Journal of Korean Medical Science
Vol. 7, No. 3, 214-220 September 1992

Nonoperative Management of Persistent Sciatic Artery Aneurysm

—A Case Report—

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A patient with a sciatic artery aneurysm, which is so rare that only 31 cases have been reported in the literature to date, was treated successfully with transcatheter arterial embolization (TAE) alone. Potentially risky and difficult surgery was avoided. This was the first trial with a good result. TAE alone is simple, safe and effective method for the treatment of sciatic artery aneurysm either in incomplete type or in complete type with adequate collateralization.

Key Words: *Arteries, Transcatheter arterial embolization, Aneurysm.*

INTRODUCTION

Persistent sciatic artery is a very rare congenital vascular anomaly resulting from lack of regression of an embryonal artery to the lower extremity and is particularly prone to undergo aneurysm formation, atherosclerosis or distal embolization (Becquemin et al., 1985; Freeman et al., 1986; Martin et al., 1986). Since Green reported the first case of a persistent sciatic artery in 1832 (Donovan and Sharp, 1984; Bower et al. 1977), about 77 cases have been published in the literature. Of the 77 reported cases, 31 cases were sciatic artery aneurysms, and of these 31 cases, 27 had operations. Surgical treatment of sciatic artery aneurysms has varied markedly from institute to institute. We report a new case of sciatic artery aneurysm treated with TAE without end to end anastomosis or bypass surgery, and discuss 31 previously published cases to delineate those factors that permit TAE.

CASE REPORT

On December 20, 1987, a 67-year-old woman was admitted with the chief complaint of a progressively growing pulsatile mass in the left gluteal region after a blunt trauma 6 months before. She also complained of numbness, and pain along the distribution of the left sciatic nerve. Physical examination revealed a huge soft pulsatile mass in the left buttock. The popliteal and pedal pulses were normal. She was not diabetic and her blood pressure was 120/80 mmHg.

Real-time ultrasonography showed a huge echolucent mass with a peripheral echogenic rim in the left gluteal region and swirling of echoes in the echolucent area. Computed tomography (Fig. 1a, b) demonstrated a 15×12cm strongly enhancing mass situated between the left gluteal muscles and an abnormal enhancing vascular structure running along the posterior surface of the left adductor magnus muscle. Arteriography (Fig. 2, 3a) revealed an aneurysm arising from the left persistent sciatic artery and a hypoplastic left superficial femoral artery connected with the popliteal artery via small collaterals.

TAE was performed on the same day. A 7 French Head-hunter catheter was inserted through the right femoral artery into the left internal iliac artery, advanced into sciatic artery 2cm distal to the last branch. Three 10mm×5cm steel coils (Cook) were delivered at the proximal part of the left sciatic artery to occlude the sciatic artery. The pulsatile nature of the aneurysm disappeared and radiating pain lessened immediately after the embolization. However, the above symptoms recurred on the following day, and hence the left internal iliac arteriography was repeated, which showed that the steel coils had drifted into the aneurysmal sac (Fig. 3b). Through a 8 French guiding catheter a

