Celiac plexus block for chronic flank pain: a case series

William W. French, MD,[1] Joseph M. Kuebker, MD,[2] Xiang Shu, MS,[3] Christopher M. Sobey, MD,[4] Ryan S. Hsi, MD[2]

[1]Department of Urology, University of North Carolina Medical Center, Chapel Hill, North Carolina, USA
[2]Department of Urology, Vanderbilt University Medical Center, Nashville, Tennessee, USA
[3]Division of Epidemiology, Department of Medicine, Vanderbilt University Medical Center, Nashville, Tennessee, USA
[4]Department of Anesthesiology, Vanderbilt University Medical Center, Nashville, Tennessee, USA

FRENCH WW, KUEBKER JM, SHU X, SOBEY CM, HSI RS. Celiac plexus block for chronic flank pain: a case series. *Can J Urol* 2021;28(1):10556-10559.

Non-obstructive, chronic flank pain in urologic patients can be a challenging problem to manage. In this series, we examined the efficacy of celiac plexus blockade in providing pain relief and reducing opiate use in 14 adult urology patients with non-obstructive flank pain for >1 year. Demographic, clinical, and procedural variables were collected from the medical record for retrospective analysis. Subjective improvement in pain occurred in 11 individuals (79%), and 5 (50%) were able to reduce their daily morphine equivalent dose (MED). Celiac plexus blockade is a viable option for symptomatic relief in urologic patients with non-obstructive chronic flank pain.

Key Words: celiac plexus block, flank pain, kidney stone, nephrolithiasis, opioids

Introduction

Flank pain is a common presenting symptom for urologic conditions, most often due to urinary tract obstruction. One such situation is recurrent kidney stone disease where repeated episodes of obstruction can lead to chronic flank pain.[1] However, in the uncommon situation when the flank pain occurs in the absence of urinary tract obstruction, management can be especially challenging to achieve symptom relief. Various treatment modalities have been described, including non-opiate analgesics, opiate analgesics, and, in rare cases, surgical intervention.[2,3]

Celiac plexus blockade (CPB) has not been previously described for chronic flank pain in urologic patients, but it may offer symptomatic relief in this scenario. In the percutaneous approach to this procedure, local anesthetic is delivered to the anterolateral aspect of the T12/L1 vertebral bodies using fluoroscopic or computed tomography (CT) guidance. Injectate can include adjuncts such as clonidine or exogenous steroid, such as dexamethasone, in an effort to prolong the duration of analgesia, or it can contain neurolytic

Accepted for publication December 2020

Acknowledgments
We would like to thank Duke Herrell, MD and Nicole Miller, MD for their intellectual contributions and their support through the development of the manuscript.

Address correspondence to Dr. William W. French, University of North Carolina Medical Center, 101 Manning Drive, Chapel Hill, NC 27514 USA

agents such as alcohol or phenol.[4] Efficacy of CPB has been shown for intractable visceral abdominal pain secondary to malignancy, specifically for pancreatic cancer, as well as other non-malignant conditions with reported improvement in pain relief over months and reduced opioid consumption.[5,6]

In this case series we describe the outcomes of celiac plexus blockade among 14 urologic patients, comprised primarily of recurrent kidney stone formers, with chronic flank pain.

Case report

We performed a retrospective review of 14 adult patients with a history of chronic flank pain without evidence of upper tract urinary obstruction who had undergone a percutaneous CPB (CPT code 64530) at our institution between 1999 and 2018. Baseline demographic and clinical variables collected from the medical record can be viewed in Table 1.

Chronic flank pain was defined as pain lasting greater than 1 year. In order for flank pain to be considered non-obstructive, a patient must be shown to be free of any intraluminal and/or extraluminal obstruction of the upper urinary tract. All patients had no evidence of obstruction on computed tomography, while eight patients (57%) had no evidence on renal ultrasound and five patients (36%) had unobstructed drainage on diuretic renogram. There were nine patients (64%) with non-obstructing stones seen on imaging, and seven of these patients underwent ureteroscopy with lithotripsy and basket extraction which provided minimal to no pain relief. Four patients (29%) had prior urologic surgery performed, including partial right nephrectomy for renal cell carcinoma in one patient and pyeloplasty for UPJ obstruction in three patients, with two of the three requiring subsequent endopyelotomy for re-stenosis.

