Chronic constrictive pericarditis caused by self-mutilation with sewing needles

A case report and review of published reports

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SUMMARY A 34 year old woman with a history of self-mutilation developed severe constrictive pericarditis with sterile, calcified intrapericardial abscess cavities as a result of inserting sewing needles into her chest seven years previously. After pericardiectomy she made a good recovery.

In peacetime needles are the most common foreign bodies found in the pericardial sac, whereas bullets and shrapnel become more common in times of war.¹ In the nineteenth century it became fashionable to attempt suicide by driving a long pin, needle, or skewer into the heart. Admiral Villeneuve who commanded the French fleet at Trafalgar was taken prisoner by the English. After his release he returned to Rennes from where he sent a message to Napoleon announcing his return to French soil. Suffering from guilt and depression, and failing to receive a reply from Napoleon, whom he knew to be more than a little displeased, he killed himself by driving a long needle six times into his heart.

In 1868 Fischer described 452 patients wounded in the heart or great vessels and showed that such wounds were not always fatal.² He recorded 319 penetrating wounds, mainly stab and gunshot, but 44 were puncture wounds. Of these, 28 were caused by various types of needles and only 10 patients survived the initial injury.

In 1899 Loison reported a further series of 61 penetrating injuries; in 23 cases these were caused by needles. Some of these patients were symptomless while others died suddenly for unknown reasons.³ Fourteen (61%) died; eight of haemorrhage with tamponade, and one of infection. In five the cause of death was not known.

The first patient to survive the attempted removal

of a needle from the heart was reported by Gérard in 1835 (case number 37 of Fischer's series). Gérard saw a schoolboy who had pushed a knitting needle through his breastbone. The boy's companion pulled out what he believed to be the intact needle. Over the next six years the boy developed pain in the cardiac region at night and subsequently died of pneumonia. At necropsy a long metal splinter was found in the wall of the right ventricle. The splinter extended into the ventricular septum and was covered with fibrosis and organised thrombus.

In Loison's series, needles were removed successfully from seven of the nine patients who survived.

It seems surprising that at the same time that needles became a fashionable suicide weapon, a Mr Foot reported to the Royal Academy of Medicine in Ireland that, "in Warsaw the latest treatment for cholera was puncturing the heart with a needle to stir up vitality."⁴

The number of pericardial needle injuries caused by self-mutilation declined this century, with only a few cases being reported in English language publications,⁵⁻¹¹ plus one caused by a straightened safety pin.¹² In two cases needles were introduced into the pericardium during medical treatment—intracardiac injection of adrenaline¹³ and a posterior pleural aspiration.¹⁴

There are 12 reports of the incidental finding at necropsy of needles embedded in the heart.^{14 15} These may have been the result of unrecognised self-mutilation or unreported accidents; the needles are often painless once the entry wound has healed.¹¹

We report a case of the late development of con-

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strictive pericarditis after self-mutilation with sewing needles. There were no acute problems at the time of needle insertion.

Case report

A 34 year old mentally retarded woman presented with a three year history of bilateral ankle oedema and a nine month history of increasing exertional dyspnoea and orthopnoea. A report from her residential institution showed that for a three year period six to nine years before she had attracted attention to herself by pushing sewing needles into her anterior chest wall. This practice had subsequently ceased and no acute problems had occurred at the time.

Her blood pressure was 100/70 mm Hg with a low volume pulse in sinus rhythm and an impalpable apex beat. Her jugular venous pulse was raised to her ears. She had with gross ankle oedema, ascites, and the liver could be felt 10 cm below the costal margin.

INVESTIGATIONS

Her haematological and biochemical profiles were normal. Chest x ray showed upper lobe venous distension with a cardiothoracic ratio of 150/310 and multiple sewing needles in the thorax (fig 1). Cross sectional echocardiography showed a dilated left atrium and a well functioning left ventricle with rapid diastolic outward movement and plateau. No pericardial thickening could be identified.

Cardiac catheterisation showed equalisation of diastolic pressures through all four chambers: right atrium mean 26 mm Hg; right ventricle 46/26 mm Hg; pulmonary capillary wedge pressure mean 26 mm Hg, left ventricle 110/26 mm Hg, with a rapid y descent on the right atrial pressure tracing. Angiography showed that the systolic function of the left ventricle was normal but diastolic filling appeared to be abruptly restricted. Needles were seen close to major vessels and one needle appeared to move within the aortic wall. Her coronary arteries were normal.

Ungated computed tomography showed a pericardium of normal thickness with no evidence of septal angulation. There was an area of heavy calcification in the pericardium within the atrio-ventricular groove at the acute margin of the heart (fig 2). The liver was enlarged with considerable fatty infiltration.

On the basis of these findings she underwent pericardiectomy. The diagnosis was confirmed when at operation the heart herniated through the incision in an extremely tight and thickened pericardium.

