

Case Report: Tunneled Epidural Management for PVNS Complicated by Persistent Arthrofibrosis of Knee

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Introduction

Pigmented villonodular synovitis (PVNS) is a subtype of tenosynovial giant cell tumors, and it commonly affects the knee, hip, and ankle joints. Symptoms include pain, swelling, stiffness, and limited range of motion of the joint. We will present a case of a 58-year-old male who developed arthrofibrosis and chronic neuropathic pain secondary to PVNS which was managed by a tunneled epidural catheter.

Case

58-year-old male with a history of suspected PVNS. He underwent arthroscopic synovectomy which was complicated by the development of fibrosis. His symptoms were classic of PVNS: decreased range of motion, stiffness, and pain. In December 2023, he underwent a knee arthroscopy and partial synovectomy. Postoperatively, he experienced persistent pain and swelling. He described it as a sharp, stabbing sensation which was worse with ambulation and flexion and extension of the joint. Conservative treatments—including NSAIDs, icing, and knee elevation—were attempted without relief. Additional therapies were also unsuccessful, and the patient reported that physical therapy exacerbated his symptoms without any appreciable benefit. He was referred to the interventional pain clinic for consideration of a tunneled epidural catheter to aid in his recovery process. This was placed the same day as his arthroscopy and run to help with pain control and tolerance of physical therapy. During this postoperative course, he experienced relief of his symptoms. Unfortunately, he did have an additional episode of decreased range of motion which required knee manipulation. However, using his tunneled epidural catheter, he experienced no further pain. At 4 weeks postop, his knee pain was rated as adequate, and the catheter was removed. He was placed back on a conservative regimen of celecoxib.

Pigmented Villonodular Synovitis

PVNS is a benign disorder of the synovium and mostly involves a single joint, most commonly the knee. Symptoms may be present for years before formal diagnosis and include pain in the area, swelling, stiffness, and limited range of motion.

The mainstay of treatment for local and some diffuse subtypes of PVNS is surgical resection, either with arthroscopic or open synovectomy. High rates of recurrence can be common, especially among the diffuse subtypes. Radiation therapy exists as an additional treatment option and has shown promising results. There are also a few medications which have shown promise in clinical trials and with tolerable side effects.

An unfortunate complication of PVNS is the development of arthrofibrosis and chronic neuropathic pain. While typically more common after an open surgical approach, arthrofibrosis can develop as a complication of PVNS itself, before or after surgical intervention. Fibrotic tissue accumulates and causes a decreased range of motion of the joint as well as pain. If pain remains poorly controlled, a patient will require frequent manipulations and ultimately be unable to participate in physical therapy to an appreciable extent.

