

CALF PAIN IN RUNNERS MAY BE CAUSED BY VENOUS INSUFFICIENCY

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Abstract

Sportsman complaints in the legs are most often associated with diseases and/or trauma of the musculoskeletal system. More rarely disturbances of the vascular system, e.g., popliteal artery entrapment have been reported in sportsman. Venous entrapment or venous claudication is mainly observed in cases of deep venous thrombosis.

We report a case of venous claudication in the right leg of a sportsman (long distance runner) without any history of venous thrombosis who presented himself to the Praxisklinik Sauerlach. After running one to two km the man had to stop running due to increasing numbness in the lower leg, aching muscles in the calf and finally pain.

An orthopaedic evaluation including magnetic resonance imaging of the leg by two orthopaedic specialists did not reveal any disturbance in the musculoskeletal system being responsible for the pain.

At the first clinical evaluation in ambulatory surgery clinic in Sauerlach there were no visible signs of varicose veins in the legs. B-mode and duplex-sonographic investigation of the right leg revealed an enlarged (0.63 cm) insufficient sapheno-popliteal junction with reflux in the right leg, the investigation of the venous system in the left leg was normal. A popliteal artery entrapment was excluded by colour duplex sonography. The operative procedure, ligation of the sapheno-popliteal junction with segmental saphenous vein stripping, has been well tolerated.

2-3 weeks after ligation of the sapheno-popliteal junction and segmental saphenous vein stripping the patient resumed his running program and could run without any painful disturbances.

Conclusion: Athletes, e.g., runners with complaints in the leg should be investigated for musculoskeletal defect but also for vascular disease, e.g., small saphenous vein insufficiency. The choice of treatment is ligation of the sapheno-popliteal junction with segmental saphenous vein resection which gives the patient optimal results and allows practicing long-distance running shortly after the operation.

INTRODUCTION

Pain in the leg is quite often found in athletes practicing long distance running, soccer or field and track. Normally it should not be a problem to find the cause of pain by physical examination and history taking. But it may be appropriate in certain cases to have a neuro-

logical, orthopaedic or vascular examination. We have demonstrated that groin hernia with nerve entrapment may be a cause of leg and/or groin pain in athletes (Holzheimer and Gresser 2007). The term poplitea-entrapment syndrome has been coined by Love and Whelan in 1965 to describe a singular constellation of neuromuscular and ischemic symptoms of the lower extremity (Love and Whelan 1965). A change of the anatomical location of the popliteal artery with a medial displacement caused by the gastrocnemius muscle has been identified as cause of these symptoms (Insua et al. 1970). Intermittent claudication that is normally associated with arterial disease may be rarely diagnosed to be of venous origin (Provan et al. 1979). Intermittent claudication has been described as a pain syndrome of the thigh or leg together with entrapment symptoms and a restriction of flow in the iliac or femoral vein in case of physical activity (Cockett et al. 1967; Bjordal 1970; Killewich et al. 1984; Negus and Cockett 1967; Raju and Fredericks 1991). It has been accused to be the least investigated complication of deep venous thrombosis (Delis et al. 2004).

CASE REPORT

A male sportsman (long-distance runner) complained of numbness, muscle aching and pain in the right calf after running one kilometre. There was no history of trauma or deep vein thrombosis. He was first examined by an orthopaedic surgeon who thought the right knee may have a defect. In the magnetic resonance imaging examination an already known lesion of the anterior part of the meniscus was demonstrated. As there were no other lesions visible and the clinical symptoms were not related to the meniscus lesion the orthopaedic surgeon did not recommend a surgical treatment of the knee. This decision has been supported by another orthopaedic examination.

History and clinical examination of the lower extremities did not indicate the presence of arterial disease, history of deep vein thrombosis or neurological disease. B-Mode and duplex-sonographic examination of the legs revealed an enlarged (0.63 cm) insufficient sapheno-popliteal junction in the right calf; the investigation of the left leg was normal. There were no signs of an old or acute deep vein thrombosis in both legs. The duplex-sonographic test for popliteal artery entrapment was negative.

A ligation of sapheno-popliteal junction and a segmental inverse saphenous vein stripping was per-

formed in the Praxisklinik Sauerlach. The small saphenous vein was macroscopically enlarged, the histological examination showed a phleboscлерosis. The post-operative follow-up was uneventful. 2-3 weeks after the operation the patient started to do the long distance running again – without painful interruptions. Follow-up B-mode and duplex-sonographic evaluation showed a normal venous system in the right leg with a closed sapheno-popliteal junction. The patient is now ten months free of symptoms and enjoys his long distance running without any painful disturbances.