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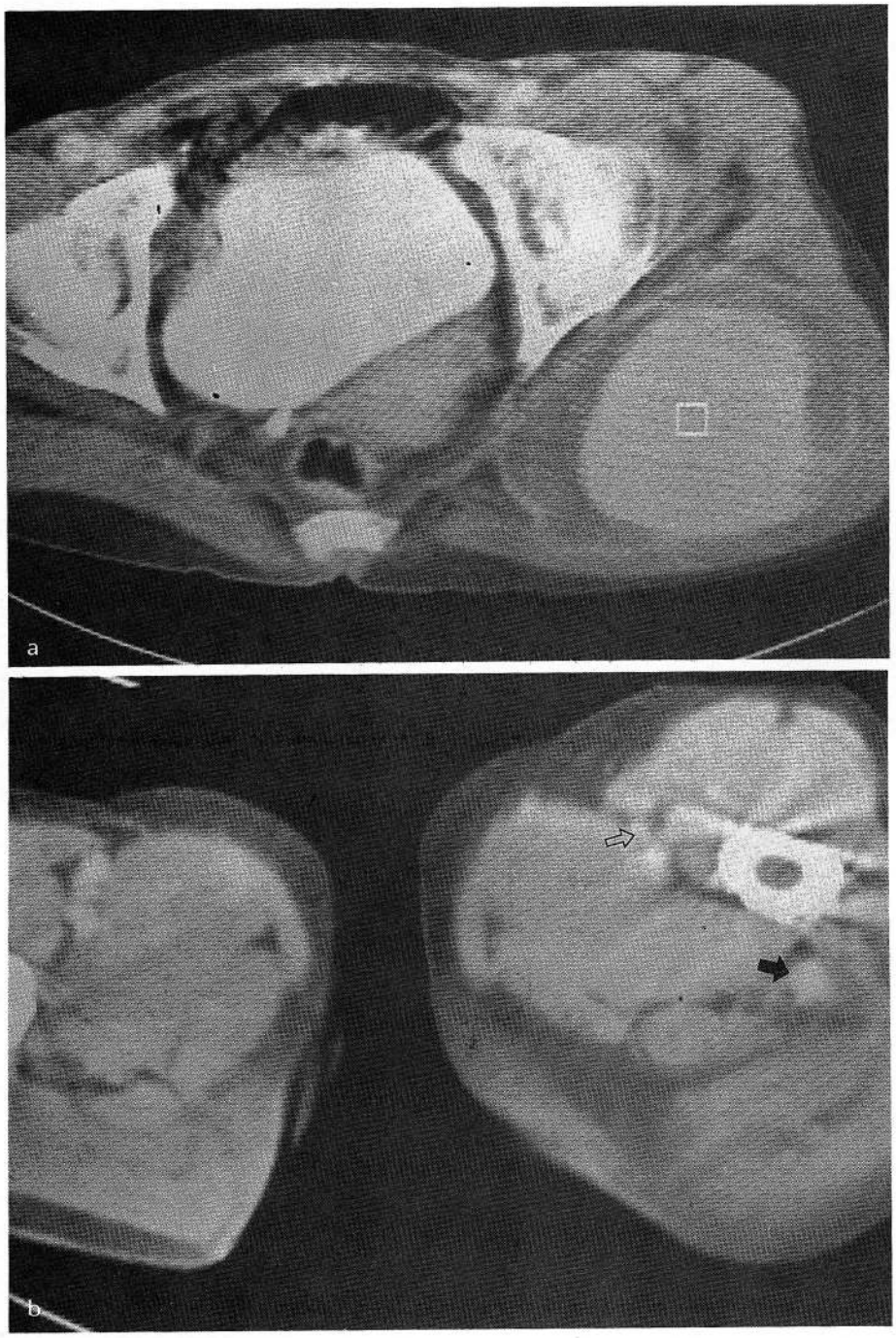

Fig. 1 CT scan before TAE (a,b).

a. Postcontrast CT scan shows a huge aneurysm containing thrombus between the left gluteal muscles.

b. Sciatic artery (arrow) posterior to the left adductor magnus muscle. Note the small size of the left superficial femoral artery (open arrow) compared with the right side.

