

# Management of primary venous aneurysms

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## ABSTRACT

**Objective:** Venous aneurysms are a relatively rare abnormality. Unlike arterial aneurysms, venous aneurysms are a much less frequent abnormality. The purpose of our study was to review our experience in the management of venous aneurysms.

**Methods:** Nine patients with venous aneurysms, who had undergone operation in the Department of Cardiovascular Surgery, Yüzüncü Yıl University Medical School, Van, Turkey, during the period September 1997 through to May 2003, were included in this study. There were 5 female and 4 male patients, ranging in age from 16-47-years with a mean age of  $31 \pm 7$  years. They were diagnosed by color flow duplex imaging. Eight patients had saccular aneurysm; the remaining one patient with basilar vein aneurysm, had fusiform aneurysm.

**Results:** Aneurysms were located the lower extremities in 4 cases, the upper extremity in 4, and external jugular vein in one. Aneurysms size ranged from 2, 3 to 5, 5 cm (mean 3, 6 cm). There were no symptoms in 2 patients (cephalic vein aneurysm in one patient, short saphenous vein aneurysm in one). These patients were operated on for cosmetic purposes. Six patients complained of pain

associated with a subcutaneous swelling. The remaining one patient with popliteal vein aneurysm complained of extremity pain, associated with deep venous thrombosis. All patients underwent surgery under local anesthesia. In 7 patients, aneurysms were resected and venous continuity with a graft was found unnecessary. End to end anastomosis was performed in 2 patients (popliteal vein aneurysm in one and axillary vein aneurysm in one). During follow up period, there were no recurrences.

**Conclusion:** Venous aneurysms may cause thrombophlebitis, thrombus formation, pulmonary embolism and theoretical complication of spontaneous rupture. Varicose veins, hemangiomas, lymphocele, hernias, hygromas, arteriovenous fistulas and similar subcutaneous swellings located subcutaneous venous spaces should be considered in the differential diagnosis. Consequently, we suggest that surgical treatment be performed to prevent subsequent complications in all cases.

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**P**Primary venous aneurysms are a relatively rare abnormality. Venous aneurysm was first mentioned in the literature by Harris.<sup>1</sup> He described an infant with congenital venous cyst of the mediastinum in 1928. Hilscher<sup>2</sup> suggested the term of venous aneurysm, similar to arterial aneurysms. Definition of a venous aneurysm has been controversial. Primary venous aneurysms are defined as an isolated zone of venous dilatation that communicates with a normal size venous segment, not being associated with trauma and excluding varicose veins it should not be contained within a

segment of varicose vein.<sup>3,4</sup> Most develop from superficial veins in the head, neck, or extremities.<sup>5</sup> Venous aneurysms in the abdomen or thorax are extremely rare. We present 9 patients with venous aneurysms. They were diagnosed by color flow duplex imaging (CFDI).

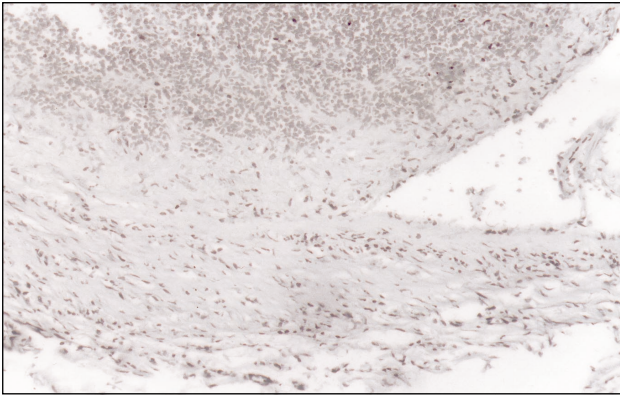
**Methods.** Nine patients with venous aneurysms, who had undergone operation in the Department of Cardiovascular Surgery, Yüzüncü Yıl University Medical School, Van, Turkey, during

