



Research Paper

ANAESTHETIC MANAGEMENT OF PATIENT WITH EXTENSIVE VENOUS SIDED METASTASIS FOR PARTIAL GASTRECTOMY AND EXCISION OF METASTATIC GROWTH UNDER CARDIOPULMONARY BYPASS

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Background: Primary cardiac tumors are very rare. Secondary cardiac tumours occur more commonly than the primary ones. Most frequent secondary cardiac tumors include Carcinoma lung and breast, melanomas, leukemias and lymphomas. Gastric leiomyosarcoma is rare. Gastric leiomyosarcoma metastasizes usually to the liver and surrounding structures. Leiomyosarcoma of the stomach rarely metastasizes to the heart. **Methods:** We describe anaesthetic management of a rare case of secondary right atrial leiomyosarcoma originating from stomach in a male patient aged 36 years with extension to Inferior Vena Cava (IVC), left lobe of the liver and embolism to Left Pulmonary Artery (LPA). He was scheduled for clearance of secondary extension from Right Atrium (RA), IVC and pulmonary artery with partial gastrectomy. The anaesthetic plan was general anaesthesia with controlled mechanical ventilation with invasive monitoring. Partial gastrectomy and partial resection of left lobe of liver was done through a midline laparotomy followed by median sternotomy for excision of the right atrial mass and embolectomy of left pulmonary artery under cardiopulmonary bypass (CPB) with Deep Hypothermic Circulatory Arrest (DHCA) using femoral venous cannulation for venous drainage. **Results and Conclusion:** Issues related to (1) Fixed cardiac output state during induction; (2) Embolization of tumor mass; (3) Central venous pressure line placement precautions; (4) Problems related to low IVC drainage after cannula placement; (5) Extensive nature of surgery with bleeding and hemostasis; (6) Postoperative respiratory dysfunction; and (7) Emphasis on usefulness of Transoesophageal Echocardiography during the perioperative period are discussed.

Keywords: Gastric leiomyosarcoma, Secondary right atrial leiomyosarcoma, Pulmonary embolectomy, Deep Hypothermic Circulatory Arrest

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INTRODUCTION

Primary tumors of the heart are rare, approximately 0.02% (Reynen, 1996). Metastatic tumors occur a 100-fold more commonly than 1° lesions (Castillo and Savy, 2010). Among malignant primary cardiac tumors, the most reported are those histopathologically considered as undifferentiated followed by angiosarcomas with leiomyosarcomas being rare (Pariasis, 2010). Cardiac involvement by metastatic gastric sarcoma is rare (Locci *et al.*, 2001). Cardiac metastases mostly appear in patients with disseminated tumor disease; solitary metastases to the heart are very rare. Intracavitary growth of secondary heart tumors is unusual (Reynen, 1996).

MATERIALS AND METHODS

A 36 years male patient presented with complaints of breathlessness on exertion, abdominal discomfort and generalized malaise since 1 year. He was diagnosed as a case of RA mass and started on Tb. Enoxaparin.

On examination, his PR = 96/min, regular, BP = 120/86 mm Hg, Pallor ++, CVS- Systolic ejection murmur grade III/VI.

CT Pulmonary angiogram showed large irregular lobulated filling defect occupying the entire right atrial cavity with continuous extension in the suprahepatic and infrahepatic portion of the IVC and right and left hepatic veins with a filling defect in main pulmonary artery extending into left pulmonary artery.

Abdominal CT scan, MRI and USG showed lobulated mass on the greater curvature of stomach 4.8*4.7 cm, with a hypodense lesion approximately 1*0.8 cm involving left lobe of liver. CT scan revealed thrombus in infrarenal portion

of IVC at its bifurcation (which was not found during surgery).

All the hematological, biochemical investigations were within normal limits. Chest radiograph was suggestive of less vascularity of left lung compared to the right.

Right 16 G peripheral venous line, 20 G radial arterial cannula were inserted under local anesthesia. His preinduction HR = 76/min, BP = 126/83 mmHg and Arterial blood gas was pH = 7.442, PCO₂ = 27.1 mmHg, PO₂ = 85.2 mmHg, SPO₂ = 97.1%, HCO₃ = 18.1 mmol/L, BE = -4.5, K⁺ = 3.16 on room air.

