

# Multidisciplinary approach to a patient with end-stage heart failure and colon adenocarcinoma – intra aortic balloon pump-supported tumor resection and bridge to heart transplantation

## ABSTRACT

Non-cardiac, potentially curative surgeries in patients with chronic end-stage heart failure and significant arrhythmias are associated with very high risk of adverse events and mortality. A hemodynamic support in this clinical scenario is a novel and reasonable approach. Intra-aortic balloon pump (IABP), with its feasibility, long-term safety record, minimal invasiveness and availability, constitutes the best and valid option. As an example we present a case of an IABP supported colon adenocarcinoma resection in a patient with end stage heart failure.

**Key words:** end-stage heart failure, non-cardiac surgery, hemodynamic support, intra-aortic balloon pump, bridge to heart transplantation

Kardiol. Inwazyjna 2016; 11 (5): 49–51

## STRESZCZENIE

Niekardiologiczne, naprawcze zabiegi operacyjne u chorych w schyłkowej fazie niewydolności serca oraz z istotnymi zaburzeń rytmu serca są obarczone bardzo wysokim ryzykiem wystąpienia niepożądanych zdarzeń lub zgonu. W tej sytuacji wsparcie hemodynamiczne może być nowatorskim i uzasadnionym wyborem. Kontrapulsacja wewnątrzaoortalna, metoda szeroko dostępna, mało inwazyjna i bezpieczna wydaje się być najbardziej interesującą opcją. Wobec powyższego prezentujemy przypadek implantacji kontrapulsacji wewnątrzaoortalnej przed operacją resekcji gruczolakoraka okrężnicy u chorego w schyłkowej fazie niewydolnością serca.

**Słowa kluczowe:** schyłkowa niewydolność serca, chirurgia pozasercowa, wsparcie hemodynamiczne, kontrapulsacja wewnątrzaoortalna, pomost do transplantacji serca

Kardiol. Inwazyjna 2016; 11 (5): 49–51

## Introduction

Non-cardiac, potentially curative surgeries in patients with chronic end-stage heart failure and significant arrhythmias are associated with very high risk of adverse events and mortality. Therefore a postponement or disqualification is recommended in most cases [1]. A hemodynamic support in this clinical scenario is a novel and reasonable approach. Particularly, intra-aortic balloon pump, with its feasibility, long-term safety record, minimal invasiveness and availability, constitutes the best and valid option. Recently, the utilization of intra-aortic counterpulsation (IABP) in cardiogenic shock has been questioned [2] and the recommendation for routine utilization in this setting downgraded [3]. Therefore, although evidence supporting utilization of IABP is not definite, we believe that certain patient subsets with complex disease and comorbidities may benefit from this approach. Herein, to the best of our knowledge, for the first time we present a case of an IABP-supported colon adenocarcinoma resection in patient with end stage heart failure.

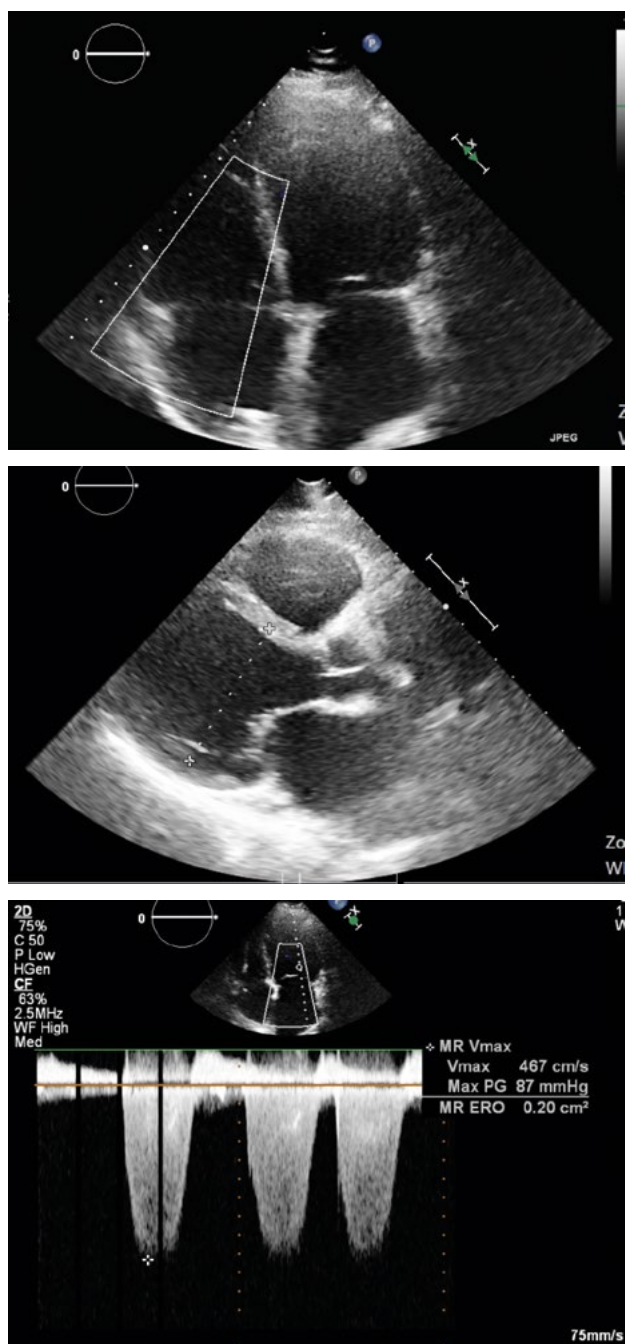
Piotr P. Buszman<sup>1</sup>, Michał Hawranek<sup>1</sup>,  
Grzegorz Słonka<sup>1</sup>, Justyna Małyszek-  
Tumidajewicz<sup>1</sup>, Stanisław Pótorak<sup>2</sup>,  
Andrzej Chmielarz<sup>2</sup>, Anna Kozakiewicz<sup>2</sup>,  
Marek Gierlotka<sup>1</sup>, Mariusz Gąsior<sup>1</sup>

