

# Relapsing constrictive pericarditis after implantation of an expanded polytetrafluoroethylene surgical membrane

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## Abstract

One of the challenges compounding the complexity of reoperative cardiac surgery are the surgical adhesions, which can be responsible for adverse intraoperative events. In such situations implantation of a substitute neo-pericardium has become a frequently used solution for avoiding injuries to the heart and great vessels, with rising numbers of reoperations. The pericardium can be reconstructed using biological (heterologous or autologous) or synthetic material, each having their pros and cons. In this report we present a case of relapsing constrictive pericarditis after implantation of expanded polytetrafluoroethylene neo-pericardium (GORE®). A highly differentiated algorithm and a careful preoperative review of indication is recommended in order to plan the optimal method of pericardioplasty, taking into account the pros and cons of each available material.

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## Introduction

One of the challenges compounding the complexity of reoperative cardiac surgery are the surgical adhesions, which can be responsible for adverse intraoperative events **(1)**. Closure of the native pericardium is not always possible and in such situations implantation of a substitute neo-pericardium has become a frequently

used solution for avoiding injuries to the heart and great vessels, with currently rising numbers of reoperations (1,2) .

The safety and efficacy of the Gore-Tex surgical membrane (SM) have been already reported. Scanning electron microscopic examination demonstrated neither cellular ingrowth nor immunocompetent cellular elements(3,4). The patients re-operated had no adhesions and the dissection was reported to be easier.

In this report we present a case of relapsing constrictive pericarditis after implantation of Gore-Tex expanded polytetrafluoroethylene (e-PTFE) SM.

## Clinical Summary

A 38-year-old man (187 cm, 115 kg, body mass index 32.9 kg/m<sup>2</sup>) with a history of hypertension, hypercholesterolemia, smoking and constrictive pericarditis was admitted with progressive dyspnea, fatigue and peripheral congestion. Echocardiography showed a moderate aortic insufficiency and a bicuspid Sievers type 1 aortic valve. Computed tomographic angiography revealed an ascending aortic aneurysm with a diameter of 48 mm and a thickened pericardium. Coronary angiography results were normal. Echocardiography and diagnostic hemodynamic cardiac catheterization also confirmed the diagnosis of constrictive pericarditis. Valve sparing aortic root replacement (David procedure) with leaflet repair, ascending aorta replacement and pericardiectomy was indicated. Informed consent of the patient was obtained.

After median sternotomy, a thickened (0,5-1cm) leather-like pericardium with significant adhesions was observed. A “from phrenic to phrenic” and diaphragmatic pericardiectomy was performed. After successfully performing the above-mentioned operative steps, an expanded polytetrafluoroethylene (e-PTFE) neo-pericardium (GORE®) was implanted – **Figure 1** . Postoperatively, after an uneventful recovery, the patient was discharged asymptomatic after 7 days. Transthoracic echocardiography at discharge showed an ejection fraction of 62%, no sign of constrictive pericarditis and a good surgical outcome without any rest aortic insufficiency.

Two years and two months after the initial operation the patient was readmitted with progressive dyspnea and marked limitation of ordinary activity (NYHA III). A diagnosis was made: echocardiography and diagnostic hemodynamic cardiac catheterization (re-)confirmed the diagnosis of constrictive pericarditis. After median re-sternotomy the neo-pericardium was excised, under which a layer of granulation tissue of approximately 5mm assembling a foreign body reaction was observed under the whole length of the e-PTFE patch – **Figure 2** . The layer was completely excised and biopsy samples were sent to the pathology lab. The result reported a pattern of chronic inflammation and nodular aggregation of lymphocytes, confirming a foreign body granulomatous reaction. After the surgery the patient recovered uneventfully and was discharged after 6 days.

## Discussion

Constrictive pericarditis limits the diastolic ventricular filling of the heart with the resulting pathophysiological cascade of reduced cardiac output and congestion. Surgical pericardiectomy can restore the normal physiology, provided that there is no cardiomyopathic component. It has been shown that radical pericardiectomy is superior to conventional in terms of long-term mortality, right ventricular systolic pressure and tricuspidal regurgitation (5) .

Surgical implantation of a neo-pericardium in patients undergoing cardiac surgery and having a high probability of reoperation is recommended to avoid adverse intraoperative events during the eventual reoperation. Pericardial reconstruction is also indicated after pneumonectomy with pericardiotomy or pericardiectomy as prophylaxis of heart herniation, a condition associated with a very high mortality because of the torsion of the atrio-caval junction and great vessels(6) . Therapeutic reconstruction can also be performed for symptomatic congenital pericardial agenesis.

