

Thirty-five years of single-center experience in cardiac myxoma surgery and related postoperative complications



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Abstract

Introduction: Myxoma is the most common benign primary cardiac tumor.

Aim: To present a single center's 35-year experience with myxoma surgery in terms of surgical technique and postoperative complications.

Material and methods: The data of 166 patients (56.7 ±12.6 years old, 68.1% female) with surgically removed myxoma were retrospectively analyzed. Information on blood transfusions, additional procedures and postoperative complications was collected.

Results: A median sternotomy was performed in 97.5% of patients. A right mini-thoracotomy was performed in 4 patients. Most (95.2%) patients were semi-urgent. The reason for truly urgent surgery was hemodynamic instability in 4.8% of patients. Crystalloid cardioplegia was used in 62% of cases. Postoperative complications were observed in 12% of patients. One death was observed on the first postoperative day. During hospitalization, 6 deaths (3.6%) were observed. The most common cause of death was multisystemic organ failure. There were no gender differences in mortality and complications.

Conclusions: Surgical treatment of myxomas is a relatively safe procedure with a mortality rate comparable to other types of cardiac surgery. The postoperative complication rate is low. Gender has no influence on the complication rate or type.

Key words: cardiac myxoma, cardio-oncology, benign tumors, surgical treatment.

Introduction

Characteristics of cardiac tumors

Metastases are the most common neoplastic diseases of the heart [1]. Primary cardiac tumors are rare in the general population, with myxomas being the most common form [2]. They are most commonly, but not exclusively, localized in the left atrium. There are rare clinical cases previously described that link the recurrence and familial presentation of cardiac myxomas to the Carney complex [3]. Cardiac myxomas are typically pedunculated and can be up to 15 cm in size [4, 5].

Myxoma treatment

The typical treatment of cardiac myxomas involves complete removal of the tumor with reconstruction of the cardiac structures, which is necessary to protect the patient from embolic complications or heart failure [6]. However, myxoma removal, especially in elderly patients with other

serious comorbidities, can be associated with postoperative complications, including death.

Aim

The aim of this study is to present the surgical techniques and postoperative complications observed in 166 patients treated for myxoma in a single center over a 35-year period.

Material and methods

Study population

This retrospective study included 166 (aged 56.7 ±12.6 years, 68.1% female) patients who had undergone surgical removal of a cardiac myxoma between November 1982 and November 2017 and had histopathologic confirmation of cardiac myxoma. Myxoma recurrence was observed in only 1 patient. The type of surgery, additional procedures during surgery, surgical complications and death of the pa-

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tient during hospitalization were recorded manually from the hospital registry.

Statistical analysis

Data were analyzed using IBM SPSS Statistics 29.0 (Predictive Solutions, Pittsburgh, PA, USA). Categorical variables are presented as numbers (*n*) or percentages. Quantitative variables are presented as the mean with standard deviation. The normal distribution was analyzed using the Shapiro-Wilk test. Differences between categorical variables were determined using the χ^2 test for independence. A *p*-value < 0.05 was considered significant.

Results

Baseline characteristics

Baseline characteristics of the patients, including previous cardiac tumors, are listed in Table I.

Surgical procedure characteristics

97.5% of patients underwent median sternotomy. A right mini-thoracotomy was performed in 4 patients. Semi-urgent surgery was performed in most patients (95.2%). The reason for truly urgent surgery was hemodynamic instability in 4.8% of patients. Crystalloid car-

dioplegia was used in the majority of cases (62.0%). Blood transfusions were performed in 59.6% of patients, partly due to the very popular autotransfusion program in our department. Fresh frozen plasma was administered in 12% of patients. A transfusion of platelets was performed in 3% of cases. An additional procedure was performed in 24.6% of patients.

Additional procedures and complications

The most common additional procedures were closure of the patent foramen ovale (4.6%) and coronary bypass surgery (3.8%). In 7 patients, several additional procedures were performed, including the aforementioned closure of the patent foramen ovale (5 patients), coronary bypass surgery (4 patients) and implantation of a pacemaker (4 patients). Postoperative complications occurred in 20 (12.0%) patients and no significant difference was found in the prevalence of complications between men and women (*p* = 0.753). Rethoracotomy was performed in only 4 patients due to postoperative bleeding. One death was observed on the first postoperative day. Six (3.6%) deaths were observed during hospitalization. The most common cause of death was multisystemic organ failure. Detailed surgical complications can be found in Table II.

Table I. Baseline patients' information

Parameter	Female (<i>n</i> = 113)	Male (<i>n</i> = 53)	General (<i>n</i> = 166)
Age, mean \pm SD	56.6 \pm 12.2	56.9 \pm 13.5	56.7 \pm 12.6
Diabetes mellitus type 2, <i>n</i> (%)	8 (7.1)	7 (13.2)	15 (9.0)
Hypertension, <i>n</i> (%)	39 (34.5)	15 (28.3)	54 (32.5)
Previous myxoma, <i>n</i> (%)	1 (0.9)	0 (0.0)	1 (0.6)
Other cancer, <i>n</i> (%)	7 (6.2)	2 (3.8)	9 (5.4)
Persistent atrial fibrillation, <i>n</i> (%)	15 (13.3)	10 (18.9)	25 (15.1)
Paroxysmal atrial fibrillation, <i>n</i> (%)	1 (0.9)	1 (1.9)	2 (1.2)

n – number, SD – standard deviation.

