Received: 19 February 2020 | Revised: 4 May 2020 | Accepted: 26 May 2020

DOI: 10.1002/emp2.12157

JACEP OPEN
JOURNAL OF THE AMERICAN COLLEGE OF EMERGENCY PHYSICIANS OPEN
A GLOBAL JOURNAL OF EMERGENCY MEDICINE
Open Access
WILEY

CASE REPORT

General Medicine

Breaking open the case of one patient's acute left flank pain: nutcracker syndrome

Rebecca Bajkowski MD | **Anthony Lagina MD**

Emergency Medicine Department, Wayne State University, Detroit, Michigan, USA

Correspondence
Rebecca Bajkowski, MD, Detroit Medical Center, Emergency Department, 4201 St. Antoine, Detroit, MI, 48201, USA.
Email: bbajkowski@gmail.com

Funding and support: By *JACEP Open* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist.

Abstract

Acute flank and abdominal pain represent a common presenting complaint in the emergency department. The etiology can be broad, ranging from the chest to the groin, from benign to catastrophic. There are common causes such as nephrolithiasis and pyelonephritis for which more than 1 million Americans are diagnosed with in the United States each year.1 Other etiologies are more rare and difficult to diagnose. The following case discusses a rare syndrome involving a young man with flank pain and a few other symptoms.

KEYWORDS
abdominal pain, flank pain, hematuria, nutcracker syndrome, superior mesenteric artery syndrome

1 | INTRODUCTION

Acute flank and abdominal pain represent a common presenting complaint in the emergency department (ED). The etiology can be broad, ranging from the chest to the groin, from benign to catastrophic. There are common causes such as nephrolithiasis and pyelonephritis for which more than 1 million Americans are diagnosed with in the United States each year.[1] Other etiologies are more rare and difficult to diagnose. The following case discusses a rare syndrome involving a young man with flank pain and a few other symptoms.

2 | CASE REPORT

A 28-year-old male with a remote history of a stab wound to the abdomen presented to the ED with 3 days of quickly progressing left flank pain. On history, he reported left flank and left lower abdominal pain progressing over the past 3 days that radiated to his groin. The pain was associated with difficulty urinating, hematuria, nausea, and constipation. There was no dysuria. His last bowel movement was 2 days ago, and he was still passing flatus. He described the pain as the worst he has ever felt.

On physical exam, he was hemodynamically stable and appeared in mild distress. His abdominal exam was significant for a soft but tender left upper and lower quadrant, left costovertebral angle tenderness, but no masses appreciated. He had no testicular swelling or hernias. His basic and abdominal labs were unremarkable, and urinalysis was significant for bacteria. A computed tomography (CT) abdomen/pelvis without contrast was obtained to evaluate for urolithiases.

His CT abdomen/pelvis without contrast showed no acute process. His pain was not relieved by opioids, and he had no urinary output. A Foley catheter was placed with 300 cc of output. With his continuous pain, even after parenteral opioid medications, and a normal scan without contrast, there was a concern for splenic artery infarction or renal artery stenosis; therefore, a CT angiogram was ordered and read by the radiologist as a "narrowing of the third portion of the duodenum (Figure 1) between the aorta and superior mesenteric artery and the left renal vein (Figure 2). This can produce a nutcracker syndrome phenomenon." After the patient was admitted, his abdominal ultrasound had suboptimal images; however, it showed a patent renal vein and

Supervising Editor: Angela Lumba-Brown, MD.