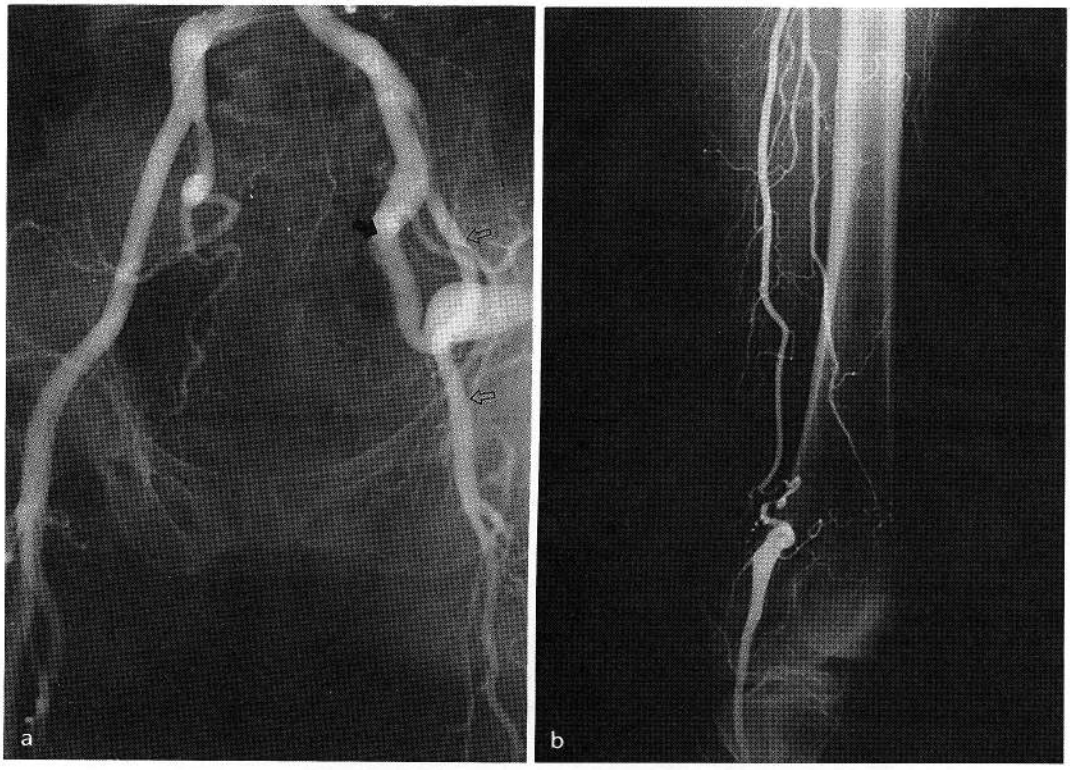

Fig. 2. Pelvic angiogram (a) and left superficial femoral angiogram (b) before TAE.
a. Left internal iliac artery (arrow) is arteriomegalic and left external iliac and femoral arteries (open arrows) are hypoplastic compared with the right side.
b. Left superficial femoral artery is connected with the popliteal artery via small collaterals.

14mm Debrun detachable balloon (Ingenor Medical System) was inserted into proximal sciatic artery, inflated with silicone glue and released, resulting in a complete occlusion of the feeding artery (Fig. 3c). As the left popliteal and pedal pulses were palpable even after the TAE, a by-pass graft was not performed. No postoperative complications occurred. The patient was discharged from hospital 4 day after TAE.

At follow-up 4 months later, numbness and radiating pain had subsided gradually. A CT scan (Fig. 4) showed that the size of the aneurysm had decreased significantly, although there was still some asymmetry between the hips. Therefore, 180ml of a chocolate-colored liquefied blood clot were removed percutaneously from the aneurysmal sac through a 6 French pigtail drainage catheter, balancing the asymmetry in her hips.

A follow-up arteriogram 3 years later showed continued occlusion of left sciatic artery (Fig. 5). The patient is now doing well.

DISCUSSION

The sciatic artery is the major blood supply to the lower limb bud. It develops as a branch from the dorsal root of the umbilical artery and can be identified as early as the 6mm embryo. Just proximal to the origin of the sciatic artery, the umbilical artery gives rise to the external iliac artery. The 14mm embryo is the only stage during the development in which the lower extremity has a dual blood supply; the more primitive sciatic artery and the newly formed femoral system. By the 22mm embryo, the arterial system is now complete and the sciatic artery is no longer a dominant system (Donovan and Sharp, 1984). At the same time the primitive sciatic artery involutes, leaving as its remnant the proximal part of the inferior gluteal artery (Becquemin et al., 1985). It can persist in adults.