With no identifiable cause for pain, each of these patients subsequently underwent CPBs. The percutaneous approach was dependent upon provider preference and utilized a mixture of retrocrural, splanchnic, and transaortic techniques. Small variations in location were secondary to patient anatomy (i.e. low lying 12th rib, inferiorly displaced diaphragm) in order to access the desired location safely and effectively. Typically, needles are inserted immediately caudal to the 12th rib, 7-8 cm lateral to the midline, bilaterally. Each needle is then angled at 45 degrees and advanced towards the inferior aspect of the T12 or superior aspect of the L1 vertebral body under imaging guidance, until contact is made with the desired vertebral body. The needle is then slightly withdrawn and redirected laterally until 1-2 cm anterior to the vertebral body where, following negative aspiration of heme and confirmatory deposition of contrast, a block can be performed. Each of these blocks was performed bilaterally, and no neurolytic agents were given. For the 61 recorded CPBs, ropivacaine was used in 47 procedures (77%), bupivacaine in 14 procedures (23%), and lidocaine in 4 procedures (6.5%). Steroids, including dexamethasone, methylprednisolone, and betamethasone, were used in 31 procedures (51%), and clonidine was used in 31 procedures (51%) as well.

Patients were generally evaluated at 1 month following a block, and the minimum interval between blocks was about 1 month as well. The results regarding subjective improvement in pain as well as

TABLE 1. **Patient demographics and pain history**

Variables	**n = 14 patients**
Age, mean (range, SD), years	38.7 (21-62, 11.3)
Sex (n, %)	
Female	10 (71%)
Male	4 (29%)
BMI, mean (range, SD), kg/m^2	28 (20.8-39.5, 6.13)
Urologic history (n, %)	
Nephrolithiasis	12 (86%)
Medullary sponge kidney	4 (39%)
UPJ obstruction	3 (21%)
Other[a]	2 (14%)
Duration of persistent pain prior to first block, mean (range, SD), years	8.6 (1-22, 6.4)
Laterality of pain (n, %)	
Right	4 (29%)
Left	5 (36%)
Bilateral	5 (36%)
Opioid use prior to first block (n, %)	11 (79%)
Average daily opioid use 30 days prior to first block, mean (median, range, SD), MED	53 (35, 0-165, 50.1)
Duration of opioid treatment prior to first block, mean (median, range, SD), years	2.6 (1.5, 0-8, 2.8)
Follow up duration, mean (range, SD), years	5.4 (0.25-15.7, 4.4)

[a]polycystic kidney disease – 1; retroperitoneal fibrosis – 1; MED = morphine equivalent dose; BMI = body mass index

TABLE 2. **Celiac plexus block and outcomes**

Variables	**n = 14 patients**
Number of blocks per patient, mean (median, range, SD)	4.4 (2, 1-18, 5.2)
Responders[a]	11 (79%)
Percent pain improvement by patient report, mean (SD)	82% (18)
Responders with post block MED reduction (n, %)[b]	5 (50%)
Percent reduction (range, SD)	83% (36-100%, 24.3)
Mean reduction, MED, (range, SD)	60 (20-105, 48.8)
Responders with complete response (MED reduction to 0) (n, %)	3 (30%)

[a]responder is defined as any subjective documentation of pain improvement following and attributed to the celiac plexus block. One patient was without follow up following their procedure, so they were presumed a non-responder.
[b]one patient responded but was not on opioids prior to the procedure, so they were not included in the MED reduction analysis.
MED = morphine equivalent dose

the reductions in daily MEDs can be viewed in Table 2. A responder was defined by having any subjective report of pain improvement documented at follow up, and this was quantified with a percent improvement in symptoms. Subjective quantification was available for 10 of the 14 patients, while three patients only had anecdotal evidence of response. Opiate use prior to and after intervention was extracted in two ways: 1) from medication history and 2) reports from the Tennessee Controlled Substance Monitoring Database (CSMD). All medications and dosages were converted to morphine equivalent dosing (MED). Among patients with multiple CPBs, MED reduction was calculated based on pre-intervention compared to after the last blockade, while subjective improvement was determined as the mean percentage change over the treatment course.

