A 53-year-old female presented with severe Raynaud’s Phenomenon (RP) desiring surgical digital palmar sympathectomy. Her past medical history includes Overlap Connective Tissue Syndrome, with features of Sjogren’s, Rheumatoid Arthritis, Polymyositis, Interstitial Lung Disease, and Systemic Sclerosis (SSc). Her RP was causing debilitating hand pain and ischemic ulcers in several fingertips that were concerning for dry gangrene. Her symptoms had worsened despite a medical regimen of Nifedipine, Sildenafil, Aspirin, Pravastatin, Pentoxyphylline, and Hydrocodone/Acetaminophen. She was forced to quit her job due to the frequency of attacks and the severe pain from her ulcers. On exam, she was in considerable pain, with a hand that was cool to the touch and white in appearance. During preoperative admission, pulse oximetry waveforms were not obtainable from any digit of the operative hand.

The hand-surgeon requested a pre-op nerve block for intra-op and post-op analgesia. After discussion with the patient, an infraclavicular brachial plexus block was performed with 20cc of 0.5% Bupivacaine. A 20g catheter was then placed perineurally and secured at the skin. Within approximately 10 minutes of initial local anesthetic placement, the pulse oximeter on the second digit of the operative hand developed a robust, pulsatile waveform measuring oxygen saturations of 98 percent. Additionally, the patient’s pain subsided, her capillary refill was more brisk, and the color of her hand appeared pink.

The patient then underwent an uncomplicated digital palmar sympathectomy and was discharged home later that day with the pain catheter delivering 0.2% Ropivacaine at 6 milliliters an hour. She removed her catheter without incident on postoperative day 2. At her follow up clinic visit 2 weeks later, she reported significant pain reduction and partial healing of her ischemic ulcers. She was very content with her operative results as well as the outcome from her nerve block and catheter. She is now planning to undergo digital palmar sympathectomy on her contralateral hand.

Raynaud’s Phenomenon is an exaggerated vasospastic response to an environmental (cold, smoking) or emotional trigger, resulting in profound color change and discomfort in the patient’s digits. Primary RP (formerly known as Raynaud’s Disease) refers to symptoms that occur without an associated disorder; whereas, secondary RP is when the symptoms are linked with a disorder, most commonly from an autoimmune etiology. Up to 90% of patients with Systemic Sclerosis suffer from secondary RP, which is more likely than primary RP to lead to severe, life-limiting symptoms.
Management of RP begins with patient education and avoidance of triggers. However, secondary RP often requires medical management. Calcium channel blockers are the first line treatment, followed by phosphodiesterase-5 inhibitors, alpha-blockers, endothelin antagonists, topical nitrates, prostaglandin analogs, statins and antioxidants. (2) Roughly 30-70% of patients with SSc and RP will eventually develop digital ulcerations, which are considered to be a sign of late stage disease. (3) Interventional techniques tend to be reserved for when medical management fails and/or digital ulcers form, and they include botulinum toxin injections, peripheral nerve blockade, sympathetic ganglion blockade, spinal cord stimulation, and surgical sympathectomy. (4) Our patient was previously referred to a Scleroderma specialist, who recommended botulinum toxin injections for chemical sympathectomy. This option was not covered by her insurance, thus a surgical intervention was pursued. In a study of botulinum toxin injections for treatment of digital ischemia secondary to RP, the benefits of the therapy proved to be temporary, with a roughly 2-4 month duration of relief, resulting in 35% pain reduction in 75% of patients, and healing of ischemic ulcers in 48% of patients. (5)

Surgical sympathectomy has long been utilized as the last resort for severe RP given its invasive and costly nature. However, recent studies suggest that surgical sympathectomy performed earlier in the disease process may portend better outcomes. A study of 26 surgical digital palmar sympathectomies showed symptom relief in 24 of 26 cases (92%). (3) Chemical sympathectomy via a peripheral nerve catheter has been utilized as a means to demonstrate the potential success of a surgical sympathectomy, as well as a bridge to treatment leading up to surgical intervention. (1) In addition, axillary blocks using liposomal bupivacaine have been studied in the setting of digital ischemia. Interestingly, 2 of the 13 patients in the study experienced sustained resolution of their symptoms after the block without any alterations to their medical management. (6)

Objective measurement of sympathectomy in the setting of peripheral nerve blockade can be accomplished in several ways. Soberon et al. utilized a variety of criteria in their study of 13 patients with digital ischemia receiving axillary nerve blockade with liposomal bupivacaine. They measured change in radial/ulnar artery diameter and blood flow velocity (measured by ultrasound), pain score, capillary refill, and hand temperature. They reported statistically significant improvement in all of these measures 60 minutes after the axillary block was performed. (6)

To the best of our knowledge, our case was the first to describe the use of a pulse oximetry waveform to document successful chemical sympathectomy in a patent with digital ischemia secondary to Raynaud’s Phenomenon. The reappearance of the pulse oximeter waveform is an objective measurement of blood flow being restored in an otherwise vasospastic and poorly perfused hand. Our patient exhibited additional evidence of improved blood flow, including a reduction in pain, quicker capillary refill time, and improved coloration of her digits. We feel that using a pulse oximeter before, during, and after a peripheral nerve block is an effective tool for evaluating the efficacy of chemical sympathectomy in this subset of patients. We plan to utilize this technique and others described by Soberon et al. when our patient returns for her peripheral nerve block and catheter placement prior to undergoing surgical digital palmar sympathectomy on her contralateral hand.

References:


