) v 271(13%) v 20(11%), $P<0.001$). By multivariable analysis, axillary artery cannulation was not an independent correlate of operative mortality ($P=0.1$), postoperative respiratory failure ($P=0.7$), perioperative stroke ($P=0.5$), postoperative renal dysfunction ($P=0.5$), perioperative length of stay ($P=0.4$) or survival ($P=0.9$). However, axillary cannulation increased the likelihood of transfusion (Odds Ratio 2.5 (1.5-4.1, $P<0.001$)). Cannulation complications were rare but included pectoral atrophy in 2/769(0.3%) axillary patients, leg ischemia in 1/174(0.6%) femoral patients, wound infection in 1/174(0.6%) femoral patients, and aortic injury or dissection in 3/2133(0.1%) aortic patients.

CONCLUSIONS: Right axillary artery cannulation is a safe alternative for right mini-thoracotomy mitral surgery. Advantages may include avoidance of the aorta in reoperations or older patients, avoidance of peripheral atherosclerosis in older patients, and a low incidence of limb ischemia or wound infection. Disadvantages may include longer access time, an additional chest incision, and increased likelihood of transfusion.

PURPOSE

- Compare outcomes of axillary artery versus femoral or central aortic cannulation in R mini-thoracotomy mitral surgery

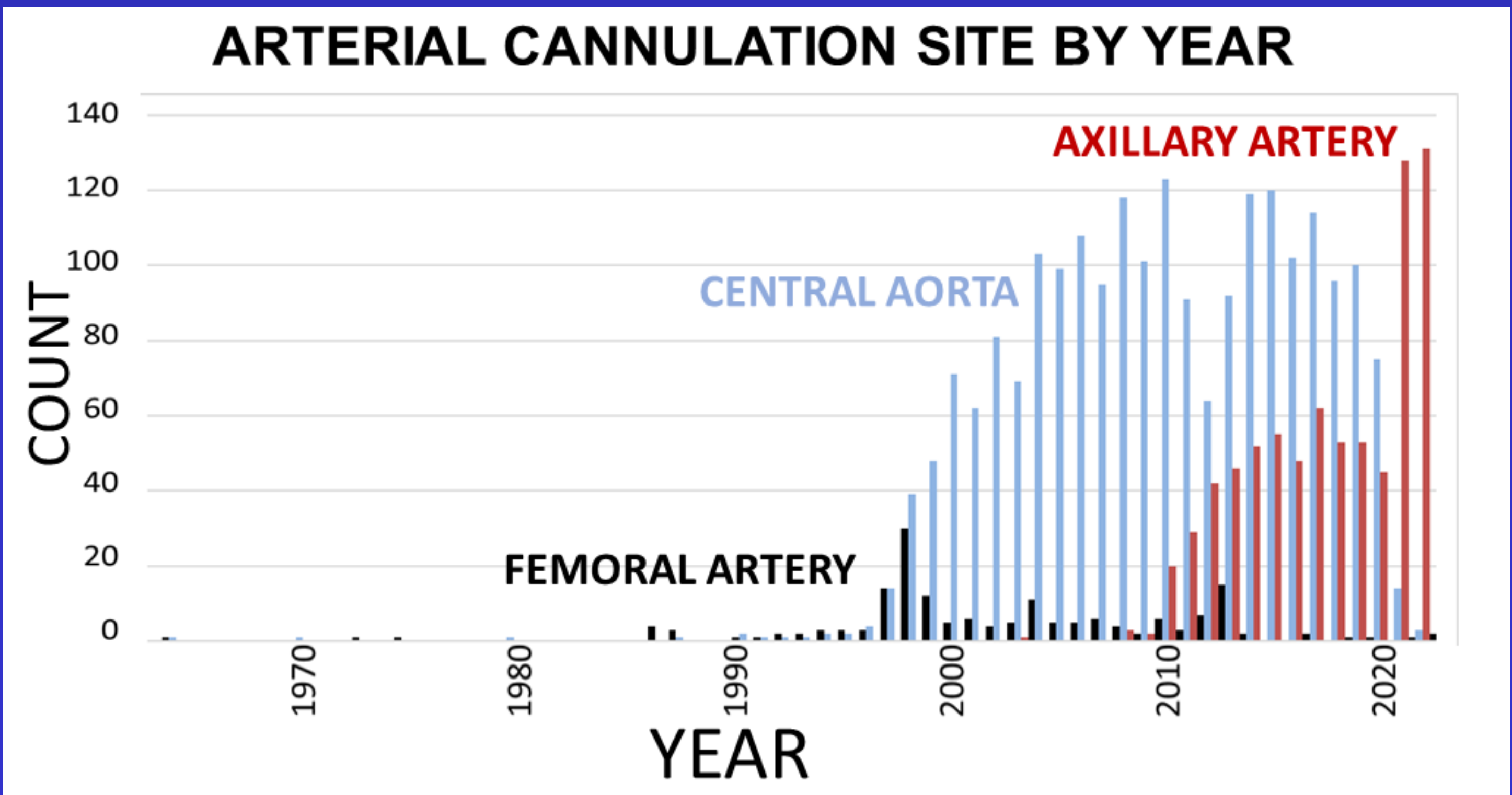
BACKGROUND

- Cannulation techniques evolve
- R axillary artery is relatively undocumented in outcome relative to alternatives