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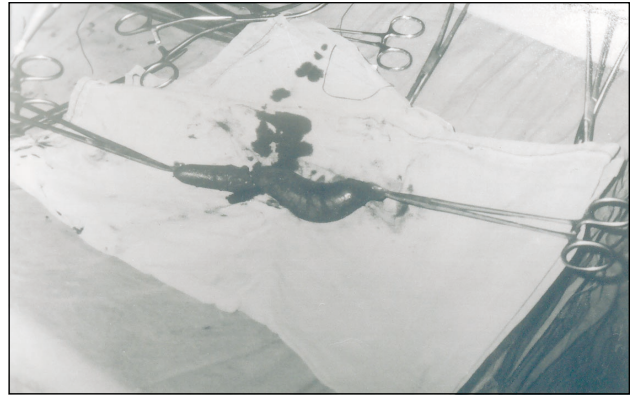
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**Figure 1** - Histologic appearance of the thrombosed popliteal vein aneurysm wall. Elastic fibers show areas of disruption.



**Figure 2** - Specimen showing fusiform aneurysm of the basilic vein.

the period from September 1997 to May 2003, were included in this study. There were 5 female and 4 male patients, ranging in age from 16-47 years with a mean age of  $31 \pm 7$  years. The saphenofemoral junction, the common femoral vein, popliteal vein, long and short saphenous veins were palpated in the standing position. Jugular, cephalic and basilic veins are examined in the position that is below the heart level. Distal compression was also carried out to ensure maximal filling of the veins. Popliteal vein, long and short saphenous veins were observed for reflux along their whole length with intermittent calf compression and sudden release. Cephalic and basilic veins were observed along their whole length. Foot or hand compression was used in observing their distal ends. Compressibility of the veins and the presence of the endoluminal echoic material were investigated with use of the B mode CFDI. Venography was used in one patient with popliteal vein aneurysm.

**Results.** Aneurysms were located the lower extremities in 4 cases, the upper extremity in 4, and external jugular vein in one. Aneurysm size ranged from 2,3 to 5,5 cm (mean 3,6 cm). Patients' symptoms and signs depended on the location of the aneurysm. There were no symptoms in 2 patients (cephalic vein aneurysm in one patient, short saphenous vein aneurysm in one). These patients were operated on for cosmetic purposes. Six patients complained of pain associated with a subcutaneous swelling. The remaining one patient with popliteal vein aneurysm complained of extremity pain, associated with deep venous thrombosis. All patients denied any preceding trauma or surgical intervention. Physical examination of the patients revealed subcutaneous masses. Direct compression of the masses reduced their sizes. In one patient with external jugular vein aneurysm, subcutaneous jugular mass was enlarging

with breathing. All patients underwent imaging studies before undergoing the operation. Venography was performed in one patient with popliteal vein aneurysm. Diagnosis of venous aneurysms was confirmed with CFDI in all cases. There were no cases associated with varicose veins. One patient with popliteal vein aneurysm had intraluminal thrombosis (**Figure 1**). Eight patients had saccular aneurysm; the remaining one patient with basilic vein aneurysm had fusiform aneurysm (**Figure 2**). All patients had isolated one aneurysm. The localizations of the aneurysms were the cephalic vein in 2 cases, long saphenous vein in 2, short saphenous vein in one, popliteal vein in one, axillar vein in one, external jugular vein in one, and basilic vein in one. Before the operation, there was one thromboembolic complication (deep venous thrombosis) in patient with popliteal vein aneurysm. Low molecular weight heparin treatment was performed preoperatively in this patient. All patients underwent surgery under local anesthesia. Total excision was performed in all patients. Venous continuity with a graft was found unnecessary in 7 patients. Venous continuity was achieved with end to end anastomosis in 2 patients (popliteal vein aneurysm in one and axillar vein aneurysm in one).

