ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA
VOL. LIX, N 1, 72 SECTIO D 2004

Department of Cardiac Surgery, Department of Surgery and Transplantology
Skubiszewski Medical University of Lublin

JANUSZ STĄŻKA, KRZYSZTOF JAGUŚ, ELŻBIETA KRAWCZYK,
MARIUSZ MATUSZEK, SŁAWOMIR RUDZKI

Abdominal complications after cardiac surgery in cardiopulmonary bypass

Gastrointestinal problems are an infrequent (0.3% to 3%) but serious consequence of cardiac surgery that includes cardiopulmonary bypass, the mortality can exceed 60% (4, 5). Despite improvements in preoperative, operative and postoperative care it has been the general impression that abdominal complications remain a significant problem. Predictors of these complications are not well developed, and the role of fundamental variables remains controversial (12). Due to the absence of early specific clinical signs, diagnosis is often delayed (6).

In this paper we present five patients after cardiac operation with cardio--pulmonary bypass l operated urgently because of serious gastrointestinal problems.

MATERIAL AND METHODS

Between July 1998 and August 2002, 1,552 patients (1,106 male and 446 female, 71.3% and 28.7% respectively) in mean age 56 years (range: 22 to 86) underwent heart surgery with cardiopulmonary bypass (CPB) in the Department of Cardiac Surgery, Medical University of Lublin. There were 1,231 coronary artery bypass grafting operations (CABG), 308 valve replacements, 26 valve replacements with CABG, seven acute dissections of the ascending aorta. The emergency cardiac operations were performed in 155 of 1,552 patients (10%). All patients got routinely Heparin in bolus before cardiopulmonary bypass under the activated clotting time (ACT) control. Postoperatively, anticoagulation was routinely performed in all patients undergoing cardiac operations. Patients got heparin (post CABG-patients Clexane 2 x 40 mg, post valve replacement Heparin in iv infusion in the dose of 1000 mg/hour) as long as they were intubated and then post-CABG patients got Polopiryn (150 mg/day) and valve replacement-patients Syncumar (under INR monitoring). All CPB patients as quickly as possible got H2 receptor's blockers (Solvertyl 3x1 amp or Ranigast). Those who had peptic ulcer disease in anamnesis got Loseck 40 mg per day.

Among 1,552 patients undergoing cardiac operation with CPB, 21 (1.35%) had gastrointestinal complications, mainly because of gastrointestinal bleeding due to gastritis and five of them (0.32% of all CPB patients) required operative intervention (Table 1).

Table 1. Indications for laparotomy and surgical procedures

Patient	Indication for cardiac surgery	Cardiac surgery	Indication for laparotomy	Surgical procedure
68-year-old man (P. K.)	Combined aortic valve disease	Aortic valve replacement	Hemorrhage in the upper digestive tract	Hoffmeister-Finsterer gastrectomy
59-year-old woman (Cz. M.)	Combined aortic valve disease, mitral valve insufficiency	Aortic and mitral valves replacement	Hemorrhage in the upper digestive tract	Rydygier gastrectomy
58-year-old man (Ch. W.)	Coronary artery disease – unstable angina pectoris, mitral valve insufficiency	CABG + mitral valve plasty	Acute intestine ischaemia	Right hemicolectomy
56-year-old man (K. Z.)	Coronary artery disease – unstable angina pectoris, combined	CABG + mitral valve replacement	Acute intestine ischaemia, cecum	Appendectomy with cecum sewing

