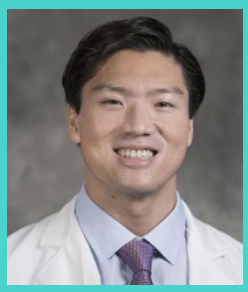
Case Study

Management of Neuroma-Associated Complex Infrapatellar Saphenous Nerve Pain Post-Total Knee Arthroplasty with allay™ Hydrogel Cap



Surgeon & Facility

Neill Y. Li, MD, Peripheral Nerve, Hand and Upper Extremity, and Orthopedic Surgeon

Duke University Medical Center & Duke Health

Specialties

Adult and Pediatric Brachial Plexus Injuries, Upper and Lower Extremity Nerve Injuries, Nerve Tumors, Upper Motor Neuron Syndrome Reconstructions, and Orthopedic Trauma

Case Summary

A 78-year-old woman presented with a 7-year history of chronic, generalized knee pain following primary total knee arthroplasty (TKA). The pain was unresolved despite repeated interventions including revision surgery, oral medication, local anesthetic injection, and spinal cord stimulation. She was referred to the Duke Nerve Center in 2024 with a visual analog scale (VAS) 9/10 pain score and was diagnosed with fibular mononeuropathy and underwent peroneal nerve decompression, which relieved the lateral and anterior components of the pain. However, ongoing and persistent medial knee pain was noted postoperatively. Following a clinical exam and localized injection of lidocaine to the medial aspect, the patient was diagnosed with a neuroma of the infrapatellar branch of the saphenous nerve. After excision and capping with the allay™ Hydrogel Cap, the patient reported complete symptom resolution and improved quality of life at nine months post-op with a VAS pain score of 0/10.

Clinical Problem

Persistent, refractory knee pain following total knee arthroplasty (TKA) is often difficult to localize and treat. Neuromas are estimated to account for up to 10–20% of unexplained postoperative knee pain and may occur after both primary and revision procedures.[1] In this case report, we describe the clinical course of a patient who underwent multiple evaluations and unsuccessful interventions before a neuroma of the infrapatellar branch of the saphenous nerve was diagnosed. Given the failure of prior interventions, surgical excision of the neuroma and capping with the first-of-its kind allay™ Hydrogel Cap was chosen to reduce the risk of disorganized axonal regrowth and neuroma post-procedure.

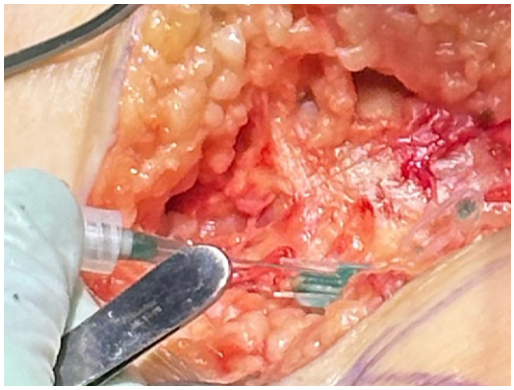


Figure 1: The allay™ Hydrogel Cap is deployed *in situ* and without sutures at the proximal end of the infrapatellar branch of the saphenous nerve, activating upon delivery.

Treatment Overview

Following an extensive history of chronic knee pain with minimal relief, this previously active 78-year-old woman was referred to the Duke Nerve Center with chronic left knee pain rated at 9/10 on the Visual Analog Scale (VAS), impairing the quality of daily activities. Her exam revealed a well-healed midline incision and preserved motor function across all major nerve distributions, but with diminished sensation in the superficial and deep peroneal nerve distributions. Alongside a positive Tinel's sign at the fibular neck overlying the common fibular nerve, she was sent for electrodiagnostic testing which revealed common peroneal neuropathy at the fibular head. Following diagnosis and discussion, the patient elected to proceed with common peroneal nerve decompression. Intraoperatively, taut and tenacious anterior and posterior crural fascia eliciting compression of the peroneal nerve was observed prior to the nerve's distal branching.