The pericardium can be reconstructed using biological (heterologous or autologous) or synthetic material, each having their pros and cons. The bovine pericardial patch as heterologous biological material has been

demonstrated to be a strong and versatile surgical material but can elicit a hypersensitivity reaction (7). On the other hand, autologous material such as pleural or pericardial fat flaps is well tolerated and infection-resilient but not strong enough (8). Fascia lata flaps have the disadvantage of requiring a secondary incision and operative field. Synthetic meshes have become the material of choice and the Gore-Tex SM emerged as an optimal option for pericardioplasty(3,4).

In this case report, we present a patient who developed relapsing constrictive pericarditis after implantation of a Gore-Tex SM needing a reoperation for relieving the constrictive component. The pathology report indicated a foreign body granulomatous reaction. A histologic study of Gore-Tex samples removed after reoperative rhinoplasty conducted by Jang and colleagues concluded that the material can induce foreign body reaction with inflammation, ingrowth of neighboring tissues and calcified tissue degeneration (9), in accordance with our report.

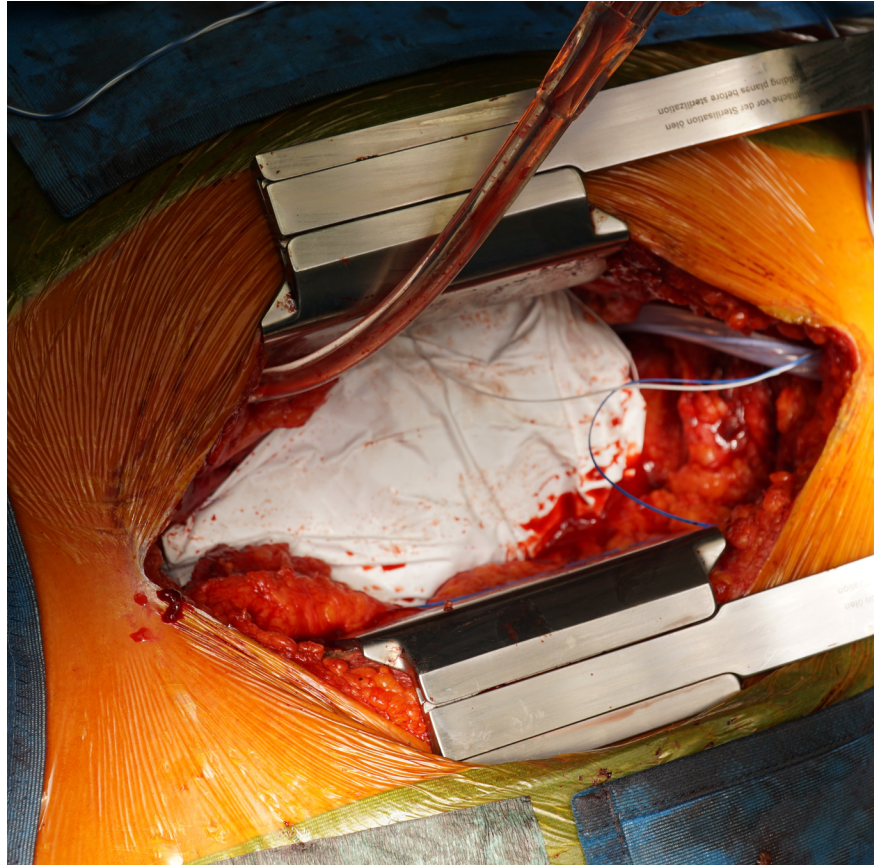
## Conclusion

We report a case of relapsing constrictive pericarditis with the confirmed morphological correlate of foreign body reaction following the implantation of a polytetrafluoroethylene (e-PTFE) neo-pericardium (GORE(r)) SM. A highly differentiated algorithm and a careful preoperative review of indication is recommended in order to plan the optimal method of pericardioplasty, taking into account the pros and cons of each available material.

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## Figure Legends



**Figure 1:** Intraoperative view depicting the implantation of the neo-pericardium.

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The ePTFE patch being excised      The layer of granulation tissue under the patch

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**Figure 2 -** Intraoperative view depicting the layer of granulation tissue during the reoperation.