

## Case Report

# First Percutaneous Balloon Pericardiotomy (PBP) or Pericardioplasty in Jordan: A Case Report and Review of Literature

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### Abstract

Patients with large pericardial effusions regardless of their etiology frequently undergo surgical pericardial window to avoid recurrence that occurs in more than 50% if pericardiocentesis alone was done through the percutaneous approach.

Some patients are very sick to undergo surgery options. A newly developed old procedure, Percutaneous Balloon Pericardiotomy (PBP), was introduced in 1991 and has been proven to be safe and efficient, with very low rate of recurrence, and little chance of complications. Herein, we describe this procedure done for the first time in Jordan.

**Keywords:** Percutaneous Balloon Pericardiotomy, Pericardial Effusion, Pericardiocentesis.

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### Case Report

A 69 year old white female known case of breast cancer stage IV was admitted to Jordan University Hospital (JUH) with extreme shortness of breath. Physical examination revealed systolic blood pressure of 80 mmHg, distended jugular veins, distant heart sounds and presence of pulsus paradoxus, there was decreased air entry on the left middle and lower lobes.

ECG showed low amplitude and pulsus alternans, transthoracic Echocardiography was performed emergently while the patient was receiving IV fluids showed a dancing heart with huge pericardial effusion and fibrin strands.

Cardiothoracic Surgery was consulted for pericardial window, however, they denied her due to severe obesity and PO<sub>2</sub> of 40 mmHg on 5L nasal cannula. Cardiology was consulted, procedure consent was obtained from the patient and her family.

### Procedure Note

Using the apical approach, under sterile aseptic techniques and after local anesthesia, a nephrostomy needle was inserted in the pericardium with initial pericardial pressure of 35 mmHg. 1.5 liters of bloody non-clotted fluid was drained with immediate restoration of normal hemodynamics; systolic blood pressure increased from 80 mmHg to 155mmHg and heart rate decreased from 135 beats/minute to 75

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beats/ minute sinus rhythm.

After draining 1.5 liters, a stiff wire was introduced carefully in the pericardium, and insertion of a 12 Fr sheath was done under fluoroscopic guidance. A 22 x 4 Z med II Balloon was used to create a pericardial window with successful results. A pigtail catheter was inserted afterwards, and left in place for 24 hours then discontinued. The patient was covered with antibiotics for 2 days, and then the pericardial drain was discontinued.

A repeated echocardiogram done 2 weeks later showed minimal pericardial effusion with normal left ventricular systolic function. The patient continued to follow with her oncologist as an outpatient.

### **Discussion**

PBP (Percutaneous Balloon Pericardiotomy) or pericardioplasty was initially introduced by Dr. Palacios<sup>1</sup> in USA in 1991, and was mainly indicated for recurrent malignant pericardial effusion when surgery option was too risky, since surgical pericardial window creation in critically ill patients requires general anesthesia and carries an increased risk of morbidity and mortality.<sup>2</sup>

For some reason, PBP fell over time out of favor without exact cause, then during mid nineties got some attention, which was renewed by some interventional physicians during the twenty first century when Dr. Aqel reported the first case in literature of PBP done for infected but surgically denied pericardial window in a young soldier with H. influenza infection, the procedure was successful, and the patient did very well.<sup>3</sup> After that Dr. Aqel reported the first case in literature of a PBP done for a young patient with severe pulmonary hypertension and left ventricular collapse,<sup>4</sup> again the procedure was successful. Since then, we performed close to 20 cases with excellent results and zero percent rate of recurrence of pericardial effusion.

Herein, we describe the first successful case in Jordan to educate our community including our medical partners for this available modality for

such patients with recurrent idiopathic and malignant pericardial effusion, and where surgery is highly risky especially the very high risk patients of this sick sector in our community.

We believe strongly that all patients should be offered this procedure, if well-trained doctors are available, and we extend this offer to all kinds of pericardial effusion with hemodynamic compromise. We believe that it is not only safer than surgical window especially in very sick patients, but also cheaper and has proven to be safe, feasible and effective in preventing recurrence of pericardial effusion.

PBP has been performed mainly in patients with malignant effusions, as well as in miscellaneous cases of pericardial effusion with tamponade, recurrent pericardial effusions, or for initial therapy at the time of pericardiocentesis.<sup>1, 3-21</sup>

The procedure itself requires special training to master its performance, otherwise bad sequelae might ensue like any other cardiac procedure. The mechanism of its performance lies in causing big tears in the pericardium with  $\geq 95\%$  of the cases creating a common pathway between the pericardium and pleural cavities.

Chow et al. studied the mechanism of pericardial window creation during autopsy in 12 adults with normal pericardium.<sup>22</sup> The histological assessment revealed breakage of the collagen and elastic fibers and disruption of their alignment at the edge of the pericardiotomy site. The balloon inflation resulted in a localized tearing in the parietal pericardium creating a communication between the pericardial and pleural, or rarely, the abdominal cavities.

