Re-sternotomy – impairing the postoperative risk? An outcome-based analysis

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1 INTRODUCTION

In cardiac surgery, the median sternotomy is established as the gold standard access route, with mediastinitis being a dreaded complication.[1] Therefor it is still considered as a complicating factor in cardiac surgery. Until now, the general assumption has been that re-sternotomy represents an independent risk factor of sternal wound healing disorder (WHD) and impairs postoperative outcome.[2,3] Nowadays several studies suggest repeated sternotomy no longer to be a significant risk factor for sternal WHD. Further the number of re-sternotomies is increasing significantly in the present era.[4,5] This circumstance has led to a renewed critical discussion of whether re-sternotomy can continue to be considered an independent risk factor.

2 AIM

Evaluate the impact of repeat sternotomy on:

- sternal WHD after cardiac redo surgery
- primary outcome (30-day mortality)

3 METHODS

- data of 551 patients was retrospectively reviewed and analyzed of the period from January 01, 2007, to December 31, 2016, from the Department of Cardiovascular Surgery at the University Hospital Schleswig-Holstein Campus Kiel
- Selection criteria were interval of at least 6 months between first and re-sternotomy, minimum age of 18 years at time of repeat sternotomy, purely conventional median longitudinal sternotomy
- collected parameters were divided into pre-, peri-, and postoperative variables and, where appropriate, distinguished into continuous, categorical, or ordinate variables
- Endpoints of this analysis were observation of sternal WHD after re-sternotomy an postoperative outcome defined by 30-day mortality

4 RESULTS

30-day mortality in association with type of intervention

The 30-day mortality of the entire patient population was 7.6% (n=42).
Sternal WHD was documented postoperatively in 9 patients (1.63%).

Type of intervention	30-day mortality in %; (n)
CABG	5,23 (9)
Valve-surgery	5,52 (10)
Aortic-surgery	9,09 (4)
Combination surgery with CABG	8,79 (8)
Combination surgery without CABG	14,29 (4)
Others	20,00 (7)

Table 1. CABG = coronary artery bypass grafting; n = characteristic value; Others= Implantation of an Assist Device, orthotopic heart transplantation or pericardial procedures

Use of the EuroSCORE for risk assessment

From a total of 499 (90.6%) patients, all necessary variables for the calculation of the log. EuroSCORE and EuroSCORE II could be collected.
It can be seen that a significantly higher mortality is determined with the logistic EuroSCORE than with the EuroSCORE II, although the standard deviation of both models is approximately the same.

EuroSCORE Modell	M	SD
Log. EuroSCORE	23,87	10,29
EuroSCORE II	10,29	10,30

Table 2. M= mean value; SD= standard deviation

Pre-, peri- and postoperative Variables associated with sternal WHD

Variable	*n*	*(%)*	*M*	*SD*
Preoperative Variable				
Age (in years)			68,05	11,28
Female	121	22,0		
Diabetes mellitus	128	23,2		
IDDM	28	5,1		
BMI			22,80	13,22
BMI ≥30 kg/m²	173	31,4		
Hypertension	412	74,8		
Hyperlipoproteinemia	305	55,4		
PAD	72	13,1		
Creatinine pre-surgery (µmol/l)			102,11	65,39
Chron. Dialysis pre-surgery	20	3,6		
COPD	50	9,1		
Smoking (active)	60	11		
NYHA			2,08	0,97
NYHA ≥ III	211	38,9		
LV-EF >55%	275	54,7		
LV-EF 45-54%	102	19,9		
LV-EF 30-44%	83	16,2		
LV-EF <30%	52	10,2		
AMI (< 72h)	23	4,2		
Preop. endocarditis	52	9,5		
C.a. sternal WHST	8	1,5		
Perioperative Variable				
Surgery-Classification:				
elective	423	76,8		
urgent	88	16,0		
emergency	39	7,1		
Surgery-duration (min.)			324,28	90,32
CPB time (min.)			168,21	64,12
XCL time (min.)			104,73	57,42
Postoperative Variable				
Dialysis/Hemofiltration post-surgery (new)	49	9,1		
Duration of mechanical ventilation (hours)			59,38	148,86
Intensive duration (days)			6,81	13,04
CPR post-surgery	25	4,6		
Bronchopulmonary infection	72	13,2		
Re-thoracotomy due to bleeding	39	7,2		

Table 3. IDDM= insulin dependent diabetes mellitus; BMI= Body-Mass-Index; PAD= Peripheral arterial disease; COPD= chronic obstructive pulmonary disease; NYHA= New York Heart Association; LV-EF= left ventricular ejection fraction; AMI= acute myocardial infarction; C.a.= Condition after; CPB= cardiopulmonary bypass; XCL= Aortic cross-clamp; CPR= cardiopulmonary resuscitation; n=characteristic value; M= mean value; SD= standard deviation

5 CONCLUSION

Against the background of a growing number of re-sternotomies due to the ageing population and the associated comorbidities, re-sternotomy as a risk factor for a sternal wound healing disorder must be critically discussed. With only 9 Patients (1,63%) our analysis showed a relatively low number of sternal WHD postoperatively, reflecting the conclusion from several studies that re-sternotomy can be performed with a similar risk to primary sternotomy if carefully planned.

6 ACKNOWLEGEMENTS

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