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Subxiphoid window drainage of pericardial effusion- study of 35 cases.

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Abstract

Pericardial effusion defines the presence of an abnormal amount and/or character of fluid in the pericardial space. It can be acute or chronic and caused by a variety of local and systemic disorders, or it may be idiopathic. Pericardial effusion can be relieved by medical treatment, pericardiocentesis through a needle with or without echocardiographic guidance, or by surgical procedures, such as subxiphoid pericardial tube drainage, by creating a pericardial window through a left anterior thoracotomy, or by video assisted thoracoscopic surgery (VATS)

Subxiphoid pericardial window drainages were done on 35 patients with symptomatic pericardial effusion in the Department of cardiac surgery, BSMMU, from February, 1995 through July, 2009, and were all included in this retrospective observational study. The inclusion criteria were an established diagnosis of pericardial effusion confirmed by history, physical findings and transthoracic echocardiography, hemodynamic alteration as evidenced by hypotension(systolic blood pressure < 90 mm of Hg), shortness of breath, echocardiographic finding of > 10 mm echo free space with/ without compression of heart, recurrence after pericardiocentesis, haemorrhagic or thick pericardial effusion and malignant pericardial effusion. The exclusion criteria were loculated or post surgical pericardial effusion, effusive constrictive pericarditis or where formal thoracotomy was applied for drainage of effusion. Patients were followed up at one month and three months following the drainage procedure.

The age range was from 13 years to 70 years (Mean 47.86 ± SD 15.20 years), 19 (54.28%) were male, 16(45.72%) were female. The symptomatology varied but cardiac and respiratory decompression overwhelmed other symptoms. In this study tuberculosis is the most common cause of pericardial effusion, idiopathic and malignancies are other important causes. Subxiphoid window drainage is an effective process in relieving pericardial effusion and the reaccumulation rate is low.

Key words: Subxiphoid window drainage, Surgical drainage of pericardial effusion, Pericardial effusion.

Introduction

Pericardial effusion defines the presence of an abnormal amount and/or character of fluid in the pericardial space. It can be acute or chronic and caused by a variety of local and systemic disorders, or it may be idiopathic[1]. Although pericardial effusion is less frequent than pleural effusion, patients may be asymptomatic, or have symptoms ranging from mild to severe dyspnoea, cough, and chest pain, depending on the rate of fluid accumulation, absolute volume, and physical characteristics of the pericardial effusion[2,3]. Pericardial effusion may appear as transudate (hydro pericardium), exudates, pyopericardium, or haemopericardium. Large effusions are common with neoplastic, tuberculous, cholesterol, uremic pericarditis, myxedema, and parasitoses[4]. Loculated effusions are more common when scarring has supervened (e.g., postsurgical, post trauma, post purulent pericarditis). Massive chronic pericardial effusions are rare (2 to 3.5% of all large effusions)[4]. Cardiac tamponade is the decompensated phase of cardiac compression caused by effusion accumulation and the increased intrapericardial pressure. In "surgical" tamponade, intrapericardial pressure is rising rapidly, in the matter of minutes to hours (i.e., haemorrhage); whereas a low-intensity inflammatory process is developing in days to weeks before cardiac compression occurs ("medical" tamponade). The volume of fluid causing tamponade varies inversely with both parietal pericardial stiffness and thickness (150 to 2,000 mL)[4]. In local compression, dyspnoea, dysphagia, hoarseness (recurrent laryngeal nerve), hiccups (phrenic nerve), or nausea (diaphragm) can occur[4]. Insidiously developing tamponade may present with the signs of its complications (renal failure, abdominal plethora, shock liver and mesenteric ischemia). The size of effusions can be graded as (1) small (echo-free space in diastole <10 mm), (2) moderate (at least ≥10 mm posteriorly), (3) large (≥20 mm), or (4) very large (≥20 mm and compression of the heart)[4].

