

Surgical Outcome of Constrictive Pericarditis

Yaser Abduljabbar Saleh Alshimary¹, Fadhil Ghali Alamran², Amra Yahya Abbas¹

¹Department of Cardiac Surgery, Ministry of Health, Baghdad Medical Office Al-Karkh, IBN Al-Bitar Center for Cardiac Surgery, Baghdad, Iraq, ²Department of Medicine, Ministry of Higher Education and Scientific Research, College of Medicine, Kufa University, Al-Najaf, Iraq

Abstract

Background: constrictive pericarditis may cause scarring and consequent loss of the normal elasticity of the pericardial sac. It is caused by idiopathic, viral, following cardiac surgery, radiation, connective tissue disorder, postinfectious (tuberculous or purulent pericarditis), or miscellaneous causes (malignancy, trauma, drug-induced, asbestosis, sarcoidosis, and uremic pericarditis). It is mostly presented by shortness of breath (SOB) due to right-sided failure. Surgical procedure is the cornerstone of management by doing pericardiectomy. **Aim of the Study:** This study aimed to review the surgical management of constrictive pericarditis and its surgical outcome. **Materials and Methods:** A retrospective study involved 13 patients with constrictive pericarditis in the Iraqi-cardiac surgery center in Iraqi-Cardiac Surgery Center in Baghdad Medical Complex and Ibn Al-Bitar center for cardiac surgery from 2011 to 2015. Eight (61.5%) of them were female, and the rest (38.5%) were male. Their ages ranged between 10 and 32 years old (the mean age was 21 years). The data were collected from the medical records of the patients. **Results:** The majority of patients were in the age group of 20–29 years (46.1%). The youngest was 10 years old. Dyspnea on exertion was the most presenting feature (61.5%). In the electrocardiogram, atrial fibrillation was found in three patients (23.2%), and a chest X-ray showed calcium deposition at the pericardium in eight patients (61.5%). Cardiac catheterization (right-sided) and transthoracic echo study also demonstrated the findings of the disease. None of the patients needed the by-pass machine. The biopsy results revealed that tuberculosis (TB) was the most frequent cause of pericarditis. **Conclusion:** Pericardiectomy is a useful surgical procedure to treat constructive pericarditis, and it was beneficial to all patients in this study, with improvement in their functional capacity. Another finding of significance is that despite intensive vaccination and the use of anti-TB drugs in our country, TB is still an important cause of constrictive pericarditis.

Keywords: Constrictive pericarditis, pericardiectomy, surgery of pericarditis

INTRODUCTION

The pericardium has three layers: one external and two internal serous (parietal and visceral) separated by pericardial fluid. The heart and proximal great vessels are contained within the conical fibrous pericardium. The apex fuses with the adventitia of the vessels, and the base fuses with the central tendon of the diaphragm. The fibrous pericardium is lined inside by the parietal serous pericardium, which is reflected around the great vessels becoming continuous with the visceral layer of the pericardium. The lines of reflection define the oblique sinus (bounded by the *inferior vena cava* and four pulmonary veins) and the transverse sinus (bounded by the superior vena cava, left atrium, pulmonary trunk, and aorta) posteriorly [Figure 1].^[1,2]

The normal pericardium is a fibroelastic sac surrounding the heart which contains a thin layer of fluid.^[3] When larger amounts of fluid accumulate (pericardial effusion) or when

the pericardium becomes scarred and inelastic, one of three pericardial compressive syndromes may occur:

- Cardiac tamponade: Which may be acute or subacute, is characterized by^[3] the accumulation of pericardial fluid under pressure. Variants include low pressure (occult) and regional tamponade^[4]
- Constrictive pericarditis: Is the result of scarring and consequent loss of the normal elasticity of the pericardial sac. Pericardial constriction is typically chronic, but variants include subacute, transient, and occult constriction. Pathologically, this results in chronic

Address for correspondence: Dr. Yaser Abduljabbar Saleh Alshimary, Department of Cardiac Surgery, Ministry of Health, Baghdad Medical Office Al-Karkh, IBN Al-Bitar Center for Cardiac Surgery, Baghdad, Iraq. E-mail: skydoctor2008@yahoo.com

Submitted: 08-Jul-2022 Revised: 05-Aug-2022 Accepted: 07-Aug-2022 Published: 07-Aug-2023

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Alshimary YA, Alamran FG, Abbas AY. Surgical outcome of constrictive pericarditis. *Mustansiriya Med J* 2023;22:26-9.