<sup>1</sup>3<sup>rd</sup> Department of Cardiology,  
Medical University of Silesia,  
Silesian Center for Heart Diseases, Zabrze, Poland

<sup>2</sup>Center of Oncology, Maria Skłodowska-Curie  
Memorial Institute, Gliwice, Poland

## Case report

A 53-year-old male, with non-ischemic dilative cardiomyopathy, awaiting for heart transplantation, was admitted to our Intensive Cardiac Care Unit due to multiple BIV-ICD discharges, persistent VT and circulatory decompensation. The echo showed severely decreased LV function (LVEF: 12%, LVEDD: 60 mm, Figure 1) and significant mitral and tricuspid regurgitations. Intravenous inotropes, diuretics and lidocaine due to remitting VT were administered. Significant clinical improvement, circulatory compensation and hemodynamic stabilization were achieved after several days. Subsequently, coronary angiography was performed via radial approach and showed no occlusive coronary artery disease.



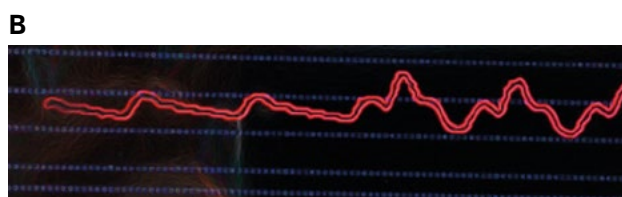
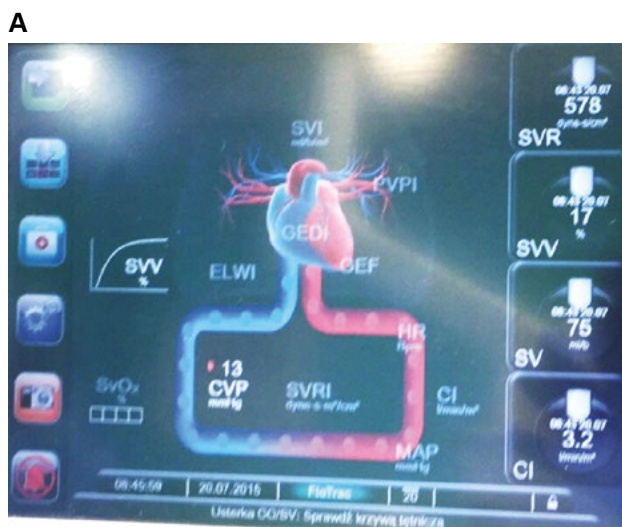
**Figure 1.** Transthoracic echocardiography showing left ventricle distension, significantly impaired left ventricle ejection fraction and severe mitral and tricuspid valve regurgitation

During hospitalization, lower gastro-intestinal tract bleeding occurred. Colonoscopy revealed a bleeding tumor in the mesocolon. Biopsy was performed. The tumor was later confirmed by CT scan and SPECT with no metastatic disease. The CEA and alpha-fetoprotein concentrations were within normal limits; however, adenocarcinoma was confirmed in the histopathological evaluation and therefore the patient temporarily put on hold with transplantation.