The mainstay of treatment includes removal of fluid and correction of underlying causes. Pericardiocentesis, a less invasive procedure performed under local anaesthesia, is effective as an acute means to relieve symptoms. However, most patients develop fluid re-accumulation shortly after fluid drainage[5]. Pericardial window by means of subxiphoid approach, or pleuropericardial window through thoracotomy or video-assisted thoracoscopy are both effective methods for controlling acute symptoms and result in a low rate of recurrence. On the other hand, they have the disadvantage of being a more invasive approach, with general anaesthesia required in severely ill patients[6,7]. A procedure, pericardiocentesis and intrapericardial sclerosis, was described recently and appears to be a less invasive procedure with good rates of control of pericardial effusion.[8] Other, more aggressive approaches, such as pericardiectomy, are rarely indicated for the treatment of patients with advanced malignant disease.

Patients and Methods

Subxiphoid pericardial window drainages were done on 35 patients with symptomatic pericardial effusion in the Department of cardiac surgery, BSMMU, from February, 1995 through July, 2009, and were all included in this retrospective observational study.. The inclusion criteria were an established diagnosis of pericardial effusion confirmed by history, physical findings and transthoracic echocardiography, hemodynamic alteration as evidenced by hypotension(systolic blood pressure < 90 mm of Hg), shortness of breath, echocardiographic finding of > 10 mm echo free space with/ without compression of heart, recurrence after pericardiocentesis, haemorrhagic or thick pericardial effusion and malignant pericardial effusion. The exclusion criteria were loculated or post surgical pericardial effusion, effusive constrictive pericarditis or where formal thoracotomy was applied for drainage of effusion. The age and sex of the patients were recorded; history regarding cough, fever, shortness of breath, weight loss and signs of cardiac tamponade, radiological, haematological, echocardiographic findings were noted. The amount and colour of the fluid were recorded and the fluid were sent for microscopic examination, Gram staining, Zeil-Nelsen staining, biochemical testing, culture and sensitivity testing, cytological testing. Histopathological studies of the pericardial biopsy specimen were also conducted. All patients were followed up at one month and three months interval with repeat chest X-ray and echocardiography to see any evidence of recurrence.

Results

The age range was from 13 years to 70 years (Mean 47.86 ± SD 15.20 years), 19 (54.28%) were male, 16(45.72%) were female and clinical presentation were as follow.

Symptoms	Number	Percentage
Dyspnoea	35	100%
Chest pain	15	42.86%
Palpitation	30	85.71%
Orthopnoea	27	77.12%
Cough	22	62.86%
Fever	17	48.57%
Oedema	19	54.29%
Abdominal swelling	8	22.86%
Night sweats	14	40.00%

Table-1: Symptoms of pericardial effusion in 35 patients.

Signs	Number	Percentage
Temperature(>38°C)	32	91.43%
Respiratory rate (> 30 breaths/min)	30	85.71%
Systolic blood pressure (< 90mm Hg)	22	62.86%
Tachycardia (>100 beats/min)	35	100.00%
Jugular venous distension (> 5cm H_2O)	19	54.29%
Oedema	18	51.43%
Friction rub	12	34.29%
Ascites	08	22.86%
Hepatomegaly	06	17.14%
CXR (increased cardiac silhouette)	35	100.00%
Echo free space (> 10 mm posterior)	35	100.00%

Table-2: Signs of Pericardial effusion in 35 patients

The amount and colour of the fluid were recorded and the fluid were sent for microscopic examination, Gram staining, Zeil-Nelsen staining, biochemical testing, culture and sensitivity testing, cytological testing. Histopathological studies of the pericardial biopsy specimen were also conducted. The final diagnoses were as follows:

Causes	Number	Percentage
Tuberculous pericarditis	20	57.15%
Non-tuberculous bacterial/ viral pericarditis	03	08.57%
Malignant processes invading the pericardium	03	08.57%
Collagen disease	02	05.71%
Uremic pericarditis	02	05.71%
Idiopathic and undefined pericarditis	04	11.43%
Congestive heart failure	01	02.86%

Table- 3: Causes of pericardial effusion

None of the patients showed any signs of recurrence at 1month and 3 months follow up.