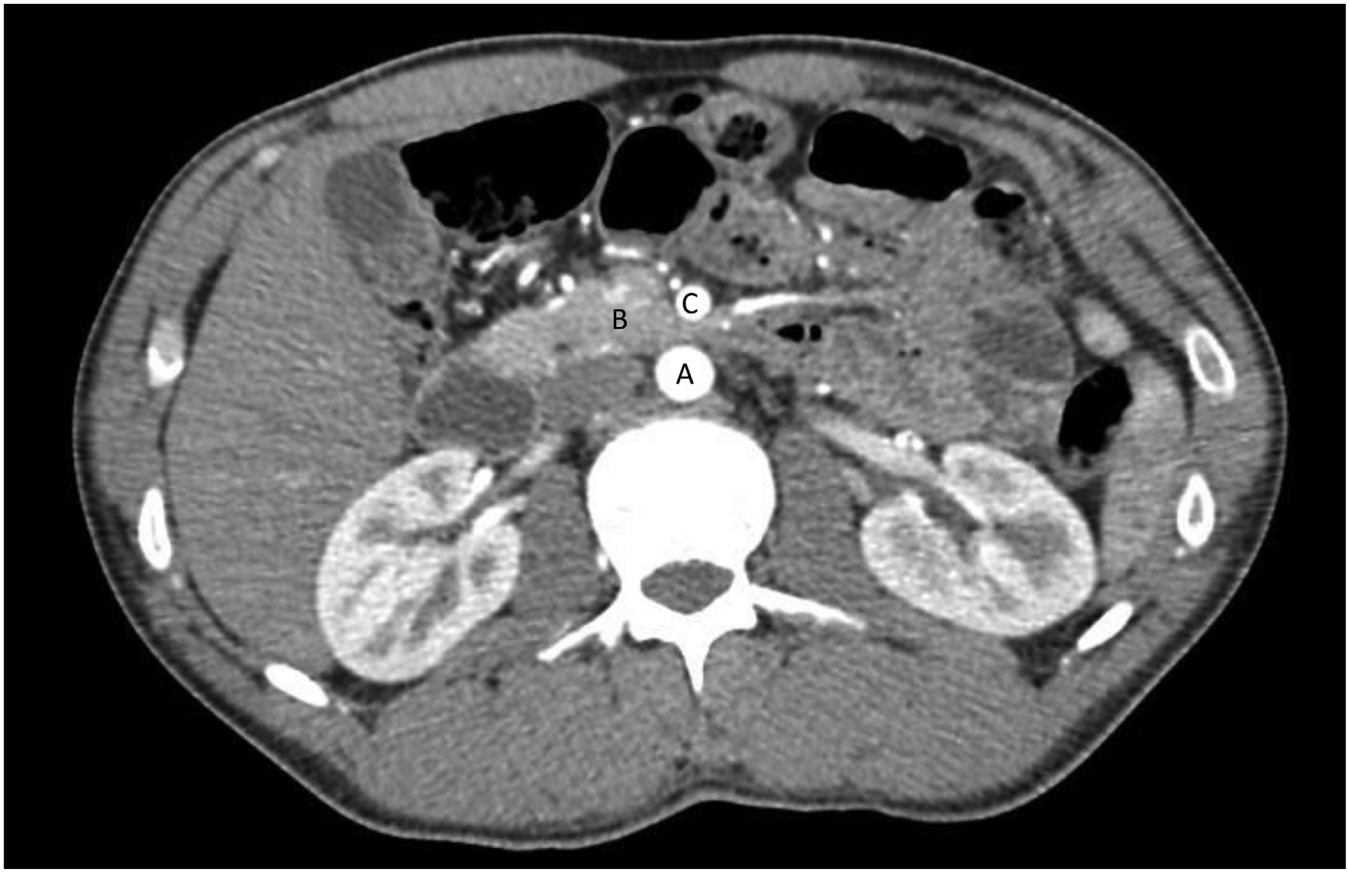

FIGURE 1 Compression of the duodenum (B) between the abdominal aorta (A) and the superior mesenteric artery (C)

