



Case Report

Totally endoscopic resection of epicardial cardiac haemangioma under on-pump beating heart

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ABSTRACT

Introduction: Cardiac haemangioma (CH) is an extremely rare type of benign heart tumor, with prevalence only 2.8% of all primary cardiac tumors. The symptoms of tumor are often nonspecific. Preoperative screening and diagnosis are based on imaging examinations. Radical surgical resection is indicated in symptomatic patients. **Case presentation:** We report on a case of an incidentally found tumor located on the right-sided epicardium that was successfully removed with the totally endoscopic surgery (TES) and the concomitant use of cardiopulmonary bypass (CPB).

Discussion: Excision of these tumors has been described through a median sternotomy approach. In recent years, TES has grown in popularity with many advantages. On the other hand, on-pump beating-heart (ON-BH) technique has been appreciated as a superior myocardial preservation method. The combination of these procedure provides clinical benefits and patient preferences.

Conclusion: Totally endoscopic resection of CH under ON-BH is a safe, effective procedure, which can be adopted in similar cases.

1. Introduction

Cardiac haemangioma (CH) is a very rare type of benign heart tumor, characterized by benign proliferative endothelial cells lining blood vessels with increasing vascularization [1]. It can be found from any of three cardiac layers: endocardium, myocardium, or epicardium [2]. Among all, the epicardium is the rarest site of origin for this tumor. The common symptoms of CH are various, such as: exertional dyspnea, chest pain, cough, palpitations. However, a primary CH is accidentally detected in a completely asymptomatic patient who presents for an unrelated disease. In patients with the presentation of suggestive symptoms, imaging modality is particularly important to confirm a diagnosis of CH. Advances in imaging such as: echocardiography, computed tomography (CT), magnetic resonance imaging (MRI) provide valuable insights into this disorder, although the pathologic diagnosis is still the gold standard [3]. For symptomatic patient, surgical removal is considered the preferred treatment option when possible.

Over the last two decades, minimally invasive cardiac surgery (MICS) has been developed with smaller incisions and more video assistance. At the highest level of MICS, TES brings many advantages such as lower risk of infection, less blood loss, reduced pain [4]. Whilom,

cardiac surgery was performed under beating heart or ventricular fibrillation conditions prior to the advent of cardioplegia, which made surgery easier. However, inadequate preservation of myocardial function was largely responsible for mortality and morbidity after cardiac surgery. Avoidance of the adverse consequences of cardioplegia has been the driving force behind the development of ON-BH. Some previous studies have reported the clinical benefits of ON-BH in high-risk patients [5].

In this case report, we describe a successful removal of epicardial CH under totally endoscopic surgical procedure of ON-BH. This work has been reported in line with the SCARE 2020 criteria [6].

2. Case presentation

A 64-year-old woman presented with mild dyspnea and chest discomfort, dry cough for three months. Clinical examination revealed no fever, a regular heart rate of 72 bpm, blood pressure of 125/70 mmHg. Pulmonary sounds were clear with no crackles, and heart sounds were regular with no murmur. *Trans*-thoracic echocardiographic findings showed an epicardial echogenic 4,1 × 5,3cm mass located round aortic root, spreading to the anterior wall of the right ventricular and

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right atrial. Left ventricular ejection fraction was 76% (Simpson) and normal valvular function, without right ventricular outflow tract obstruction, normal right ventricular function. Transesophageal echocardiography detected more accurately the position and boundary of the tumor (Fig. 1A). Diagnosis of CH was based on based on its characteristic MRI signal intensity (Fig. 1B).

2.1. Surgical technique

The patient was placed in a supine position with the right side of her body raised approximately 30° and intubated with a double-lumen endotracheal tube for left lung ventilation. Peripheral CPB was established via the right femoral vessels. The femoral artery was cannulated indirectly through an 8mm Dacron graft. Femoral venous cannulation was performed with a 21F venous cannula using Seldinger technique (Fig. 2B). Three ports were placed in the marked positions, included the following: A 10-mm trocar in the 5th intercostal space in the anterior axillary line for surgical instruments (e.g tissue forceps, needle holder, Ligasure, or Electrocautery) and the tumor retrieval bag, a 5-mm port in the 3rd intercostal space in the midaxillary line (for tissue forceps), and a 10-mm trocar in the 4th intercostal space in the midaxillary line (for endoscopic camera) (Fig. 2A).