Table II. Postoperative complications of myxoma surgery

Parameter	Female (<i>n</i> = 113)	Male (<i>n</i> = 53)	General (<i>n</i> = 166)	<i>P</i> -value
Any complications reported	13 (11.5%)	7 (13.2%)	20 (12.0%)	0.753
Arrhythmia	7 (6.2%)	4 (7.5%)	11 (6.6%)	0.744
Rethoracotomy	2 (1.8%)	2 (3.8%)	4 (2.4%)	0.433
Cardiorespiratory failure	2 (1.8%)	1 (1.9%)	3 (1.8%)	0.958
Pneumothorax	3 (2.7%)	0 (0.0%)	3 (1.8%)	0.231
Renal failure	1 (0.9%)	2 (3.8%)	3 (1.8%)	0.193
Seizure	1 (0.9%)	1 (1.9%)	2 (1.2%)	0.581
Infection	1 (0.9%)	1 (1.9%)	2 (1.2%)	0.581
Myocardial infarction	0 (0.0%)	2 (3.8%)	2 (1.2%)	0.038
Hemorrhage	1 (0.9%)	1 (1.9%)	2 (1.2%)	0.581
Tamponade	1 (0.9%)	0 (0.0%)	1 (0.6%)	0.492

Discussion

Complications of myxoma removal

In the past, the most common complication after surgical removal of a cardiac myxoma was cardiac arrhythmia, as confirmed by our study [4, 7]. These publications reported a statistically significant difference between male and female patients in terms of postoperative myocardial infarction, but these data should be interpreted with caution due to the small number of cases observed [4, 8]. In our cohort, only four pacemakers were implanted. There are several indications for pacemaker implantation, including pacemaker and cardiac conduction system dysfunction [8]. These indications may be related to the removal of cardiac myxomas, which, like other cardiac tumors, may be located near components of the conduction system [9].

In our population, blood transfusions were performed in 59.6% of patients, partly due to the popularity of the autotransfusion program in our department. These figures are comparable to other previously published cardiac surgical procedures. The most common indication for blood transfusion was a clinically significant drop in hemoglobin levels [10]. In certain clinical situations, fresh frozen plasma may be administered to patients with coagulation factor deficiency in whom active bleeding is observed [11]. Platelet transfusion is usually performed in patients undergoing surgery and being treated with antiplatelet drugs or in patients with hematologic disorders [11]. The observed mortality during hospitalization was comparable to other open cardiac surgical procedures performed under crystalloid cardioplegia and was associated with a lower number of complications [12].

Treatment of choice for cardiac myxomas

Although cardiac myxomas are found incidentally in up to 20% of cases, their surgical removal is mandatory due to the high risk of thromboembolic complications and hemodynamic effects [4]. A causal drug treatment for cardiac myxomas is not yet known. However, when surgical removal is performed in a high-risk patient with multiple comorbidities, drug treatment for complications, including arrhythmias and heart failure, is offered [6]. Complete surgical removal of cardiac myxomas is the method of choice as it is safe and offers patients good postoperative outcomes [7]. Additionally, in our cohort, exclusively treated with radical surgical tumor removal, only one tumor recurrence was observed. To prevent embolism, vigorous tumor manipulation is performed only after aortic cross-clamping and cardioplegia. The potential surgical approach should be chosen with caution, as in patients with optimal tumor localization and anatomical predispositions, the minimally invasive approach may be beneficial.

Concomitant procedures as additional benefit to the patient

In some cases, additional procedures may be required, including patch correction of the surgical defect, foramen ovale

closure, coronary artery bypass grafting, or valve replacement, which was performed in 1.8% of our patients [7, 13].

In our study, closure of the patent foramen ovale was the most common additional procedure required. Patent foramen ovale is a condition that can be simply described as a connection in the wall between the left and right atrium that has not closed on its own after birth. It can be associated with embolism and ischemic complications, including stroke [14].

Limitations

The present study is a single-center retrospective analysis with limited information on long-term postoperative survival. There is no detailed information on postoperative drug treatment, echocardiography or late complications.

Conclusions

Surgical treatment of myxomas is associated with a low complication rate and periprocedural mortality comparable to other cardiac procedures. The complication rate, including myocardial infarction, is not related to patient sex.

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Ethical approval

The authors of this study take full responsibility for the accuracy and integrity of the research and have taken appropriate measures to ensure that any concerns about the work are addressed. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (as revised in 2013). Approval of the study from the Jagiellonian University Ethics Committee and the need for individual informed consent were waived for this retrospective analysis.

Disclosure

The authors report no conflict of interest.

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