

Femoral Neuropathic Pain After Cardiac Catheterization: An Under-diagnosed but Treatable Condition

YiLi Zhou, Heather Shaw and Sara Webber

Femoral nerve damage, or femoral neuropathy after cardiac catheterization or stent placement could be a very painful¹, but sometimes not well recognized condition. The authors had two cases within the last twelve months.

Case 1

The patient was a 65-year-old female with left leg pain after a femoral stent placed on Aug 1, 2012. Patient reported severe burning pain upon waking up from surgery in her left groin, hip and buttock area, radiating down through the medial side of the left leg. She noted increased pain with standing and walking and had difficulty sleeping due to severe pain. She consulted multiple physicians, including her cardiologist who placed the stent, her family doctor and a neurologist without clear diagnosis and effective treatment. CT of abdomen and left leg were all negative. The patient was told her leg pain was due to degenerative changes in the back. She saw two chiropractors and did five weeks of physical therapy and chiropractic treatment without improvement. She was given a myriad of medications including amitriptyline, hydrocodone, oxycodone, tramadol, and gabapentin to which she experienced serious side effects and had no pain improvement.

Patient presented to our office 4 months after femoral stent placement with a daily VAS pain score of 10. She felt miserable and hopeless. She could only sleep 3 hours a night because of severe pain. On physical examination she was crying and found to have decreased sensation to pinprick throughout the anterior-medial aspect of the left leg in the femoral nerve distribution and diminished patellar reflex on the left leg. Based on history and physical examination, a clinical diagnosis of femoral neuropathy after stent placement was made. The patient was given pregabalin 50 mg BID with an increase to 100 mg BID over 2 weeks. In one-month follow up visit, she indicated improvement in her pain but her pain was still not gone. The dose of pregabalin was increased to 150 mg BID. In two-month follow up visit, the patient was completely pain free. She was also able to sleep on average 7 hours per night and walking normally. The patient is extremely happy with the results of the treatment.

Case 2

Case 2 was a 78 year-old female with right thigh pain, which began four days after a femoral artery cardiac catheterization. She described her pain as burning, throbbing and cramping. The pain started from the right groin area, radiating down to the front thigh and medially to the level of the knee. This pain fluctuated in intensity. It was exacerbated by walking, and was somewhat alleviated by sitting and lying flat on her back. The patient has tried acetaminophen and tramadol without pain relief.

The patient was referred to our pain clinic approximately 5 months after the onset of her pain. She was very depressed and felt hopeless, because she visited many physicians for her leg pain without clear diagnosis and treatment. Her cardiologist told her nothing was wrong at the site where the catheter was inserted. Her family doctor and neurologist could not tell her what the cause of her pain was. On physical examination she was found to have diminished right knee reflex with decreased sensation to pinprick in the pattern of the right femoral nerve enervation including the anterior right thigh and the medial right lower leg. A clinical diagnosis of femoral neuropathy was made, which was further supported by an EMG/NCV study. The compound muscle action potential (CMAP) and sensory nerve action potential (SNAP) were diminished for right femoral nerve and right saphenous nerve respectively.

The patient started on pregabalin 75mg BID. A follow up telephone conversation with the patient after 1 week of treatment with pregabalin revealed significant improvement in the patient's pain. At a follow up visit one month after beginning of the treatment, the patient's pain was completely resolved.

Femoral neuropathic pain after cardiac catheterization or stent is not uncommon. Kent et al followed a group 9585 cardiac catheterizations and reported incidence of 0.21% of peripheral neuropathy, involving the femoral, obturator, or lateral femoral cutaneous nerves². The clinical symptoms of femoral neuropathy after cardiac catheterization include severe pain, numbness in the anterior medial thigh and medial calf, and

occasionally motor deficits³. Direct damage to the femoral nerve, hematoma in the iliacus muscle caused by heparin therapy following catheterization or PTCA^{4 5 6}, use of prolonged digital pressure for post-procedural hemostasis⁷ and femoral artery pseudoaneurysm⁸ all have been implicated in the development of femoral neuropathy and pain after the procedures.

Diagnosis is not difficult. As mentioned above, history of severe pain in the femoral nerve distribution following the cardiac catheterization may suggest the diagnosis. Careful bedside neurologic examination may reveal decreased sensation to pin prick in the anterior medial thigh and medial calf. EMG/NCV test may further confirm the existence of femoral nerve damage. CT or MRI may found retroperitoneal or iliacus hematoma. However it may often be negative, in case there is no hematoma or aneurysm.

Techniques such as minimizing the procedural time, avoiding injury to the vessels and maintaining optimal posture of patient's thigh by limiting abduction and external rotation of hip⁷ and avoiding trauma to the iliacus muscle during catheterization can all be utilized to prevent the complications.

Anti-neuropathic pain medications should be used for this condition. Hsin and Hwang³ reported a case of femoral neuropathic pain after cardiac catheterization, which was successfully treated by a multimodal treatment program including duloxetine. A case of percutaneous approach for femoral nerve stimulation also has been reported to relieve the pain due to femoral nerve damage after cardiac catheterization⁹. In case, a retroperitoneal hematoma or pseudoaneurysm is identified as the cause of the femoral neuropathy, surgical removal of the hematoma or repair of the pseudoaneurysm may be a choice of treatment^{8 10}.

