

Excision of Atrial Myxomas is progressing from Median Sternotomy to Mini-Thoracotomy.

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November 20, 2020

Abstract

Background: Atrial myxomas are rare benign tumors; causing obstructive or embolic complications, and even death, depending on their site and size. Therefore, once diagnosed, it should be surgically resected emergency. Atrial myxomas are present about 75% in left atrium (LA) and about 15% in right atrium (RA). Early diagnosis is a challenge because of nonspecific manifestations, and sometimes is asymptomatic and discovered accidentally during TTE. Objective: Minimally invasive cardiac surgery (MICS) has benefits include cosmetically, less pain, shorter intensive care unit (ICU) and hospital stay. Methods: From Jan. 2011 to Sept. 2020, (20) patients (10 Sternotomy, 10 MI) underwent surgery for isolated resection of atrial myxoma. We reported outcomes; cardiopulmonary bypass time (CPB), cross-clamp time, conversion to median ST, length of stay, complications (stroke, renal failure, respiratory failure, reoperation, and infection), pain, patient's satisfaction, recurrence and survival. Mean follow-up time was 6 month. Results: There is no significant difference in CPB or cross-clamp time between groups. No MI cases required conversion to a median ST. Length of stay is shorter in the MI group by 2.2 days ($p = 0.045$). There is no difference in morbidity or mortality between groups. Conclusions: A minimally invasive approach for atrial myxoma resection is safe, feasible, and favored over sternotomy.

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The key question

Is atrial myxoma emergency cardiac surgery?

Is the diagnosis of atrial myxoma incidentally discovered?

Is the character of myxoma important for surgical decision?

Is mini-thoracotomy safe surgery?

What is the comparison between sternotomy and mini-thoracotomy approach?

The key finding

Atrial myxoma is emergency cardiac surgery. It has non-specific manifestations and may be discovered accidentally. Different imaging techniques help in diagnosis and described its characters [site – size – number]. Surgical excision through sternotomy is safe, curable, and without recurrence. Recently, mini-thoracotomy is safe, has low morbidity and mortality like sternotomy, and better cosmetic with less pain.

Take Home Message

Mini-thoracotomy as MICS approach is safe, cosmetic, less pain, and rapid recovery than sternotomy in excision of atrial myxoma.

Declarations

Availability of data and material: - It is available from recording files and operative data at cardiothoracic surgery departments and clinics for follow up.

Competing interest: None to declare

Funding: None

Abstract

Objectives : Atrial myxomas are rare benign tumors; causing obstructive or embolic complications, and even death, depending on their site and size. Therefore, once diagnosed, it should be surgically resected emergency. Atrial myxomas are present about 75% in left atrium (LA) and about 15% in right atrium (RA). Early diagnosis is a challenge because of nonspecific manifestations, and sometimes is asymptomatic and discovered accidentally during TTE. Minimally invasive cardiac surgery (MICS) has benefits include cosmetically, less pain, shorter intensive care unit (ICU) and hospital stay. **Methods:** From Jan. 2011 to Sept. 2020, (20) patients (10 Sternotomy, 10 MI) underwent surgery for isolated resection of atrial myxoma. We reported outcomes; cardiopulmonary bypass time (CPB), cross-clamp time, conversion to median ST, length of stay, complications (stroke, renal failure, respiratory failure, reoperation, and infection) , pain, patient’s satisfaction, recurrence and survival. Mean follow-up time was 6 month.**Results :** There is no significant difference in CPB or cross-clamp time between groups. No MI cases required conversion to a median ST. Length of stay is shorter in the MI group by 2.2 days ($p = 0.045$). There is no difference in morbidity or mortality between groups.**Conclusions:** A minimally invasive approach for atrial myxoma resection is safe, feasible, and favored over sternotomy.

Keywords: Myxoma, Median Sternotomy, Minimal Invasive Cardiac Surgery, mini-thoracotomy, Heart tumor.

