Sutureless repair for postinfarction cardiac rupture: A simple approach with a tissue-adhering patch

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Left ventricle free wall rupture (LVFWR) occurs in 2% to 4% of patients following acute myocardial infarction (AMI).¹ Several techniques have been proposed to treat LVFWR, including sutures with pledgets, Dacron patch, and infarctectomy, as well as the use of biologically glued autologous/heterologous pericardial or Teflon patches.¹ TachoSil (Nycomed, Linz, Austria), a ready-to-use surgical patch, consists of a white collagen sponge coated on one side with fibrinogen and thrombin that allows hemostasis and tissue sealing, and is also used in cardiovascular surgical procedures.² Since August 2008, 6 consecutive patients affected by LVFWR were treated using the TachoSil patch.

The mean interval between AMI and LVFWR, and LVFWR and operation was 5 ± 3 days and 3 ± 2 hours, respectively. Coronary angiography was not performed in 2 patients because of instability and 3 patients had undergone previous percutaneous myocardial revascularization.

All patients were operated on via a sternotomy. Myocardial infarction localized in the lateral cardiac wall was found in 2 patients, in the posterior and lateral cardiac

wall in 2 cases, and in the posterior wall and cardiac apex in 1. One patient had isolated left ventricular apex involvement. According to LVFWR lesion classification, the “oozing” type¹ was present in 4 patients whereas the “blow-out” type was present in 2 patients. A TachoSil patch was anchored and pressed with wet gauze to the dry surface of the ventricle for a few minutes. In 2 patients, a simple patch was not large enough to cover the entire damaged surface, so a second patch was used. Surrounding healthy myocardium not involved in the necrotic scar was also included in the TachoSil patch application in all patients to allow better anchoring and to avoid rerupture. Cardiopulmonary bypass (CPB) and cardiac arrest for an unstable hemodynamic condition, and to obtain a satisfactory exposure of the lateral and posterior cardiac wall, were necessary in 3 patients, whereas the beating-heart procedure was used in the remaining 3 patients. Mean CPB and aortic crossclamp time were 47 ± 18 minutes and 17 ± 6 minutes respectively. Mean operation time was 150 ± 127 minutes. No surgical revascularizations was performed. Operative data and postoperative complications are detailed in Table 1.

We had 1 death on postoperative day 6 that resulted from low cardiac output syndrome. A new blow-out type of LVFWR localized at the cardiac apex occurred on postoperative day 15 and was treated urgently with 3 Teflon-reinforced 4/0 polypropylene single stitches without CPB. All discharged patients are alive and have a good clinical status at a mean follow-up of 24 ± 18 months.

The introduction of sutureless techniques for LVFWR repair allowed a decrease in operative mortality rate from 24% to 35% to 15.6% to 0%.¹ The treatment of LVFWR

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TABLE 1. Patients details, operative variables, and postoperative outcomes after TachoSil left ventricle free wall rupture repair

Patient no.	Age, y	Sex	LVFWR site	LVFWR type	CPB time, min	AoClamp time, min	Operative time, min	ICU stay, days	Postoperative complications	Outcome	Follow-up, mo
1	68	M	Lateral wall	Oozing	—	—	65	6	Dialysis, postoperative AMI	Dead	—
2	78	F	Lateral and posterior walls	Oozing	38	13	153	7	ARF, AF	Alive	43
3	83	F	Lateral and posterior walls	Oozing	35	14	165	11	ARF, AF	Alive	42
4	83	F	Apex	Oozing	—	—	62	5	AF	Alive	21
5	68	M	Posterior wall and apex	Blow-out	68	25	392	9	ARF, AF, heart wall rerupture	Alive	12
6	60	M	Lateral wall	Blow-out	—	—	63	2	—	Alive	3

LVFWR, Left ventricle free wall rupture; CPB, cardiopulmonary bypass; AoClamp, aortic crossclamp; ICU, intensive care unit; M, male; F, female; AMI, acute myocardial infarction; ARF, acute renal failure; AF, atrial fibrillation.

FIGURE 1. Operative findings of “blow-out” type left ventricle rupture in the lateral cardiac wall (A) repaired on a beating heart with apical suction devices (A, B). B, Two 9- × 4-cm patches of TachoSil (Nycomed, Linz, Austria) were positioned on the cardiac rupture, with complete bleeding control (Table 1, patient 6).

using either the TachoComb or TachoSil patches, which are similar, has been noted in the literature.^{3,4} In 2005, Muto and colleagues³ reported a case of oozing-type LVFWR localized in the lateral wall, which was treated successfully off pump with this fibrin tissue adhesive. Recently, Pocar and associates⁴ treated 3 patients with LVFWR with the TachoSil patch and the addition of a second layer of pericardium to reinforce the rupture area during CPB. TachoComb use has been advocated by some authors¹ before patch-and-glue repair to prevent rerupture occurring from oozing-type ruptures.

We started using TachoSil to treat postinfarction cardiac rupture in 2008 and, to our knowledge, this is the first report of a series of 6 consecutive patients affected by LVFWR treated with this technique. The technique is easily reproducible and fast. Moreover, in 3 patients a beating heart procedure was used, and easy exposure of the lateral wall was achieved with an apical suction device in patient 6 (Table 1, Figure 1). Our results were satisfactory; the only death resulting from extensive AMI occurred in a patient with a poor preoperative clinical condition. One patient experienced a new rupture in an area not covered by the previous patch. He underwent an additional operation and both the softness of TachoSil and the surrounding fibrotic myocardium allowed us to suture the new rupture without complications.

In conclusion, surgical treatment of LVFWR should be expeditious and simple, and it should avoid suturing the friable infarcted ventricle. A sutureless technique can be used for LVFWR also without CPB. Since 2008, TachoSil patch application on a beating heart represents our first choice to achieve hemostasis in LVFWR. This surgical experience, despite the small number of patients treated, shows satisfactory operative and midterm results. The TachoSil patch is very easy to handle and is less stiff than synthetic fabric. Further investigations are needed to establish long-term follow-up after TachoSil patch application.

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