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Case Report

A Complete Heart Block Caused by the Swan-Ganz Catheter in Liver Transplantation: A Case Report

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Abstract

Orthotropic liver transplantation surgery can be marked by significant hemodynamic instability, so various hemodynamic monitors are used to help in intraoperative management. One of the invasive monitoring tools is the Swan-Ganz catheter or the pulmonary artery catheter (PAC). Cardiac arrhythmias occur commonly during liver transplantation surgery. We report a case of complete heart block induced by inserting a pulmonary artery catheter (PAC) in the preexisting Left Bundle Branch Block (LBBB).

Introduction

Orthotropic liver transplantation can be marked by significant hemodynamic instability requiring many invasive and noninvasive tools for patient monitoring to aid in intraoperative management. The most common abnormal ECG findings included prolonged QT interval, left ventricular hypertrophy, right bundle branch block, and left bundle branch block. Despite the potential complications, a Pulmonary Artery Catheter (PAC) has been used for advanced hemodynamic monitoring during liver transplantation, and that is because of the valuable information obtained from such monitoring devices. Arrhythmia and heart block is one of the rare complications of pulmonary catheter insertion. The most common arrhythmia after PAC is premature ventricular and arterial contractions, ventricular tachycardia, or fibrillation; however, we present a case to report one other complication: Right Bundle Branch Block (RBBB).

Case Report

A 52-year-old male (height 172 cm, weight 75 kg) was scheduled for orthotropic liver transplantation due to alcoholic liver cirrhosis. He had a history of end-stage liver disease with a MELD score of 24. His past medical history was significant for chronic hypertension and with preexisting left bundle branch block.

His preoperative vital signs were normal, and his physical examination was unremarkable. A twelve-lead electrocardiogram showed normal sinus rhythm, nonspecific ST-T changes, and a left bundle branch block (Figure 1). His Echocardiography revealed normal-sized ventricles, mild anterior hypokinesis, normal wall motion, and a left ventricular ejection fraction of 65%.

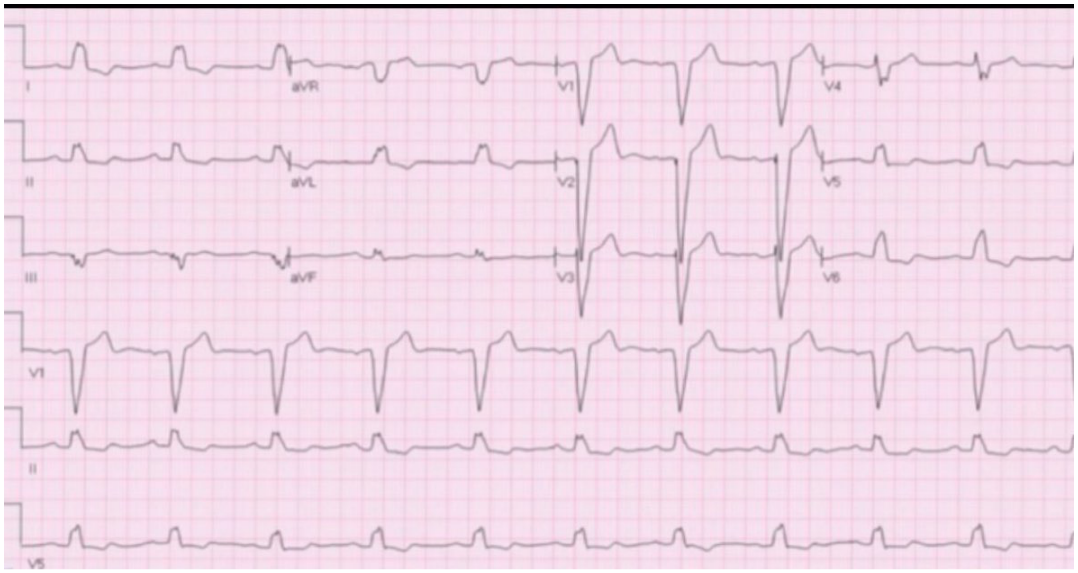

Figure 1: Preoperative ECG showing the preexisting left bundle branch block.

