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Successful Use of Renal Denervation in Patients With Loin Pain Hematuria Syndrome—The Regina Loin Pain Hematuria Syndrome Study

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Introduction: Loin pain hematuria syndrome (LPHS) is characterized by severe unilateral or bilateral loin pain that suggests a renal origin but occurs in the absence of identifiable or relevant urinary tract disease. Hematuria can either be microscopic or macroscopic, but the renal abnormalities responsible for the hematuria are unexplained. Debilitating pain refractory to conventional pain medications is the main cause of morbidity.

Methods: We conducted a single-arm, single-center study. Twelve patients between the ages of 21 and 62 years (11 female, 1 male) with LPHS underwent endovascular ablation of the renal nerves between July 2015 and November 2016, using the Vessix renal denervation system. The primary objective was to achieve 30% reduction in self-reported pain with the McGill Pain Questionnaire (MPQ) at 6 months. The secondary objectives were to measure changes in disability (Oswestry Disability Index [ODI]), mood (Geriatric Depression Scale [GDS]), and quality of life (EuroQol-5D [EQ-5D] and the MOS 36-Item Short Form Survey [SF-36]) scores from baseline to 6 months postprocedure.

Results: Ten of 12 patients at 3 months and 11 of 12 patients at 6 months reported a >30% reduction in pain based on the MPQ at 3 and 6 months. We found consistent improvements in MPQ, ODI, GDS, EQ-5D, and SF-36 scores from baseline to 6 months postprocedure.

Conclusion: We conclude that renal denervation is associated with a considerable improvement in pain, disability, quality of life, and mood. Our results suggest that percutaneous catheter–based delivery of radiofrequency energy is a safe, rapid treatment option that should be considered in all patients with LPHS.

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Loin pain hematuria syndrome (LPHS) is a rare clinical disorder with a reported prevalence of 0.012%[1] and typically affects younger women. Since its initial description in 1963,[2] it has remained a poorly understood clinical condition characterized by severe, unilateral or bilateral loin pain localized to the kidney but in the absence of identifiable urinary tract disease.[2] Hematuria can be either microscopic or macroscopic, and the renal abnormalities responsible for both pain and hematuria are often unexplained.[3] Debilitating pain refractory to conventional pain medications is the main cause of morbidity.[4] LPHS imposes a significant health and economic impact in terms of loss of productivity and quality of life in a young population as these patients are shuffled among numerous health care providers in search of a diagnosis.[5] Multiple visits to the emergency departments add to the significant burden of investigations and consultations.

It is likely that multiple, as-yet-unrecognized stimuli are responsible for the agonizing and unrelenting pain. Nociceptive fibers are transmitted in afferent Aδ and C

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fibers from the kidney, coursing through the periarterial nerves, ascending by way of renal and intermesenteric plexi to the lowest splanchnic nerve, and passing via the dorsal roots of T11 through L1 to the spinothalamic tracts.[6,7] The presence of these pain-carrying fibers in the renal arterial adventitia presents a unique opportunity to interrupt the pathways by using percutaneous intravascular ablation by thermal ablation as a practical superior alternative. Recent case reports[8] and small case series[9,10] have shown successful renal denervation (RDN) to be a potent therapeutic target for patients with LPHS. It has the advantage of being catheter based, safe, rapid, and minimally invasive.[8,9]

We present 12 cases of patients who underwent successful RDN as part of our Prairie renal denervation study using the Vessix renal denervation system, leading to significant improvement in pain relief.

MATERIALS AND METHODS

Study Design and Participants

We conducted a single-center, single-arm, pre−post design study, consisting of 12 patients with LPHS who were referred for bilateral endovascular ablation of the renal nerves for pain relief across western Canada. Individual patient consent was obtained prior to the procedure. RDN was performed after seeking Health Canada approval. The results of this study include findings from 4 patients of our previous study.[9]

Inclusion Criteria

Patients were included if they had flank and loin pain expressed at the costovertebral angle, unilateral or bilateral, and described as "deep pain." Pain was required to be chronic, severe, recurrent for 6 months or more, and exacerbated by a gentle punch to the costovertebral angle. It was required to be sufficiently severe to prompt the patients' health care providers to prescribe or consider narcotic therapy. If urolithiasis had occurred in the past, the absence of obstruction was confirmed by 1 or more consecutive imaging procedures obtained during episodes of flank pain. For the LPHS cohort, hematuria was defined as more than 5 red blood cells (RBCs) per high-power field (HPF).

Exclusion Criteria

Patients were excluded if the traditional causes of flank pain and hematuria were present: obstructive uropathy, pyelonephritis, polycystic kidney disease, renal artery embolism, renal artery dissection, renal papillary necrosis, renal vein thrombosis, left renal vein entrapment (nutcracker syndrome), trauma, and renal tumor. All patients underwent cystoscopy and triphasic computed tomography of the abdomen and pelvis with delayed images; a MAG3 split-function renogram was arranged to look at split glomerular filtration rate to exclude secondary causes of LPHS. Patients also underwent basic biochemistry tests (including a renal panel and electrolytes) and a complete blood count, and provided urine for cytology and repeated urine microscopic examinations.

Procedure

All patients underwent renal artery radiofrequency ablation using a Vessix catheter, 5- to 7-mm wide, in the angiography suite under general anesthesia. An interventional radiologist gained percutaneous femoral access to introduce the 7Fr Terumo destination sheath under aseptic technique. A 0.035-inch-diameter guide wire was introduced via the arterial puncture. This was followed by insertion of a 5Fr pigtail catheter. An aorto-renal angiogram was performed in 10° Left Anterior Oblique projection. A cobra catheter was used to perform selective individual renal artery catheterization and angiography. A 3000-IU quantity of heparin and 50-μm quantity of Nitrocine (glyceryl trinitrate) were administered into each renal artery. The Vessix catheter (5−7 mm wide, 2 cm long) was selectively introduced into renal arteries sequentially over a 0.018-inch SV5 guide wire. Six bipolar electrodes on a balloon platform enabled firm contact with the renal endothelium, which was confirmed on the generator module. Energy (30 seconds long, 0.7-W radiofrequency energy ablations) was then delivered multiple times across the entire length of the vessel in a fixed helical pattern under radiographic and impedance control, creating between 16 and 24 lesions, depending on the length of the main artery and the presence of accessory vessels. The procedure was then repeated on the contralateral renal artery. A final renal angiogram was then obtained, to check the integrity of the renal artery. A closure device was used for all patients to allow early ambulation.

Data Collection

Once the patient was considered to be suitable for the procedure, the coordinator then interviewed the patient to document the following: pain score (McGill Pain Questionnaire [MPQ]), quality of life scores (EuroQol-5D [EQ-5D] and 36-Item Short Form Health Survey [SF-36]), mood (Geriatric Depression Scale [GDS]), and disability (Oswestry Disability Index [ODI]). The interviews were conducted prior to the procedure and at 3 and 6 months after RDN (±15 days).

McGill Pain Questionnaire

The MPQ provides a quantitative profile of 3 aspects of pain (sensory, affective, and evaluative, to specify subjective pain experiences). It also contains an