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Endowaskularne leczenie tętniaków tętnicy podkolanowej za pomocą stentu pokrywanego Hemobahn

The endovascular treatment of popliteal aneurysms with the Hemobahn system

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Abstract

Due to multiple problems associated with the conventional open surgical therapy for popliteal aneurysms an interventional approach was sought. Ten patients were provided with covered stentgrafts (Hemobahn). Eight of these implantations proved successful in a follow-up control after an average period of 16 months. We observed 2 single occlusions. The reasons for these, as well as the advantages and disadvantages of this method, will be evaluated in the discussion.

Key words: popliteal aneurysms, interventional therapy, Hemobahn, covered stentgrafts

Introduction

Recently there have been several reports concerning interventional therapy of popliteal aneurysms. Single case reports usually manifest good results, but the research with larger groups did not. This research commonly dealt with heterogeneous diagnosis and stentgraft systems [1–4]. The size of the patient groups in this literature was comparable to our group size, but up to 4 different stentgraft systems were used, for example in one group for 10 patients [5]. These results were poor. Our primary results using homogeneous groups (diagnosis and stentgraft system) proved more successful so we decided to publish them. The literature manifests only one other paper with similar homogeneous groups but using a different similarly successful system [6].

Background

Popliteal aneurysms are often known to cause complications. The most feared complication is the embolic obliteration of peripheral vessels, which is responsible for limb loss in patients who require emergency treatment in up to 36% [7]. Usually at clinical diagnosis more than one embolic episode has occurred and parts of the inferior limb arteries are already occluded. Other problems arise from damage due to local pressure or septic complications. The complication rate rises from 3.1% to 14.2% when the critical size of 2 cm in diameter is exceeded [8]. This is why invasive treatment according to the criteria shown in Table I is indicated.

The treatment consists of the operative elimination of the aneurysm. The following strategies are known: orthotopic replacement and extra-anatomical bypassing. The material of choice is vein, if available. If veins cannot

Table I. Idications for the elective treatment of popliteal aneurysms

Diameter > 2 cm
Embolic complications
Symptoms by local pressure
Mycotic aneurysms

Table II. Conventional open operative procedures for popliteal aneurysms

Exclusion by: resection/ligature/inlay
Replacement by: vein orthotopic/extraanatomical alloplastic material orthotopic/extraanatomical

be harvested, artificial bypass material must be implemented (Table II).

The treatment is quite effective and patency rates between 60% and 90% for surgical repair [6, 7, 9] have been reported, yet a problem exists in the form of peri- and postoperative morbidity.

In most cases the reconstruction has to pass the knee. While patency of below-knee reconstructions is not perfect, good results are quite often reached as secondary patency rates. Unfortunately, re-intervention, which causes much patient discomfort, is connected to these results. Convalescence is often prolonged by local problems related to an open approach or lymphoedema or nerve irritations.

These are the reasons why we were looking for alternative procedures to treat popliteal aneurysms. Whereas other authors looked for an improvement using "endovascularily assisted" methods [10], we sought a full endovascular approach at a time when not much experience about these procedures could be found in the literature. We decided to use stentgrafts as these systems were convincingly "minimaly invasive". Furthermore, the handling is quite easy.

The well-known problems of normal stents in the femoro-popliteal area consist in an indeterminable proneness to the formation of neointimal hyperplasia. For coated stents different conditions are present. The interrupted contact between blood, intima and metallic stent might change the conditions for intimal hyperplasia.

Material and methods

Between September 1999 and April 2002, we treated 24 popliteal aneurysms invasively. Ten of them received a Hemobahn system (covered stentgrafts).

Results

Eight of the Hemobahn implantations were primarily successful after an average of 16 months (Fig. 1). Two of the implantations failed after 9 and 23 weeks respectively. We did not see any local complications in the femoral or popliteal region.

Patient 1

Occlusion of the Hemobahn after 9 weeks. An immediate revision showed that this was caused by a rapid progression of the diabetic peripheral occlusive disease with gangrene of the foot. The patient lost his leg after another 18 months. He died due to cardiac failure 2 years after the Hemobahn implantation.

Patient 2

Three weeks postoperatively the patient reappeared with a phlegmon of the same leg and a deep venous thrombosis. Twenty-three weeks after the implantation the patient appeared at the hospital with an occluded Hemobahn and left heart failure. Thus open operative thrombectomy was contraindicated. The then applied lysis was unsuccessful. The patient left the hospital in a Fontain stadium II b. A delayed open reconstruction was planned. When the patient represented herself for this reconstruction some weeks later she performed a walking test in which the measured distance exceeded 1000 m. The patient is free of complaints up till now.

Discussion

Eight out of ten patients achieved full success to this date. The group is too small to figure up a percentage. One of the two patients who failed got an

Figure 1. Angiogram of a popliteal artery in a functional position with a successfully implanted Hemobahn system

acceptable result. We presume that this result was favourable compared to a failed open reconstruction thanks to the advantages of the method described below. The other patient who failed was a victim of a rapidly advancing diabetic peripheral arteriosclerotic disease. The run-off for the graft was impaired. The same would have happened to an open repair, so it does not seem to be pathognomonic for the interventional method.

Advantages of this method consist in minimised trauma, a short time of convalescence and the fact that existing veins are not used and therefore can be preserved for other areas or indications. If there are no veins you have an additional option before using alloplastic material in an open below-knee reconstruction.

In our experience we also found some advantages for the interventional method when it primarily failed. There is still a minimised trauma approach, the sparing of the run off vessels and the sparing of the arterial rete genu. As an intermediate result the options for an open conventional repair are preserved.

There are also disadvantages for the interventional method. You cannot use this procedure if there are local problems like nerve compression caused by huge aneurysms (Fig. 2), so it is not ideal for all morphological challenges (Fig. 3). And last but not least: there are immense costs. A vein you get for free. But on the other hand what is the price for a 3-month convalescence, a persisting lymphoedema or nerve irritation?

Conclusion

Whereas other authors had results which were not satisfying [5], these results over the described period are promising so that a further ***critical*** application of the system is justified. Presently there are no valid results about a generally acceptable indication for the application of interventionally implanted systems for popliteal aneurysms. As long as there are only experiences with patient groups which are quite small, we propose to produce homogene groups to build up bigger experiences and comparable results.

There are no long-term results up to now. In accordance with this the main indication for the application of these systems could be seen in patients for whom there are strong arguments for an intermediate solution.

The results from patients in whom covered systems were used for the treatment of peripheral occlusive disease are subject to completely different conditions and should not be compared to the application of covered stent grafts in the case of popliteal aneurysms.

Figure 2. Popliteal aneurysm, diameter 9.4 cm, causing neurological symptoms

Figure 3. Huge aneurysm with distally kinked popliteal artery unsuitable for interventional therapy (same as in Fig. 2)

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