A multidisciplinary discussion between the oncologist, cardiac surgeon, anesthesiologist, transplantologist was conducted. Due to concomitant oncologic condition, current standards for heart transplantation leave no option for curative therapy in this patient subset. However, because of low-stage of the cancer, patient was qualified for high risk hemicolectomy with Hartman technique and elective utilization of IABP throughout the surgery and post-operative period. A day before surgery IABP was inserted under fluoroscopic guidance. Subsequently the patient was transferred to the Institute of Oncology for elective surgery. Unfractionated heparin infusion was stopped and high voltage tachyarrhythmic ICD therapy was disabled. External pads connected to defibrillator were used instead. Throughout the surgery, which also unexpectedly required colonoscopy which prolonged the procedure, the patient remained hemodynamically stable, and no tachyarrhythmias occurred (Figure 2). The mean cardiac index was 3.8 l/min/m<sup>2</sup> and BP was 110/60 mm Hg. Invasive hemodynamic measurement showed that IABP added 0.6 l/min/m<sup>2</sup> of cardiac index and 20–30 mm Hg of additional systolic pressure throughout surgery, without the necessity of inotrope infusion (Figure 3). The hemi-colectomy was successful and perioperative period uneventful. Patient was moved



**Figure 2.** Operating room set-up during surgery



**Figure 3A.** Invasive hemodynamic monitoring during procedure with the pulse contour analysis (PiCCO) showing 3.2 l/min/m<sup>2</sup> of cardiac index with IABP support; **B.** Pressure wave without and with IABP counterpulsation

to Intensive Cardiac Care Unit and after one week discharged uneventfully.

The histopathological evaluation showed a G2 adenocarcinoma with no metastasis. Following the successful procedure, the patient was consulted by the heart and transplantological team. Due to low grade carcinoma, the decision has been made to qualify the patient for orthotopic heart transplantation, providing one-year remission only instead of five. If necessary, left ventricular assist device was suggested as an option for a bridge to heart transplantation. At five-month follow-up the patient remained in oncologic remission. The patient was scheduled for large intestine reconstruction surgery again with the use of IABP as a circulatory support. Unfortunately, 8 months after the procedure the patient died suddenly due to exacerbation of heart failure and cardiogenic shock in the regional hospital.

## Discussion

Heart failure (HF) and cancer are becoming increasingly prevalent as our population ages. Both conditions are associated with significant mortality and morbidity. Additionally, it has been recently shown that the cancer is more common in patients with HF [4]. The treatment strategy in this setting is difficult, many times leaving no option for curative therapy due to high or inoperable risk as well as non-eligibility for heart transplantation. Herein, we

present a case in which this problem was resolved by utilization of hemodynamic support with intra-aortic balloon pump. Previously, this solution has been proposed and utilized in patients with complex coronary disease who required a hemihepatectomy due to hepatocellular cancer or metastatic disease [5, 6]. In our case, we present a patient who was hemodynamically unstable with severe ventricular tachyarrhythmias due to severe heart failure. IABP is the most common mechanical circulatory assist device for a variety of clinical conditions in patients with cardiovascular disease, with long-term safety, feasibility and efficacy record, particularly in cardiac surgery.

The utilization of IABP during cardiac surgery has been well established; however, there are few studies regarding its use in non-cardiac surgery setting. To the best of our knowledge, this is the first report of an IABP-assisted major hemicolecotomy surgery in a patient with end-stage heart failure, which allowed later for qualification to heart transplantation.

Therefore, we support previous reports and provide new evidence that the perioperative use of IABP is a promising option in patients with severe heart failure who require non-cardiac surgery for various reasons.

## References

- Kristensen S.D., Knuuti J. New ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management. *Eur. Heart J.* 2014; 35: 2344–2345.
- Thiele H., Zeymer U., Neumann F.J. *et al.* Intraaortic balloon support for myocardial infarction with cardiogenic shock. *N. Engl. J. Med.* 2012; 367: 1287–1296.
- Steg P.G., James S.K., Atar D. *et al.* ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *Eur. Heart J.* 2012; 33: 2569–2619.
- Hasin T., Gerber Y., McNallan S.M. *et al.* Patients with heart failure have an increased risk of incident cancer. *J. Am. Coll. Cardiol.* 2013; 62: 881–886.
- Okadome K., Hayashi H., Higashi T. *et al.* Intra-aortic balloon pump-assisted major hepatectomy in a case with coronary disease. *Surg. Case Rep.* 2015; 1: 112.
- Oliver J.C., Welsh F.K., Bell J., Bishop A.J., Glover J., Rees M. Elective intra-aortic balloon counterpulsation during a high risk liver resection. *Anaesthesia* 2008; 63: 1365–1368.

### Address for correspondence:

Piotr P. Buszman, MD, PhD  
3<sup>rd</sup> Department of Cardiology, Medical University of Silesia, Silesian Center for Heart Diseases  
ul. Curie-Skłodowskiej 9, 41–800 Zabrze, Poland  
Tel.: 32-3733860; fax: 32-3733819  
e-mail: pbuszman@gmail.com