ACUTE RENAL FAILURE AFTER OPEN HEART SURGERY IN DEVELOPING COUNTRIES

Pages with reference to book, From 137 To 138

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Abstract

Open heart surgeries were performed on 2463 cases . Acute renal failure occurred in 18 patients after such procedures in 11 patients after correction of congenital anomalies and in 7 patients after valvular surgery. Peritoneal and hemodialysis was required in 16 patients. lntraoperative hypotension, bleeding, low cardiac output, excessive use of cardiotonics, cardiac arrest and mismatched transfusions were the most common causes. Twelve acute renal failure patients died (mortality rate 66%). The etiology, presentation, management, results and possible prevention in developing countries, of this highly lethal complication of open heart surgery, is discussed (JPMA 38: 137,1988).

INTRODUCTION

Acute renal failure following cardiovascular surgery is a severe complication with high mortality, even in developed countries[1], in contrast to chronic renal failure requiring hemodialysis for which the mortality is only 3% per year[2].

PATIENTS AND METHODS

Between 1981 to 1987, 2463 patients underwent open heart surgery, 1106 for correction of congenital anomalies and 1357 for repair or replacement of cardiac valves. There were 1132 males and 1331 females with ages ranged from 1 year to 63 years, with an average mean age of 23.7 years. All patients had standard cardiopulmonary bypass with aortic and bicaval cannulation. Moderate hypothermia of 28°C was routine. Diastolic flaccid cardiac arrest was achieved with 12 mecq of KCI in 500 cc of 5% Dextrose/Water, infused in the aortic root. Average mean aortic cross clamp time was 58 minutes and the average perfusion time was 93 minutes. Eightyone percent patients were preoperatively in N.Y.H.A. functional class III and 19% in class IV. Eighteen patients developed acute renal failure after such procedures. In 11 patients, acute renal failure occurred after correction of simple (S patients) or complex (6 patients), congenital cardiac anomalies and in 7 patients after surgery for cardiac valve lesions.

RESULTS

Acute renal failure was encountered in 18 patients following 2463 open heart surgeries, presenting an incidence of 0.73%. The mortality rate of acute renal failure was 66% as 12 patients died (Tables I & II).

Table 1. Acute Renal failure after repair of congenital Cardiac Anomalies .

Type of Anomaly	No of Patients	No. of Deaths
V.S.D. Pulmonary Hypertension	2	1
Atrial Septal Defect of primum type	1	0
Ebstein Anomaly	1	0
Tetralogy of Fallot	3	3
Fontan for single ventricle	1	1
Corrected Transposition with trocardia and large V.S.D.	2	2

Table II. Acute Renal failure after open Heart Surgery for Cardiac Valve defects.

Defect	No. of Patients	No. of Deaths
Mitral and Aortic Valve Replacement	3	2
Mitral Valve Replacement	2	2
Mitral Valve Repair	2	1

Intraoperative hypotension due to persistent surgical bleeding with low perfusion pressure (hypotension) and low cardiac output leading to renal failure was seen in two patients who underwent combined aortic and mitral valve replacement and in one patient who underwent mitral valve re-replacement after earlier surgery, where diffuse mediastinal vascular adhe sions were found. Congestive

cardiac failure due to pre-existing myocardial damage or due to operative myocardial insult were identified in 3 patients respectively who underwent mitral valve repair (one patient), total correction for tetralogy of fallot (one patient) and patch closure of a ventricular septal defect with advanced pulmonary hypertension and dilated right ventricle. In all these 3 patients, excessive cardiotonic support with Dopamin or Adrenaline was practiced which led to severe renal vasoconstriction. Prolonged bypass was an etiological factor in one patient who had a very complex congenital anomaly with dextrocardia, large V.SD. and levotransposition of the great arteries. Mismatched blood transfusion was the etiological cause in a 28 years old female patient who underwent mitral valve replacement. Sudden cardiac arrest was the cause of acute renal failure in two patients, one underwent correction of a partial atrioventricular canal and the other patient was a child with a large V.S.D. biventricular hypertrophy and advanced pulmonary hypertension. Acute renal failure also occurred, post surgery, in 8 patients who developed low cardiac output during or in the first 12 hours. Two of these patients underwent total correction for tetralogy of fallot and remained in congestive right heart failure. One patient underwent combined mitral and aortic valve replacement, a 9 year old child underwent Fontan repair for single yentricle, and a 38 year old lady underwent mitral valve repair and remained in persistent low cardiac output. Postoperative peritoneal dialysis was performed in 5 patients, while hemodialysis was performed in 13 patients. Transient renal failure was seen in 4 patients of the 6 surviving ones. Two patients developed chronic renal failure and required chronic hemodialysis. 12 patients died with acute renal failure foilowing open heart surgery.

DISCUSSION

Acute renal failure after open heart surgery is a severe and serious complication with a very high mortality rate . Acute renal failure after open heart surgery has a higher incidence in developing countries. The important etiological causes are low cardiac output due to advanced myocardial damage because of rheumatic fibrosis and/or the chronic mechanical strain. Such patients appear rather late with advanced pulmonary hypertension and require frequent cardiotonic support. Low cardiac output due to persistent bleeding secondary to mediastinal and pericardial adhesions or surgical and medical causes are also important factors. Cardiac arrest due to intractable failure and arrhythmias is an occasional cause, while mismatched blood transfusion is the least encountered cause. We recommend, therefore, early referral for surgery before significant myocardial damage and pulmonary hypertension develops in addition to rational use of cardiotonics, avoidance of vasopressors, such as Adrenaline or Nor-Adrenaline and use of Cryoprecipitate, fresh frozen plasma and platelet concentrates to avoid bleeding due to coagulopathy. Perfusion time and aortic cross clamp time should be kept to a minimum. Arrhythmias should be detected early by trained personnel to prevent cardiac arrest.

REFERENCES

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