

## THERAPY

**20-year experience with operations for popliteal artery aneurysm**

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**At the 2nd Department of Surgery, St. Anne's University hospital Brno, a total of 76 operations for popliteal artery aneurysm were performed in 67 patients in the last 20 years, in period 1985–2004. 63 operations were elective and 13 urgent. For reconstruction, autologous saphenous vein was used in 53 cases, vascular prosthesis in 15 cases, and a cryopreserved vein allograft in 3 cases.**

**In 5 cases, amputation for advanced lower limb ischaemia was performed without arterial reconstruction.**

**Elective operation is indicated in all patients with popliteal artery aneurysm, and it is associated with a relatively low risk for the patient. In fact, it is a preventive operation.**

**In the acute stage, there is a higher risk of complications and (potential) amputation (Fig. 1, Ref. 8).**

**Key words: aneurysm, popliteal artery, treatment.**

A popliteal artery aneurysm is one of the most frequent types of peripheral aneurysms. It occurs either separately or involves popliteal arteries of both lower limbs, frequently together with an abdominal aortic aneurysm or thoracic aortic aneurysm, or constitutes a part of multiple aneurysms.

Frequent complications of the popliteal artery aneurysm are distal embolization, aneurysm thrombosis, venous compression (edema, cyanosis, collateral circulation) and neural compression (paresthesias, functional disorder). An infection and rupture of aneurysm belong to the most serious complications (1). The risk of thromboembolism increases especially in patients with aneurysms in other locations (2, 3).

The risk factors of aneurysm development are mainly environmental factors, e.g. smoking (4) and age, haemodynamic factors including systolic hypertension, and genetic factors (5, 6, 7). These factors cause changes in structural features of the arterial wall and subsequently aneurysmal dilatation (8).

**Material and methods**

At the 2nd Department of Surgery, St. Anne's University hospital Brno, a total of 76 operations for popliteal artery aneurysm were performed in 67 patients in the last 20 years, in period 1985–2004. In our group of patients, there were 62 men and 5 women. Patients' age ranged from 49 to 80 years, with a mean age of 69 years. Replacement of the popliteal artery was per-

formed 71 times. Reconstruction was abandoned 5 times. The most frequent clinical finding was a palpable pulsating mass in popliteal fossa. Claudications were not an important sign of the aneurysm presence. The aneurysms were examined clinically, sonographically, and angiographically, and later using CT and NMR. In 7 patients, also an abdominal aortic aneurysm resection and replacement with aorto-femoral or aorto-iliac prosthesis were performed due to abdominal aortic aneurysm. In 9 patients, the intervention was performed on both popliteal arteries. In 2 patients, abdominal aorta and both popliteal arteries were replaced due to aneurysms.

In our group of patients, a reconstruction with a replacement of the popliteal artery was performed in 71 cases. The popliteal artery was replaced with an autologous saphenous vein in 53 cases, vascular prosthesis 15 cases, and a cryopreserved vein allograft in 3 cases. In 5 cases reconstruction was abandoned: in 3 cases due to missing run off and in 2 cases due to an abscessed haematoma.

The most frequent type of reconstruction was resection or just ligation of the popliteal aneurysmal artery above and below

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Fig. 1. Arteriography of popliteal artery aneurysm.

the aneurysm and its replacement with a supra-infraarticular bypass with end-to-end anastomoses. This type of reconstruction was performed in 46 cases – 39 of them were elective operations, 5 acute ischaemia management, and 2 aneurysm rupture operations. An autologous vein graft from the great saphenous vein was used 36 times, prosthesis with a spiral 10 times.

An operation using a cryopreserved great saphenous vein of an identical blood group (A, B, AB, 0) donor was twice performed electively and once because of an acute ischaemia.

Due to significant arteriosclerotic changes in the superficial femoral artery, in 22 cases was the bypass performed from the common femoral artery with a distal anastomosis to the popliteal artery below the knee joint or to one of crural arteries, using an autologous great saphenous vein 17 times (12x elective, 5x acute operation), and a prosthesis 5 times (4x electively, 1x because due to a rupture).