Preoperative serum sodium, potassium, and magnesium were normal. On the patient's arrival at the operating room, his vital signs were within normal limits. Standard monitoring, according to the American Society of Anesthesia (ASA) protocols: five-leads ECG, pulse oximetry, noninvasive blood pressure and temperature, and attached pads of the defibrillator before induction of anesthesia.

General anesthesia was induced with midazolam 5 mg, fentanyl 200 mcg, lidocaine 60 mg, and propofol 100 mg IV. Rocuronium was used for muscle relaxation. Isoflurane was used to maintain the anesthesia. Arterial and central venous accesses were established without difficulty. In our institute, we use MAC Two-Lumen Central Venous Access with 7-7.5 Fr. Catheters. In this case, the insertion of the pulmonary artery catheter was difficult that required many attempts. In every attempt, there was right atrial tracing followed by a right ventricular waveform; when we pushed more, we didn't get the Pulmonary Artery (PA) waveform. On the fourth attempt, when the ECG monitor suddenly demonstrated a complete heart block with a heart rate of less than 30/minute (Figure 2), systolic BP decreased dramatically from 120 to less than 50 mmHg, and the arterial waveform became shallow. The PA catheter was immediately deflated and withdrawn completely. Cardiopulmonary Resuscitation (CPR) was initiated, and intravenous administration of epinephrine 1mg, atropine 1mg, and the defibrillator was put on pacing mode. The CPR took around three minutes; the vital signs returned to normal. After that, a transesophageal echocardiography was inserted to provide real-time visual information on ventricular function and hemodynamic volume status. The finding was normal ventricular function with normal hemodynamics and normal volume status.

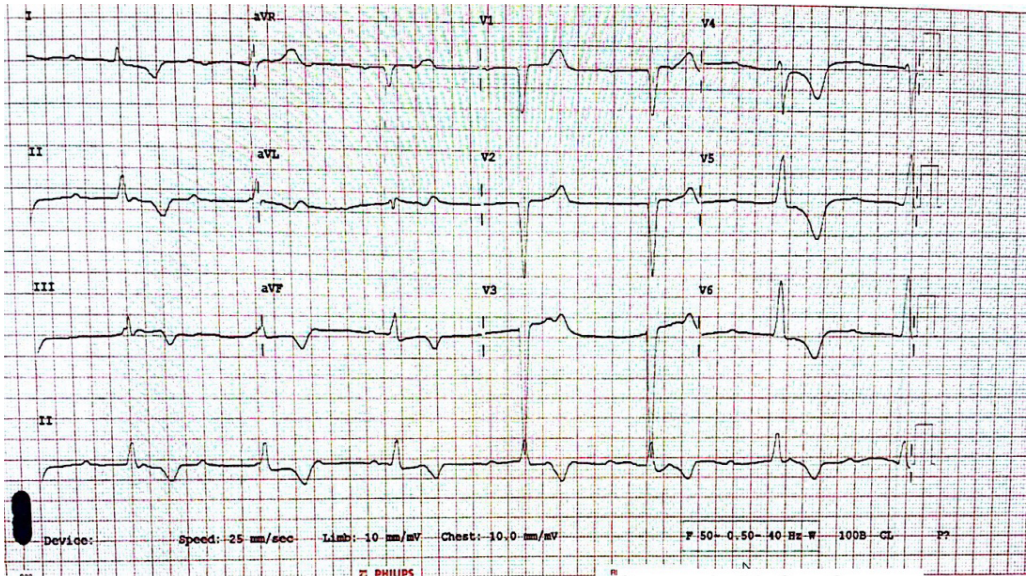

Figure 2: ECG following the insertion of Swan-Ganz catheter showing a complete heart block.