There were areas of adhesions at the acute margin

Fig 1 Chest x ray showing many sewing needles in the thorax.

of the heart and within these adhesions two sterile abscess cavities with heavily calcified walls were found. One cavity about 1.5 cm in diameter lay, as predicted by computed tomography, in the atrio-ventricular groove where the right coronary artery was clearly visible in its floor. A second cavity of similar dimensions was found between the apex and diaphragm. As expected from the aortogram a sewing needle was found embedded in the adventitia of the ascending aorta. This was removed but no attempt was made to search for or remove other needles. There were no needles within the abscess cavities.

She made an uneventful recovery with a good symptomatic response.

Discussion

There are few reported cases of constrictive pericarditis after penetrating injury.^{6 13 16-18} In one case constrictive pericarditis followed trans-pulmonary migration of a nail.¹⁹ Paul Wood was unable to detect the development of constrictive pericarditis in a single instance in a series of thirty stab, bullet, and shrapnel wounds of the heart despite an adequate follow up.²⁰ Of the cases of direct pericardial needle injuries reported above only two developed constrictive pericarditis. The first resembles our case: this was another mentally ill

Fig 2 Computed tomogram of the chest showing an area of heavy calcification in the atrioventricular groove. The pericardium is of normal thickness.

patient who inserted sewing needles into her chest.⁶ In this instance, however, the constriction developed five months later and was clearly a sequel to acute pericarditis resulting from the insult. In the other case constrictive pericarditis followed the loss of an intracardiac needle during a cardiac arrest and took six years to develop.¹³ In the second case the only insult to the pericardium was from the needle, since cardiac massage was not required at the arrest and there was no history of acute pericarditis. In our case constrictive pericarditis took a similar time (seven years) to develop and also was not associated with any acute symptoms.

The causes of constrictive pericarditis are legion^{18 21 22} and the aetiology often remains obscure even after a thorough clinical and pathological assessment. In our patient there was nothing to suggest a metabolic or infective origin. In particular, there was no evidence in the history or chest x ray to implicate tuberculosis. Recognition that constrictive pericarditis may result from blunt chest trauma and haemopericardium is growing.²³⁻²⁶ It is also known that post-traumatic calcific pericarditis may ensue.²⁷ So although we cannot be certain that the constriction was a direct consequence of the needles, the balance of probability suggests a causal relation.

The cause of constrictive pericarditis when needles are present is unclear. Various authorities believe that haemopericardium alone can cause constriction.^{18 28} However, the negligible incidence of constrictive pericarditis after cardiac surgery or pericardial aspiration militates against this concept.²⁹ Furthermore, several experimental studies in dogs have failed to support this theory. Instillation of autologous blood into the pericardial cavity of

dogs did not produce constriction or adhesions although some pericardial thickening was produced when the lipid fraction of pooled dog blood was injected into the pericardial cavity.^{30 31} When the haemopericardium is produced by damage to the pericardium or epicardium or both there can be evidence of constrictive pericarditis, indicating that some form of damage to the mesothelial lining is required as well as a haemopericardium for the development of constriction.^{32 33} This is further supported by the observation that hot saline (105°F (39.9°C)) in the pericardial sac can induce dense adhesions, which do not occur with isothermic saline.³¹ Presumably the continued presence of a foreign body within the pericardium, possibly combined with low grade chronic infection provides sufficient pericardial irritation and mesothelial damage to induce the formation of dense adhesions and chronic constriction.

The ability of needles to migrate through tissues is remarkable. Muskat reported several cases in which x ray examination showed how needles can rapidly traverse the tissues and he was able to reproduce migration experimentally in animals.³⁴ There are reports of inhaled and swallowed needles migrating into the pericardium¹⁴ and of swallowed needles escaping from the body through the skin of the chest³⁵ and abdomen³⁶ after months or years. The combination of migration and systolic gripping action of the myocardium can rapidly suck a needle into the chest, making retrieval extremely difficult or impossible without an open heart operation.^{5 37 38} In one exceptional case an attempt to remove a needle from the heart was abandoned because the needle could not be seen after pericardiectomy although the eye of the needle could be felt in the substance of the heart above the apex. Three weeks after the operation the needle appeared in the third left intercostal space and was successfully removed.³⁹

The view has been expressed that all foreign bodies should be removed irrespective of symptoms, or the timing of the injury, on the basis that "late embolic, inflammatory and septic sequelae from retained pins and needles are real and transcend the risks from striving for surgical retrieval of these objects".¹¹ We have not found sufficient evidence of late complications to support this view. Given the state of present imaging techniques we feel that the timing of surgical intervention should be determined by the patient's clinical condition. The potential for rapid migration necessitates accurate preoperative imaging and may make location and removal of a needle from the myocardium difficult without cardiopulmonary bypass. Thus surgical intervention is best avoided unless grave manifestations are present. If the symptoms are less

severe it is reasonable to adopt a conservative approach in the knowledge that with time most foreign bodies become safely encysted and do no harm.

