

Malposition of Central Venous Pressure Catheter as a Rare Cause of Tricuspid Valve Prosthesis Malfunction: A Case Report

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Received: 04 Feb. 2023; Accepted: 14 Sep. 2023

Abstract- Prosthetic valve malfunction is a hazardous clinical entity that needs early diagnosis and management. Hereby, we present a case of tricuspid valve (TV) malfunction due to interaction of central venous pressure (CVP) catheter with TV leaflets. Our case was a 38-year-old male who referred to our center with the diagnosis of TV malfunction. Confirming the diagnosis of TV malfunction, intravenous Heparin was initiated. Anticoagulation therapy was discontinued early due to the development of significant headache in the setting of subarachnoid hemorrhage. Due to contraindication of anticoagulation therapy, he underwent redo TV. On the 4th post-operative day, echocardiography examination illustrated significant increase in gradients of TV prosthesis. At this time, fluoroscopy depicted interaction of CVP catheter with TV leaflets due to its cardiac advancement resulted in fixed TV leaflets in semi-open position. By extraction of CVP catheter the TV gradients improved immediately. Malposition of CVP catheter or large CVP catheter could be considered as one of the rare causes of TV malfunction. Repositioning of CVP catheter brings dramatic improvement in this case.

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Acta Med Iran 2023;61(12):770-772.

Keywords: Tricuspid valve; Prosthetic malfunction; Central venous pressure catheter

Introduction

Prosthetic valve malfunction is unusual and disastrous clinical event that needs prompt diagnosis and evaluation of possible etiologies (1,2). Prosthetic valve thrombosis is more common in tricuspid valve (TV) position (3). In some instances, identification of etiological mechanisms require vigilance and being familiar with its probable causes. Hereby, we present a case of TV prosthesis malfunction in the setting of malposition CVP catheter.

Case Report

Our case was a 38-year-old male who referred to our center with the diagnosis of TV malfunction. At his childhood, he had undergone pulmonary artery (PA) banding surgery followed by ventricular septal defect closure and PA debanding with subsequent pulmonary

valve replacement and TV replacement (TVR) at nine years ago. Confirming the diagnosis of TV malfunction, intravenous Heparin was initiated. Anticoagulation therapy was discontinued early due to the development of significant headache in the setting of subarachnoid hemorrhage. Due to contraindication of anticoagulation therapy, he underwent redo TVR using Carbomedics Valve, No#31 for the treatment of TV malfunction due to prosthetic valve thrombosis. On the 4th post-operative day, echocardiography examination illustrated significant increase in gradients of TV prosthesis (mean gradient=10 mmHg, pressure half time=500 msec). Meanwhile, his platelet count was less than 100,000/ μ L, that hinted towards development of heparin-induced thrombocytopenia. At this time, cine fluoroscopy depicted interaction of central venous pressure (CVP) catheter with TV leaflets due to its cardiac advancement resulted in fixed TV leaflets in semi-open position

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(Figure 1). Chest X-ray also confirmed the extension of CVP catheter beyond TV valve (Figure 2). CVP catheter should be positioned adjacent to superior vena cava

(SVC) orifice without further advancement. By extraction of CVP catheter the TV gradients improved immediately.



Figure 1. AP chest X ray depicts extension of CVP catheter beyond TV valve

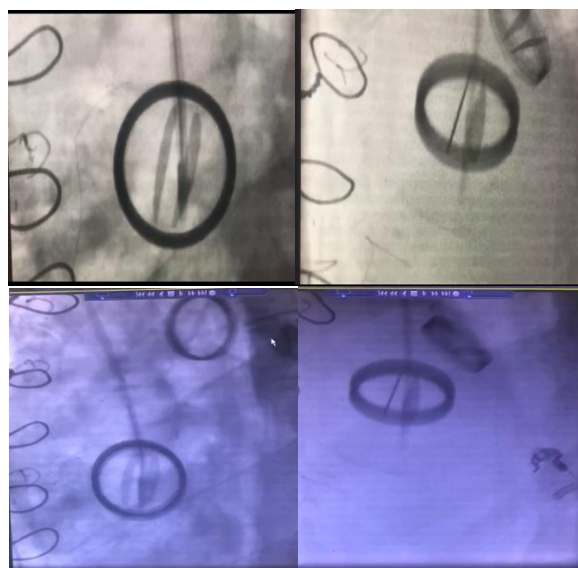


Figure 2. Cine fluoroscopy illustrates the interaction of CVP catheter with TV leaflets due to its cardiac advancement which subsequently resulted in fixed TV leaflets in semi open position

