Carcinoma hepatocelular tras cirugía de Fontan: relato de un caso

Hepatocellular carcinoma after Fontan procedure: case report

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ABSTRACT

Single ventricle includes cardiac abnormalities in which either one ventricle is underdeveloped or a ventricular septal wall did not form, leading to the mixing of arterial and venous blood in the heart. The Fontan procedure separates the systemic and pulmonary circulations with a surgical cavopulmonary connection. This procedure leads to an increased systemic venous pressure and low hepatic perfusion pressure and oxygenation which, over time, increases the risk of fibrosis, cirrhosis and, ultimately, hepatocellular carcinoma.

This case report details a 40-year-old man who received the Fontan procedure, developing symptoms reminding of cardiac failure 30 years later. After further evaluation and worsening of these symptoms, findings were consistent with hepatocellular carcinoma with lung metastasis, leading to death in less than one month.

Fontan patients must be screened for cirrhosis and hepatocellular carcinoma to prevent disease progression and its detection in advanced stages. Therefore, a multidisciplinary approach is important to screen for complications of this procedure.

Keywords: Hepatocellular carcinoma, Fontan procedure, cirrhosis, palliative care, case report.

RESUMEN

El ventrículo único incluye anomalías cardiacas en las que un ventrículo está poco desarrollado o no se ha formado una pared septal ventricular, lo que provoca la mezcla de sangre arterial y venosa en el corazón. La intervención de Fontan separa las circulaciones sistémica y pulmonar mediante una conexión quirúrgica cavopulmonar. Esta intervención provoca un aumento de la presión venosa sistémica y una presión de perfusión y oxigenación hepáticas bajas que, con el tiempo, aumentan el riesgo de fibrosis, cirrosis y, en última instancia, carcinoma hepatocelular.

En este caso clínico se describe el caso de un varón de 40 años que se sometió a la intervención de Fontan y que, 30 años después, desarrolló síntomas que recordaban a los de la insuficiencia cardiaca. Tras una evaluación adicional y el empeoramiento de los síntomas, los hallazgos fueron compatibles con un carcinoma hepatocelular con metástasis pulmonar, que le causó la muerte en menos de un mes.

Los pacientes de Fontan deben someterse a cribado de cirrosis y carcinoma hepatocelular para prevenir la progresión de la enfermedad y su detección en estadios avanzados. Por lo tanto, es importante un enfoque multidisciplinar para detectar las complicaciones de este procedimiento.

Palabras clave: Carcinoma hepatocelular, Fontan, cirrosis, cuidados paliativos, caso clínico.

INTRODUCTION

A single ventricle is a broad term including various cardiac structural abnormalities in which one of the ventricles is underdeveloped or the ventricular septal wall did not form, leading to mixing of arterial and venous blood in the heart chambers.[1]

Fontan procedure is the standard surgical procedure for patients with single ventricle anatomy[2], in which a cavopulmonary communication is performed, which allows dividing systemic and pulmonary circulation.[3]

With this procedure, the venous return from the upper body is directly connected to the pulmonary artery via the superior vena cava and the venous return from the lower body is directly connected to the pulmonary artery as well, via the inferior vena cava.

This procedure improves cyanosis and volume overload but leads to an increase in central venous pressure to ensure blood flow into the lungs; this limits the ventricular volume load reserve, which results in a decreased cardiac output.

We describe a patient with a history of single ventricle and Fontan procedure, developing symptoms reminding of cardiac failure 30 years later. After further evaluation and worsening of symptoms, a diagnosis of hepatocellular carcinoma with lung metastasis was made, leading to death in less than one month.

CLINICAL CASE

The authors report a case of a 41-year-old man with a past medical history of single ventricle diagnosed at birth, submitted to Fontan procedure at the age of 10, and permanent atrial fibrillation. No other medical history to report as obesity or dislipidemia, and no alcohol consumption.

After the procedure, the patient had follow-up appointments with a Cardiologist at least once a year, with regular electrocardiograms and echocardiograms. He was medicated with Warfarin, Bisoprolol 2.5 mg/day and Digoxin 0.125 mg/day.

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Figure 1

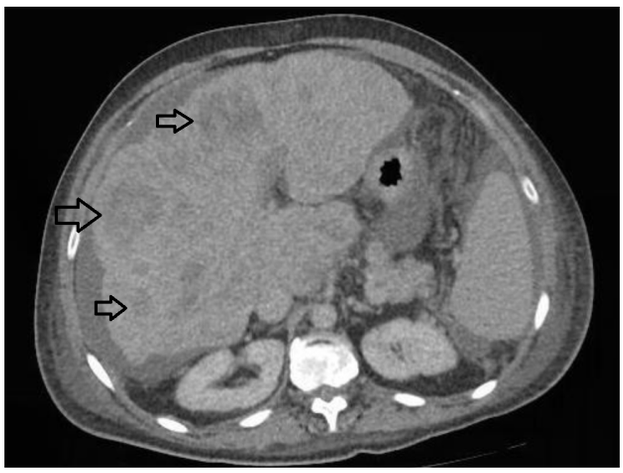
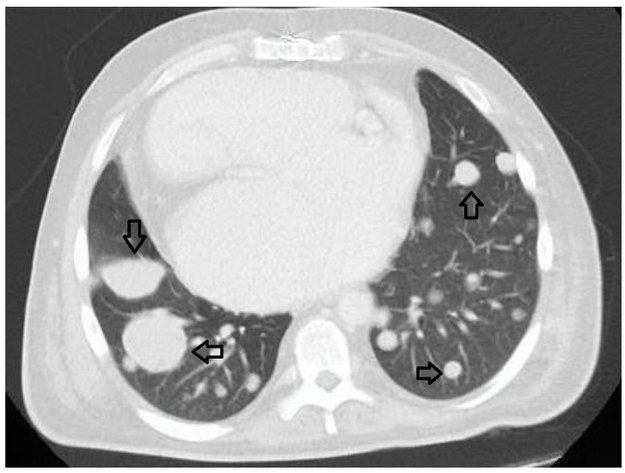


Figure 2



About thirty years after the surgery, at the age of 40, the patient developed, within 5 months, a progressive increase in abdominal circumference, peripheral edema and, ultimately, dyspnea with minimal activity. He reported these symptoms for the first time at the Cardiology appointment. An echocardiogram was performed, showing a depressed ventricular function (with a global longitudinal strain of 8%) and a dilated inferior vena cava (IVC).