DISCUSSION

Venous claudication has been detected in 8% of patients with chronic venous insufficiency after deep vein thrombosis (Labropoulos et al. 1997). The incidence of 43.6% venous claudication in patients after deep vein thrombosis as reported by Delis et al. in 2004 underscores the significance this disease may have.

The differential diagnosis of pain in the lower extremity in athletes includes venous aneurysm (Hallstenson et al. 2005), trauma of the musculoskeletal system, tibial stress syndrome, stress-fracture, exercise-associated compartment syndrome or less often radiculopathy, lumbosacral spinal stenosis, focal nerve entrapment, popliteal artery entrapment or arterial occlusive disease (Fredericson and Wun 2003; Mozes et al. 1975). A rare pathogenesis of claudication is the cystic degenerative disease of the adventitia of the popliteal artery (Baron et al. 1993). Chronic compartment syndrome is caused usually by overstraining in athletes, mostly long distance runners; however, it does not respond to protection, anti-inflammatory medication and physiotherapy (Turnipseed et al. 1989).

The clinical symptoms of our patient correspond to the symptoms reported by Provan (1979). The venous claudication stands out by pain in the calf, which can be so intensive, that the patient is forced to sit down. The physical examination usually shows no sign of arterial occlusive disease. Patients are often young and had sustained a deep vein thrombosis in the past. Sometimes the patient is able to localize exactly the pain. If the patient is stressed until the maximum capacity varicose veins may be demonstrated. Insufficiency of perforating veins has been accused to cause this syndrome (Provan et al. 1979). As the patients symptoms started after one kilometre we were unable to do a provocation test.

The diagnosis of venous claudication has been mainly confirmed by plethysmography, tread mill, phlebography and Doppler sonography (Brülsauer et al. 1987; Walker et al. 1985; Baumgartner and Bollinger 1991). In several studies it has been demonstrated that there is a good correlation between clinical classification and venous reflux (Lin et al. 2004; Labropoulos et al. 1996). Actually there is no gold standard available to determine the extent of a venous drainage (Neglen et al. 2000; Delis et al. 2004). The duplexsonography remains the most important method to diagnose venous insufficiency and popliteal artery entrapment (Labropoulos and Leon 2005). The arterial entrapment has been excluded; however, there were signs of reflux

and venous insufficiency in the small saphenous vein, which may lead to the symptoms reported by this patient. Long-term venous hypertension can cause long-term morphological damage in the skeletal muscle, which may then be followed by atrophy, denervation and myopathy (Taheri et al. 1984). Occlusion of the iliac vein and venous claudication may be associated with increased intra-muscular pressure, increased deposit of water in the muscle, increase in lactate and diminished blood flow (Ovarfordt et al. 1984).

Several authors recommended a fasciotomy to get rid of the increased muscular pressure (Ovarfordt et al. 1984; Snook 1975). Others emphasized a structured training of the calf muscles for 6 months (Padberg et al. 2004). Several investigators preferred to do a surgical treatment of the superficial varicose veins (Ting et al. 2001; Lin et al. 2004). In this presented case the ligation of the sapheno-popliteal junction with a segmental inverse varicose vein stripping, causing no pain or loss of quality of life to the patient, has been successful in the elimination of the symptoms of venous claudication and allowed the patient to start with his long-distance running only 2-3 weeks after the procedure.

CONCLUSION

Pain in the lower extremities of athletes may not only be caused by musculoskeletal alterations but may be associated with venous claudication caused by small saphenous vein insufficiency. Treatment of choice can be the ligation of the sapheno-popliteal junction with segmental stripping of the saphenous vein. The patient can take up his running program shortly after the successful operation.

