

Case Report

Minimally Invasive Removal of Right Atrial Extension of Tumour Thrombus in a Young Patient of Hepatocellular Carcinoma (Liver Transplant Candidate)

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Abstract

Hepatocellular carcinoma is a primary malignancy of the liver and occurs predominantly in patients with underlying chronic liver disease and cirrhosis. The cell(s) of origin are believed to be the hepatic stem cells, although this remains the subject of investigation. Tumors progress with local expansion, intrahepatic spread, and distant metastases. There are very few cases of hepatocellular carcinoma with canal and right atrial extension of the tumour reported in literature. We report a case of 30 years old male patient who was liver transplant candidate got diagnosed to have inferior vena cava and right atrial extension of hepatocellular carcinoma, which was successfully removed through minimal access cardiac surgery via right anterolateral minithoracotomy and establishing peripheral bypass and liver transplant done thereafter in the same sitting after heparin reversal.

Keywords: Hepatocellular Carcinoma; Liver Transplant; Minimally Invasive Cardiac Surgery, Right Atrium Tumour Thrombus

Background

Hepatocellular Carcinoma (HCC) is one of the most common malignant tumours and the second leading cause of cancer-related deaths [1]. HCC is a highly progressive cancer with a high rate of metastasis. Furthermore, Tumour Thrombus (TT) formation in the portal or hepatic vein is common in the advanced stages of HCC [2]. When the tumour thrombus invades the Inferior Vena Cava (IVC) and right atrium (RA), the prognosis is usually very poor, since the condition may lead to cardiac failure or pulmonary embolisation [3-5]. Furthermore, the treatment options at this stage are limited and not very effective. The general treatment of choice is major surgery with cardiopulmonary bypass, which is dangerous, risky, and expensive. In addition, many patients at this stage of HCC cannot tolerate such an operation.

We report the case of a patient with HCC associated with a tumour thrombus extending into the RA that was surgically

resected through minimal access cardiac surgery on peripheral cardiopulmonary bypass with a short time of total circulatory arrest. To our knowledge, this is the second reported case in which minimally invasive cardiac surgery was used to treat an HCC patient with a tumour thrombus in the RA.

Case Presentation

A 29 years old male got diagnosed to be Hepatitis C reactive on evaluation for blood donation 7 years ago. After diagnosis he received interferon for three months. Two years ago he developed abdominal discomfort and ascitis. On evaluation, USG and CT abdomen showed space occupying lesion in left lobe of the liver with features of cirrhosis. On MRI, secondaries found in other liver lobe. Final diagnosis of Diffuse Hepatocellular Carcinoma with vascular invasion with Inferior vena cava invading with right atrium extension of tumour. This patient was admitted under Liver Transplant team and was planned for tumour removal from Right Atrium [RA] and Inferior Vena Cava [IVC] followed by Liver Transplant. The tumour was removed minimally invasively via right mini thoracotomy under cardiopulmonary bypass with a short period of Total Circulatory Arrest (TCA).

Peripheral CPB was established using right common femoral artery; superior vena cava was cannulated through right internal jugular vein and IVC drained through right common femoral vein. SVC snared and RA opened, IVC was not snared, it was well managed with Pump sucker for minor flooding from IVC. Anterior root blood cardioplegia was used. RA was approached via right anterolateral mini thoracotomy through fourth intercostal space. After opening RA, the tumour mass of about 3 cms was found to be adherent to inter atrial septum extending to posterior wall of IVC. The tumour was removed from the septum and IVC and the base of tumour was found to be clean with no intramural invasion of tumour to the heart muscle or endothelium. The base of tumour cauterised with monopolar cautery. A small period of 30 seconds of TCA was done to assess the quality of tumour removal and it was found to be satisfactory. The IVC snaring was then done as control of intra hepatic and infra hepatic part of IVC to be assessed during liver transplant. After RA closure, the patient was successfully weaned off CPB, decannulation done and complete reversal with Protamine done. Post-op TEE revealed no residual tumour mass and thoracotomy closed in layers. Total bypass time was 108 min and total aortic cross clamp time was 75 minutes. After this, the patient underwent liver transplant in the same sitting successfully.

The patient is doing well in post-operative period. The echocardiography on POD 5 showed normal heart function with no residual tumour mass in RA or upper IVC.

Histopathology of the tumour mass retrieved from right atrium showed Organizing thrombus and necrotic tumour mass.

Discussion

Only 0.67–4.1% of HCC patients develop a tumour thrombus extending into the RA [6,7]. In our patient, the accessory hepatic vein was invaded by the tumour all the way up to the RA. This is a very rare condition that carries a dismal prognosis, as it is associated with a high risk of systemic metastasis, acute pulmonary embolism, and heart failure.

The management of patients with advanced HCC and a tumour thrombus extending into the RA is difficult and risky. The prognosis is dismal if only supportive care is provided (median survival, 5 months) [8]. Surgical extraction of the thrombus and resection of the tumour appears to be the only effective treatment option. However, this is a major open surgery that commonly requires cardiopulmonary bypass. Moreover, the operation involves incising the subcostal arch, RA, IVC, and all the way down to the hepatic venous root site [4].

However, patients with advanced HCC complicated with tumour thrombus in the IVC and RA are usually elderly and may not tolerate major open surgery to extract the thrombus. Moreover, there is a high risk of operative failure and complications related to general anaesthesia in these patients. The high expense of major operations is also a factor.

A potential severe complication of our treatment is pulmonary embolism due to dislodgement of the ablated thrombus. However, this complication was not observed in our patient and has not yet been reported in the literature.

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