



Robotic Totally Endoscopic Tricuspid Valve Surgery: Early Results and Midterm Outcomes

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OBJECTIVE

While robotic cardiac surgery is becoming more widely adopted for valve repairs/replacements, TV surgery is less commonly performed due to patients with severe TR having high morbidity and the postoperative mortality risk. We seek to improve patient outcomes from tricuspid valve repair and replacements by highlighting early and mid-term results in 68 isolated and concomitant TV repairs (TVr) with clinical and echocardiographic outcomes.

PATIENTS AND METHODS

Study Design

- ❖ Retrospective study of 68 concomitant and isolated TV surgery over 9 years.
- ❖ Groups: Concomitant (N=54) and Isolated (N=14)
- ❖ Average STS risk: 4%

RESULTS

Demographic Variable	All patients (n=68)
Age, mean ± SD [range]	67 ± 14.5 [16 – 91]
Female gender, n (%)	38 (57)
BMI > 30, n (%)	24 (36)
Hypertension, n (%)	49 (73)
Hyperlipidemia, n (%)	39 (58)
Diabetes mellitus, n (%)	10 (15)
Insulin-dependent diabetes mellitus, n (%)	5 (7)
Peripheral vascular disease, n (%)	4 (6)
Atrial Dysrhythmia, n (%)	44 (66)
Chronic obstructive pulmonary disease, n (%)	9 (13)
Congestive heart failure, n (%)	26 (39)
Hemodialysis, n (%)	1 (1.5)
Obstructive sleep apnea, n (%)	17 (25)
History of smoking, n (%)	26 (39)
Prior cerebrovascular accident, n (%)	7 (10)
Prior myocardial infarction, n (%)	2 (3)
STS predicted risk of mortality, mean ± SD [range]	4.0 ± 4.3 [0.12 -19.4]
EF (%), mean ± SD	56 ± 11.4
EF < 40%, n (%)	8 (12)
Prior permanent pacemaker, n (%)	7 (10)
Previous heart surgery, n (%)	11 (16)
Previous sternotomy, n (%)	8 (12)

Table 1: Demographic characteristics

Intraoperative Variables	All patients (n=68)	Concomitant patients (n=54)	Isolated TV patients (n=14)
Operative time (min), mean ± SD	248 ± 77	262 ± 68	195 ± 89
Concomitant procedures:			
CryoMaze, n (%)	34 (50)	32 (60)	2 (14)
PFO closure, n (%)	6 (9)	6 (11)	0 (0)
ASD closure, n (%)	4 (6)	4 (7)	0 (0)
Conversion to sternotomy, n (%)	0 (0)	0 (0)	0 (0)
Intraoperative blood transfusion, n (%)	32 (47)	27 (50)	5 (36)
Inotropes use, n (%)	17 (25)	14 (26)	3 (21)

Table 2: Intraoperative variables

Postoperative Complications	All patients (n=68)	Concomitant patients (n=54)	Isolated TV patients (n=14)
New postoperative atrial fibrillation, n (%)	4 (6)	4 (7)	0 (0)
Wound infection, n (%)	0 (0)	0 (0)	0 (0)
Groin seroma, n (%)	2 (3)	2 (3)	0 (0)
Pleural effusion, n (%)	5 (7)	4 (7)	1 (7)
Pulmonary embolism, n (%)	1 (1)	1 (2)	0 (0)
Unilateral pulmonary edema, n (%)	3 (4)	3 (6)	0 (0)
Acute kidney injury, n (%)	3 (4)	2 (4)	1 (7)
New permanent pacemaker, n (%)	7 (10)	5 (9)	2 (14)
Tracheostomy, n (%)	4 (6)	3 (6)	1 (7)
ECMO, n (%)	4 (6)	2 (2)	2 (14)
Return to OR for bleeding, n (%)	5 (7)	3 (6)	2 (14)
Clinical myocardial infarction, n (%)	0 (0)	0 (0)	0 (0)
CVA n (%)	2 (3)	2 (4)	0 (0)
Hospital mortality, n (%)	1 (1.5)	0 (0)	1 (7)