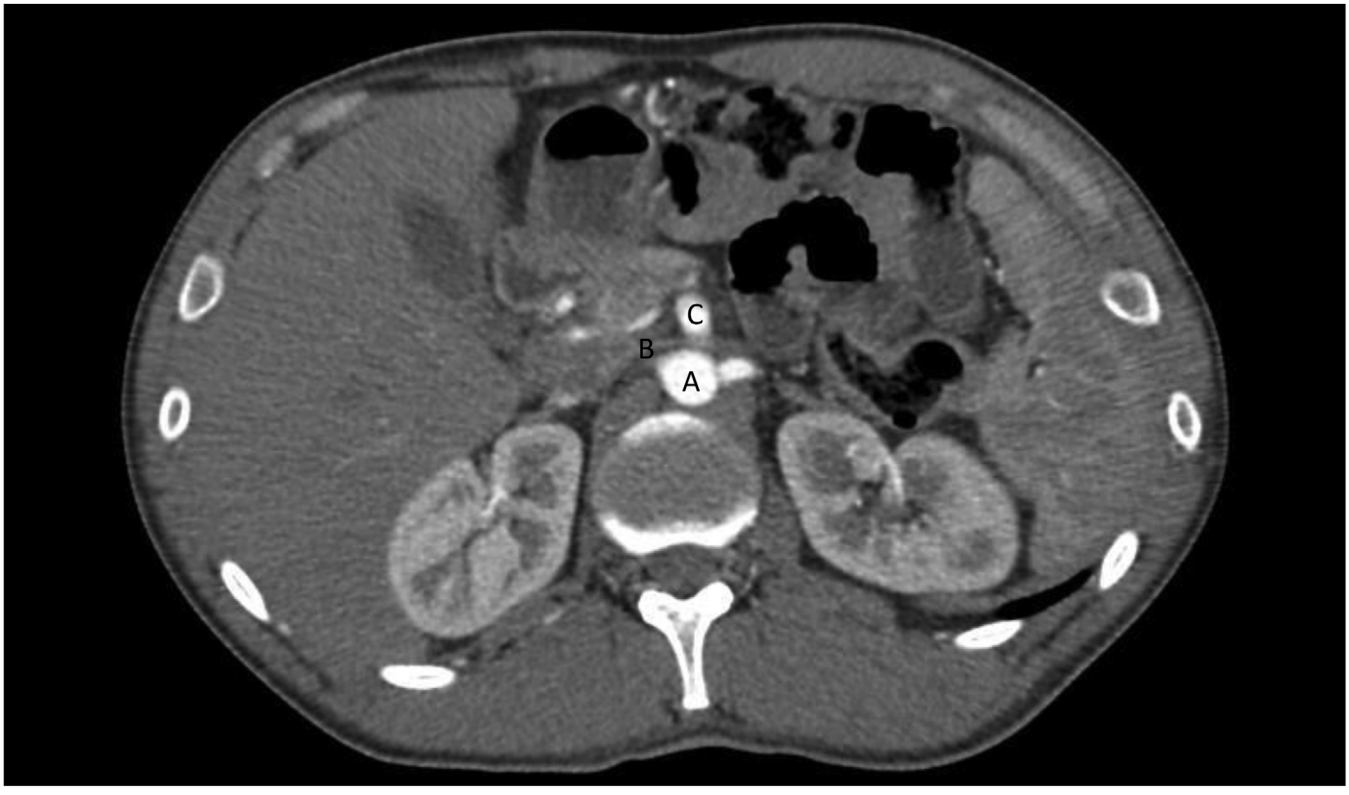

FIGURE 2 Narrowing of the left renal vein (B) in between the abdominal aorta (A) and the superior mesenteric artery (C) as it passes to the inferior vena cava

normal phasicity. The patient was discharged on hospital day 3 after his pain was controlled and he was voiding without a Foley catheter. Throughout his hospital course, he was followed by vascular surgery who concluded there was no indication for surgery at this time, and he should followup in the outpatient setting.

3 | DISCUSSION

The diagnosis in this case was renal nutcracker syndrome. Renal nutcracker syndrome is especially rare (incidence = 0.8%) and difficult to diagnose.[2] It is so rare, in fact, that the diagnostic criteria were not established until 2017.[2] Even though this syndrome is rare, there is a high morbidity associated with it, with complications including renal vein thrombosis and renal failure.

