Right Vertical infra Axillary Incision Approach in Cardiac Surgery

——Assessing Postoperative Pulmonary Function Compared to Conventional Incision

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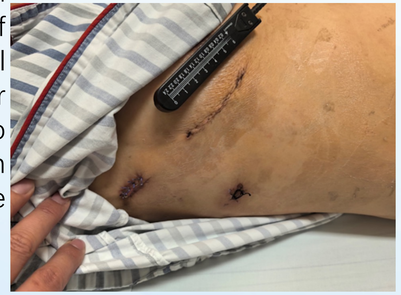
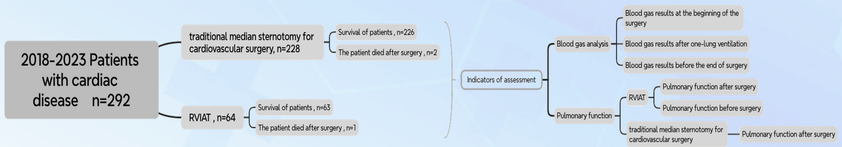
Background

Similar to traditional median sternotomy for cardiovascular surgery, right axillary direct incision approach is used for cardiovascular surgery. Unlike the unilateral pulmonary ventilation required in the process of surgery through a traditional approach, it is not necessary for this new approach. We aimed to investigate whether it has an impact on postoperative pulmonary function.



Method

We included 292 surgical patients with congenital heart disease and cardiac valve disease who underwent surgery through right axillary small incision or median incision from 2018 to 2023, among whom three surgical patients died. Through univariate logistic regression analysis of data from the two groups of patients, we explored the relationship between the choice of the right axillary direct incision approach and postoperative pulmonary function in patients.



Result

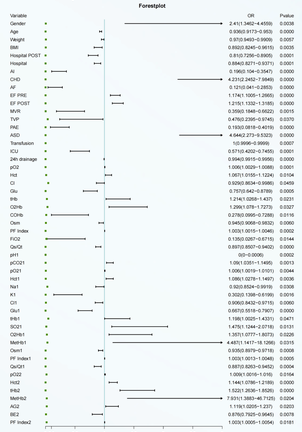
For patients undergoing surgery through the right axillary direct incision approach, the duration of surgery did not shorten. However, the extracorporeal circulation time during the surgical procedure was relatively reduced. Postoperatively, the length of hospital stay was significantly shortened, the duration of mechanical ventilation was markedly reduced, and postoperative pulmonary function showed a clear improvement.

	Traditional Median Sternotomy (n=229)	Right Axillary Direct Incision Approach (n=64)	P
Age (median [IQR]), years	61.00 [52.00, 67.00]	40.50 [26.00, 54.25]	<0.001
BMI (median [IQR]), kg/m^2	23.85 [20.76, 26.03]	21.61 [20.14, 24.22]	0.004
Length of postoperative stay (median [IQR]),days	12.00 [10.00, 15.00]	9.00 [8.00, 12.00]	<0.001
Aortic insufficiency (%),n No	76 (33.3%)	46 (71.9%)	<0.001
Yes	152 (66.7%)	18 (28.1%)	
CCD (%),n No	198 (86.8%)	39 (60.9%)	<0.001
Yes	30 (13.2%)	25 (39.1%)	
Atrial fibrillation (%),n No	134 (58.8%)	59 (92.2%)	<0.001
Yes	94 (41.2%)	5 (7.8%)	
EF PRE (median [IQR]),%	56.00 [50.05, 59.00]	60.00 [58.00, 63.00]	<0.001
EF POST (median [IQR]),%	55.00 [50.00, 58.00]	59.00 [56.00, 60.00]	<0.001
AVR (%),n No	166 (72.8%)	64 (100.0%)	<0.001
Yes	62 (27.2%)	0 (0.0%)	
MVR (%),n No	123 (53.9%)	49 (76.6%)	0.002
Yes	105 (46.1%)	15 (23.4%)	
Radiofrequency ablation of atrial fibrillation (%),n No	131 (57.5%)	56 (87.5%)	<0.001
Yes	97 (42.5%)	8 (12.5%)	
Repair of atrial septum (%),n No	209 (91.7%)	45 (70.3%)	<0.001
Yes	19 (8.3%)	19 (29.7%)	
Transfusion (median [IQR]),ml	3000.00 [2000.00, 4650.00]	2000.00 [1000.00, 3125.00]	<0.001
Mechanical ventilation duration (median [IQR]),hours	10.00 [6.00, 16.50]	5.00 [3.88, 9.12]	<0.001
24h drainage (median [IQR]),ml	440.00 [300.00, 685.00]	150.00 [50.00, 300.00]	<0.001
PF Index (median [IQR])	233.34 [146.18, 334.94]	354.99 [277.27, 422.88]	<0.001
PF Index after mechanical ventilation (median [IQR])	278.80 [215.68, 392.64]	370.80 [249.99, 512.76]	<0.001

BMI：Body Mass Index; ICU：Intensive Care Unit; PRE: Preoperative; POST: Postoperative; CCD: congenital cardiovascular diseases; EF: Ejection Fractions; AVR: Aortic valve replacement; MVR: Mitral valve replacement

		Traditional Median Sternotomy (n=229)	Right Axillary Direct Incision Approach (n=64)	P
Gender (%)	Male	115 (50.4%)	19 (29.7%)	0.005
	Female	113 (49.6%)	45 (70.3%)	
Age (median [IQR]), years		61.00 [52.00, 67.00]	40.50 [26.00, 54.25]	<0.001
FEF75% (median [IQR]),L		1.46 [1.16, 1.78]	1.71 [1.49, 1.80]	0.027
MEP (median [IQR]),cmH2O		27.00 [20.00, 37.00]	20.00 [14.00, 29.75]	0.041
proportion of MEP (median [IQR]),%		21.80 [17.15, 31.05]	17.45 [12.35, 27.20]	0.035

FEF：forced expiratory flow; MEP：Maximal Expiratory Pressure



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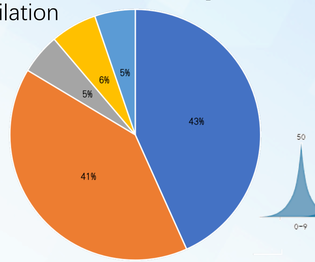

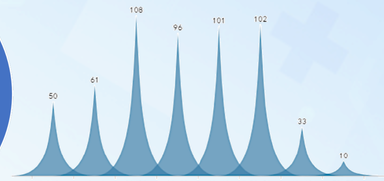

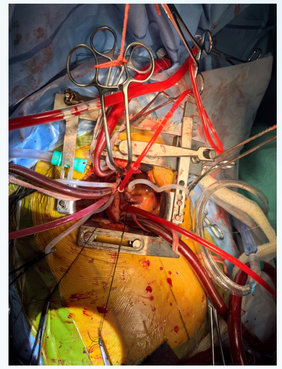

Conclusion

Cardiovascular surgery performed through the right axillary direct incision approach, compared to traditional median sternotomy, results in a significant improvement in postoperative pulmonary function for patients. This improvement is achieved without increasing the duration of extracorporeal circulation during the surgical procedure. It effectively reduces the duration of mechanical ventilation and length of hospital stay for patients postoperatively, contributing to an enhanced prognosis for the patients.