Ziskind et al. reported on the safety and effectiveness of this procedure in 50 patients with large pericardial effusion and tamponade.<sup>21</sup> Forty-four of these patients had malignancy-related effusions. The procedure was successful in 46 patients during a 3-month follow-up period, giving an efficacy of 90%. One patient in their series required surgical intervention due to pericardial bleeding. Thanopoulos et al. reported the outcomes of 10 children with malignant

recurrent effusions treated with PBP.<sup>19</sup> They also reported a success rate of 90% over a 14-month follow-up period, with no complications requiring surgical intervention.

Other authors have described a modified double-balloon technique with one short and one long balloon for pericardiotomy.<sup>20</sup> In this modification, two balloons, one large and one small, are inflated simultaneously across the pericardium. The smaller balloon is then pushed and pulled across the pericardial border in an attempt to create a larger window in the parietal pericardium. Wang et al. reported the results of this modified technique in 50 patients.<sup>20</sup> The procedure was successful in 44 patients. Five patients had recurrence of their effusion that required further percutaneous or surgical pericardiotomy.

In the multicenter PBP registry that involved 130 patients, 85% of PBP were performed in patients with malignant pericardial effusions, and the rest were performed in patients with idiopathic effusions, HIV disease, postoperative/traumatic effusions, uremia, renal transplantation, hypothyroidism, congestive heart failure, autoimmune disease and viral infection.<sup>23</sup> In the PBP registry, PBP was successful in 85% of the cases, with no recurrence of the pericardial effusion at  $5 \pm 5.8$  months of follow up. The most common complication was fever that occurred in 11 patients, though no patient showed evidence of bacteremia or infected pericardial fluid. Prophylactic antibiotic therapy is thought to decrease these febrile episodes. Large pleural effusions have been reported within 12 to 24 hours of PBP, and have required thoracentesis or chest tube placement in 9% of patients without preexisting pleural effusions in the PBP registry.<sup>23</sup>

Due to the common channel generated between pericardium and pleural cavities, we strongly recommend performing a baseline chest X-ray, followed by another one 24 hours later. Also, we believe that this procedure, like balloon valvuloplasty, should be under the cover of 2 days of antibiotics if not more. In cases of suspicion of infected pericardial effusion, though

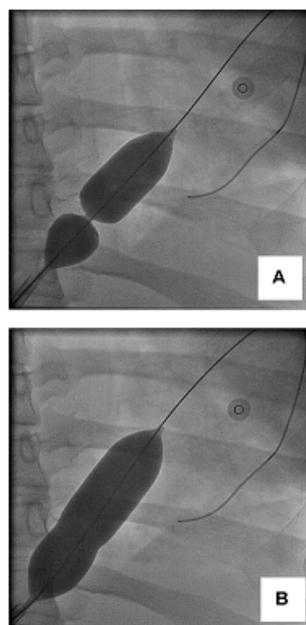
we reported previously otherwise, we believe that pericardiocentesis can be done, patients would be covered for a few (2-3) days of antibiotics then PBP can be performed on a second stage.

So far, we have performed 4 cases at Jordan University Hospital, all of them were successful. We are very proud to start this procedure for the first time in Jordan and would be happy to train qualified doctors on its performance.

Our future direction would be to form a registry and compare the results to surgical window cases assuming the same demographics of patients exist. In other words, we will exclude patients denied by the surgery team due to the degree of sickness.

Finally, risks of the procedure in experienced hands do not exceed pericardiocentesis risk performed by most cardiologists, however, if done by non-trained hands, this could lead easily to rupture of the myocardium.

In conclusion, PBP or pericardioplasty has been performed for the first time in Jordan at JUH, and can be offered as an alternative to surgical window in a selected group of sick patients with large pericardial effusion, maintaining excellent results.



**Figure (1): Percutaneous balloon pericardiotomy. In (A): a 22 x 4.0 mm Z med II balloon inflated showing waist in pericardium and in (B): post balloon pericardioplasty with disappearance of the previous waist.**

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## أول عملية إجراء فتحة في غشاء القلب في الأردن بوساطة البالون

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### الملخص

إن تجمع السوائل المتكرر في غشاء القلب (التامور) يعالج عادة عن طريق الجراحة، وذلك بإجراء فتحة في هذا الغشاء لتجنب تجمع السوائل فيه مرة أخرى.

ولكن، ولسوء الحظ فإن الكثير من هؤلاء المرضى، وبسبب وضعهم الصحي، من الصعب إجراء هذه العملية لهم، بحيث يتم رفضهم. لحسن الحظ أدخل Palacios في عام 1991 طريقة لعمل فتحة في غشاء القلب عن طريق البالون خاص. وقد أثبتت هذه الطريقة في العلاج نجاحها في الحفاظ على خلو الغشاء القلبي من تراكم السوائل الضار، وأعطت المرضى فرصة في العيش الكريم.

في هذه النشرة نصف أول عملية من هذا النوع في الأردن، وننصح بإجرائها لمن يحتاج إليها، راجين أن تساعد رسالتنا الأطباء في إعطاء هؤلاء المرضى فرصة أخرى للعيش الكريم.

الكلمات الدالة: فتحة في غشاء القلب، تجمع السوائل في غشاء القلب، عملية إجراء فتحة في غشاء القلب.