Access this article online

Quick Response Code:



Website:
<http://www.mmjonweb.org>

DOI:
10.4103/mj.mj_22_22

inflammation and, frequently, calcification. Grossly, the pericardium is considerably thicker than normal in approximately 80% of cases^[4]

- Effusive constrictive pericarditis: This variant is characterized by constrictive physiology with a coexisting pericardial effusion, usually with cardiac tamponade. Such patients may be mistakenly thought to have only cardiac tamponade; however, the elevation of the right atrial and pulmonary wedge pressures persists after drainage of the pericardial fluid.^[4]

Aim of the study

This study aimed to review the surgical management of constrictive pericarditis and its surgical outcome.

MATERIALS AND METHODS

Patients

A retrospective study involved 13 patients who had surgery for constrictive pericarditis in the Iraqi-cardiac surgery center in Baghdad medical complex and Ibn Al-Bitar Hospital for cardiac surgery from March 1, 2011, to January 31, 2015. Eight (61.5%) of them were female, and the rest (38.5%) were male. Their ages ranged between 10 and 32 years old (the mean age was 21 years).

Method

the data were collected from the medical records of the patients that included age, sex, presenting signs and symptoms, in addition to the findings of clinical examinations concentrating on:

1. General examination including dyspnea, orthopnea, anemia, jaundice, lymphadenopathy, and peripheral edema
2. Physical examination of chest and mediastinum including inspection, palpation, percussion, and auscultation.

The results of radiological examination (CXR and chest computed tomography [CT] scan), abdominal ultrasonography, transesophageal ECHO, echocardiography, electrocardiogram (ECG), and cardiac catheterization were recorded. They obtained histopathological reports and any associated morbidity and mortality and their follow-up.

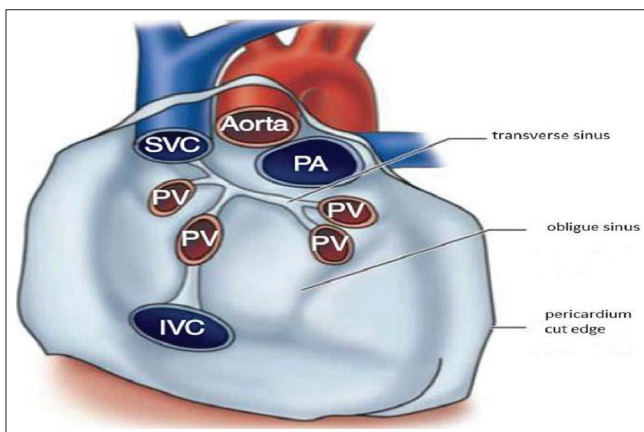


Figure 1: Anatomy of the pericardium

RESULTS

Out of 13 patients, 3 patients (23%) presented with a history of tuberculosis (TB), and they were on anti-TB drugs. The majority were in the age group of 20–29 years (46. 1%). The youngest was 10 years old, and the majority were females, as revealed in Figure 2.

The most frequent clinical presentations were dyspnea on exertion (61.5%) and pericardial knock (53.8%), as shown in Table 1.

Regarding the abnormalities in the electrocardiography, atrial fibrillation was found in three patients (23.2%) and ST changes in ten patients (79.9%).

Pericardial calcifications on chest X-rays were found in four of the patients (30.7%).

Chest CT-scan showed calcium deposition at the pericardium in eight patients (61.5%), and seven patients (53.8%) showed pulmonary and pleural lesions.

Cardiac catheterization showed elevated RV end-diastolic pressure (RVEDP) in 11 patients (84.6%).

Twelve of the patients (92.3%) had thickened pericardium on echocardiographical findings. Table 2 shows the details of the other findings.

Surgical approach

Median sternotomy and pericardiectomy were adopted in all cases with a smooth postoperative period without complications. None of the patients needed the by-pass machine.

TB was the most common cause in histopathological results (61.5%), as shown in Table 3.