The follow up period ranged from 3-70 months (mean 28 months). There were no major complications in the postoperative period such as deep venous thrombosis or pulmonary embolism. There were minor complications such as wound hematoma and moderate swelling. In one patient with popliteal vein aneurysm, hematoma was drained, and the wound healed uneventfully. In one patient with saphenous vein aneurysm, postoperative swelling responded well to treatment with leg elevation and elastic hosiery. During follow up period, there were no recurrences. In pathological examination, wall of the aneurysmal segment was thinner than the adjacent normal venous segment. However, its basic morphology

was preserved. Histological findings of venous aneurysms were endophlebohypertrophy (progressive proliferation of elastic fibers, muscle, and connective tissues) and endophleboscclerosis (degenerative changes characterized by thinning of elastic fibers, reduction of smooth muscle cells of the media, and fibrosis) in 6 cases, absence of the media and adventitia in 2, and only thinning of the vein wall in one.

**Discussion.** The definition of a venous aneurysm has been controversial. A venous aneurysm is best described as a solitary area of venous dilatation that communicates with a main venous structure by a single channel, and it must have no association with an arteriovenous communication or a pseudoaneurysm. Most importantly, it should not be contained within a segment of varicose vein.<sup>4</sup> Most venous aneurysms originated from superficial veins are palpable and easily compressible. They are usually diagnosed just by inspection and palpation, or by doppler ultrasonography. Furthermore, changes in size with breathing are often seen with venous aneurysms in the neck,<sup>5</sup> as in our one patient. However, in several reports the diagnosis was not made until surgical exploration.<sup>4</sup>

In the diagnosis, venography, magnetic resonance imaging, computed tomography scanning; radionuclide venography and CFDI have been used. As in our series, the diagnosis of venous aneurysm can be accurately carried out with CFDI without venography. Color flow duplex imaging is the method of choice today. It has 3 advantages: first as CFDI is highly reliable in revealing both vascular abnormalities and coexisting diseases such as Baker's cyst; second CFDI is easily repeatable, is noninvasive, and causes minimal discomfort to the patient; and third, as CFDI can reveal the hemodynamic status of the leg.<sup>6</sup> When partial or complete thrombosis exists, the venography could not suggest the existence of venous aneurysm. Color flow duplex imaging can be performed quickly and easily and it measures its true size, and permits knowledge of the presence and extent of thrombus within the lumen with a complete functional assessment of both superficial and deep venous system.<sup>3</sup> These advantages have established CFDI as the method of choice in the diagnosis and follow up venous diseases. The extensive use of CFDI may reveal many asymptomatic venous aneurysm cases in the future.<sup>6</sup> In physical examination, 2 patients with saphenous vein aneurysm at the inguinal region were misdiagnosed as inguinal hernia. However, correct diagnosis was confirmed with CFDI. The true incidence of primary venous aneurysms is not known. Their etiology is not yet clarified. Etiologically venous aneurysms are divided into

congenital or acquired aneurysms. Some reports suggest that venous aneurysms are developmental, perhaps secondary to a weakness of elastic fibers in the vein wall.<sup>7,8</sup> The cause of venous aneurysms remains unknown, although several theories have been proposed. Schatz and Fine<sup>7</sup> concluded that endophleboscclerosis and endophlebohypertrophy are important factors in the development of the venous aneurysm,<sup>8</sup> in a manner similar to role of atherosclerosis in arterial aneurysm formation.<sup>9</sup> A marked decrease in the number and size of the muscular and elastic fibers in the aneurysmal segment of the vein wall is a very common finding, although this changes cannot be affirmed by some authors.<sup>3</sup> Matsuura et al<sup>10</sup> noted a reduction of elastic fiber in the aneurysmatic wall and he suggested that major cause might be congenital fragility of venous wall due to decreasing of elastic fiber. In contrast, Gilbert<sup>11</sup> found a histologically normal venous structure and a normal component of elastic tissue. The histological discrepancies between different reports could suggest different etiologies and differences in the location or in the chronicity of the lesions.<sup>8,12</sup> Generally trauma, inflammation, congenital weakness or degenerative changes in the venous wall resulting from a connective tissue disorder or a local inflammatory process and cardiovascular abnormalities producing increased venous pressure should be considered as possible causes.<sup>13,14</sup> Inflammation has also been cited as a possible cause of venous aneurysms. Although this may be a dramatic finding in some cases, it probably results from the mass effect of the aneurysm itself.<sup>9</sup> Following arteriovenous fistula formation, both venous dilatation and elevated pressure may predispose the patients to aneurysm formation, presumably at congenital or acquired weak points. Forceps handling, extensive mobilization of the vein, and aggressive manual intraluminal dilation of the vein may result in trauma to the vessel that may latter lead to aneurysm formation.<sup>15</sup> Venous aneurysms can produce complications like thrombus formation, pulmonary embolism, spontaneous rupture, and thrombophlebitis. Popliteal venous aneurysms may cause pulmonary embolism. We believe that rupture is only theoretical complication of venous aneurysm. While rupture of arterial aneurysm is an expected complication if a timely operation is not performed, rupture is virtually unheard of with venous aneurysm.<sup>9</sup> We have found no report of ruptured venous aneurysms except belonging to the intrathoracic or intraabdominal venous aneurysms. Rupture of the intraabdominal venous aneurysm may occur, especially in cases originating from the portal system owing to secondary portal hypertension.<sup>16,17</sup> In addition, the stagnant venous blood may lead to another complication (thrombus formation). Surgical excision is the treatment of