Under standard invasive cardiac monitoring, since RA mass was extensive, induction was done in a titrated slow manner keeping in mind the fixed right sided cardiac output state with Inj. Midazolam 3 mg, Fentanyl 250 µg, Vecuronium 6 mg IV. During induction, patient's BP decreased to 66/33 mm of Hg, which was managed with IV Mephentermine 6 mg. Patient was intubated with oral portex, cuffed low pressure endotracheal tube size 9 Fr under vision with all aseptic precautions and fixed at 22 cm from the incisors, connected to the mechanical ventilator on Volume Control mode to deliver a tidal volume of 8 ml/kg. An adult TEE probe was inserted orally. TEE examination showed large mass occupying the entire Right Atrium and another 4*6 cm mass adherent to the anterior leaflet of the tricuspid valve (Figures 1 and 2). After midline laparotomy, partial gastrectomy was done with partial resection of left lobe of liver. Celiac lymph nodes were not palpable. Retroperitoneal exploration was done with mobilization of IVC. No thrombus could be palpated below or above the renal veins. After median sternotomy, CPB was established with femoral artery and femoral venous cannulae

in the likelihood of difficult RA cannulation and interrupted venous drainage. Under DHCA, patient was cooled to 18 °C. Ice packs were kept on the patients head and neck. Under uniform cooling, 1 g of Thiopentone, 1 g Methylprednisolone and incremental doses of Fentanyl and Pancuronium were added to the CPB circuit. Pulmonary artery was explored and lobulated mass from MPA and LPA was excised. RPA was free from any mass. RA was opened and the mass was excised (Figure 3) which was extending into both right and

Figure 1: TEE 5 Chamber View Showing Large Mass Occupying the Entire Right Atrium and Another 4*6 cm Mass Adherent to the Anterior Leaflet of the Tricuspid Valve

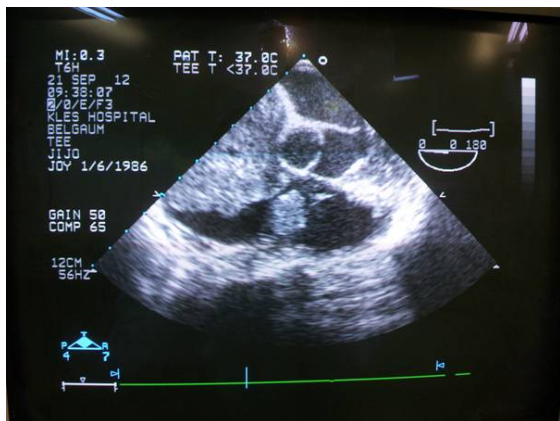


Figure 2: TEE Image Bicaval View Showing Extensive Right Atrial Mass

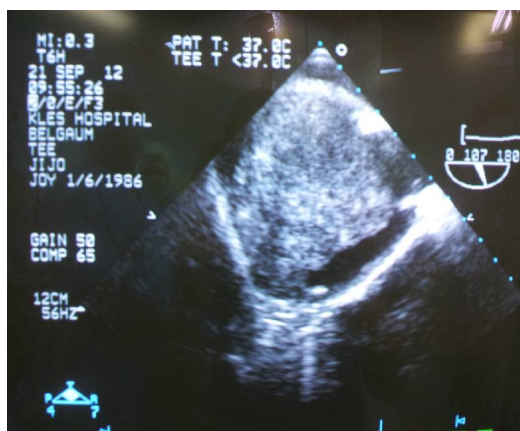


Figure 3: Intraoperative Photograph of Right Atrial Mass Adherent to the Entire Wall



left hepatic veins and free flow from IVC was established. The total DHCA time was 20 min.

Patient was weaned off from CPB and shifted with IV Dobutamine 5 mcg/kg/min. He was started on anticoagulation, antiplatelets and Sildenafil from 1st postoperative day. Patient was irritable on 2nd postoperative day, although CT brain was normal. Patient was discharged on 12th postoperative day.