Objectives

Cardiac myxoma is the most common primary benign cardiac tumor and managed by surgical excision. However, it can occur within any cardiac chamber, a majority of them are located in LA (75%), in RA (15), biatrial (2.5%), very rare in ventricles and valve. Atrial myxomas arise from interatrial septum, at the border of fossa ovalis[1] . Depending on size, site, and mobility of the mass, myxomas give manifestation of obstruction or embolization, or constitutional symptoms. If the myxoma is large pedunculated and mobile, can obstruct the valve, resulting in sudden death. Therefore, myxomas should be resected surgically, once diagnosis confirmed[2] . Diagnosis is done mainly by echocardiography (TTE-TEE) or other imaging; like computed tomography (CT), and magnetic resonance imaging () (**Figure 1**) . Resection of myxomas is safe, with very low mortality and morbidity [3] . Early diagnosis is challenged because its symptoms are nonspecific. Clinical manifestation includes fever, chest distress, dyspnea, anemia, syncopal attack, and embolism [9]. Large myxomas may be asymptomatic if the growth is very slow [5] . Atrial myxomas are usually considered as an indication for urgent surgery [10] . It is very rare procedure; its incidence in cardiac surgery operation is about 0.3% [4] . Advanced imaging provides more accurate evaluation of size, site, shape, and attachment. So, exploration of all chambers may not be required intraoperative. MI approach should be considered as a treatment option [5].

Several surgical approaches (isolated left or right atriotomy, right atriotomy with trans-septal incision, and bi-atrial approach) and chest incision (median sternotomy and mini-thoracotomy) have been used for myxoma resection [11]. Myxomas usually are managed by complete excision through a median ST. However, the poor cosmetic effect and possible complications of ST are occasionally troublesome. The concept of MICS has been introduced recently to cardiac surgery. MICS has potential benefits such as increased patient satisfaction, less pain, decreased length of ICU and hospital stays, improved quality of life, and so decreased costs. The safety and efficacy of MICS approach, in comparison to ST approach, for atrial myxoma resection has proven challenging [6-7-8].

Methods

A total of 20 patients undergoing surgery for atrial myxoma resection from Jan. 2011 to Sept. 2020, were included in the analysis. Ethics approval and consent to participate that have read and understood by patients with information about the research as provided in the participant information sheet inside his file. The study conformed to the principles of “Declaration of Helsinki” and the investigator followed the appropriate safeguards regarding the rights and welfare of the human participants that have been included in the performed study. Consent for publication was obtained written consent from patients. There were 10 patients who underwent resection through ST and 10 patients who underwent resection through MI approach.

In case of median ST, standard aorto-bicaval, moderate hypothermia (32°, and direct cold blood cardioplegia. In cases MI approach, peripheral femoral cannulations were utilized to establish CPB by a Seldinger technique. The left femoral artery was cannulated with (16-) arterial cannula, and the left femoral vein was cannulated with () venous cannula. TEE is utilized to check the position of venous cannula in the superior vena cava. Mini-thoracotomy incision (4-) was made in 4th or 5th intercostal space medial to the anterior axillary line. The pericardium was opened above and parallel to phrenic nerve and extended over the aorta. Venous drainage was augmented with vacuum assistance applying negative pressures (30 Hg) to empty the right side. and were snuggared before right atriotomy. A retrograde cardioplegic cannula was directly inserted after right atriotomy. Aortic cross clamping was done through 2ndright intercostal space by a Chitwood clamp. Carbon dioxide blower was used into the operative field. De-airing was performed with a needle in the root of the aorta and under TEE guidance. With the heart empty, both atrial and ventricular pacing wires were placed. After discontinuing and administering protamine, decannulation was performed. The purse string sutures were tied and the femoral artery was directly repaired using 5/0 Prolene. A single or two chest tubes were placed in right pleural space and pericardium. The mini-thoracotomy incision was closed in the standard fashion (**Figure 2**). Myxoma was approached through the right atriotomy. Myxomas are pedunculated, friable and appear as a soft, gelatinous, with areas of hemorrhage or thrombi (**Figure 3**). The pedunculated Myxoma was excised with its attachment to interatrial septum, and septal defect was closed directly or with autologous pericardial patch. Intraoperative TEE revealed no residual tumor, no residual defect, complete deairing, and no valvular insufficiency. Pathological examination was confirmed benign myxoma (**Figure 4**). Follow up after (6) months by TTE revealed no recurrence and normal functioning mitral and tricuspid valves.