Discussion

Fluid accumulation in the pericardial cavity is not uncommon and may be due to varieties of causes. Pericardial effusion is a potentially dangerous condition, as accumulated fluid in the pericardial sac can ultimately lead to cardiac tamponade and fatal shock[9]. Pericardial effusion can be relieved by medical treatment, pericardiocentesis through a needle with or without echocardiographic guidance, or by surgical procedures, such as subxiphoid pericardial tube drainage, by creating a pericardial window through a left anterior thoracotomy, or by video assisted thoracoscopic surgery (VATS) [10, 11, 12]. Pericardiocentesis is effective and safe in relieving emergency situation but reaccumulation is very common. The most serious complications of pericardiocentesis are laceration and perforation of the myocardium and the coronary vessels. Safety was improved with echocardiographic or fluoroscopic guidance. Recent large echocardiographic series reported an incidence of major complications of 1.3–1.6%. In fluoroscopy guided percutaneous pericardiocentesis cardiac perforations occurred in 0.9%, serious arrhythmias in 0.6%, arterial bleeding in 1.1%, pneumothorax in 0.6%, infection in 0.3%, and a major vagal reaction in 0.3%.[13,14]. Subxiphoid window drainage is an effective process in relieving pericardial effusion and the reaccumulation rate is low[15]. The symptomatology varies but cardiac and respiratory decompression overwhelms other symptoms, in case of recurrent pericardial effusion these are more severe[16]. In this study tuberculosis is the most common cause of pericardial effusion, idiopathic and malignancies are other important causes. The largest numbers of tuberculosis cases occur in the Southeast Asian region, which accounts for 33% of the incident cases globally[17]. However, in sub-Saharan Africa, this incidence is nearly twice that of Southeast Asia[17].

The yield of pericardial fluid for Acid-fast bacilli is low, however, pericardial biopsy and histopathological examination remains the mainstay of diagnosis. In more than 80% of cases, the aspirated pericardial fluid in tuberculosis is haemorrhagic[18].The diagnosis of tuberculous pericarditis is confirmed by the presence of acid-fast bacilli in the pericardial fluid or on the biopsy of the pericardium. Acid-fast bacilli are difficult to isolate from pericardial fluid; [19] they are rarely seen on direct examination, and the positive culture rate from conventional culture is only around 50%, although immediate inoculation in double strength liquid Kirchner culture medium increases the yield to 75%.[20] The diagnostic yield of pericardiocentesis and pericardial biopsy also appears to be similar[21]. All the patients with tuberculous pericardial effusion got antituberculous drug for 6-8 months along with tapering dose of oral steroids (oral prednisolone, 1mg/kg body weight for 4 weeks, gradually tapered to 2.5 to 5 mg over a period of 8 weeks) for 3 months and there was no recurrence at 1 month and 3 months follow up time. One prospective randomized control trial revealed the beneficial effect of prednisolone in reducing mortality and other complication.[22] Apart from tuberculosis other causes were idiopathic (4 cases), non tuberculous bacterial or viral pericarditis (3 cases), malignant invasion of the pericardium causing effusion (3 cases), collagen disease (SLE- 2cases), uremic pericarditis (2 cases) and congestive cardiac failure in 1 case, there was none due to trauma. In the West, malignancy is the most common cause of large pericardial effusions, followed by uraemia,[23] however, tuberculosis remains a common cause of pericarditis in developing countries, although it accounts for less than 5% of cases in the West[19]. In one study done at Aga khan university hospital, Pakistan, Quraishi et al reported malignancy (50%) to be the leading cause of pericardial effusions, followed by tuberculosis (25%)[16]. In another study done in the same hospital, tuberculosis was found to be the commonest cause of recurrent effusions, occurring in 50 percent (n = 16) of patients, followed by malignancy (n = 9)[21].

Conclusion

Subxiphoid window drainage is a safe procedure and can be used to treat pericardial effusion due to varieties of causes.