CPB was initiated with mild hypothermia. Then, the pericardium was opened 2-cm anterior to the phrenic nerve. Intraoperative aspect of the solid tumor was adherent to the anterior of right ventricular. The tumor was partly attached to the atrioventricular groove and the right ventricular-aortic boundary (Fig. 3A). We resected it from the epicardial fat of right ventricular. The mass did not invade the surrounding structures, and there was also no connection of blood vessels between the tumor and the heart (Fig. 3B). Afterward, we carefully exposed each layer of the tumor to avoid iatrogenic cardiac injury and bleeding. Fig. 3C shows that the tumor was located next to the right coronary artery, which required accurate dissection, especially with a beating heart. Finally, the tumor was completely resected and retrieved through the 10-mm trocart after 62 minutes on-pump (Fig. 3D and E).

Pathologic diagnosis confirmed unusual type of haemangioma composed of large, endothelial-lined, thin-walled channels and intervening dense proliferation of capillary-sized vessels (Fig. 3F).

Post-operatively, the patient was extubated within 5 h, then spent one day in ICU. She was discharged eight days following the intervention without any complication and returned to normal activity after two weeks.

3. Discussion

CH has the same histological features as haemangiomas elsewhere in the body. Depend on the tumor's location and dimension, it can cause various symptoms such as: arrhythmia, pericardial effusion, congestive heart failure, right ventricular outflow tract obstruction, thromboembolic events. Imaging can confirm diagnosis of CH. Primarily, echocardiography is a traditional method, economical, simple but it also has certain limitations. A better modality would be CT because it is able to better demonstrate the tumor's location, and its association with surrounding structures. Among all, MRI is good at describing the vessel proliferation of haemangioma and remains the gold standard of diagnosis of this condition as it provides a higher contrast resolution compared with CT. In view of the potential risk, CH is predominantly indicated for surgical removal as the first line therapy [3].

Most surgical tumor resections are performed through traditional median sternotomy. However, MICS is being generally applied in all areas of cardiovascular surgery, including cardiac tumors. Regardless of the surgical approach, most right sided cardiac tumors could be resected using CPB support with or without cardiac arrest. In this case, the tumor attached to the anterior surface of the right ventricle, adhered to the aortic root but it did not invade the wall of the right ventricle and surrounding structures. Therefore, we decided to perform with a beating heart.

Some previous studies has shown that the ON-BH technique provides significantly lower early morbidity and mortality than conventional arrested heart, especially in high-risk patients. The advantages of ON-BH are as follows: smaller systemic inflammatory response by reducing the release of interleukin-6, interleukin-8, interleukin-10, and tumor necrosis factor; myocardial ischemic-reperfusion injury [5,7]. The ON-BH has been appreciated as a superior technique in cardiac surgery. Nevertheless, heart motion and a less than optimal surgical field of view can challenge cardiac surgeon in some cases. Therefore, differences in experience of surgeons should be considered before the decision to choose the appropriate procedure is made.

To our knowledge, this is the first reported case that had an epicardial CH resected by TES with ON-BH. The rationale beyond this approach is to get the multitude of benefits of those special techniques simultaneously with oncological clearance comparable to the conventional median sternotomy. Success of the surgery depends on the tumor location, type, size, and invasiveness. In our case, the patient had no perioperative complications and was discharged early after the intervention.