The persistent sciatic artery is considered "complete" when is the main supply to the lower extremity and changes little in its course to the popliteal artery. This configuration is present in 63-79% of all cases. It is

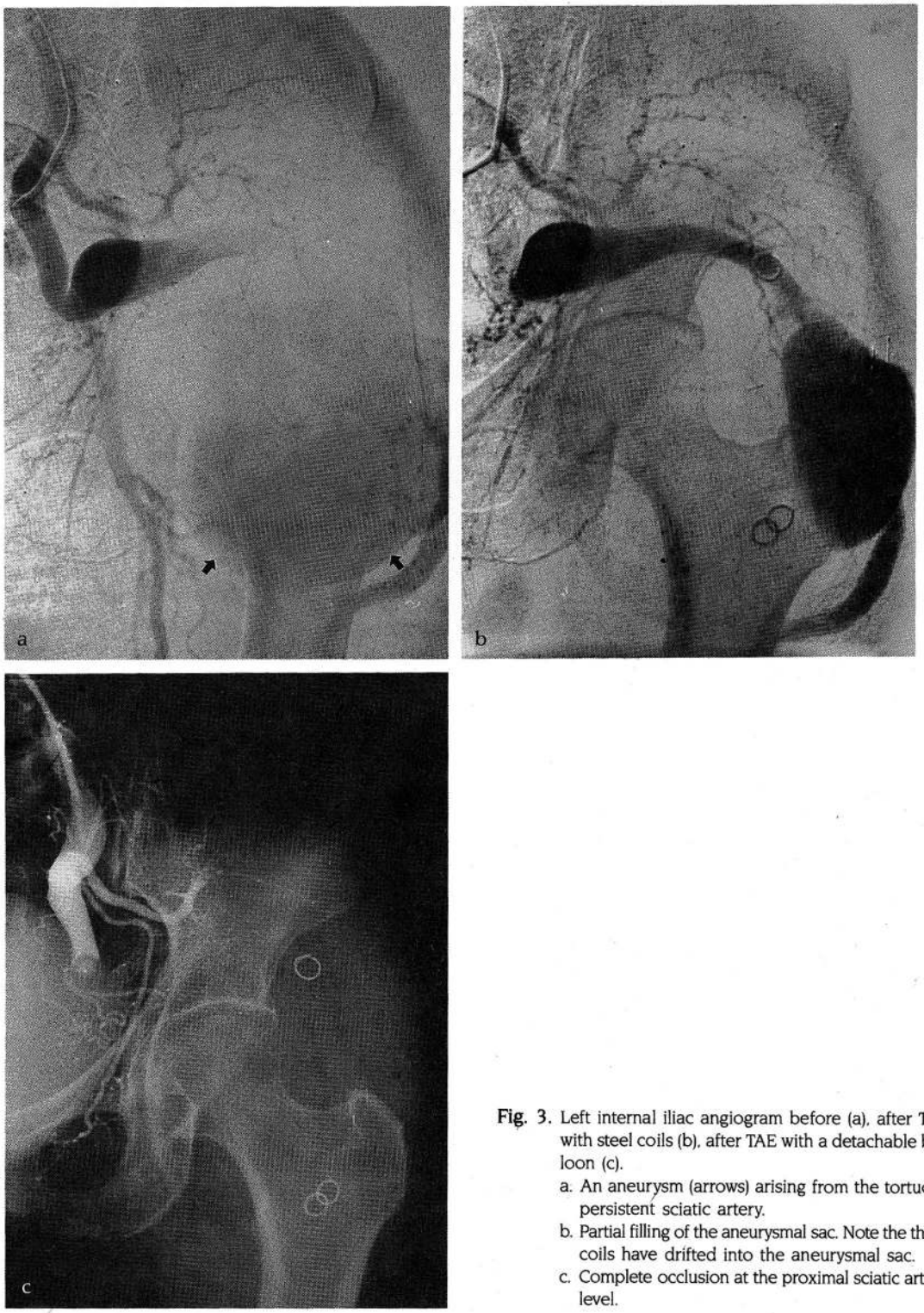

Fig. 3. Left internal iliac angiogram before (a), after TAE with steel coils (b), after TAE with a detachable balloon (c).

a. An aneurysm (arrows) arising from the tortuous persistent sciatic artery.

b. Partial filling of the aneurysmal sac. Note the three coils have drifted into the aneurysmal sac.

c. Complete occlusion at the proximal sciatic artery level.