References

1. William J Strimel, Ramin Assadi, Ali A Sovari, Abraham G Kocheril. Pericardial effusion. eMedicine Specialties > Cardiology > Pericardial Disease, Updated: Sep 9, 2008, http://emedicine.medscape.com
2. Lee CH, Chan GS, Chan WM. Unexplained recurrent pericardial effusion: a lethal warning? Heart 2003; 89:e11.
3. Little WC, Freeman GL. Pericardial disease. Circulation 2006; 113:1622-32.
4. Maisch B, Seferovic PM, Ristic AD, Erbel R, Rienmuller R, Adler Y, Tomkowski WZ, Thiene G, Yacoub MH. Guidelines on the diagnosis and management of pericardial diseases. Sophia Antipolis (FR): European Society of Cardiology; 2004. 28.
5. Markiewicz W, Borovik R, Ecker S. Cardiac tamponade in medical patients. *Am Heart J* 1986; 111:1138–42.
6. Little AG, Kremser PC, Wade JL, Levett JM, DeMeester TR, Skinner DB. Operation for diagnosis and treatment of pericardial effusions. *Surgery* 1984; 96:738–44.
7. Mills SA, Julian S, Holliday RH, et al. Subxiphoid pericardial window for pericardial effusive disease. *J Cardiovasc Surg* 1989; 30:768–73.
8. Shepherd FA, Morgan C, Evans WK, Ginsberg JF, Watt D, Murphy K. Medical management of malignant pericardial effusion by tetracycline sclerosis. *Am J Cardiol* 1987;

60:1161–66.

9. Sagrista-Sauleda J, Merce J, Permanyer-Miralda G, *et al.* Clinical clues to the causes of large pericardial effusions. *Am J Med* 2000;109:95–101.
10. Becit N**,** Ozyazicioglu A, Ceviz M, *et al.* Clinical experience with subxiphoid pericardiostomy in the management of pericardial effusions: a study of 240 cases. *J Int Med Res* 2003;31:312–17.
11. Sugimoto JT, Little AG, Ferguson MK, *et al.* Pericardial window: mechanisms of efficacy. *Ann Thorac Surg* 1990;50:442–45.
12. Lindenberger M**,** Kjellberg M, Karlsson E, *et al.* Pericardiocentesis guided by 2-D echocardiography: the method of choice for treatment of pericardial effusion. *J Intern Med* 2003;253:411–17.
13. Maisch B, Seferovic PM, Ristic AD, *et al.* Guidelines on the diagnosis and management of pericardial diseases. *Eur Heart J* 2004;25:587–610.
14. Maisch B, Ristic AD. Practical aspects of the management of pericardial disease. *Heart* 2003;89:1096–103.
15. Jefferson Luiz Gross, , Riad Naim Younes, Daniel Deheinzelin, et al. Surgical Management of Symptomatic Pericardial Effusion in Patients with Solid Malignancies. Annals of Surgical Oncology *2006(13):1732-38.*
16. Quraishi AR, Khan AA, Kazmi KA, et al. Clinical and echo cardiographic characteristics of patients with signifi cant peri cardial effusion requiring pericardiocentesis. J Pak Med Assoc 2005; 55:66-70.
17. Khushk IA, Ahmed I, Shah SS. Tuberculosis control in Pakistan: current issues and challenges. J Coll Physicians Surg Pak 2006; 16:387-88.
18. Gibbs CR, Watson RD, Singh SP, Lip GY. Management of pericardial effusion by drainage: a survey of 10 years' experience in a city centre general hospital serving a multiracial population. Postgrad Med J 2000; 76:809-13.
19. Permanyer-Miralda G, Sagristá-Sauleda J, Soler-Soler J. Primary acute pericardial disease: a prospective series of 231 consecutive patients. Am J Cardiol 1985; 56:623-30.
20. Strang G, Latouf S, Commerford P, et al. Bedside culture to confirm tuberculous pericarditis. Lancet 1991; 338:1600-1.
21. Shahbaz Sarwar C M, Fatimi S. Characteristics of recurrent pericardial effusions. Singapore Med J 2007; 48 (8) : 725.
22. J.I.G. Strang, A.J. Nunn, D.A. Johnson et al. Management of tuberculous constrictive pericarditis and tuberculous pericardial effusion in Transkei: results at 10 years follow-up. Q J Med 2004; 97: 525-35.
23. Fowler NO. Cardiac tamponade. A clinical or an echocardiographic diagnosis? Circulation 1993; 87:1738-41.