RESULTS

A 68-year-old male (P. K.) with heart failure (NYHA III), history of smoking and hypertension was admitted to the Department of Cardiac Surgery because of combined aortic valve disease. Operative intervention was performed and aortic prosthesis was implanted and the patient was weaned from extracorporeal circulation (ecc) with moderate catecholamine support. After surgery the patient required prolonged mechanical ventilation (13 days). In the postoperative course the increase of urea, creatinine and bilirubin serum levels was observed (100 mg%, 2.0 mg% and 7 mg%, respectively). On 12th day the patient was reoperated on due to sternum instability. Three days later a hemorrhage in the upper digestive tract occurred. The bleeding stopped after medical treatment. A gastrofiberoscopy revealed an ulcer in the duodenal bulb. Two days later the respiratory failure occurred and the patient required intubation for the next nine days. On 26th day severe bleeding from the upper gastrointestinal tract was recurred requiring emergency surgery. The patient was admitted to the 1st Department of Surgery and Transplantology, where Hoffmeister-Finsterer operation was performed after intraoperative revealing of bleeding ulcer in the duodenal bulb. Two days later surgery duodenal fistula symptoms were observed. During next days the patient state was getting better, he was extubated, and transported to the regional general surgery ward on 41st day after cardiac surgery, where he died during duodenal fistula closing operation.

A 59-year-old female (Cz. M.) with combined mitral and aortic valve disease, clinical grade NYHA III, was operated. Mitral and aortic prosthesis valves were implanted and the weaning of ecc was possible after longer reperfusion time as well as moderate catecholamine support. In the early postoperative period was uneventful, but on 10th postoperative day, instability of sternum and postoperative wound infection were found. Three days later surgical stabilisation of the sternum was performed. After the reoperation, clotting disturbances (INR 5.37) with bleeding from gastrointestinal tract occurred. Despite normalization of blood clotting time and medical treatment the intensive hemorrhage maintained. In gastrofiberoscopy it was only clots and fresh blood that were found in the oesophagus and stomach, and the emergency laparotomy was indicated. Numerous gaster mucosa

erosions and punctuate bleeding were found and gastrectomy modo Rydygier was performed. In the early postlaparotomy period the patient was circulatory and respiratory stable, but after six days later the subcutaneous eventration was found. Four days later symptoms of purulent infection of postlaparotomic wound occurred. The patient died on 42nd day after cardiac surgery with symptoms of multiorgan insufficiency.

A 58-years-old male (Ch. W.) with history of smoking, diabetes and hypertension was operated because of unstable angina pectoris and mitral valve incompetence (gr. III°) in NYHA II heart failure. Coronary artery bypass grafting (CABG) with three distal anastomoses and mitral valvuloplasty was performed. Three days after the operation, symptoms of acute abdomen occurred and the emergency laparotomy was indicated. Operative intervention revealed ischemic changes (necrosis) of cecum and ascending colon. Right hemicolectomy was performed. Postoperative course was uneventful and the patient was discharged home on 15th day after cardiac surgery.

A 56-years-old male (K. Z.) with history of brain stroke was operated because of unstable angina pectoris, heart failure (NYHA II) and mitral valve disease. Coronary artery bypass with four distal anastomoses and mitral valve replacement were performed. There were no problems during operation but the patient was weaned from bypass with a low dose of cathecholamines as well as Nitroglycerin. For the next six days the patient remained unconscious and he required prolonged mechanical ventilation up to 10th day after operation. During those days atrial fibrillation was succesfully treated many times medically and with electrical cardioversion. On 15th postoperative day symptoms of peritonitis were observed. Urgent laparotomy was indicated. Intraoperatively focal ischemic changes in cecum with perforation were revealed. Appendectomy with cecum sewing were performed. Postoperative course was uneventful and the patient was discharged home on 23rd day after cardiac surgery.

A 46-year-old male (C. E.) was urgently operated on because of dissecting aorta ascending aneurysm of type I according to DeBakey. Preoperative state of the patient was severe with symptoms of shock, ischemia of left lower extremity and abdominal organs (anuria, aperistalsis). Implantation of vascular prosthesis with circulatory arrest was performed. Respiratory failure occurred after the operation. During the first postoperative day symptoms of intestine ischemia with peritonitis were observed. Urgent laparotomy was indicated. Intraoperatively focal necrosis of sigmoid colon was revealed. The sigmoid resection according to Hartman was performed. The patient died because of septic shock and multiorgan failure developed on the second day after cardiac operation.