Pregabalin, a calcium channel modulator, has been approved by the US FDA for the treatment of multiple neuropathic pain conditions including peripheral diabetic neuropathy, post herpetic neuralgia, central pain due to spinal cord injury¹¹ and fibromyalgia. Several other studies also reported clinical efficacy of pregabalin for the treatment of other neuropathic pain conditions such as central pain syndrome after stroke¹², neuropathic cancer pain¹³ and post-traumatic peripheral neuropathic pain (PTNP)¹⁴. To the knowledge of the authors, this is the first report of pregabalin for the treatment of neuropathic pain due to femoral nerve damage.

In conclusion, femoral neuropathic pain after cardiac catheterization or stent could be very painful and debilitating. However, this condition is still not well recognized. Both of the two patients in the report had an acute onset of pain after the procedures with pain limited to the femoral nerve distribution. Physical examination findings were typical. However, both of them had consulted many clinicians including the cardiologists, family physicians, neurologists, and chiropractors and physical

therapists over the several months period after the onset of their symptoms without being able to reach a diagnosis. Thus an increased attention may be needed to evaluate the possibility of femoral neuropathic pain, if a patient developed severe leg pain after femoral arterial cardiac catheterization, especially when CT or MRI is negative. Treatment with anti-neuropathic pain medication, such as pregabalin may be helpful, even though more studies are needed.

Competing Interests

None Declared

Author Details

YILI ZHOU, MD, PhD, HEATHER SHAW PA-C, and SARA WEBBER PA-C; Florida Pain and Rehabilitation Center, Gainesville, FL 32605, USA.

CORRESPONDENCE: YILI ZHOU, MD PhD, Florida Pain and Rehabilitation Center, Gainesville, FL 32605, USA.

Email: yilizhoumd@yahoo.com

REFERENCES

1. Jabara B, Punch G, Ching B. Neurologic complication after use of a percutaneous vascular closure device. *J Vasc Interv Radiol* 2012 August;23(8):1099-101.
2. Kent KC, Moscucci M, Gallagher SG, DiMattia ST, Skillman JJ. Neuropathy after cardiac catheterization: incidence, clinical patterns, and long-term outcome. *J Vasc Surg* 1994 June;19(6):1008-13.
3. Hsin HT, Hwang JJ. Isolated femoral nerve neuropathy after intra-aortic balloon pump treatment. *J Formos Med Assoc* 2007 March;106(3 Suppl):S29-S32.
4. Warfel BS, Marini SG, Lachmann EA, Nagler W. Delayed femoral nerve palsy following femoral vessel catheterization. *Arch Phys Med Rehabil* 1993 November;74(11):1211-5.
5. Puechal X, Liote F, Kuntz D. Bilateral femoral neuropathy caused by iliacus hematomas during anticoagulation after cardiac catheterization. *Am Heart J* 1992 January;123(1):262-3.
6. Ganglani RD, Turk AA, Mehra MR, Beaver WL, Lach RD. Contralateral femoral neuropathy: an unusual complication of anticoagulation following PTCA. *Cathet Cardiovasc Diagn* 1991 November;24(3):176-8.
7. Kuruvilla A, Kuruttukulam G, Francis B. Femoral neuropathy following cardiac catheterization for balloon mitral valvotomy. *Int J Cardiol* 1999 October 31;71(2):197-8.
8. Jacobs MJ, Gregoric ID, Reul GJ. Profunda femoral artery pseudoaneurysm after percutaneous transluminal procedures manifested by neuropathy. *J Cardiovasc Surg (Torino)* 1992 November;33(6):729-31.
9. Narouze SN, Zakari A, Vydyanathan A. Ultrasound-guided placement of a permanent percutaneous femoral nerve stimulator leads for the treatment of intractable femoral neuropathy. *Pain Physician* 2009 July;12(4):E305-E308.
10. Merrick HW, Zeiss J, Woldenberg LS. Percutaneous decompression for femoral neuropathy secondary to heparin-induced retroperitoneal hematoma: case report and review of the literature. *Am Surg* 1991 November;57(11):706-11.
11. Cardenas DD, Nieshoff EC, Suda K, Goto S, Sanin L, Kaneko T, Sporn J, Parsons B, Soulsby M, Yang R, Whalen E, Scavone JM, Suzuki MM, Knapp LE. A randomized trial of pregabalin in patients with neuropathic pain due to spinal cord injury. *Neurology* 2013 February 5;80(6):533-9.
12. Gray P. Pregabalin in the management of central neuropathic pain. *Expert Opin Pharmacother* 2007 December;8(17):3035-41.
13. Raptis E, Vadalouca A, Stavropoulou E, Argyra E, Melemini A, Sifaka I. Pregabalin Vs. Opioids for the Treatment of Neuropathic Cancer Pain: A Prospective, Head-to-Head, Randomized, Open-Label Study. *Pain Pract* 2013 March 6.

14. Jenkins TM, Smart TS, Hackman F, Cooke C, Tan KK. Efficient assessment of efficacy in post-traumatic peripheral neuropathic pain patients: pregabalin in a randomized, placebo-controlled, crossover study. *J Pain Res* 2012;5:243-50.
-