DISCUSSION

Neoplasms of the heart may be 1° or 2°. Most frequent 2° tumors-Ca lung and breast, melanomas, leukemias and lymphomas. Metastases can reach the heart by retrograde lymphatic extension (most carcinomas), hematogenous seeding (many tumors), direct contiguous extension (1° Ca lung, breast/oesophagus), by venous extension (tumors of the kidney or liver) (Kumar *et al.*). Gastric leiomyosarcoma is rare (Locci *et al.*, 2001; Biswas *et al.*, 2006; Reynen *et al.*, 2004). Method of choice for diagnosis-2D Transthoracic Echocardiography (TTE).

In cases of peri- or paracardial lesions, Transesophageal Echocardiography (TEE) is superior to TTE (Clarke *et al.*, 2002; Magnus Dencker *et al.*, 2009). If echocardiography is not conclusive, Cardiac MRI is advisable. TEE helps us to evaluate extent of lesion on operation table, safe placement of central venous catheter, detection of systemic embolization and evaluate clearance of tumor on table after surgery.

ANAESTHETIC CONSIDERATIONS

1. Hypotension due to fixed Cardiac Output state, arrhythmias, decrease in Systemic Vascular Resistance (SVR), venodilatation. Management – Increase SVR with vasopressors. Chest compressions may displace the tumor mechanically (Balachander *et al.*, 2010). In our patient, the most likely cause for decrease in BP with induction may be due to decrease in SVR with fixed cardiac output and venodilatation which was managed with Inj. Mephentermine 6 mg.
2. Hypoxaemia due to tumor obstruction of pulmonary artery leading to increased work of breathing, pulmonary infarct and pulmonary embolization due to tumor fragmentation. In our case, no episode of hypoxaemia during the perioperative and postoperative period. After extubation, patient had lower oxygen tension values due to multiple pulmonary infarcts.
3. Central venous catheter placement precautions: Risk posed by the RA mass and tumor embolization, TOE guided CVP line insertion to avoid tumor fragmentation and subsequent embolization. PA catheters are contraindicated (Laurie K Davies) and CVP line placement at other sites. In our case, we selected the right IJV as it is most representative of CVP. The line was placed under TOE guidance. The guidewire was inserted only upto 10 cm to avoid entering RA.
4. Neuroprotection: DHCA, Preferred method of pH management on CPB is α -stat, uniform and adequate hypothermia with slow rewarming. Neuroprotective agents: Corticosteroids, Mannitol and Barbiturates, Surface cooling of head with ice (Djalani *et al.*, 2011; Rawat *et al.*, 2010). Methyl prednisolone decreases brain injury by free radical release. Thiopentone decreases free radical scavengers and Cerebral Metabolic Rate. Anesthetic agents facilitate preconditioning and decrease glutamate excitotoxicity. Sildenafil is a selective PDE-5 inhibitor.
5. Bleeding is a major problem in an extensive surgery like pulmonary embolectomy with DHCA and long CPB time. It requires transfusion of whole blood and blood products. In our case, 2 packed red blood cell units were used during CPB, 2 whole blood, 1 packed red blood cell, 2 fresh frozen plasma and 2 random donor platelet units were transfused postoperatively. Inj. Tranazemic acid 1 g was used prior to surgical incision and after coming off CPB. Cell salvation procedures were not used keeping in mind the risk of microtumor metastases.
6. Postoperative ventilator management includes use of positive end-expiratory pressure and accepting lower limits of oxygen tension values.

7. Pain relief is an important aspect of postoperative ventilator management which includes use of opioids and thoracic epidural anesthesia. In our case, we used continuous fentanyl infusion at 50 mcg/h after a bolus of 150 ug for 1 day for pain relief.

CONCLUSION

Secondary tumors of the heart are more commoner than the primary ones. This requires scrupulous examination of other systems also other than the cardiovascular system. Deep hypothermic circulatory arrest is the keystone of pulmonary embolectomy with extensive atrial mass. Transoesophageal echocardiography has a major role to play in the anesthetic management of such cases.

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