allay™ HYDROGEL CAP

Table 1: Intervention Timeline

Unresolved, Chronic Knee Pain Following TKA			Resolution with allay™ Hydrogel Cap	
2016	2017	2018-2022	2024 (Duke Health)	
• Patient undergoes primary TKA	• Presents with burning anterior and lateral left pain • Undergoes revision TKA, with minimal pain relief	• Receives multiple trials of medications (gabapentin, steroids), physical therapy and lumbar injections • Undergoes spinal cord stimulator (T8–T9) implantation that offers temporary pain relief	• Initial VAS score: 9/10 • Diagnosed with chronic peroneal neuropathy; peroneal nerve decompression is performed • Improved lateral and anterior knee pain reported at 6 weeks, but new medial knee discomfort is revealed	• Three months later, patient undergoes saphenous nerve exploration and neuroma resection with the allay™ Hydrogel Cap • Final VAS score: 0/10; 9-months post-op, with improved mobility and function

At six weeks post-decompression, the patient reported significantly improved lateral and anterior knee pain but still complained of persistent medial knee discomfort that referred from the distribution of the saphenous nerve. Examination revealed a positive Tinel's sign just medial to the prior TKA longitudinal incision, following a course across the infrapatellar branch of the saphenous nerve. At the three-month post-operative visit, the presence of ongoing, persistent medial knee pain led to a diagnostic lidocaine injection that provided immediate relief. The patient then elected to proceed with saphenous nerve exploration, neuroma resection, and management of the proximal nerve stump. Intraoperative findings demonstrated two branches arising from the infrapatellar saphenous nerve that terminated in neuromas medial to the TKA incision. To ensure optimal relief of the medial knee distribution, both branches were traced to the main infrapatellar saphenous nerve and resected proximal to its bifurcation. The proximal nerve end was then encapsulated in situ with the allay™ Hydrogel Cap nerve cap to block axonal escape and further growth of the nerve, which was then implanted into the medial gastrocnemius to further stabilize the nerve and minimize risk of recurrence prior to closure.

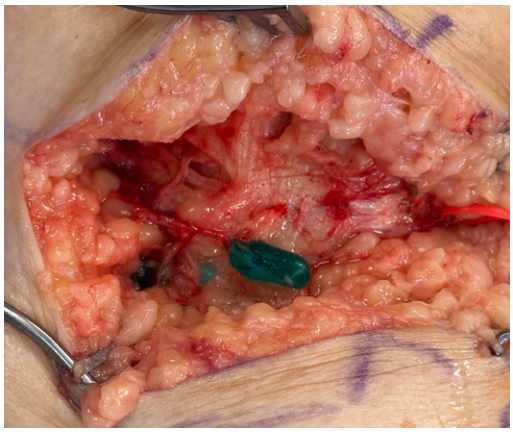


Figure 2: The allay™ Hydrogel Cap forms a non-compressive and protective cushion designed to block axonal escape and reduce the risk of neuroma formation.

Postoperative recovery was favorable. At two weeks, the patient reported reduced pain with occasional tingling citing a score of 6/10; by six weeks, she noted additional improvement to 4/10. At nine months post-op, the patient reported a VAS score of 0/10. She noted significantly improved mobility and enhanced quality of life compared to preoperatively. Long-term follow-up will conclude at the 1-year mark.

Conclusion

This case illustrates the challenges of diagnosing and managing complex pain following TKA. Despite exhaustive prior treatments, focused clinical examination and preoperative workup to identify the root cause led to the identification and excision of a symptomatic neuroma followed by application of the allay™ Hydrogel Cap. Ultimately, the patient's symptoms resolved by 9 months post-treatment. The allay™ Hydrogel Cap provided an effective and reliable option to reduce the risk of neuroma formation, making it a valuable addition to the procedure.

> *"Following proper diagnoses after years of failed interventions, the allay Hydrogel Cap helped to provide this patient with relief that she had not seen in many years."*
>
> ***Neill Y. Li, MD***

allay™ Hydrogel Cap with Adaptive Hydrogel Technology

1. Jokela A et al. Neuroma after TKA: an underdiagnosed pain cause. J Arthroplasty. 2017;32(4):1234–8.