## Results

Early amputation of a limb was performed in 4 patients – in two patients after the femoro-crural bypass was thrombotised (Fig. 1). Thrombectomy was performed in both patients. Due to an ongoing irreversible ischaemia, the amputation was performed on day 9 and 14 after reconstruction, respectively. In the third patient, amputation was performed on day 10 after supra-infraarticular bypass with prosthesis. The fourth amputation was carried out on day 3 after supra-infraarticular bypass with a vein implanted at the site of a ruptured and later infected aneurysm. All the amputations followed vascular reconstructions and were performed due to an acute ischaemia.

A late amputation was performed in one patient – 2 years after the resection of aneurysm, where reconstruction did not take place because of missing run off.

4 patients died of other diseases.

## Discussion

Popliteal artery aneurysm is an important, though marginal and less frequent cause of lower limb ischaemia. More than a

half of cases are asymptomatic. Untreated popliteal artery aneurysms most often cause peripheral embolizations, rupture of the affected artery, and finally even amputation of the limb. Detection of popliteal aneurysms is often incidental. Diagnostics is based on clinical examination, ultrasonography, arteriography, and CT and NMR examinations. Prompt surgical intervention is inevitable.

An elective operation is indicated in all patients with popliteal artery aneurysm greater than 2 cm. It is associated with a relatively low risk for patients. It prevents possible later complications resulting in peripheral lower limb ischaemia and amputation. Results of acute operations are worse, having a higher incidence of amputations. An autologous vein graft from the great saphenous vein is still considered the most suitable material for reconstruction surgery. If it is not available, it is possible to use a prosthesis, preferably the one reinforced with a spiral against breaking. The use of a vein allograft is a method of choice as well.

## Conclusion

In accordance with both domestic and foreign experience we recommend every popliteal artery aneurysm with a diameter of more than 2 cm for an elective operation (2). The burden and risks associated with elective operations are lower than those associated with acute operations. Especially in acute interventions, patients are jeopardized by complications, even by the loss of the limb.

## References

1. **Kauffman P, Puech-Leao P.** Surgical treatment of popliteal Artery aneurysm, a 32-year experience. *J Vasc Brit* 2002; 1 (1): 5-14.
2. **Dawson I, van Bockel JH, Brand R, Terpstra JL.** Popliteal artery aneurysms. Long term follow up of aneurysmal disease and results surgical treatment. *J Vasc Surg* 1991; 13: 398–407.
3. **Dawson I, Sie R, van Balen JM, van Bockel JH.** Asymptomatic popliteal aneurysm, elective operation versus conservative follow up. *Brit J Surg* 1994; 81: 1504–1507.
4. **Strong.** Cigarette smoking and atherosclerosis in autopsied men. *Atherosclerosis* 1976; 23: 451–476.
5. **Fowkes FGR, Housle E, Riermersma RA et al.** Smoking, lipids, glucose intolerance and blood pressure as risk factors for peripheral atherosclerosis compared with ischemic heart disease in the Edinburgh Artery Study. *Amer J Epidemiol* 1992; 135: 331–340.
6. **Greenhalch RM, Lewis B, Rosengarten DS, Mevart I, Calnan JS, Martin P.** Serum lipids and lipoproteins in peripheral vascular disease. *Lancet* 1971; II: 947–950.
7. **Lee B, Godfrey M, Vitale E et al.** Linkage of Marfan syndrome and phenotypically related disorder to two different fibrillin genes. *Nature* 1991; 352: 330–334.
8. **Mac Sweeney STR, Skidmore C, Turner RJ, Sian M, Brown L, Henney AM, Greenhalgh RM, Powel JT.** Unravelling the familiar tendency to aneurysmal disease: Popliteal aneurysm, hypertension and fibrillin genotype. *Europ J Vasc Endovasc Surg* 2; 1996: 162–166.

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