REFERENCES

- Baron O, Julia P, Sintes V, Jeraba V, Fabiani JN. A rare cause of claudication in a young patient: cystic adventitial degeneration of the popliteal artery. Case study. *J Mal Vasc* 1993;18(1):68-9
- Baumgartner I, Bollinger A. Intermittent venous claudication. *Ther Umschau* 1991;48(10):679-82
- Björdal RI. Intermittent venous claudication: a report of two cases. *Acta Chir Scand* 1970;136:641-645
- Brülsauer M, Jäger K, Bollinger A. Intermittent venous claudication: a rarely diagnosed walking disability. *Schweiz Med Wochenschr* 1987;117(4):123-6
- Cockett FB, Thomas ML, Negus D. Iliac vein compression: its relation to iliofemoral thrombosis and the post-thrombotic syndrome. *Br Med J* 1967;2:14-19
- Delis KT, Bountouroglou D, Mansfield AO. *Ann Surg* 2004;239:118-126
- Fredericson M, Wun C. Differential diagnosis of leg pain in the athlete. *J Am Podiatr Med Assoc* 2003;93(4):321-4
- Hallstenson S, Ljungman C, Rudström H, Björck M, Bergqvist D. Claudication and pulmonary embolism can be caused by venous aneurysm. A case report illustrates difficulties with this unusual diagnosis] *Lakartidningen*. 2005 Apr 11-17;102(15):1152-3.
- Holzheimer RG, Gresser U. Inguinal hernia vs. Arthritis of the hip in sporting adolescents – case report and review of the literature. *Eur J med Res* 2007;12(7):314-9
- Insua JA, Young JR, Humphries AW. Popliteal artery entrapment syndrome. *Arch Surg* 1970;101:771-5

- Killewich LA, Martin R, Cramer M, Beach KW, Strandness DE. Pathophysiology of venous claudication. *J Vasc Surg* 1984;1:507-511
- Labropoulos N, Giannoukas AD, Nicolaides AN, Veller M, Leon M, Volteas N. The role of venous reflux and calf muscle pump function in nonthrombotic venous insufficiency. Correlation with severity of signs and symptoms. *Arch Surg* 1996;131(4):403-6
- Labropoulos N, Volteas N, Leon M, et al. The role of venous outflow obstruction in patients with chronic venous dysfunction. *Arch Surg* 1997;132:46-51
- Labropoulos N, Leon LR. Duplex evaluation of venous insufficiency. *Semin Vasc Surg* 2005;18(1):5-9
- Lin JC, Iafrati MD, O'Donnell TF, Estes JM, Mackey WC. Correlation of duplex ultrasound scanning-derived valve closure time and clinical classification in patients with small saphenous vein reflux: Is lesser saphenous vein truly lesser?. *J Vasc Surg* 2004;39(5):1053-8
- Love JW, Whelan TJ. Popliteal artery entrapment syndrome. *Am J Surg* 1965;109:620-4
- Mozes M, Ouakine G, Nathan H. Saphenous nerve entrapment simulating vascular disorder. *Surgery* 1975;77(2):299-303
- Neglen P, Berry MA, Raju S. Endovascular surgery in the treatment of chronic primary and post-thrombotic iliac vein obstruction. *Eur J Vasc Endovasc Surg* 2000;20:560-571
- Negus D, Cockett FB. Femoral vein pressures in post-phlebotic iliac vein obstruction. *Br J Surg* 1967;54:522-525
- Ovarfordt P, Eklöf B, Ohlin P, Plate G, Saltin B. Intramuscular pressure, blood flow, and skeletal muscle metabolism in patients with venous claudication. *Surgery* 1984;95(2):191-5
- Padberg FT, Johnston MV, Sisto SA. Structured exercise improves calf muscle pump function in chronic venous insufficiency: a randomized trial. *J Vasc Surg* 2004;39(1):79-87
- Provan JL, Moreau P, MacNab I. Pitfalls in the diagnosis of leg pain. *CMA Journal* 1979;21:167-171
- Raju S, Fredericks R. Venous obstruction: an analysis of one hundred thirty-seven cases with hemodynamic, venographic, and clinical correlations. *J Vasc Surg* 1991;14:305-313
- Snook GA. Intermittent claudication in athletes. *J Sports Med* 1975;3(2):71-5
- Taheri SA, Heffner R, Williams J, et al. Muscle changes in venous insufficiency. *Arch Surg* 1984;119:929-931
- Ting AC, Cheng SW, Wu LL, Cheung GC. Changes in venous hemodynamics after superficial vein surgery for mixed superficial and deep venous insufficiency. *World J Surg* 2001;25(2):122-5
- Turnipseed W, Detmer DE, Girdley F. Chronic compartment syndrome. An unusual cause for claudication. *Ann Surg* 1989;210(4):557-62
- Walker RT, Woodyer AB, Dormandy JA. Venous claudication. A report of 15 cases and overview of the literature. *Int Angiol* 1985;4(3):365-7

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