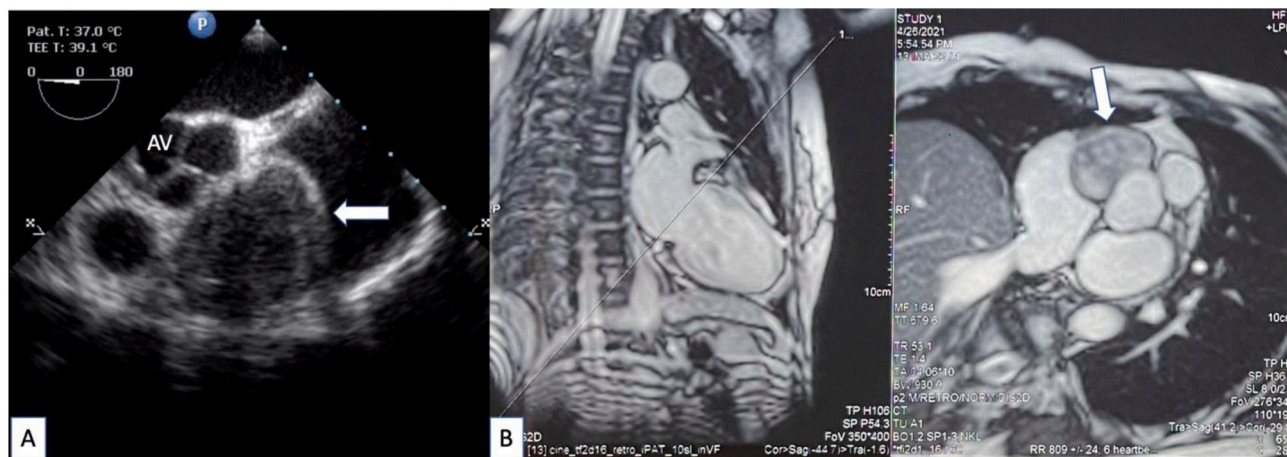


Fig. 1. (A) Transesophageal echocardiography demonstrated a mobile, hyperechogenic lesion (arrow). (B) Oblique gradient-echo cine image. Cardiac MRI showed one well-defined extra-cardiac mass located round aortic root, spreading to the anterior wall of the right ventricular and right atrial.

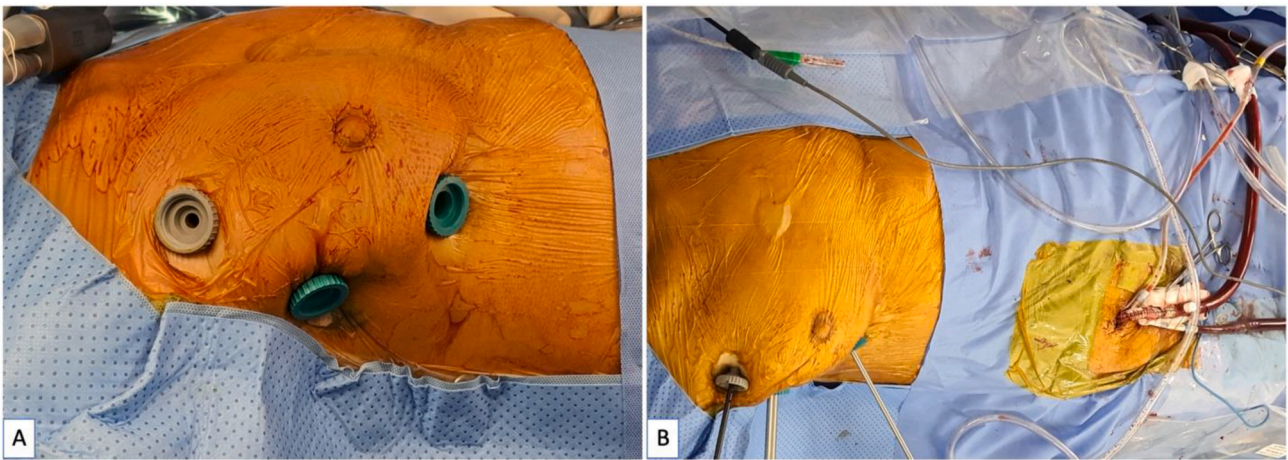


Fig. 2. Peripheral cardiopulmonary bypass and endoscopic port placement.