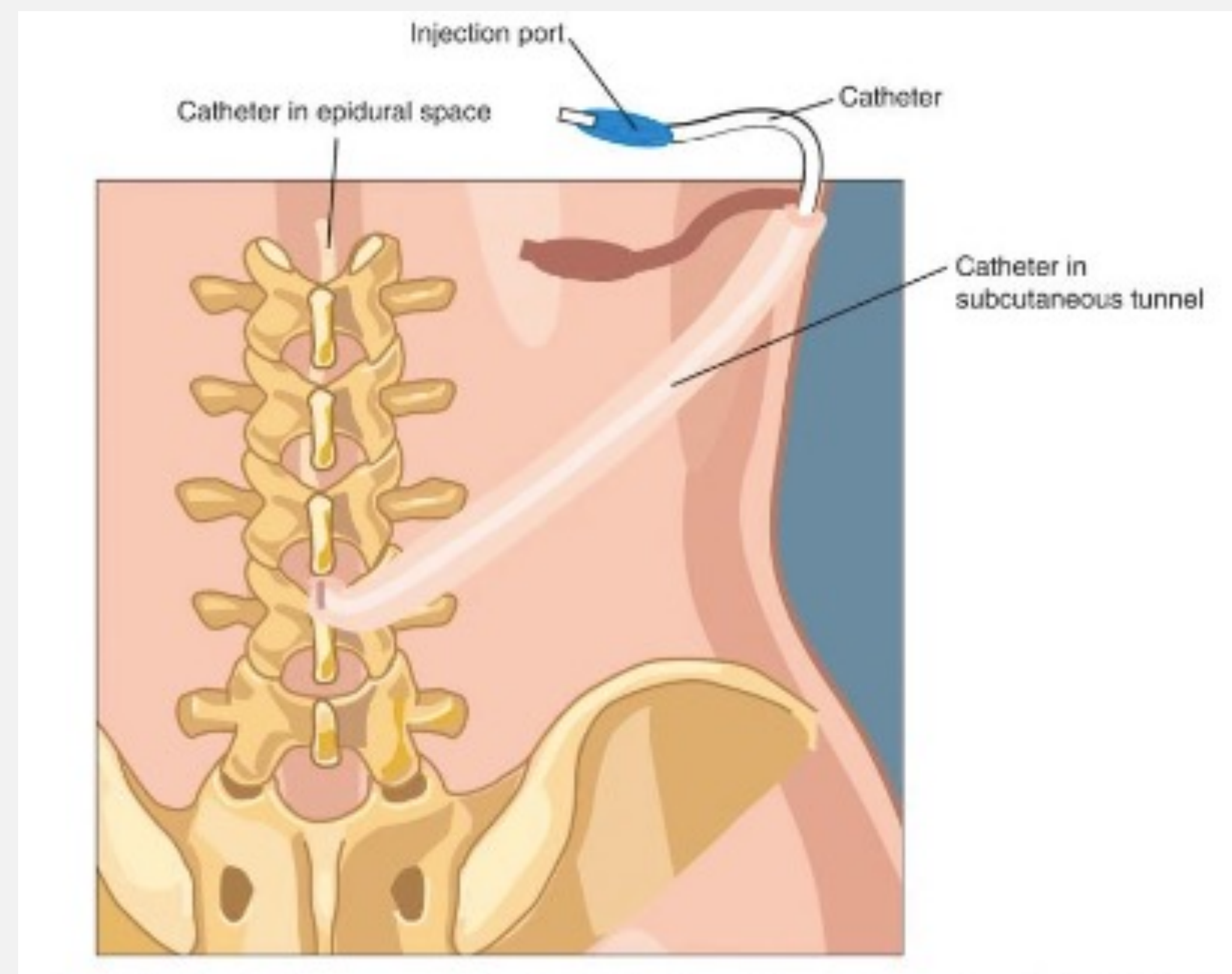


Fig 1: Tunneled Epidural at L3-L4 taken from Atlas of Interventional Pain

Discussion

Our patient demonstrated findings concerning for early chronic regional pain syndrome secondary to central sensitization. Peripheral nerve stimulation and dorsal column stimulation were considered; however, given the distribution of the pain and risk of postoperative complications with physical therapy, these were not pursued. Continuous infusion of local anesthetics along the sympathetic chain with an epidural was determined a suitable alternative, providing superior analgesia and being less cumbersome in the immediate postoperative period.

Common complications of this approach can be prevented by careful titration of infused drugs, frequent observation, and adequate patient and family education. Studies have demonstrated that continuous epidural infusions in CRPS patients reduced pain scores by >50% both at the end of the infusion period and two weeks post-infusion. Similarly, studies have also demonstrated that after six weeks postoperatively, 94.4% of patients met the definition for clinical motion success (improvement in range of motion) and 70% maintained success following knee arthroscopy in patients with arthrofibrosis.

References

1. de Saint Aubain Somerhausen N, van de Rijn M. Tenosynovial giant cell tumour, diffuse type. In: Fletcher CDM, Bridge JA, Hogendoorn P, Mertens F, editors. WHO Classification of Tumours of Soft Tissue and Bone, vol. 5. 4th ed: International Agency for Research on Cancer (IARC); 2013. p. 100–3.
2. Mollon B, Lee A, Busse JW, Griffin AM, Ferguson PC, Wunder JS, Theodoropoulos J. The effect of surgical synovectomy and radiotherapy on the rate of recurrence of pigmented villonodular synovitis of the knee: an individual patient meta-analysis. Bone Joint J. 2015 Apr;97-B(4):550-7.
3. Brahmi M, Vinceneux A, Cassier PA. Current Systemic Treatment Options for Tenosynovial Giant Cell Tumor/Pigmented Villonodular Synovitis: Targeting the CSF1/CSF1R Axis. Curr Treat Options Oncol. 2016 Feb;17(2):10.
4. Nassar WA, Bassiony AA, Elghazaly HA. Treatment of diffuse pigmented villonodular synovitis of the knee with combined surgical and radiosynovectomy. HSS J. 2009 Feb;5(1):19-23. doi: 10.1007/s11420-008-9104-5. Epub 2008 Dec 19. PMID: 19096892; PMCID: PMC2642543.
5. Moufawad S, Malak O, Mekhail NA. Epidural infusion of opiates and local anesthetics for complex regional pain syndrome. Pain Pract 2002; 2:81-86.
6. Pariente GM, Lombardi AV Jr, Berend KR, Mallory TH, Adams JB. Manipulation with prolonged epidural analgesia for treatment of TKA complicated by arthrofibrosis. Surgical Technology International. 2006 ;15:221-224. PMID: 17029180.
7. Saltzman BM, Dave A, Young A, Ahuja M, Amin SD, Bush-Joseph CA. Prolonged Epidural Infusion Improves Functional Outcomes Following Knee Arthroscopy in Patients with Arthrofibrosis after Total Knee Arthroplasty: A Retrospective Evaluation. J Knee Surg. 2016 Jan;29(1):40-6. doi: 10.1055/s-0034-1394163. Epub 2014 Oct 9. PMID: 25300008.
8. Pandita M, Arfath U. Complex regional pain syndrome of the knee - a case report. BMC Sports Sci Med Rehabil. 2013 May 31;5:12. doi: 10.1186/2052-1847-5-12. PMID: 23725372; PMCID: PMC3673900.