ENDOVASCULAR AND SURGICAL TECHNIQUES

iatrogenic AV-Fistula Treated by a Graft-covered Self-expandable Stent

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Introduction

Vascular injuries in association with lumbar disc surgery was estimated to be less than 1% in a survey made by Bergentz and Bergqvist.1 The most frequent vascular complication was arteriovenous fistula with a mortality rate of 16-22% followed by acute haemorrhage with a mortality rate as high as 46-61%.1 Primary repair of the lesion has until recently been the method of choice. Here we present a case treated by a transfemorally introduced and endoluminally placed Gianturco stent covered with ePTFE.

Case Report

A 58-year-old previously healthy female was operated on for lumbar disc hernia causing L5-S1 root symptoms of the right limb. The disc between L5-S1 was removed by a pituitary rongeur. Technically, the operation was not demanding. However, during the operation, the patient had a drop in blood-pressure. Postoperative recovery was long and the patient had an increasing pulsating feeling in the right lower quadrant of the abdomen. One year after the operation in a work-up for a persistent low back pain the patient had a murmur in the lower abdomen and suffered from attacks of supraventricular tachycardia and abnormal exhaustion on physical exertion. A chest X-ray was unremarkable except for a slightly enlarged heart.

Angiography revealed a less than 0.5 cm (in diameter) fistula between the mid-left common iliac artery (CIA) and an enlarged left common iliac vein (CIV) (Fig. 1). Computed tomography (CT) with intravenous contrast enhancement together with angiography revealed that the diameter of the left CIA was 10 mm and its length 3 cm.

A stented graft was created using a 20 mm long and 12 mm in diameter Gianturco (Cook Europe, Bagsvaerd, Denmark) stent covered with ePTFE (Gore, Flagstaff, Arizona, U.S.A.). An 8 mm ePTFE graft was distended with a 12 mm balloon. The covered stent was mounted on a 12 mm balloon and then introduced in an 8 mm sheath. In order to keep the covered stent securely on the balloon, a 16 F pusher was placed

Fig. 1. 0.5 cm wide arterial venous fistula arising from the midportion of the left common iliac artery. Note dilated veins and the few arterial branches visualised.
on the shaft of the balloon catheter behind the stent. The tip of the balloon protruding outside the 18 F sheath served as a dilator when the balloon was semi-inflated.

Under general anaesthesia the left common femoral artery was exposed and through a longitudinal arteriotomy a straight catheter was introduced and exchanged over a guide-wire for the system preloaded with the covered Gianturco stent. A curved 5F catheter was placed percutaneously from the right common femoral artery and positioned into the orifice of the left CIA for repeated angiographies. Having verified the correct position of the covered stent over the AV fistula and taking care not to obstruct the left internal iliac artery (IIA), the stent was deployed under fluoroscopic control by withdrawing the outer 18F sheath. The balloon was then fully inflated to 12 mm. A completion angiography demonstrated closure of the AV fistula with patent adjacent arteries (Fig. 2).

The patient recovered uneventfully and was discharged on the fourth postoperative day. At 1 month follow-up a repeated angiography revealed permanent closure of the AV-fistula and restored normal arterial flow. The ankle-brachial index remained normal. The paroxysmal supraventricular tachycardia and the patient’s fatigue on exercise have resolved after 1 year.

Discussion

Although rare, iatrogenic AV-fistula after lumbar disc surgery is associated with a high mortality (16–22%).

Our patient had a typical history for such a complication, but the symptoms were overlooked for 1 year, which is not unusual. The sign of a continuous murmur in diastole led to the suspicion of an AV-fistula verified by angiography.

The conventional treatment of choice for iatrogenic AV-fistulas is to divide the fistula and repair the vessels. This procedure may be cumbersome as the venous pressure is increased, which may have led to several dilated draining veins that make dissection more challenging. A midline incision is preferable in that it avoids some of the dilated veins. Nevertheless, the complication rate associated with open surgical repair of a traumatic AV-fistula varies from 10–25%.

An endovascular closure with a stent-graft of an AV-fistula appears to be a less demanding procedure. The femoral route to gain access to the arterial tree is fast, effective and seldom troublesome, which makes it a safe site for introduction of the stent-graft. The first report on the use of a covered stent to treat a traumatic arterial injury was by Becker in 1991. He treated a large bore catheter-induced subclavian artery injury by remote access, and a 30 mm long silicone covered Palmaz stent which was placed over the injury prior to operation, at which the stent was removed. This report was followed by that of Parodi et al. who treated a patient for a traumatic subclavian artery AV-fistula, but with the intention to leave the graft-covered stent as definitive treatment. Parodi also used a Palmaz stent, though covered with a Dacron graft. This was
followed by the first report on percutaneously placed graft-covered stents by Marin et al. The use of ePTFE in combination with Palmaz stent was also described by May et al., and recently the use of Gianturco stent in combination with Dacron graft has been described.

To avoid the drawback of the shortening of the Palmaz stent when expanded we used a self-expandable Gianturco stent. Because it does not shorten during expansion it is easier to control. However, the standard Gianturco stent is constructed from relatively thick wire and when wrapped completely with ePTFE it is bulky. As a result an arteriotomy was needed for a safe placement of our 18F system.

Compared with open surgery of the AV-fistula the degree of trauma was considerably smaller as was the operative time and the postsurgical recovery. The closure of AV-fistulas using endoluminally placed stent-grafts will most likely become the treatment of choice.

References


Accepted 12 January 1996