choice.<sup>18</sup> There are several reasons to recommend surgical treatment of most venous aneurysms. Potential morbidity and death are the most compelling. Pain, swelling, or undefined mass is common indications. Aneurysms of the superficial venous system should be excised. Aneurysms of the deep system present a more complex challenge. Simple anticoagulant therapy has been tried by some investigators, with poor outcome.<sup>4</sup> Accordingly, we preferred surgical treatment in both superficial and deep venous systems aneurysms. The need for venous reconstruction after resection depends on its location. Superficial venous aneurysms may be managed by simple ligation and excision. In patients with previous deep venous thrombosis, venography should be performed to insure the patency and continuity of the deep venous system.<sup>4</sup> In our series, venography was required in one patient with popliteal vein aneurysm due to preoperative deep venous thrombosis.

In the differential diagnosis of venous aneurysms, varicose veins should be considered with the highest priority. Hemangiomas, hygromas, venous dilatation associated with cardiovascular abnormalities should be considered in differential diagnosis. In our series, saphenous vein aneurysms at the inguinal region were misdiagnosed as previously reported by Gillespie et al.<sup>4</sup> Varicose veins are multiple lesions and generally localized to the territory of the long and short saphenous veins. They mainly occur in female and in the elderly. On the other hand, venous aneurysms are unusual vascular malformations that occur equally between the sexes and are encountered at any age.<sup>4,19</sup> The dilatation of a restricted region of the vein without extension or meandering of the vessel distinguishes a venous aneurysm from a varicose vein. Moreover, the etiology of a varicose vein is usually valve failure, whereas a venous aneurysm is more likely to be result of a congenital anomaly or trauma,<sup>18</sup> although the precise etiology remains unclear.<sup>5</sup> Histological findings help to distinguish a venous aneurysm from a varicose vein. Histological findings of venous aneurysm may be loss of elastic layers and hypertrophy of the connective tissue, absence of the media and adventitia, absence of muscle cells, endophleboscrosis, endophlebohypertrophy, and the thinning of the venous wall without congenital anomaly.<sup>14</sup> In contrast to venous aneurysm, varicose vein's fibrous tissue is increased. Particularly, muscle layers and the vessel wall is thickened.<sup>20</sup> In addition, ectasia is accompanied by prolongation in a varicose vein, whereas venous aneurysm is not accompanied by prolongation.<sup>10</sup> Natural history of venous aneurysms may run the gamut from stable, painless subcutaneous masses to painful lesions producing embolization.<sup>9</sup>

In contrast, to arterial aneurysms, venous aneurysms are relatively rare entities. Currently, the

method of choice for diagnosis of venous aneurysms is CFDI. It can also help in the differential diagnosis of the venous aneurysm from calf vein thrombosis, nonoccluding thrombus, and venous valve incompetence. We believe that with widespread using of CFDI, venous aneurysms and other venous abnormalities will likely be identified with increasing frequency. Varicose veins, hemangiomas, lymphocele, hernias, hygromas, arteriovenous fistulas and similar subcutaneous swellings located subcutaneous venous spaces should be considered in the differential diagnosis. They may cause thrombophlebitis, thrombus formation, pulmonary embolism and theoretical complication of spontaneous rupture. Consequently, we suggest that surgical treatment be performed to prevent subsequent complications in all cases.