DISCUSSION

Constrictive pericarditis develops when progressive fibrotic changes in the pericardium compress the myocardium causes the impairment of ventricular diastolic filling.^[5]

The causes of constrictive pericarditis include TB, radiotherapy, collagen disease, mesothelioma, and previous cardiac

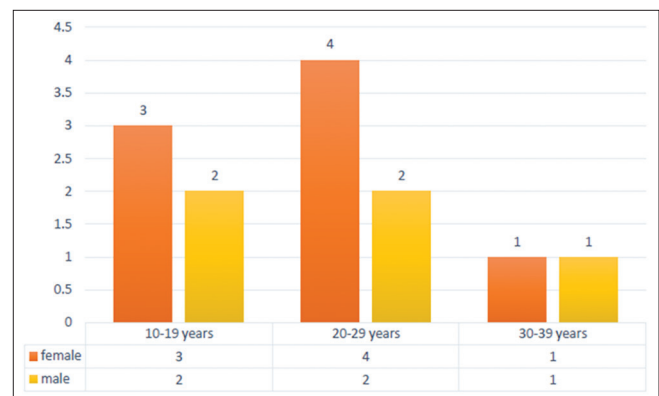


Figure 2: Age and sex distribution

Table 1: Clinical features

Symptoms and signs	Number of patients, <i>n</i> (% of total)
Dyspnea on exertion	8 (61.5)
Orthopnea	2 (15.3)
Ascites	4 (30.7)
Peripheral edema	5 (21.7)
Elevated JVP	6 (46.1)
Pericardial knock	7 (53.8)
JVP: Jugular vein pressure	

Table 2: Echo results

Echo results	Percentage
Dilated RA	46.1
Thickened pericardium	92.3
50 < ejection fraction	61.5
50 > ejection fraction	38.4
Pericardial effusion	23
RA: Right atrium	

Table 3: Histopathological results

Biopsy result	Number of patients, <i>n</i> (%)
Tuberculosis	8 (61.5)
Idiopathic	4 (30.7)
SLE	1 (7.6)

SLE: Systemic lupus erythematosus

surgery.^[6] Less common causes include neoplastic pericardial involvement; septic pericarditis, including opportunistic acquired immunodeficiency syndrome-related infections; chronic renal failure; and connective-tissue disorders such as rheumatoid arthritis and progressive systemic sclerosis.^[7]

Although the constrictive effects of chronic pericarditis occur in relation to all four cardiac chambers, the only consistent significant hemodynamic abnormality is the impairment of ventricular diastolic filling.^[8] Clinical signs and symptoms often develop insidiously.

In regard to frequency, the most common complaints described are dyspnea on exertion (78%), abdominal swelling (68%), ankle edema (54%), abdominal discomfort (32%), and fatigue (25%). Secondary to abdominal ascites, symptoms such as digestive disturbances, anorexia, abdominal fullness, or even pain may develop. Loss of weight is common in tuberculous constrictive pericarditis. Chest pain is present in 24% of patients as a result of active inflammation.^[9]

Mechanical constriction around the heart produces gross signs of right heart failure without severe dyspnea, differentiating it from that of right heart failure due to valvular or myocardial disease.^[10]

In this study, 13 patients with constrictive pericarditis were surgically treated by pericardiectomy. Their age was ranging between 10 and 32 years (no old age), so this is consistent

with the study done by Anand *et al.*, who stated that all their patients are in the young age group.^[11]

The most frequent clinical presentations in our study were dyspnea on exertion (61.5%) and pericardial rub (53.8%)

The disease affects females more than males in our study (eight vs. five, respectively); this is in agreement with a study done by Bozbuga *et al.*, that their study was done on 36 patients, 26 of them were females and the others were males.^[12,13]

TB in our study was the most common cause in histopathological results (61.5%), and this was consistent with Tetley and Sereboe,^[14] where TB was the most common cause of constrictive pericarditis 63.6% in their study, which was conducted in 11 patients.

The most frequent clinical finding in our study was pericardial knock which is due to the rapid ventricular filling in early diastole and associated with unusually early, often loud, and third heart sound, this finding was seen in about 53.8% of our patients

ECG changes revealed ST changes in 79.9% of our patients, which was consistent with a study conducted by McCaughan *et al.*, where ST changes were seen in 90% of their patients.^[6]

Pericardial calcification on chest X-rays was found in 30.7% of our patients; this was nearly equal to the same findings which were seen by McCaughan *et al.* (40% pericardial calcification on chest X-rays).^[6]

Twelve of our patients (92.3%) had thickened pericardium on echocardiographical findings; Brian D Hoit claimed that transthoracic echocardiography is insensitive, as mildly increased pericardial thickening is often missed, and he suggested M measurement of pericardial thickness by transesophageal echocardiography correlates strongly with that obtained by CT.^[4]

Chest CT-scan in our study had been showing calcium deposition at the pericardium in eight of our patients (61.5%), and this is inconsistency with Talreja *et al.*, where pericardial calcification was seen in 25% of their patients, while pericardial thickening was seen in 75%.^[4]

Cardiac catheterization shows elevated in RVEDP in 84.6% of our patients. In the report by McCaughan *et al.*, such a finding was obtained in all patients coming to catheterization.^[6]

In this study, total pericardiectomy was done through median sternotomy with complete release of adhesions was done; all of our patients had a smooth postoperative period with no major complications such as a great vessel or cardiac injury. All of our patients had improved hemodynamics, and myocardial function with complete disappearance of all preoperative signs and symptoms, with no mortality was reported. Moreover, our result was consistency with Tetley and Sereboe,^[14] our results also consistent with Culliford *et al.*,^[15]

who was demonstrated that radical pericardiectomy was associated with an excellent outcome.

