



## Renal Denervation in Patients With Loin Pain Hematuria Syndrome

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Loin pain hematuria syndrome (LPHS) is a painful and incapacitating condition that typically affects young women. Treatment options, including opiates and/or surgical denervation of the renal nerves by auto-transplantation, have variable success. In this report, we describe the successful use of endovascular renal nerve ablation in this population. Four women with LPHS and intractable pain unresponsive to conservative measures underwent endovascular ablation of the renal nerves between July and November 2015 using the Vessix renal denervation system. The number and frequency of pain medications and responses to the EQ-5D, McGill Pain Questionnaire, Geriatric Depression Score, 36-Item Short-Form Health Survey, and Oswestry Disability Index were measured at baseline and 3 and 6 months postprocedure to evaluate changes in pain, disability, quality of life, and mood. There were improvements in pain, disability, and quality of life from baseline to 6 months post-procedure. By 6 months, 2 of 4 patients had discontinued all pain medications, whereas the other 2 had reduced their doses of these medications by 75%. These results suggest that percutaneous catheter-based renal nerve ablation with radiofrequency energy may be a treatment option for some patients with LPHS.

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**INDEX WORDS:** Renal denervation; loin pain hematuria syndrome (LPHS); endovascular ablation of the renal nerves; pain management; opioids; quality of life.

Loin pain hematuria syndrome (LPHS) is characterized by severe unilateral or bilateral recurrent loin pain that suggests a renal origin, but occurs in the absence of identifiable or relevant urinary tract disease.<sup>1-3</sup> Hematuria can be microscopic or macroscopic, and the renal abnormalities responsible for the hematuria are often unexplained. If nephrolithiasis had occurred in the past, a recent imaging study should rule out obstruction of the urinary tract. Debilitating pain refractory to conventional pain medications is the main cause of morbidity in this patient group. We present 4 cases of patients with LPHS who underwent endovascular radiofrequency ablation of the renal nerves and experienced significant improvement in pain relief and quality of life (QoL).

The patients reported here were participants in a single-center single-arm study of patients with LPHS from Southern Saskatchewan, Canada. In 3 patients,

secondary causes of flank pain were excluded with cystoscopy, triphasic computed tomography (CT) of the abdomen and pelvis with delayed images, CT angiography to examine the vasculature, and split function mercaptoacetyl triglycine to assess relative function of the kidneys. The patients underwent basic biochemistry testing (renal panel and electrolytes) and complete blood count, urine for cytology, and repeated urine microscopic examinations. The fourth patient had already been examined a decade earlier and had undergone a nephrectomy; therefore, the relevant investigations and procedures were not repeated during our examination. For all cases, the diagnosis of LPHS was performed by exclusion.

Renal denervation was performed after seeking Health Canada approval for this indication. The Regina Qu'Appelle Health Region Research Ethics Board approved this study. Individual informed patient consent was obtained prior to the use of their data for research purposes.

All 4 patients were treated with bilateral application of radiofrequency ablation (Vessix denervation catheter; Boston Scientific). Under local anesthesia, percutaneous femoral access was used to introduce the catheter, and selective tight renal artery catheterization was performed. The radiofrequency probe was applied to the arterial wall in a zone close to the renal hilum, under radiographic and impedance control. Thirty-second-long 0.7-W radiofrequency energy ablations were applied sequentially to both renal arteries. At the culmination of the procedure, an angiogram of

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the aorta and both renal arteries was obtained to check the integrity of the renal artery and parenchyma.

The aim of our study was to examine the effect of renal denervation on patients' use of pain medications (number and frequency) and changes in self-reported pain (McGill Pain Questionnaire [MPQ]), QoL (EuroQol 5 Dimensions visual analogue scale [EQ-5D VAS] and 36-Item Short Form Health Survey [SF-36] questionnaires), mood (Geriatric Depression Score), and disability (Oswestry Disability Index) from baseline to 3 and 6 months post-renal denervation. All 4 patients were white women; their baseline characteristics are shown in Table 1. Changes in pain, QoL, disability, and mood from baseline to the post-renal denervation time points are reported in Table 2.