Table 3: Postoperative complications

RESULTS

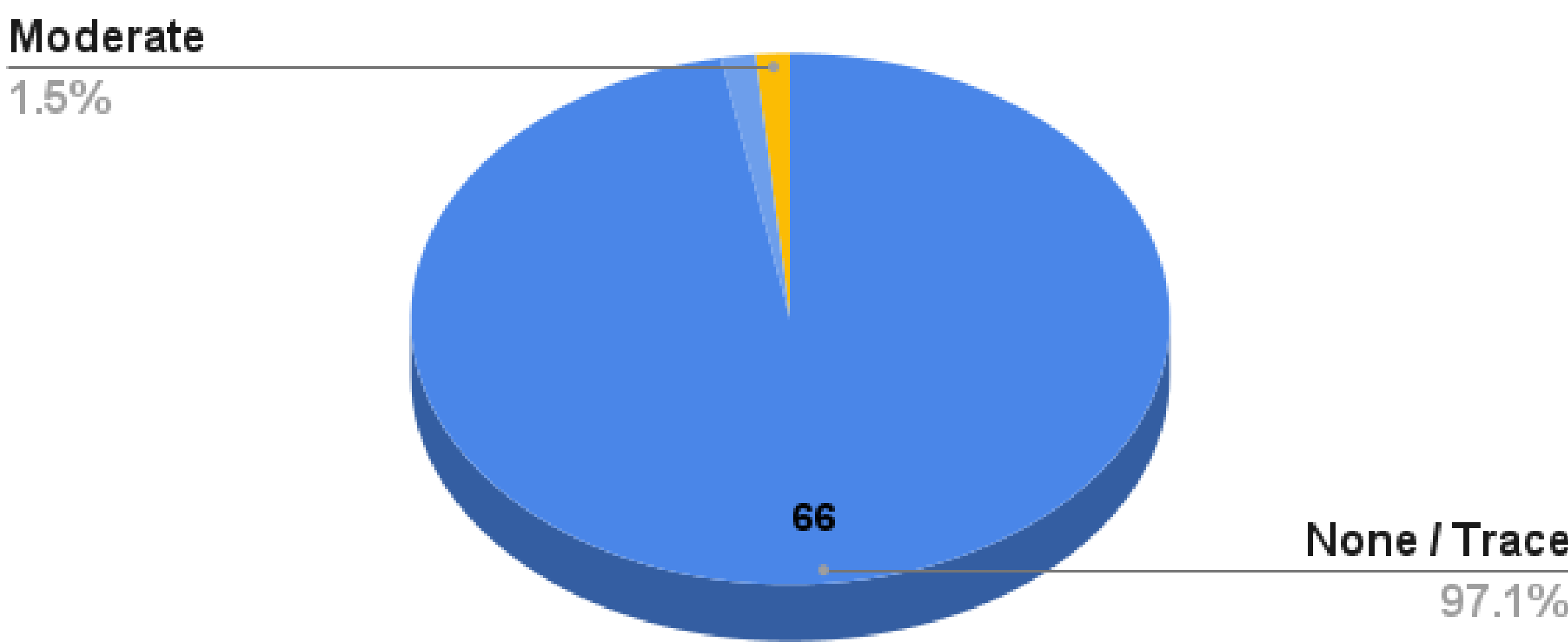
Postoperative Variables	All patients (n=68)	Concomitant patients (n=54)	Isolated TV patients (n=14)
Extubation ≤ 6 hours, n (%)	30 (44)	21 (39)	9 (64)
Prolonged intubation (> 24 hours), n (%)	12 (18)	11 (20)	1 (7)
24-hour chest tube drainage (mL), mean ± SD	918 ± 1,215	1020 ± 1,336	535 ± 416
Postoperative blood transfusion use, n (%)	36 (53)	31 (57)	5 (36)
ICU length of stay (days), mean ± SD	3.8 ± 5.0	4.2 ± 5.4	1.8 ± 1.5
Hospital length of stay (days), mean ± SD	6.7 ± 8.0	7.4 ± 8.6	3.5 ± 2.7
Discharge destination:			
Home, n (%)	53 (78)	41 (76)	12 (86)
Rehabilitation facility, n (%)	14 (21)	13 (24)	1 (7)