Because of this complication, the liver transplantation surgery was aborted, and the patient was kept intubated and sedation and transferred to the ICU for further close monitoring. In the ICU, proper echocardiography after two hours revealed normal-sized ventricles with normal wall motion, and a left ventricular ejection fraction of 60%. In addition, all blood work was within normal. The patient was extubated smoothly and discharged home the next day.

Discussion

Right bundle branch block (RBBB) is one of the complications induced by pulmonary artery catheterization [1]. In patients with underlying LBBB, transient RBBB produces a complete heat block that could lead to hemodynamic compromise [2]. Complications can occur during the insertion and removal of the PA catheter. Life-threatening complications can occur in approximately 4% of patients who undergo PA catheterization [3]. Therefore, preoperative considerations regarding the need for PA catheter monitoring should include patient comorbidities, type of surgery, and professional skill sets [4]. We should carefully consider the indication of PAC in patients with preexisting LBBB.

Due to its invasive nature and some other diagnostic limitations, the use of PAC is less than before; however, PAC is still considered one of the accurate tools to assess cardiac output and is also viewed as a vital monitor in patients with significant pulmonary hypertension. Transesophageal Echocardiography has a variety of intraoperative uses. In experienced hands, it has the capability of diagnosing Right Ventricle (RV) or Left Ventricle (LV) systolic or diastolic dysfunction, volume overload, and global or regional wall abnormalities [5].

Although the gold standard method for monitoring cardiac output during liver transplantation surgery is pulmonary arterial catheterization, experts agree that Transesophageal Echocardiography (TEE) helps manage rapid hemodynamic changes [6]. The American Association for the Study of Liver Diseases (AASLD) states that TEE should be used in all liver transplant candidates to assess chamber size, hypertrophy, systolic and diastolic function, valvular function, and left ventricle outflow tract obstruction [7]. Additionally, in patients with preexisting LBBB, it is recommended to be more cautious during PAC insertion, and TEE is preferred to be used if there is no contraindication to avoid any possibility of injury to RBBB. The superficial position of the right bundle branch in the right ventricle just below the tricuspid valve makes it more prone to damage from a foreign object [8].

Conclusion

Preoperative recognition of LBBB and adequate monitoring and management to prevent fatal arrhythmias are essential in liver transplantation patients. When choosing a PA catheter to monitor hemodynamic function and ventricular performance, serious dysrhythmic complications must be considered. The use of other hemodynamic evaluation modalities, such as transesophageal Echocardiography, is recommended.

References

1. Ishida Y, Yamakawa S, Aoyama T, Nakamura M, Nonogaki M (2012) Complete heart block induced by insertion of a pulmonary artery catheter. Masui 61: 100-103.
2. Morris D, Mulvihill D, Lew WY (1992) Risk of developing complete heart block during bedside pulmonary artery catheterization in patients with left bundle-branch block. Arch Intern Med 147: 2005-2010.
3. Ermakov S, Hoyt JW (1992) Pulmonary artery catheterization. Crit Care Clin 8: 773-806.
4. American Society of Anesthesiologists Task Force on Pulmonary Artery Catheterization (2003) Practice guidelines for pulmonary artery catheterization: an updated report by the American Society of Anesthesiologists Task Force on Pulmonary Artery Catheterization. Anesthesiology 99: 988-1014.
5. Suriani RJ (1998) Transesophageal Echocardiography during organ transplantation. J Cardiothorac Vasc Anesth 12: 686-694.
6. Shillcutt SK, Ringenberg KJ, Chacon MM, Brakke TR, Montzingo CR, et al. (2016) Liver transplantation: intraoperative transesophageal echocardiography findings and relationship to major postoperative adverse cardiac events. J Cardiothorac Vasc Anesth 30: 107-114.
7. Murray KF, Carithers RL Jr (2005) AASLD practice guidelines: evaluation of the patient for liver transplantation. Hepatology 41: 1407-1432.
8. Coulter TD, Wiedemann HP (1999) Complications of hemodynamic monitoring. Clin Chest Med 20: 249-267.