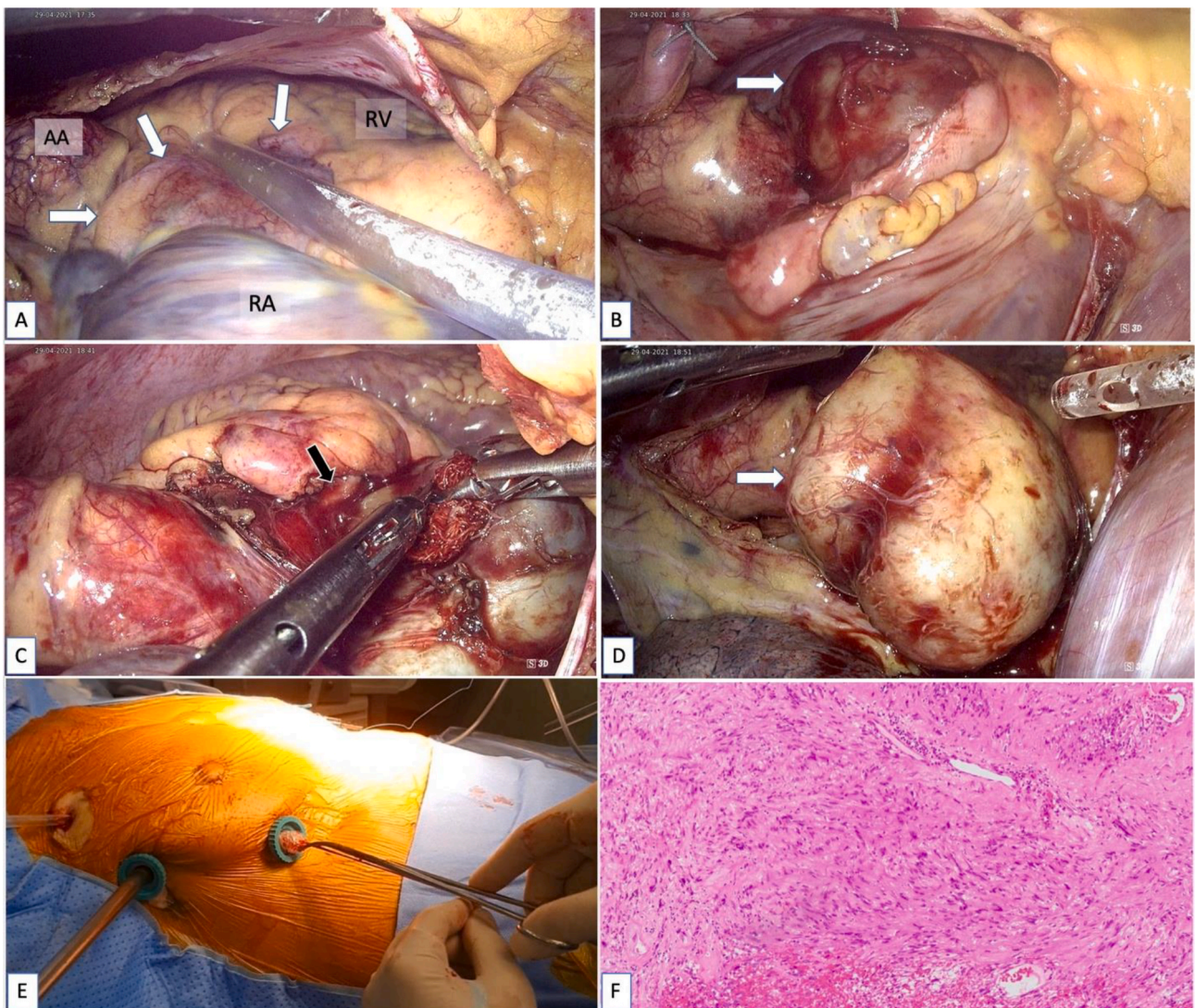


Fig. 3. (A) The solid tumor (white arrow) was adherent to the anterior of right ventricular, partly attached to the atrioventricular groove and the aortic root. (B) Resection of the tumor from the epicardial fat of right ventricular. (C) The tumor's position was next to the right coronary artery (black arrow). (D, E) The tumor was completely resected and retrieved through the 10-mm trocar. (F) Histological aspect of the tissue showing the cardiac haemangioma. AA: Aortic ascending. RA: Right atrial. RV: Right ventricular.

4. Conclusion

A rare epicardial CH was successfully removed by a totally thoracoscopic approach with ON-BH technique. This method is feasible and can be a safe alternative for complete tumor resection in similar cases.

Provenance and peer review

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Ethical approval

The study was approved by our research committee.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Research registration

N/a.

Author contributions

Huu Cong Nguyen: Surgeon performed this case, wrote manuscript.
Dat Thanh Pham: Full responsibility for scientific method and publication.

Trial registry number

This is a case report. Thus, we don't need a registration of research

study.

Guarantor

Dat Thanh Pham, M.D.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102838>.

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