Renal nutcracker syndrome occurs when the left renal vein is compressed between the abdominal aorta and the superior mesenteric artery.[3] This is similar to the concept of superior mesenteric artery syndrome where the duodenum is compressed between the abdominal aorta and the superior mesenteric artery. Superior mesenteric artery syndrome causes gastrointestinal complications such as anorexia, bloating, belching, and small bowel obstruction. Conversely, renal nutcracker syndrome is the entrapment of the left renal that presents with primarily genitourinary symptoms such as flank pain, proteinuria, and hematuria. This patient did not have any symptoms of superior mesenteric artery syndrome other than constipation, but this may have been secondary to his urinary retention rather than the compression of his duodenum. This patient's symptoms and computed tomography angiography (CTA) were more consistent with renal nutcracker syndrome rather than both renal nutcracker syndrome and superior mesenteric artery syndrome.

The diagnosis of renal nutcracker syndrome can be difficult to make; however, there are several radiological tests that have been used in the past. CTA is the easiest and least invasive. There a 3 aspects of the CT scan to look for to help make the diagnosis: narrowing of the left renal vein (a beak sign), left renal vein diameter >4.9, and <41° angle between the superior mesenteric artery and the aorta. If there is high clinical and radiographic suspicion, a phlebography or intravascular ultrasound is obtained to confirm the diagnosis, because these studies are considered the gold standard.[2]

Although this syndrome does not have a high mortality, it does produce a high morbidity from complications that consist of renal failure, left renal vein thrombosis, and for female patients, pelvic congestion syndrome, and for male patients, a varicocele from retrograde blood flow from the left renal vein into the internal spermatic vein.[4] For patients without severe symptoms, renal nutcracker syndrome is treated with conservative management and regular follow-up. This patient, without severe symptoms or end organ damage, was treated with conservative management and regular follow-up. If, after 2 years, he has persistent symptoms, even if not severe, surgery may need to be considered. However, if the patient develops gross hematuria, pain, or his renal function deteriorates, surgery needs to be considered immediately.[2] Spontaneously resolving symptoms are not uncommon in these cases, which is why there is the option for more conservative approach with mild symptoms. In addition, patient's age is taken into account with potential reversibility with younger patients.[5]

4 | WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

With all patients and cases in the emergency department it is important not to anchor on one diagnosis as an explanation for their symptoms and to continue to be aware of different diagnoses. With the diagnostic criteria of renal nutcracker syndrome not established until 2017, it has been a somewhat elusive diagnosis. CTA and ultrasounds are important in aiding in this diagnosis that can lead to high morbidity and potentially be fatal. Unlike our patient, some need surgery when initially diagnosed.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ORCID

Rebecca Bajkowski MD https://orcid.org/0000-0003-1359-0524

REFERENCES

1. Foster G, Stocks C, Borofsky MS. Emergency Department Visits and Hospital Admissions for Kidney Stone Disease, 2009: Statistical Brief #139. 2012 Jul. In: *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2006 Feb. Available from: https://www.ncbi.nlm.nih.gov/books/NBK100827/
2. Ananthan K, Onida S, Davies, AH. Nutcracker Syndrome: an update on current diagnostic criteria and management guidelines. *Eur J Vasc Endovasc Surg*. 2017;53(6):886-894.
3. Nickavar, A. "Nutcracker syndrome; a rare cause of hematuria." *J Nephropathol*. 2016;5(4):144-145. https://doi.org/10.15171/jnp.2016.27.
4. Mohamadi A, Ghasemi-Rad M, Mladkova N, Masudi, S. Varicocele and nutcracker syndrome. *J Ultrasound Med*. 2010;29:1153-1160. https://doi.org/10.7863/jum.2010.29.8.1153
5. Gulleroglu K, Gulleroglu B, Baskin E. "Nutcracker syndrome." *World J Nephrol*. 2014;3(4):277-281. https://doi.org/10.5527/wjn.v3.i4.277

How to cite this article: Bajkowski R, Lagina A. Breaking open the case of one patient's acute left flank pain: nutcracker syndrome. *JACEP Open*. 2020;1:801–803. https://doi.org/10.1002/emp2.12157