Table 4: Postoperative outcomes

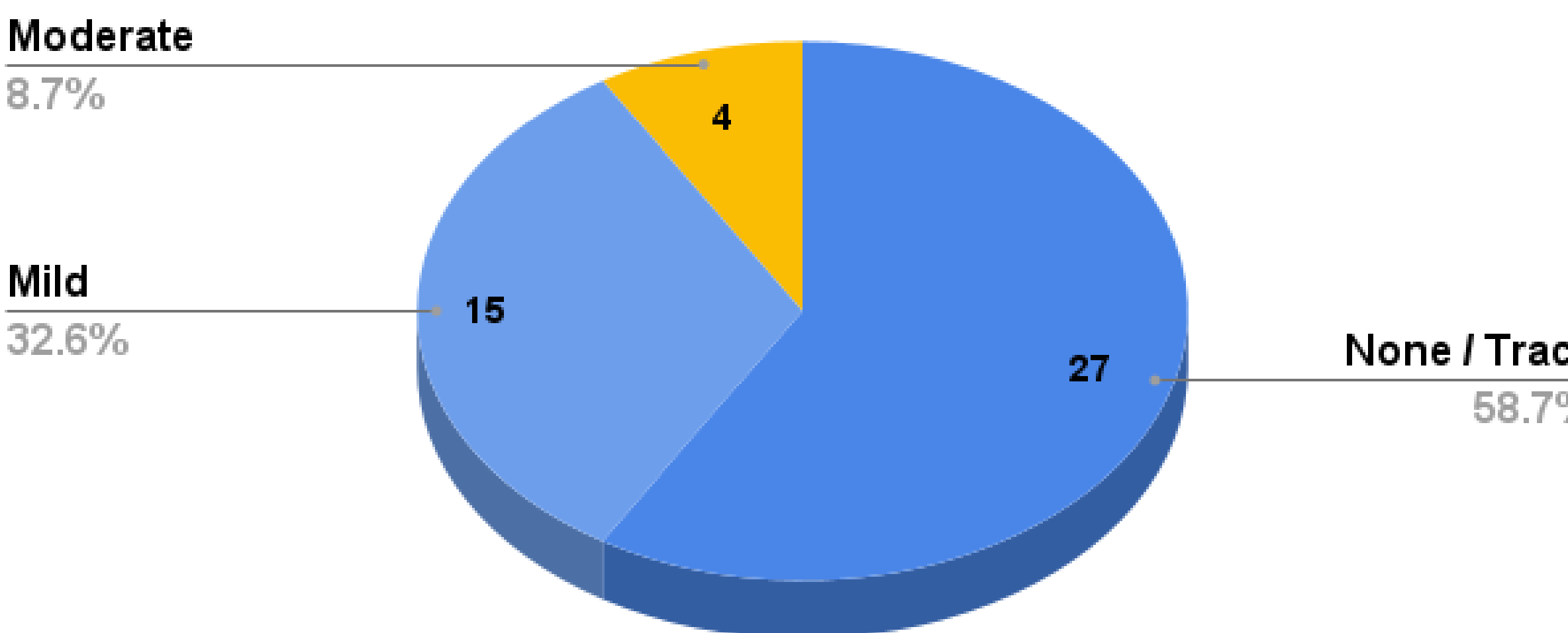


Figure 1: Healed incisions at 6 week postoperative clinic visit

Initial Postoperative Echocardiographic Results for TR (n=68)

