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Value of autopsy in cardiac surgery



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ABSTRACT

Introduction: With improvements in preoperative diagnostics and postoperative care the value of autopsy has been questioned. The aim of our study was to prospectively assess the current value of autopsy in patients after cardiac surgery.

Methods: Between January 2007 and December 2013 there were 7800 patients operated on for heart disease. Two hundred and thirteen of them died postoperatively, resulting in an overall in-hospital mortality of 2.7%. Autopsy was performed on 158 patients (74%). Data regarding the cause of death from clinical and autopsy findings were analysed and compared.

Results: Artificial ventilation, inotropic support before operation, NYHA class IV, and renal failure were the most common preoperative risk factors and surgery for postinfarction ventricular septal defect, emergency operation, operation for acute dissection, triple valve surgery and the necessity for circulatory arrest were the most significant operative risk factors. The most frequent cause of death was cardiac failure or a sepsis and/or multiorgan failure. Missed major diagnosis (class I and II) was found in 21 patients (13.3%) and missed minor diagnosis was found in 17 patients (10.4%). Of the seven patients with class I error, six died due to unidentified abdominal complications.

Conclusion: Autopsy remains the most specific indicator of errors in diagnostics and surgery in patients with cardiac disease. It is a valuable tool for quality assessment and may contribute to the improvement of patient healthcare. Clinicians should pay special attention to abdominal symptomatology in patients after cardiac surgery because this was the main cause of diagnostic errors.

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Introduction

The results of autopsy have always been a significant source of information and a tool for improving subsequent patient care. The accurate determination of cause of death is useful for the correct diagnostics and assessment of indications

for operation, surgery and postoperative treatment. Despite the fact that the accuracy of different types of investigations has improved the diagnostics of preoperative disease and postoperative complications are still not accurate enough to make autopsies unnecessary. Diagnostic errors are still the cause of preventable mortality and morbidity in hospitalised patients; 40,000–80,000 such deaths are estimated annually in

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the USA [1]. Autopsy-detected diagnostic errors are typically classified according to the Goldman criteria based on their clinical relevance and the possibility that a different therapy would have changed the outcome [2]. The aim of our study was to prospectively assess the current value of autopsy as an instrument for quality care in cardiac surgery. We compared clinical and autopsy findings concerning the causes of death and perioperative complications.

Materials and methods

Between January 2007 and December 2013 there were 7800 patients operated on for heart disease. Two hundred and thirteen of them died postoperatively resulting in an overall in-hospital mortality of 2.7%. Autopsy was performed on 158 patients (74.1%), all of them for clinic-pathologic reasons. Clinical data of all deceased patients were prospectively recorded. Clinical cause of death was determined by the physician who was present with the patient at the time of death. All the laboratory and clinical data, as well as results of invasive and non-invasive examinations, were taken into account. Autopsy was performed in the standard fashion and samples of the myocardium and other relevant organs were taken. The cause of death was described by a pathologist who took into account all available clinical data.

Results

The risk factors for death are shown in Table 1. The highest risk patients are those who need artificial ventilation and inotropic support, NYHA class IV patients and those who suffer from renal failure preoperatively. The most significant operative risk factors are operation for postinfarction ventricular septal defect (VSD), emergency operation, operation for acute dissection, triple valve surgery and the necessity for circulatory arrest.

Table 1 – Risk factors for death.

	OR
Preoperative factors	
On ventilator	15.0*
Inotropic support	14.3*
CCS IV/NYHA IV	3.4/6.9*
Renal failure	5.4*
EF < 30%	3.1*
Preoperative TIA/CVA	2.6*
BMI < 25	2.1*
DM	1.0
Hypertension	0.9
Perioperative factors	
Postinfarction VSD	20.5*
Emergent operation	6.0*
Use of circulatory arrest	5.7*
Acute dissection	5.6*
Triple valve surgery	4.9*
Reoperation	3.9*
Bilateral IMA	0.4
Double valve surgery	1.1

* $p < 0.05$.

Table 2 – Overview of autopsy patients (preoperative diagnosis).

	n	%
Age (y)	62.2 ± 11.8	
Coronary artery disease	71	44.9
AMI	24	15.2
VSD after AMI	6	3.8
Valve disease	71	44.9
Aortic	55	34.8
Mitral	29	18.4
Tricuspid	12	7.6
Infective endocarditis	14	8.9
Acute dissection	16	10.1
Aortic aneurysm	14	8.9
Cardiomyopathy	19	12.0
Pulmonary embolism	2	1.3

Overall, the EuroSCORE II risk score in diseased patients was 21.7 ± 12.7 . Some generally respected risk factors like diabetes and hypertension did not prove to be significant risk factors in our patients.

The characteristics of deceased patients are recorded in Table 2. Coronary artery disease (CAD) was the primary disease in 71 patients; 24 (33.8%) of them suffered from acute myocardial infarction (AMI). Seventy-one patients suffered from valvular disease, 14 (19.7%) of them suffered from an infective endocarditis (IE). Twenty patients (12.7%) had a combination of CAD and valvular disease.

Operative procedures are shown in Table 3. The most common procedures were coronary artery bypass grafting (CABG), valve surgery or a combination of both. In 16 patients (10.1%) some type of cardiac mechanical support was required after the operation.

The most frequent cause of death was cardiac failure or a sepsis and/or multiorgan failure (MOF) (Table 4). In 120 (75.9%), the clinical diagnostics and pathological finding corresponded completely (Goldman class V). Missed major diagnosis (Class I and II) was found in 21 patients (13.3%) (Tables 5 and 6). Of the

Table 3 – Operative procedures.

	n	%
CABG	35	22.2
VSD after MI +/- CABG	7	4.4
Remodelling of LV + CABG	2	1.3
CABG + valve	20	12.7
Single valve surgery	37	23.4
Double valve surgery	16	10.1
Triple valve surgery	5	3.2
Bentall procedure	19	12.0
Aortic aneurysm resection	14	8.9
HTx	12	7.6
Pulmonary embolectomy	2	1.3
Other	4	2.6
ECMO	5	3.2
VAD	4	2.6
Postcardiotomy		
IABP	5	3.2
ECMO	5	3.2
VAD	6	3.8

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