Laparoscopic renal denervation for chronic renal colic in a previous stone forming patient

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Introduction

Renal colic is a common presenting symptom of urolithiasis. In rare circumstances, renal colic may continue despite treatment or passage of urinary stones. Management can be challenging and require a multidisciplinary approach. Laparoscopic renal denervation has been successful in alleviating chronic renal pain in loin-pain hematuria syndrome (LPHS) and autosomal dominate polycystic kidney disease (ADPKD). There is a paucity of data regarding the use of renal denervation for refractory renal colic in stone forming patients. We present a case of successful laparoscopic renal denervation alleviating refractory renal colic in a previous stone-forming patient.

Case presentation

A 43-year-old female with a significant history of urolithiasis presented with six months of left-sided renal colic refractory to narcotic pain medication. She passed thirty urinary stones during her lifetime. She had previously undergone extracorporeal shockwave lithotripsy (ESWL) and ureteroscopy for her stone disease. She underwent left ureteroscopy one year prior for a small ureteral stone but had persistent renal colic.

In a four month period, she was seen in the emergency room on six occasions for left renal colic. She reported this pain was similar in location and intensity as previous stone episodes. Her constant pain was 8–10/10. She required daily narcotics and was prescribed 120 tablets during this period. Physical examination revealed left costovertebral pain only. Multiple imaging studies did not reveal urinary stones or upper tract dilation. A Nuclear Medicine renal scan revealed an equal split renal function and no obstruction (T1/2 less than 10 minutes bilaterally). Urine culture was negative and Creatinine was 0.75mg/dL. She had a negative musculoskeletal evaluation by pain management and neurosurgery and received vertebral injections without pain resolution.

After a thorough discussion, she underwent a left robot-assisted laparoscopic renal denervation. She was placed in modified right lateral decubitus position. After the robot (daVinci Si, Intuitive Surgical, Sunnyvale, CA) was docked, the left colon was medialized for transperitoneal kidney surgery. The left ureter was retracted anteriorly and cephalad dissection was performed toward the hilum. One artery and one vein were fully skeletonized from the surrounding tissue (Fig. 1). The renal artery was dissected circumferentially from the aortic origin to the kidney capsule. Gerota’s fascia was entered anteriorly and the kidney circumferentially freed from the fascial attachments. Despite previous ESWL treatment, there was no adherence within Gerota’s fascia. The kidney was fully mobilized and able to rotate 120° on the hilar axis (Fig. 2). The kidney was maintained in its orthotopic position and Gerota’s fascia was reapproximated (Fig. 3). No drains were left following the procedure. Operative time was 161 minutes and blood volume loss was 15mL. There were no intraoperative complications.

She was discharged the following day. Her postoperative narcotic medication use included 36 doses over the first week, averaging pain of 4–8/10. At three-weeks, her narcotic requirement decreased to 3 tablets over that week (2/10 pain). At one month, she was pain free (0/10) and not taking pain medication. At her 6 month follow up she continued to be pain free (0/10) with no narcotic medication. Interestingly, she developed left lower abdominal pain and kidney “pressure”, but no renal colic, at 9 months postoperative due to a 3mm left ureteral calculus with hydronephrosis. The stone passed without intervention.

Discussion

The prevalence of kidney stone disease has increased in adults. Renal colic is the most common presenting symptom of urinary

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Chronic renal colic can persist in rare patients even following passage or treatment of urinary stones. We report our case of a rare stone forming patient with a year-long persistent renal colic following treatment of her urinary stones that was refractory to a wide variety of therapies.

Chronic renal colic has been described in patients with LPHS and ADPKD. While chronic pain is frequently multifocal, a neural component has been the target of recent advances in management strategies. The renal plexus is the main system by which the kidneys and nervous system communicate. Animal and cadaveric studies have detailed the complex neural innervation pathway of the kidney. This network of ganglia and neural filaments course with vascular structures of the renal hilum. The majority of these fibers converge around the ventral surface of the renal artery. Histologic studies have confirmed these nerves traverse along the adventitia and periadventitial fat allowing for surgical disruption along the renal hilum. Studies have implied that renal innervation also arise from outside the hilum due to the aorticorenal and intermesentric ganglia connections that must be addressed during denervation techniques.

Refractory renal colic can present a unique challenge. Our patient experienced persistent renal colic without a urinary stone, kidney dilation or musculoskeletal abnormality. She underwent a thorough investigation in a multimodal approach by Urology, Medicine, Chronic Pain Service and Neurosurgery. A multidisciplinary approach is recommended such as behavioral modification, physical therapy, medications and surgical procedures. Our patient failed these alternative therapies and was relying on narcotic medications. Surgical interventions that have been employed for renal colic in patients with ADPKD and LPHS include cyst decortication, ablative renal denervation, laparoscopic renal denervation and nephrectomy. Laparoscopic renal denervation has shown success in the literature. A study in ADPKD patients revealed success rates of near 100% during 24 months of follow up. Also, a minimally-invasive renal denervation study in this patient population decreased narcotic use (22%) and improved quality of life (66%) for two years. There is little data outside of these populations regarding the role of renal denervation, especially in patients with no urologic or other identifiable cause. Laparoscopic renal denervation was successful in our patient, completely alleviating her chronic renal colic. Laparoscopic renal denervation may prove to be a valuable resource for patients with refractory renal colic if they fail more conservative interventions. Future studies are required to evaluate the effectiveness, as well as develop the surgical principles of this procedure.

**Conclusion**

For patients with chronic renal colic, a multidisciplinary approach for evaluation and treatment is recommended. For the appropriately selected patient, laparoscopic renal denervation may be considered.

**Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or non-for-profit sectors.

**Conflicts of interest**

Dr. AR: No competing financial interested exist. Dr. DC: No competing financial interested exist. Miss NC: No competing financial interested exist. Dr. CA: No competing financial interested exist.

The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, The Department of the Army, the Department of the Air Force and Department of Defense or the U.S. Government.
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