DISCUSSION

Gastrointestinal complications after cardiac surgery with cardiopulmonary bypass are uncommon with significant high morbidity and mortality rates. The abdominal complications were, in general, due to complications of peptic ulcer disease, decreased intestinal blood flow, and cholecystitis (6). Because of the absence of early specific clinical signs, diagnosis is often delayed.

Hypoperfusion during cardiopulmonary bypass seems a possible etiological factor (11). As many patients may be mechanically ventilated and sedated, the usual symptoms and signs of an abdominal complication may be masked. It is necessary to keep this possibility in mind in patients with abdominal pain or tenderness, and the usual diagnostic measures should be undertaken if time permits. Initial treatment is usually conservative, but when it fails, prompt intervention is obligatory. Unfortunately surgeons are often reluctant to submit patients to major abdominal operations immediately after cardiac surgery. However, effective and timely intervention may be life-saving in patients who are poorly able to compensate for major hemodynamic disturbances of the untreated serious bleeding or sepsis: Although the cardiac condition must be taken into consideration, most patients' cardiac function will have improved since their open-heart surgery and they should be able to withstand general anaesthesia and most operations (10, 11).

The surgical procedures performed in patients after cardiac surgery with gastrointestinal complications are truncal vagotomy and drainage, oversewing of a perforation or a bleeding vessel, gastrectomy, intestinal resection, laporotomy only, cholecystectomy. Intestinal ischemia had the highest mortality with rate of 85% (8). Mierdl et al. (6) showed that the relative risk of abdominal complications after cardiopulmonary bypass was highly increased in association with a cardiac index less than 2.0 l/min/m^2, postoperative onset of atrial fibrillation, emergency surgery, need for vasopressors, need for intraaortic balloon counterpulsation, and the need for re-exploration within the first 24 hours. All patients with necrotic bowel disease had elevated serum lactate levels. Cardiopulmonary bypass and aortic clamping times were significant prolonged in patients who developed gastrointestinal complications (2, 7). Excluding accidents due to anticoagulant therapy, Chigot et al. (3) reported previous history of gastrointestinal pathology (ulcer, gall stone, alcoholism), the nature of underlying cardiac disease (coronary artery and aortic valve disease) cardiopulmonary bypass, and, above all, pre- and postoperative incident: hypovolaemia, low output syndrome, respiratory and infectious complications as the main risk factors for abdominal complication after cardiac surgery. Contrary to him, Rosemurgy (9) did not find any correlation between preoperative history, physical examination, cardiac function, laboratory data, and the subsequent development of an acute abdomen.

In our material among 1,552 patients undergoing cardiac surgery in cardiopulmonary bypass 21 (1.3%) had gastrointestinal complications and five of them (23.8%) needed abdominal surgery. The mortality in abdominal complication group was 19.5% (4/21, three deaths in operated group – 60%) whereas the mortality in the whole group was 5.6 %. Our experience with five patients with gastrointestinal complications certainly does not allow statistical comparisons, but justifies, in our opinion, retrospective analysis concerning the possible influencing factors in the preoperative and perioperative period. All patients got catecholamines during and/or after operation, two of them were operated urgently.

CONCLUSIONS

Gastrointestinal complications after cardiac surgery are uncommon, but are associated with a higher mortality. Careful monitoring and physical examination of these high-risk patients following cardiac surgery is required for early detection and effective treatment. The numbers are to small for statistical analysis, but experience suggests that each case should be dealt with on its merits in accordance with common surgical practice and that operative management should not be rejected because the patient has recently undergone a major cardiac operation.

REFERENCES

1. Albes J. M. et al.: Intestinal ischemia associated with cardio-pulmonary-bypass surgery: a life threatening complication. J. Cardiovasc. Surg., 32, 527, 1991.
2. Aranha G. V. et al.: The reasons for gastrointestinal consultation after cardiac surgery. Am. Surg., 50, 6, 301, 1984.
3. Chigot J. P. et al.: Abdominal complications for heart surgery. Arch. Mal. Coeur Vaiss., 74, 6, 665, 1981.
4. Gonzales O. A. et al.: Abdominal complications after cardiopulmonary procedures, Rev. Gastroenterol. Mex., 64, 2, 61, 1999.