Results

There were no significant differences in major baseline characteristics between groups including age, BMI, preoperative EF, preoperative creatinine, COPD, stroke, NYHA class or diabetes.

Table (1-2)

In both groups, there were no postoperative bleeding, tamponade, and mortality. There was no clinical or echocardiographic recurrence or valvular insufficiency at the 6-month follow-up. No patients in the MI group underwent conversion to median ST. In MI group, there was no wound infection, better cosmetic, less pain, early recovery and return work early.

Discussion

Although myxomas are the most commonly seen primary cardiac tumors, they remain a very rare. The presenting symptoms of an atrial myxoma are widely variable and non-specific. Regardless of presentation, once a diagnosis is made urgent surgical excision is recommended to avoid the potential complications [12]. So, we reported small number of cases during long period. All patients were discovered incidentally during TTE examination.

Around 30% of the patients presented with signs and symptoms associated with secondary embolization [13]. So, once diagnosis was done surgical excision was performed to avoid incurable complications.

Biatrial exposure has been the preferred approach for complete surgical excision. MI approach has been increasingly used in the field of cardiac surgery [4-5]. In our study, we used to right atriotomy trans-septal approach for LA myxomas.

Accurate imaging of cardiac myxomas before surgical resection is critical for operative success. Myxomas are often detected with echocardiography, CT, or CMR [11]. Echocardiography serves as a cornerstone of workup in the evaluation of ischemic stroke, as (15%) are cardiac causes [14]. We reported only two cases done MRI after TTE diagnosis. Advanced diagnostic imaging helped us to be ensured there were not multiple myxomas, that were needed more exploration.

Surgical excision is the treatment of choice for atrial myxoma resulting in a complete cure (99%), and recurrence in (1%) [15]. Incomplete resection of the myxoma attachment area is considered the common cause of recurrence [16]. So, we excised myxoma with its interatrial septal attachment the repair the defect.

When compared with a median ST approach, the reported benefits of MICS include reduced; surgical trauma, blood loss, need for reoperation, and pain, early return to normal daily activity, shorter ICU and hospital stays, reduced costs, and higher level of patient's satisfaction[8]. We reported in our study that MI approach reduced time of hospital stay, no reopening due to bleeding, better cosmetic wound appearance, and more patient's satisfaction.

Conclusions

We concluded that the clinical outcome of the minimally invasive approach for atrial myxoma resection is acceptable; the technique is feasible, and safe for patients.

Abbreviations:

TTE: Trans-Thoracic Echo, **TEE:** Trans-Esophageal Echo, **RA:** Right Atrium, **LA:** Left Atrium, **CMR/MRI:** Cardiac Magnetic Resonance Imaging, **MRI:** CT: Computed Tomography, **S.Cr.:** Serum Creatinine, **DM:** Diabetes Mellitus, **HTN:** Hypertension, **BMI:** Body Mass Index, **CPB:** Cardio Pulmonary Bypass, **ST:** Sternotomy, **MI/CS:** Minimal Invasive/ Cardiac Surgery, **SVC:** Superior Vena Cava, **IVC:** Inferior Vena Cava, **ICU:** Intensive Care Unit, **COPD:** Chronic Obstructive Pulmonary Disease.

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Figure Legend

Figure (1):- TTE is showing left atrial myxoma obstructing MV causing MS.

Figure (2):- Post mini-thoracotomy incision

Figure (3):- Atrial myxoma was excised and soft jelly fraible.

Figure (4):- Histology picture of a myxoma.

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