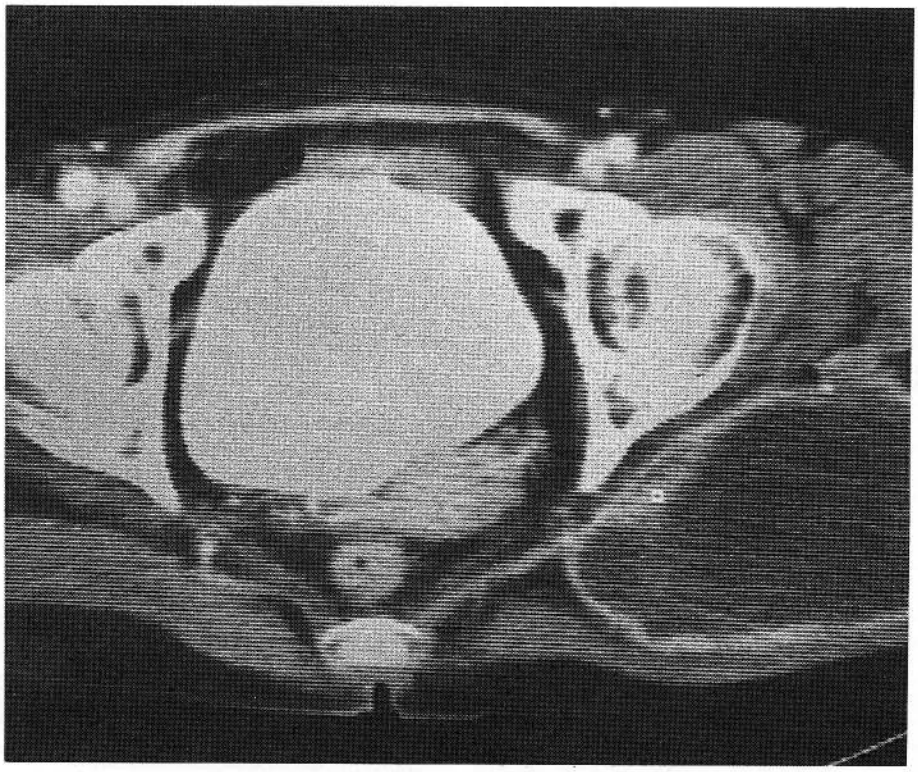

Fig. 4. CT scan 4 months after TAE.
The lumen of the aneurysm did not show a contrast enhancement.

considered "incomplete" if its continuity is interrupted, or if its anastomosis with either the internal iliac artery or the popliteal artery is by small collaterals (Becquemin et al., 1985; Bower et al., 1977; Donovan and Sharp, 1984; Freeman et al., 1986; Golan et al., 1986; Martin et al., 1986; Mclellan and Morettin, 1982; Williams et al., 1983).

Noblet et al. reviewed 71 cases of persistent sciatic artery including synonyms of persistent axial artery and ischiopopliteal trunk in 1988. Since then 6 additional cases have been reported in the literature (Conforti et al., 1990; Coppi, 1988; Gerner et al., 1988; Johansson, 1990). Persistent sciatic artery always associated with different pathologic conditions such as morphologic changes of the limb (hypertrophy and atrophy), varicosities of the leg, arteriovenous malformation, atherosclerosis and aneurysm. Among the complications, aneurysmal degeneration of the abnormal artery appears to be the most frequent and also most serious, because limb ischemia, rupture, or sciatic nerve compression are practically always associated (Becquemin et al., 1985). The incidence of aneurysm formation has been quoted to be 14%-38% (Bower et al., 1977; Donovan and Sharp, 1984; Freeman et al., 1986; Mclellan and Morettin, 1982; Thomas et al., 1978; Zaccaria et al., 1986). The etiology of the aneurysm is not clear. The suggested contributing factors are trauma, atherosclerosis, syphilitic arteritis, and congenital hypoplasia of the elastica of the artery (Becquemin et al., 1985; Bower et al., 1977; Mclellan and Morettin, 1982; Zaccaria et al., 1986). The aneurysm is always located in the gluteal area at the level of the greater trochanter (Becquemin et al., 1985; Bower et al., 1977; Wilms et al., 1986; Zaccaria et al., 1986). The most common symptoms on admission are pain in the leg or foot, a painful buttock mass, sciatica, claudication, ischemia, and a pulsatile buttock mass (Martin et al., 1986).