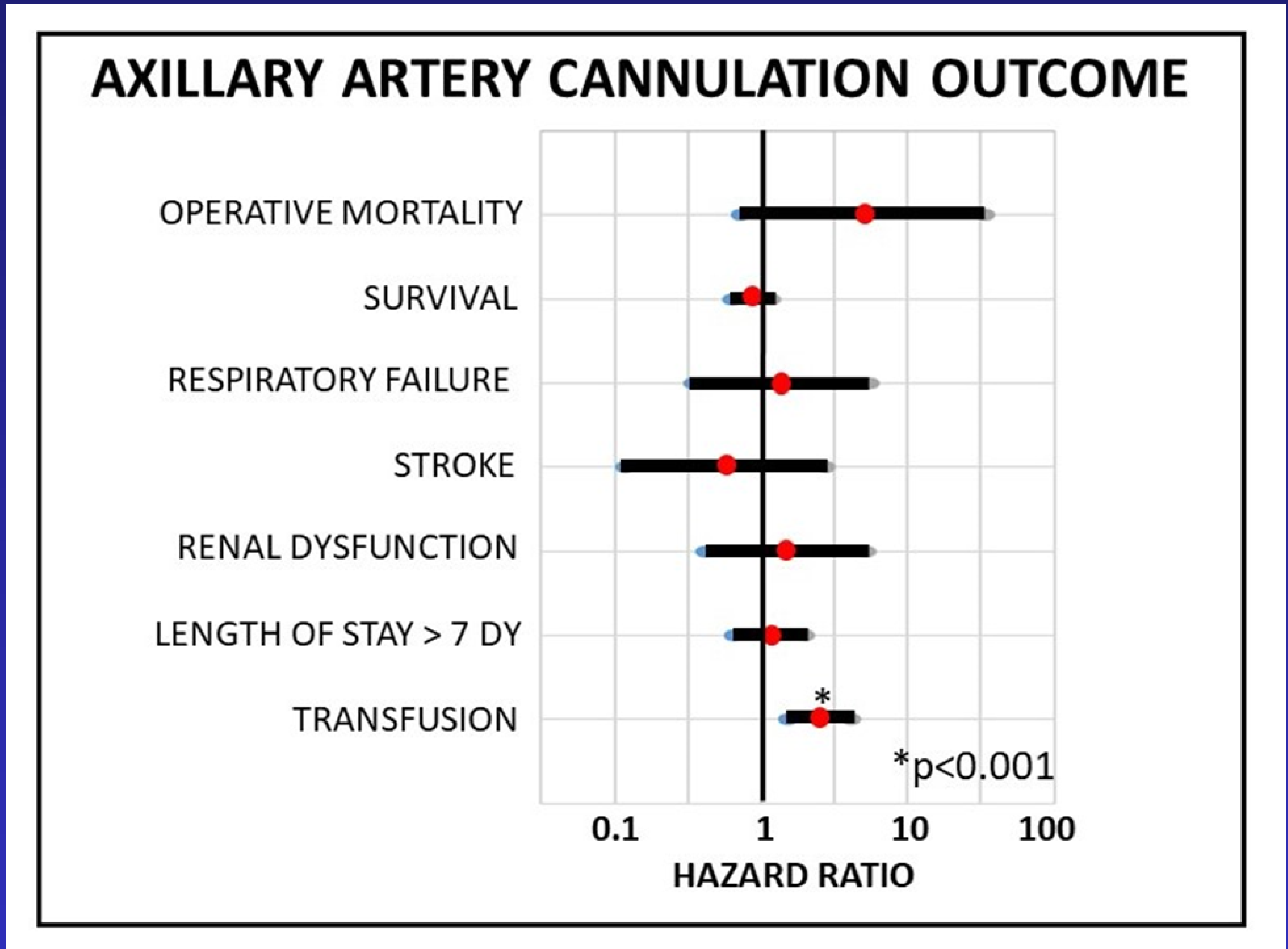
METHODS

- 3076 consecutive mitral operations 1963-2022
- All had 4-20 cm R thoracotomy
- Multivariable analysis of outcome correlates
- Robotic assistance N=227/3076(7%)

	Femoral	Aortic	Axillary	P
N	174	2133	769	
Age	56±13*	61±13	63±13*	<0.001
Male	80(46%)	1069(50%)	391(51%)	0.5
Redo	56(32%)	286(13%)*	228(30%)	<0.001
Stroke	6(3%)*	18(1%)	17(2%)	0.001
Leg ischemia	1(0.6%)	0(0%)	0(0%)	0.1
Aortic injury	0(0%)	3(0.1%)	0(0%)	0.6
Pump time	202(159,232)	195(16,240)	176(131,238)*	<0.001
Clamp time	130(96,160)	124(100,151)	88(71,125)*	<0.001



RESULTS



SUMMARY

- All 3 arterial cannulations techniques have low rate of complications
- Death, survival, respiratory failure, stroke, renal injury, length of stay not different between techniques.
- Axillary cannulation had highest likelihood of transfusion (O.R> 2.5, $P<0.001$)
- Axillary cannulation decreased pump time by 14 ± 5 min ($P=0.01$)
- Axillary cannulation decreased clamp time by 21 ± 5 min ($P<0.001$)

CONCLUSIONS

- Axillary artery cannulation for R mini-thoracotomy mitral surgery is:
 - Safe
 - Avoids aortic manipulation
 - Avoids retrograde perfusion
 - Low rate of limb ischemia
 - Low rate of wound infection
 - May increase access time
 - Less clamp, pump time
 - Slightly increased transfusion (O.R. 2.5, $P<0.001$)

Cannulation Site	Advantages	Disadvantages
Femoral artery	Fast access Familiar Avoid redo mediastinum Endoclamp	Limb ischemia Wound infection Lymphocele Retrograde embolism Aortic dissection
Central aortic	Avoid atherosclerosis Aortic injury Aortic dissection	Difficult aortic access
Axillary artery	Avoid atherosclerosis Avoid redo mediastinum Less pump, clamp times	Blood transfusion Slow access