5. Habib R. H. et al.: Predictors of gastrointestinal complications in cardiac surgery. Tex. Heart Inst. J., 27, 2, 93, 2000.
6. Mierdl S. et al.: Abdominal complications after cardiac surgery. Ann. Acad. Med., Singapore, 30, 3, 245, 2001.
7. Moneta G. L. et. al.: Hypoperfusion as a possible factor in the development of gastrointestinal complications after cardiac surgery. Am. J. Surg., 149, 5, 648, 1985.
8. Moriyama Y. et al.: Gastrointestinal complication after open cardiac operation. Kyobu Geka, 46, 13, 1122, 1993.
9. Rosemurgy A. S. et al.: The acute surgical abdomen after cardiac surgery involving extracorporal circulation. Ann. Surg., 207, 3, 323, 1988.
10. Sakorafas G. H., Tsiotos G. G.: Intra-abdominal complications after cardiac surgery. Eur. J. Surg., 165, 9, 820, 1999.
11. Wallwork J., Davidson K. G.: The acute abdomen following cardiopulmonary bypass surgery. Br. J. Surg., 67, 6, 410, 1980.
12. Zacharias A. et al.: Predictors of gastrointestinal complications in cardiac surgery. Tex. Heart. Inst., 27, 2, 93, 2000.

SUMMARY

Gastrointestinal problems are an infrequent but serious consequence of cardiac surgery that includes cardiopulmonary bypass. Predictors of these complications are not well developed, and the role of fundamental variables remains controversial. Between July 1998 and August 2002, 1,552 patients (1,106 male and 446 female), mean age 56 years, underwent heart surgery with cardiopulmonary bypass. Among those 1,552 patients, 21 (1.35%) had gastrointestinal complications, mainly because of gastrointestinal bleeding due to gastritis and five of them required surgery. We present these five patients, three with intestinal ischemia, two with intestinal bleeding. There Hoffmeister-Finsterer operation, Rydygier resection, hemicolectomy, appendectomy with cecum sewing and sigmoid resection were performed. The mortality in this group was 60% (three of five), and the cause of death was multiorgan insufficiency. Conclusion: Careful monitoring and physical examination of these high-risk patients following cardiac surgery is required for early detection and effective treatment.

Powikłania brzuszne po zabiegach kardiochirurgicznych wykonanych z użyciem krążenia pozaustrojowego

Problemy ze strony przewodu pokarmowego po zabiegach kardiochirurgicznych z użyciem krążenia pozaustrojowego występują rzadko, ale wiąże się to z poważnymi następstwami. Czynniki sprzyjające ich wystąpieniu nie są jeszcze dobrze znane. Między lipcem 1998 r. a sierpniem 2002 r. 1552 pacjentów (1106 mężczyzn i 446 kobiet), w średnim wieku 56 lat, poddano zabiegowi kardiochirurgicznemu z użyciem krążenia pozaustrojowego. W grupie 1552 pacjentów u 21 (1,35%) wystąpiły powikłania ze strony przewodu pokarmowego, głównie krwawienie, a pięciu pacjentów zakwalifikowano do zabiegu operacyjnego. W pracy przedstawiamy pięcioro operowanych pacjentów, troje z niedokrwieniem przewodu pokarmowego, dwoje z krwawieniem z przewodu pokarmowego. U pacjentów tych wykonano resekcję Hoffmeister-Finsterer, Rydygier, hemikolektomię, appendektomię z zeszyciem kątnicy oraz resekcję esicy. Śmiertelność wyniosła 60% (zmarło troje z pięciorga pacjentów), przyczyną zgonów była niewydolność wielonarządowa. Należy wnioskować, że dokładne monitorowanie i szczegółowe badanie pacjentów wysokiego ryzyka po zabiegach kardiochirurgicznych jest konieczne do wczesnego wykrycia i efektywnego leczenia.