In our study, none of the patients needed the by-pass machine. This goes with a study done by Mahmoud Tiruvoipati *et al.*,^[15] who found that 36 patients did pericardiectomy due to constrictive pericarditis; they were not in need of by-pass machine

CONCLUSION

1. Invasive investigation as a cath. Is still used as a routine test in the diagnosis of constrictive pericarditis
2. TB is still the most common cause of constrictive pericarditis in Iraq
3. Median sternotomy is still the main approach in the surgical treatment of constrictive pericarditis
4. Pericardiectomy is a useful procedure for constrictive pericarditis with a good outcome.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Chikwe J, Cooke DT, Weiss A. Oxford Hand Book of Cardiothoracic Surgery. 2nd ed. Oxford: Oxford University Press; 2013. p. 40.
2. Yuh DD, Vricella LA, Yang SC, Doty JR. Johns Hopkins Textbook of Cardiothoracic Surgery. 2nd ed. USA: McGraw-Hill Education; 2014. p. 742, 747.
3. Hancock EW. Subacute effusive-constrictive pericarditis. Circulation 1971;43:183-92.
4. Hoit BD. Constrictive pericarditis. UpToDate terms of use in constrictive pericarditis. LeWinter MM, Aldea GS, Verrier E, section editors. Up to date 2010;18:1-25.
5. Hirai S, Hamanaka Y, Mitsui N, Morifuji K, Sutoh M. Surgical treatment of chronic constrictive pericarditis using an ultrasonic scalpel. Ann Thorac Cardiovasc Surg 2005;11:204-7.
6. McCaughan MB, Schaff MD, Piehler MD, Danielson MD, Orszulak MD, Puga MD, *et al.* Early and late results of pericardiectomy for constrictive pericarditis. J Thorac Cardiovasc Surg 1985;89:340-50. [https://doi.org/10.1016/S0022-5223\(19\)38783-5](https://doi.org/10.1016/S0022-5223(19)38783-5).
7. Lorell BH, Grossman W. Profiles in constrictive pericarditis, restrictive cardiomyopathy, and cardiac tamponade. EPJOBS 2000;8:1-15.
8. Barbetakis N, Xenikakis T, Paliouras D, Asteriou C, Samanidis G, Kleontas A, *et al.* Pericardiectomy for radiation-induced constrictive pericarditis. Hellenic J Cardiol 2010;51:2014-8.
9. Maisch B, Seferović PM, Ristić AD, Erbel R, Rienmüller R, Adler Y, *et al.* Guidelines on the diagnosis and management of pericardial diseases executive summary: the Task Force on the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology. European heart journal. 2004;25:587-610.
10. Mehta A, Mehta M, Jain AC. Constrictive pericarditis. Clin Cardiol 1999;22:334-44.
11. Anand IS, Ferrari R, Kalra GS, Wahi PL, Poole-Wilson PA, Harris PC. Pathogenesis of edema in constrictive pericarditis. Studies of body water and sodium, renal function, hemodynamics, and plasma hormones before and after pericardiectomy. Circulation 1991;83:1880-7.
12. Bozbuga N, Erentug V, Eren E, Erdogan HB, Kirali K, Antal A, *et al.* Pericardiectomy for chronic constrictive tuberculous pericarditis: Risks and predictors of survival. Tex Heart Inst J 2003;30:180-5.
13. Kirklin JK, Kouchoukos NT. Cardiac Surgery. 4th ed. Philadelphia: Elsevier; 2013. p. 903-4.
14. Tettey M, Sereboe L. Surgical management of constrictive pericarditis. Ghana Med J 2015;41:1-8.
15. Tiruvoipati R, Naik RD, Loubani M, Billa GN. Surgical approach for pericardiectomy: A comparative study between median sternotomy and left anterolateral thoracotomy. Interact Cardiovasc Thorac Surg 2003;2:322-6.