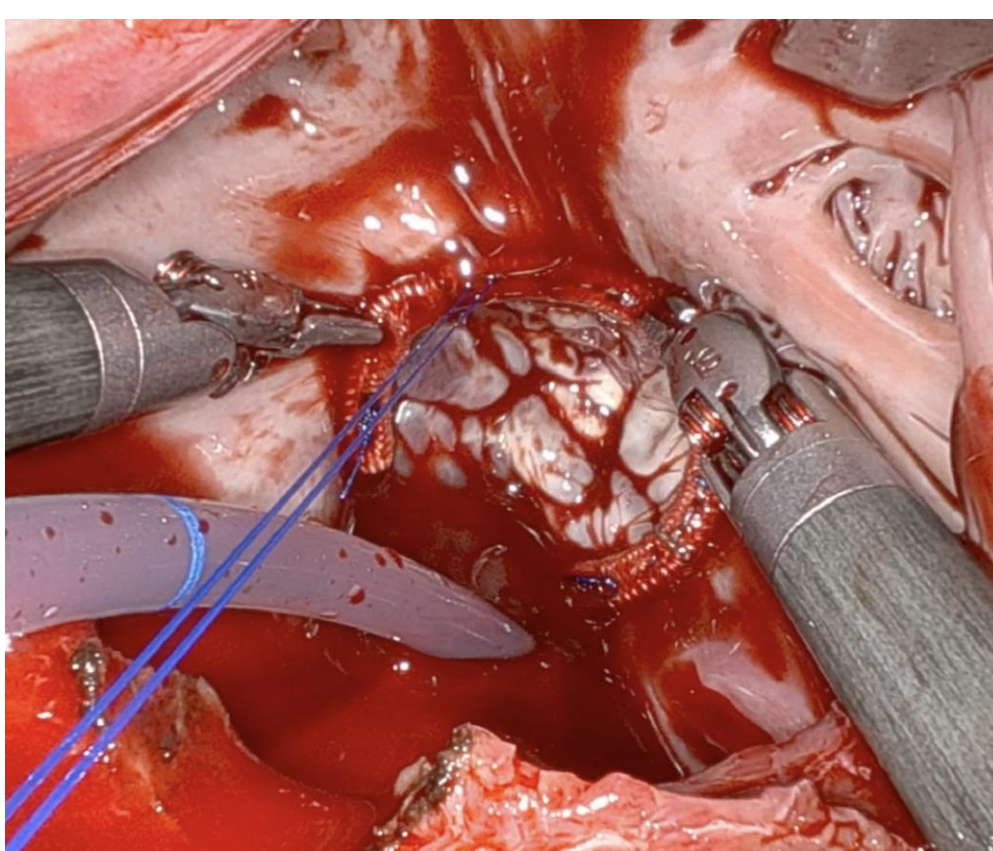
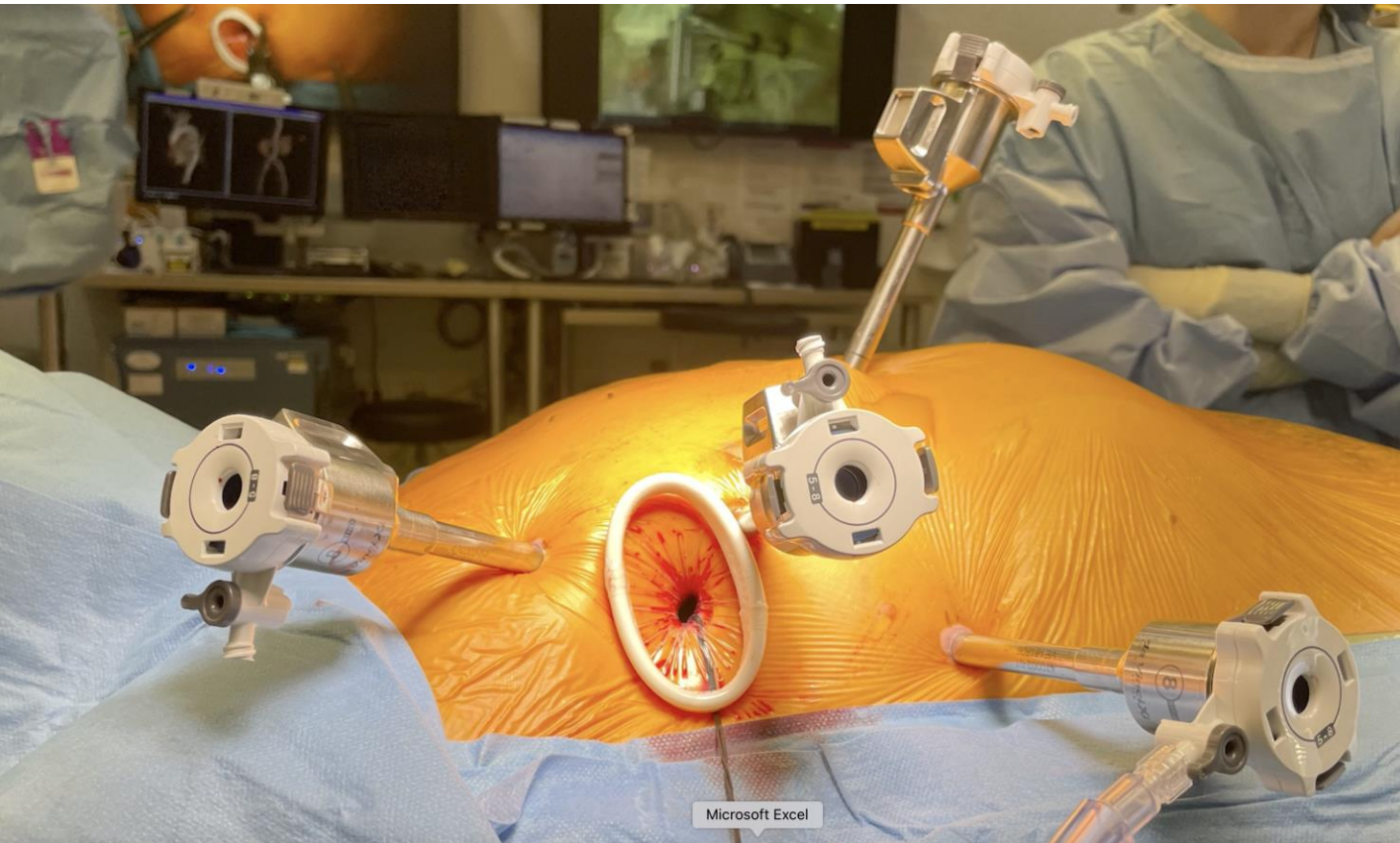


Midterm Follow-up on Echocardiographic Outcomes for TR (n=46)



SURGICAL TECHNIQUE

The Da Vinci Si or Xi robot was used for all cases with a small 8-10 mm working port. Our standard approach includes performing surgery with cardiopulmonary bypass on a beating heart.



CONCLUSIONS

We conclude that robotic totally endoscopic tricuspid valve repairs are safe, effective, and durable. The utilization of robotic technology allows for intricate TV repairs with enhanced visualization and dexterity, while avoiding sternotomy and facilitating quicker recovery. Our series demonstrates good early and midterm postoperative outcomes in both isolated and concomitant groups. Further studies are warranted to assess long-term follow up data for robotic-assisted TV repairs and replacements.

DISCLOSURES

Dr. Balkhy is a proctor for Intuitive Surgical.

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