## CASE REPORTS

### Case 1

A 62-year-old woman initially presented in 2010 with right flank pain, which became progressively worse. Six months after seeing her family physician, she passed a uric acid stone. After frequent visits to the emergency department for recurrent pain, she was referred to a urologist. Evaluation with serial anatomic and functional imaging did not show abnormalities. She started scheduled meperidine and acetaminophen/codeine therapy with partial relief. After renal denervation, she experienced considerable pain relief with dramatic reductions in MPQ score and reduced the number and dose of pain medications. Her reduction in pain was accompanied by improvements in mood on the Geriatric Depression Score, disability on the Oswestry Disability Index, and QoL on almost all subscales of the SF-36 and the VAS score of the EQ-5D.

### Case 2

A 30-year-old woman presented to our renal clinic in 2014 with right-sided chronic flank pain over the previous year. She also had passed a kidney stone 1 year prior to presentation but was stone free on serial CT. Functional imaging findings were unremarkable. After failure of conservative treatment, she underwent renal denervation with substantial improvement in pain (MPQ score), a reduction in opioid use, improvements in mood and disability, and consistent increases on all subscales of the SF-36 and EQ-5D VAS.

### Case 3

A 28-year-old woman presented to our renal clinic with right-sided flank pain for the past 6 months. She initially presented to the emergency department with an acute episode of symptomatic stone disease. Although the patient passed the stone, she experienced recurrent episodes of right-sided pain. She continued to have severe intractable pain despite no evidence of stones on follow-up imaging. After renal denervation, the patient experienced pain relief according to MPQ score and thus reduced pain medication use. She also experienced improved mood, disability, and QoL at 3 months with some waning at 6 months.

### Case 4

A 30-year-old white woman experienced her first episode of right-sided flank pain in 2003. She was examined with CT, retrograde pyelography, renal angiography, and cystoscopy, all of which had unremarkable findings. Because there was no demonstrable cause of her loin pain and hematuria, LPHS was diagnosed. She underwent autotransplantation of the right kidney for intractable pain. She had pain relief for about 6 months, but unfortunately the pain recurred, leading to nephrectomy of the right kidney. The patient was pain free until 2013, when she developed progressively worsening left-sided flank pain requiring intrathecal morphine. She experienced suboptimal control of pain and poor QoL. She underwent renal denervation with improvement in pain symptoms, disability, mood, and QoL to some extent.

## DISCUSSION

We present 4 successful cases of renal denervation, a novel treatment of intractable pain in patients with LPHS. The reduction in pain was accompanied by considerable improvement in functionality and QoL for these women. Our report adds to a 2013 case report from an Italian group,<sup>4</sup> which described a patient with hypertension and flank pain that was relieved after renal denervation. Other reports in the literature have documented the use of radiofrequency ablation for the treatment of renal pain in autosomal dominant polycystic kidney disease.<sup>5</sup> In our patients with LPHS, we have found considerable pain relief after renal denervation with no changes in blood pressure postprocedure. Renal denervation was performed bilaterally because the pain often recurs on the contralateral side. As noted, half of our 4 patients

Table 1. Patient Baseline Characteristics

Patient	Age at Onset, y	Duration of LPHS, y	Serum Creatinine, $\mu\text{mol/L}$	Medication Class	Medication Frequency
1	57	6	77	Opioid	Meperidine (50-100 mg every 8 h); acetaminophen/codeine (1-2 tabs 2 $\times$ /d)
2	28	1.5	89	Opioid	Morphine (5 mg 2 $\times$ /d); phenazopyridine (200 mg 3 $\times$ /d)
3	28	0.5	77	Opioid	Acetaminophen/codeine (1-2 tabs 2 $\times$ /d); morphine (5 mg, 1-2 tabs 2 $\times$ /d)
4	18	11	75	Antispasmodic Opioid Intrathecal pump	Hyoscine butylbromide (10 mg/d) Meperidine (50 mg 4 $\times$ /d); fentanyl patches Methadone as needed

Abbreviation: LPHS, loin pain hematuria syndrome.

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