## References

- Harris RI. Congenital venous cyst of the mediastinum. *Ann Surg* 1928; 88: 953-956.
- Hilscher WM. Zur Frage der venösen Aneurysmen. *Fortscher Röntgenstr* 1995; 82: 2444-2447.
- Perez MA, Caeiro S, Guitian MD, Sanchez M, Segura RJ. Greater saphenous vein aneurysms (a case report). *Vasc Surg* 1999; 33: 295-300.
- Gillespie DL, Villavicencio L, Gallagher C, Chang A, Hamelink JK, Fiala LA et al. Presentation and management of venous aneurysms. *J Vasc Surg* 1997; 26: 845-852.
- Kishi Y, Takayama T, Watanabe M, Ikeda M, Hui A, Motou T et al. An obstructed venous aneurysm presenting as an abdominal mass: Report of a case. *Surg Today* 2001; 31: 336-339.
- Lapropoulos N, Volteas SK, Giannoukas AD, Touloupakis E, Delis K, Nicolaides AN. Asymptomatic popliteal vein aneurysms. *Vasc Surg* 1996; 30: 453-458.
- Schatz IJ, Fine G. Venous aneurysms. *N Engl J Med* 1962; 266: 1310-1312.
- Aldridge SC, Camerota AJ, Katz ML, Wolk JH, Goldman BI, White JV. Popliteal venous aneurysm: Report of two cases and review of the world literature. *J Vasc Surg* 1993; 18: 708-715.
- Friedman SG, Krishnasastri KV, Doscher W, Deckoff SL. Primary venous aneurysms. *Surgery* 1990; 108: 92-95.
- Matsuura Y, Higo M, Yamashina H, Tamura M, Kitaoka T, Fukuhara T et al. A case report of venous aneurysm of the neck. *Jpn J Surg* 1981; 11: 39-42.
- Gulbert MG, Greenberg LA, Brown WT, Puranik S. Fusiform venous aneurysm of the neck in children: A report of four cases. *J Pediatr Surg* 1972; 7: 106-111.
- Perle BA. Venous aneurysms. In: Current therapy in vascular surgery. Ernst CB, Stanley JC, editors. St Louis (MO): Mosby; 1995. p. 970-972.
- Gruber HP, Amiri MA, Fraedrich G, Schlosser V. Multiple venous aneurysms of the saphenous vein: Report of an uncommon case. *Vasc Surg* 1990; 108: 92-95.
- Regina G, Rizzo S, Impedova G. Aneurysm of external jugular vein: Case report and review of literature - A case report. *Angiology* 1992; 108: 92-95.
- Bhama JK, Guinn G, Fisher WE. Venous aneurysm following construction of a polytetrafluoroethylene arteriovenous dialysis graft. *Ann Vasc Surg* 2002; 16: 239-241.
- Thomas TU. Aneurysm of the portal vein and report of two cases, are resulting in thrombosis and spontaneous rupture. *Surgery* 1967; 61: 550-555.

17. Taira A, Akita H. Ruptured venous aneurysm of the persistent left superior vena cava. *Angiology* 1981; 32: 656-659.
18. Koh SJ, Brown RE, Hollabaugh RS. Venous aneurysm. *South Med J* 1984; 77: 1327-1328.
19. Hayashi S, Hamanaka Y, Sueda T, Matsuura Y. Primary venous aneurysm - case report. *Vasc Surg* 1993; 27: 52-57.
20. Ahmed S. Some thoughts on aetiology of varicose veins. *J Cardiovasc Surg* 1986; 27: 534-543.

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