After the clinical and echocardiographic evaluation, he was medicated with Furosemide 60 mg/day, Spironolactone 25 mg/day and Bisoprolol was increased to 5 mg/day, and the next appointment was scheduled for one month later.

Despite this, 1 week before revaluation, after a control value International Normalized Ratio (INR) of 10, he was advised to go to the emergency department. He reported worsening of the described symptoms and he also noted a decreased urine output and choluria in the last 7 days.

At physical examination, the patient was conscious and oriented, jaundiced, with blood pressure of 110/75 mmHg and heart rate of 95 bpm. Polypneic with a respiratory rate of 22 cpm and an oxygen saturation 93% with fraction of inspired oxygen of 21%. His cardiac auscultation revealed arrythmic sounds and crackles in both hemithoraces were noticed at pulmonary auscultation. His abdomen was ascitic, with no pain on palpation but with palpable hepatomegaly 3 cm below the costal margin, with regular contours. Lower extremities showed 2+ pitting edema.

The laboratory study revealed changes in liver function tests: alkaline phosphatase 435 IU/L, gamma glutamyl transferase 308 IU/L, aspartate aminotransferase 511 U/L, alanine aminotransferase 511 U/L, total bilirubin (Brb) 11.40 mg/dL, direct Brb 6.41 mg/dL and indirect Brb 4.99 mg/dL. INR: 11. N-terminal pro-B-type natriuretic peptide (NTproBNP): 2,919 pg/mL.

Chest, abdomen and pelvis Computorized Tomography (CT) revealed hepatomegaly with lobulated contours, hypertrophy of the left and caudate lobes and countless dispersed hypovascular nodules (Figure 1), as well as mild splenomegaly (15.3 cm) and small periesophageal, pericolic and superior rectal varices. Ascites was also observed and signs of diffuse bilateral pulmonary metastasis (Figure 2), with multiple nodules up to 4.5 cm. There was also contrast reflux to the inferior and suprahepatic vena cava.

Serologies for viral hepatitis and human immunodeficiency virus were negative.

Given the CT changes suggesting a malignancy etiology, in this case most likely hepatocellular carcinoma with lung metastasis, alpha-fetoprotein was dosed and elevated, with 933.8 IU/mL.

The patient had its symptoms controlled with medical treatment (increase of diuretic therapy) and was discharged with referral to Heart and Liver transplantation, General Surgery, Medical Oncology and Palliative Care consultation. In a multidisciplinary appointment, the patient was not eligible to any curative treatment and continued the follow-up with Palliative Care.

In the following 20 days the patient experienced clinical worsening with liver failure (grade 3 hepatic encephalopathy, a total Brb of 30 mg/dL and INR 22.14) and was admitted in the Palliative Care Ward. His condition was fatal within 24 hours of admission. An autopsy was not performed.

DISCUSSION

After Fontan surgery, the increase of the central venous pressure is transmitted to the hepatic sinusoids, with portal hypertension, leading to their dilation and decreased hepatic flow, with decreased hepatic oxygenation, which culminates in fibrosis.[4,5]

Studies performed including liver biopsies reveal that liver fibrosis is a universal finding after Fontan surgery. Its severity is related to the degree of central venous hypertension and is directly proportional to the time after surgery.[4,6]

The imaging findings of this patient such as splenomegaly, esophageal/perirectal varices and ascites suggest portal hypertension.

Patients undergoing Fontan surgery should be screened for liver cirrhosis, as this is the most important risk factor for the development of hepatocellular carcinoma (HCC). In the first 10 years after surgery, liver function should be evaluated at least every two or three years and complemented with abdominal ultrasound every five years. Subsequently, both must be repeated annually.[4]

Combined heart and liver transplantation is the only therapeutic option when there is established cirrhosis.[5]

HCC has an annual risk of 1.5-5% after Fontan surgery. Thus, all patients with established cirrhosis should be submitted to HCC screening through abdominal ultrasound every six months and, additionally, supplemented with alpha-fetoprotein dosage.[4]

The prognosis for HCC in these circumstances is poor, with a survival rate of 50% after one year of diagnosis.[5]

CONCLUSION

The authors emphasize the importance of screening for liver disease associated with Fontan surgery. A patient with more than 10 years of Fontan procedure should be screened annually with abdominal ultrasound and liver function tests to an early diagnosis of liver cirrhosis.

With an earlier diagnosis of this complication, interventions (like pharmacological treatment or surgical treatment to optimize the Fontan circuit) can be performed in order to decrease central venous hypertension and increase cardiac output to prevent disease progression to liver cirrhosis and HCC.

Our case was challenging given the presence of symptoms that can be present in both cardiac failure or advanced liver disease, which can overlap in these patients.

We point out the importance of a multidisciplinary approach, including Internal Medicine, to screen for complications of the Fontan procedure, a surgery with anatomic heart changes that can lead to damage in several important organs, like the liver.

CONFLICT OF INTEREST
The authors declare that they have no conflict of interests.

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This research had no funding sources.

ETHICAL ASPECTS
All participants submitted a consent form to be included in this study.

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