Discussion

In this case series with a mean follow up time of over 5 years, we examined the long term efficacy of CPB in providing pain relief and decreasing opioid requirements in a population who reported at least 1 year of non-obstructive flank pain. Approximately 80% of the cohort reported a subjective 80% improvement in symptoms. Most patients underwent 2 or more procedures. Half of the responders that were on chronic opioid therapy were able to decrease their opiate consumption, with a few able to eliminate opiates from their pain management regimens entirely.

These results are consistent with other studies that have been published on the efficacy of CPB in pain relief. One large meta-analysis reported that 89% of patients with abdominal malignancy reported good to excellent pain relief at 2 weeks and at 3 months following their CPB.[7] A more recent systematic review by Nagels et al in 2013 showed similar results of improved pain by examining five randomized controlled trials that compared CPB with standard analgesic therapy. Pain improvement favored CPB at 1 month by a mean difference in visual analogue scale pain score of -0.47 (95% CI -0.71, -0.23; p = 0.0001) and at 2 months by a mean difference of -0.46 (95% CI -0.68, -0.25). There were also a significant difference in morphine usage between the CPB group and the standard analgesic group favoring the CPB group with a mean difference in MED of -72.41 (95% CI -86.14, -58.68,; p = 0.002) at 1 month and a mean difference of -70.02 (95% CI -104.05, -36.00; p < 0.0001) at 2 months.[8]

We observed that there were three populations within the case series. One population had no response to the procedure, though this was the minority of patients (n = 3, 21%). The responders had two distinct groups: one group that underwent only 2-3 blocks, while the other group had ≥ 4 blocks. Interestingly, the population that only had 2-3 blocks encompassed all of the patients who were able to reduce their daily MED requirements. In these patients, CPB served more as a bridge for acutely de-escalating their opiate requirements, rather than as a component of a longer term pain management strategy.

For our subgroup of responders that underwent ≥ 4 blocks, the injections appear to have become a part of their long term pain management regimen, while no durable reduction or elimination of opiates were observed. One prior case study examined a patient with autosomal dominant polycystic kidney disease with chronic flank and epigastric pain who experienced over 90% relief with a CPB and repeated the procedure every 4-6 months for a total of 27 months for continued therapy.[9] The duration of analgesic effect for our cohort was exceptionally variable, ranging from 2 days to 5 months; however, because of the variability of injection contents and the small sample size, we were not able to draw any conclusions regarding prolongation of therapeutic effect.

Complications are usually mild and infrequent in CPBs. The most common complications include

transient hypotension, diarrhea, and needle insertion site pain. More serious, although very rare, complications can include pneumothorax as well as the spread of neurolytic agent into the nerve roots, epidural space, or intrathecal space causing transient or permanent spinal cord damage or paraplegia. Serious complications have an incidence of less than 0.2%.[10] For our specific population, side effects were infrequent. Two patients experienced nausea and one patient experienced self-limited shortness of breath attributed to diaphragmatic irritation following their first block. Another patient experienced a transient syndrome of blood pressure dysregulation, nausea, vomiting, diarrhea, fluctuating temperature, and decreased kidney output post-procedure. It was believed to be related to the administration of clonidine, which was withheld during the next block and no subsequent adverse events occurred.

Limitations of this study include its small sample size, retrospective design, use of subjective measures of pain, missing data, and the heterogenous presentation among the cohort. Moreover, there was variability in the injectate administered, which limited our ability to draw any conclusions regarding the type of anesthetic or adjuncts used. Despite the limitations, major strengths of this study include the unique population with documented pain > 1 year and long term follow up. Prospective studies with standardized injection components and consistent follow up at regular intervals are needed to confirm these findings and to better determine the degree of pain reduction and functional improvement.

Conclusions

CPB provided symptomatic relief in this small series of urologic patients with non-obstructive chronic flank pain. Some patients were able to wean off chronic opioid medication, and the procedure appears safe with a low complication rate. It may be reasonable to trial CPB prior to more invasive treatment, but further prospective studies are needed to confirm these findings. □

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