Discussion

This case underscores the importance of considering CVP catheter malposition or the use of a large CVP catheter as potential rare causes of TV malfunction. Malpositioning of central venous catheters can lead to significant complications, including catheter occlusion, thrombosis, and mechanical issues (4). In this case, the interaction of the CVP catheter with the TV leaflets resulted in the leaflets being fixed in a semi-open position, causing the malfunction.

Repositioning or removing the CVP catheter can lead to dramatic clinical improvement, as demonstrated by the

immediate improvement in TV gradients following catheter extraction (5). Proper placement and management of central venous catheters are crucial to prevent such complications. The American Society of Anesthesiologists' guidelines emphasize the importance of correct catheter placement and management to reduce infectious, mechanical, thrombotic, and other adverse outcomes (7-8).

Furthermore, a systematic review and meta-analysis highlighted that approximately 3% of CVC placements are associated with major complications, with ultrasonography guidance reducing some of the specific risks (6-9). Another study emphasized the need for

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evidence-based measures to prevent complications, such as hand hygiene, full-barrier precautions during catheter insertion, and prompt removal of unnecessary CVCs (10).

In summary, this case illustrates the critical need for vigilance in the placement and management of CVP catheters to avoid rare but significant complications such as TV malfunction. Ensuring proper catheter positioning and adhering to best practices can significantly reduce the risk of adverse outcomes.

Malposition of CVP catheter or large CVP catheter could be considered as one of the rare causes of TV malfunction. Repositioning of CVP catheter brings dramatic improvement in this case. TV prosthesis malfunction could also be considered as one of the complications related to CVP catheter.

References

1. Cardoso G, Trabulo M, Andrade MJ, Ribeiros R, Rodrigues R, Neves JP, et al. A rare case of two mechanisms of prosthetic valve dysfunction in the same patient. *Rev Port Cardiol* 2013;32:1037-41.
2. Ma WG, Hou B, Abdurusul A, Gong DX, Tang Y, Chang Q, et al. Dysfunction of mechanical heart valve prosthesis: experience with surgical management in 48 patients. *J Thorac Dis* 2015;7:2321-9.
3. Shapira Y, Sagie A, Jortner R, Adler Y, Hirsch R. Thrombosis of bileaflet tricuspid valve prosthesis: clinical spectrum and the role of nonsurgical treatment. *Am Heart J* 1999;137:721-5.
4. Apfelbaum, Jeffrey L. Practice guidelines for central venous access 2020 an updated report by the American Society of Anesthesiologists Task Force on central venous access. *Anesthesiology* 2020;132.1:8-43.
5. McGee DC, Gould MK. Preventing complications of central venous catheterization. *N Engl J Med* 2003;348:1123-33.
6. Ruesch S, Walder B, Tramer MR. Complications of central venous catheters: internal jugular versus subclavian access--a systematic review. *Crit Care Med* 2002;30:454-60.
7. Vesely TM. Central venous catheter tip position: A continuing controversy. *J Vasc Interv Radiol* 2003;14:527-34.
8. Mayhall CG, Batt MD, Wong ES. Requirements for Infection Control Education and Practice Compliance Established for Physicians and Other Healthcare Workers in Minnesota. *Infect Control Hosp Epidemiol* 1993;14:503.
9. Mermel LA, Allon M, Bouza E, Craven DE, Flynn P, O'Grady NP, et al. Clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection: 2009 Update by the Infectious Diseases Society of America. *Clin Infect Dis* 2009;49:1-45.
10. Kornbau C, Lee KC, Hughes GD, Firstenberg MS. Central line complications. *Int J Crit Illn Inj Sci* 2015;5:170-8.