In 1986, Martin et al., described 3 cases of sciatic artery aneurysms and found another 21 cases in the literature. Since then 7 additional cases of sciatic artery aneurysms have been recorded in the literature (Freeman et al., 1986; Gerner et al., 1988; Hessling; et al., 1988; Nishizawa et al., 1987; Noblet et al., 1988 Wilms et al., 1986; Zaccaria et al., 1986). Treatment of sciatic artery aneurysms has varied markedly according

Fig. 5. Left internal iliac angiogram 16 months after TAE. No recurrence of the aneurysm. The steel coils are not included in this oblique view.

to available techniques and ingenuity. Out of a total 31 sciatic artery aneurysms 4 patients were not treated surgically; one exsanguinated due to the rupture of the aneurysm, one was not a surgical candidate, one refused surgery with an unknown result, and the outcome of the last is unknown (Martin et al., 1986). The remaining 27 patients were treated surgically. Five (Martin et al., 1986; Wilms et al., 1986) underwent ligation of the sciatic artery, resulting in the death of one patient and foot drop in another. Two patients underwent resection of the aneurysm and another had aneurysmorrhaphy, all with good results (Martin et al., 1986; Nishizaqa et al., 1987). Six patients (Hessling et al., 1988; Martin et al., 1986) had excision of the aneurysm, or endoaneurysmorrhaphy, followed by end-to-end sciatic artery bypass, none had complications after surgery. Eleven patients underwent ligation of the sciatic artery followed by femoropopliteal bypass (Freeman et al., 1986; Gerner et al., 1988; Martin et al., 1986; Noblet et al., 1988) or internal iliac-popliteal bypass (Zaccaria et al., 1986), and all had excellent results except for 2, who later required above-knee amputation. Two patients (Becquemin et al., 1985; Loh, 1985) were successfully treated by femoropopliteal bypass followed by percutaneous endovascular occlusion of the aneurysm.

As we have described above, four out of the 27 patients treated surgically had complications after the surgical procedures; one resulting in death, two in above knee amputation, one in foot drop. All of these patients were in a complete type of persistent sciatic artery. These results support the opinion that in patients with complete type without adequate collateralization, ligation of the sciatic artery aneurysm must be followed by some of bypass to avoid disastrous results (Martin et al., 1986). Among the 31 cases of sciatic artery aneurysms, there were 2 cases of an incomplete type (Clark and Beazley, 1976; Kieffer et al., 1980) and 2 cases of a complete type with adequate collateral blood supply to the leg via the superficial femoral artery (Nishizawa et al., 1987; Thomas et al., 1978), and all of them were treated successfully by ligation of the sciatic artery or aneurysmorrhapy without end to end anastomosis or bypass surgery. However, buttock incision, which is required for radical treatment, jeopardizes the sciatic nerve and does not allow comfortable and safe access to the abnormal artery (Becquemin et al., 1985). In our patient, who is considered to be of the complete type of the persistent sciatic artery with adequate collateralization, these problems were avoided because TAE of the sciatic artery was done without bypass graft. Our experience has shown that it is not necessary embolizing the distal artery but rather simply to embolize feeding proximal artery is sufficient to produce permanent occlusion of the aneurysm, and it is rare that retrograde collateral circulation reopens the aneurysm cavity possibly due to very slow blood flow in the sciatic artery.

Although there are now a large number of embolic materials available, none of them are ideal in all cases. The choice depends on the site and size of the aneurysm, and on the availability of the embolic material within the institution (Uflacker, 1986). We first tried to occlude the feeding artery with large steel coils because of ready availability along with the fact that they are inexpensive and easy to handle. However, owing to the large size of the feeding artery, this failed. Finally, we embolized it successfully with a 14mm Debrun detachable balloon without difficulty.

In summary, TAE alone seems to be simple, safe effective for the treatment of sciatic artery aneurysm either of an incomplete type or a complete type with adequate collateral blood supply to the lower extremity via the superficial femoral artery, and TAE with a femoropopliteal bypass seems to be recommended if the aneurysm is of a complete form without adequate collaterals.

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