Finally, if a patient is physically well it is important to consider their state of mind before attempting surgical retrieval, because the patient may insert more needles after operation.¹¹ Also the knowledge that a sharp foreign body lies near their heart may lead to the development of further psychiatric symptoms.^{23 40}

References

- Barrett NR. Foreign bodies in the cardiovascular system. *Br J Surg* 1950;37:416-45.
- Fischer G. Die wunden des herzens und des herzbeutels. *Arch Klin Chir* 1868;9:571-910.
- Loison E. Des blessures du pericarde et du coeur et de leur traitement. *Rev Chir* 1899;19:49-73, 205-34, 774-818.
- Foot. Address to The Royal Academy of Medicine in Ireland. *Dublin J Med Sci* 1888;85:365-6.
- Fair GL. Foreign body in the heart. *NY State J Med* 1935;35:435-58.
- Kishon Y, Pauzner Y, Dalith F, Neufeld HN. Foreign body in the myocardium as a cause of constrictive pericarditis. *Thorax* 1967;22:238-41.
- Friedlander J, Brodman H, Smith C. Foreign body (needle) in the heart. *NY State J Med* 1949;49:1837-9.
- McCormack PM, Knapper W. Unusual foreign body pathway to the heart [Letter]. *JAMA* 1977;238:2016.
- Berg E. Traumatic pericarditis following self injury with a needle: case report. *MMW* 1971;113:182-5.
- Dreiling B. Penetrating wound of the heart and lung with successful removal of a foreign body. *Ohio State Med J* 1933;29:698-700.
- Schechter D, Gilbert L. Injuries of the heart and great vessels due to pins and needles. *Thorax* 1969;24:246-53.
- Peterson M. Safety pin through the heart for 18 months. *JAMA* 1929;92:1599.
- Strauss B. Chronic constrictive pericarditis due to a foreign body (needle) in the pericardium. *Am Heart J* 1944;28:805-9.
- Hinton J. Indirect injury to the heart by needles and similar foreign bodies. *JAMA* 1929;93:266-9.
- Gould SE. *Pathology of the heart*. 2nd ed. Springfield Illinois: Thomas 1960:848.
- McGuire C, Gage H. Discussion on cardiac tamponade: treatment by aspiration. After paper by Elkin D, Campbell R. *Ann Surg* 1951;133:623-30.
- McKusick V, Kay J, Isaacs J. Constrictive pericarditis following traumatic haemopericardium. *Ann Surg* 1955;142:97-103.
- Deterling R, Humphreys H. Factors in the aetiology of constrictive pericarditis. *Circulation* 1955;12:30-43.
- Haas R, Lea R, Sbokos C, Conway N. Constrictive pericarditis resulting from the transpulmonary migration of an inhaled nail. *Thorax* 1979;34:559-60.
- Wood P. Chronic constrictive pericarditis. *Am J Cardiol* 1961;7:48-61.
- Blake S, Bonar S, O'Neill H, et al. Aetiology of constrictive pericarditis. *Br Heart J* 1983;50:273-6.
- Hirschmann J. Pericardial constriction. *Am Heart J* 1978;96:111-22.
- Kissane R, Rose S. Traumatic pericarditis. *Am J Cardiol* 1961;7:97-101.
- Rasaretnam R. Constrictive pericarditis following mild non penetrating trauma. *Aust NZ J Med* 1975;5:57-62.
- Schaffer A. A case of traumatic pericarditis with chronic tamponade and constriction. *Am J Cardiol* 1961;7:125-9.
- Raker J, Langfield S, Gowen G. Traumatic haemopericardium producing late constrictive pericarditis. *Ann Surg* 1958;148:134-8.
- Lewis W, Killip T. Traumatic calcific non-constrictive pericarditis. *Am J Cardiol* 1965;16:901-5.
- Goldstein S, Yu P. Constrictive pericarditis after blunt chest trauma. *Am Heart J* 1965;69:544-9.
- Simon J, Pluth J. Constrictive pericarditis. *Ann Thorac Surg* 1976;21:440-1.
- Erenhaft J, Taber R. Haemopericardium and constrictive pericarditis. *J Thorac Surg* 1952;24:355-68.
- Beck C, Moore R. The significance of the pericardium in relation to the surgery of the heart. *Arch Surg* 1925;11:550-77.
- Sbokos C, Karayannacos P, Kontaxis A, Kamblyackas J, Skalkes G. Traumatic haemopericardium and chronic constrictive pericarditis. *Ann Thorac Surg* 1977;23:225-9.
- Cliff W, Grobety J, Ryan G. Postoperative pericardial adhesions. The role of mild serosal injury and spilled blood. *J Thorac Cardiovasc Surg* 1973;65:744-50.
- Muskat G. Über wanderung von friendkorpen. *Med Klin* 1908;4(suppl 2):1373-4.
- Kircher. Die wanderung einer nahnadel im menschlichen korper. *MMW* 1926;73(suppl 2):2169.
- Nestos P. Interesting case of a needle as a foreign body. *Journal-Lancet* 1922;42:316-7.
- Cope Z. Extraction of a sewing needle from the heart. *Lancet* 1920;i:813-4.
- Eakin W. The removal of a large needle from the heart with electrocardiographic changes in rhythm during the operation. *Am Heart J* 1932-3;8:540-6.
- Nehrkorn. Herzdurchwaderund einer Nadel. *Zentralbl Chir* 1929;56(suppl 1):544.
- Watts T, Toone E. Successful removal of foreign bodies within the pericardium: a report of two cases. *Surgery* 1945;18:685-95.