

## CLINICAL VIGNETTE

# An Unexpected Bruit: Remembering the Basics of the Abdominal Exam

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### **Background**

An abdominal bruit can be an unexpected physical exam finding with a variety of potential causes (Table 1). While the frequency with which physicians perform abdominal auscultation varies, consistent auscultation and accurate documentation of findings can have meaningful effects on patient triage and healthcare utilization.<sup>1</sup>

This case report highlights the importance of a complete abdominal examination in patients presenting with abdominal pain, and helps clinicians develop a differential diagnosis and framework for approaching abdominal bruits discovered in the outpatient setting.

### **Case Report**

A 78-year-old female with dementia, hypertension, diverticulitis, chronic back pain, prior tobacco use, and a left adrenal nodule presented to an outpatient internal medicine with abdominal pain and increased agitation.

Three months prior to presentation, on evaluation of hematuria, she was incidentally found to have a dilated distal pancreatic duct without identifiable mass and a 5.5 x 4.1 x 4.4 cm left adrenal mass with indeterminate features. Further evaluation with abdominal MRI was scheduled.

The patient described the abdominal pain as 10/10 in severity, constant, and most severe in the left lower quadrant with radiation to the back. On exam, she was mildly agitated but well appearing. Vital signs included blood pressure of 187/94 mmHg with remaining vital signs within normal limits. Cardiovascular and lung exams were normal, without murmurs or crackles. Auscultation of the abdomen revealed a loud bruit throughout all quadrants. Her abdomen was soft and non-distended but diffusely tender to palpation without rebound or guarding. Her baseline insight and cognition were impaired per her family, but worse than baseline.

A review of her chart revealed no prior documentation of an abdominal bruit, despite prior documentation of normoactive bowel sounds. Given this presumed new abdominal bruit, severe pain radiating to the back, and acute hypertension, the patient was triaged to the emergency department (ED) to rule out abdominal aortic dissection, mesenteric ischemia, or other

abdominal emergencies, including findings related to her pancreatic or adrenal pathologies.

ED labs included a normal complete blood count, comprehensive metabolic panel, and lactate. Computed tomography (CT) scan of the abdomen and pelvis with and without contrast showed significantly increased size of the left adrenal mass, now 9.7 x 7.5 x 9.7 cm, with multiple new soft tissue nodules in the left retroperitoneum and a mass effect on the left kidney, concerning for metastatic cancer. Additionally, there was extensive atherosclerotic vascular disease throughout the abdominal aorta and major branches, with occlusion of the entire length of the left common iliac artery with distal collateral vascularization, and partial obstruction of the right common iliac artery with irregular luminal contrast filling (Figure 1). The pancreatic tail dilation was stable, which per radiology may represent an intraductal papillary mucinous neoplasm (IPMN). Vascular surgery was consulted, and no acute surgical interventions were warranted given her palpable left dorsalis pedis pulse and posterior tibial artery signal on doppler with symmetrical color, warmth, and capillary refill of bilateral feet.

The patient was admitted to the internal medicine service. A biopsy of the adrenal mass revealed a high-grade neuroendocrine carcinoma. CT chest with contrast revealed multiple pulmonary nodules consistent with metastatic disease. Due to worsening agitation and psychosis while hospitalized, a lumbar puncture was obtained and was negative for autoimmune and paraneoplastic disease. Due to the patient's poor functional status, chemotherapy and surgery were not offered. Palliative radiation was discussed pending a goals of care conversation. However, the patient developed a severe aspiration pneumonia and died in the hospital.

### **Discussion**

This case illustrates several important points relating to both physical examination of the abdomen and evaluation of abdominal bruits. Prior documentation in the chart noted "normoactive bowel sounds" without mention of a bruit, however her CT findings were consistent with long-standing, extensive atherosclerotic disease and her bruit was unrelated to her acute abdominal pain, which was likely due to metastatic carcinomatosis. The patient did require hospital admission,

however prior documentation of the bruit may have avoided the emergency room evaluation.

Although medical students are taught the abdominal examination begins with observation followed by auscultation, auscultation may be less commonly performed by practicing physicians. One study reported only seventeen percent of clinicians always auscultating the abdomen and forty-four percent reported rarely auscultating the abdomen.<sup>1</sup> While listening for the presence, frequency, and pitch of bowel sounds is a more common application of abdominal auscultation, the detection of an abdominal bruit is an important finding that adds to the differential diagnoses. When documented in the medical record, informs additional assessment.<sup>2</sup>

A variety of intra-abdominal pathologies can cause a bruit, including but not limited to atherosclerotic narrowing of intra-abdominal arteries, renal artery stenosis, celiac artery compression, certain malignancies, and most dangerously, aortic dissection (Table 1).<sup>3-6</sup> Contrary to the educational dogma, abdominal bruits can be auscultated in approximately 16% of otherwise healthy individuals in a study comparing the prevalence of abdominal bruits in healthy volunteers, hypertensive individuals, and patients with known renal artery stenosis. This study reported younger patients were more likely to have benign bruits while patients older than 50 years were more likely to have hypertension and other pathological causes. Of patients in this study with hypertension, about a quarter had an abdominal bruit, and of these, slightly more than fifty percent did not have any identifiable renal artery stenosis after comprehensive evaluation, suggesting hypertension as the only known cause.

The location, pitch, intensity, and timing of an abdominal bruit also correlates with the underlying pathology.<sup>4</sup> In a study of 503 patients undergoing abdominal CT angiography for a variety of conditions including hypertension 27%, renal mass 19%, and abdominal pain 13%, 106 (21%) of were found to have an audible abdominal bruit.<sup>3</sup> Bruits were heard in all age groups with mean age 46 years and were significantly more prevalent in females ( $p < 0.05$ ). The authors suggest this may be due to their smaller body size aiding in more readily auscultated sounds. The most common location of the bruit was in the upper abdomen, with about 50% of cases attributed to celiac artery stenosis (defined as  $>50\%$  narrowing of the lumen). In celiac artery stenosis, the bruits were produced or accentuated by deep expiration and were mostly asymptomatic. Interestingly, of these bruits attributed to celiac artery stenosis, 58% were due to extrinsic compression rather than atherosclerosis. In contrast, only eight of the 106 bruits identified in this study were heard throughout the entire abdomen. Six of these eight had advanced atherosclerosis, as in our patient, and four had abdominal aortic aneurysms. These patients were older (mean age, 62 years) and the bruits louder (three or four out of four in intensity).<sup>3</sup> Table 2 summarizes these findings regarding location, timing, pitch and intensity of bruits and their etiologies.<sup>3,4</sup>

In conclusion, this case illustrates both the importance of a comprehensive clinical examination of the abdomen, which should include careful auscultation, as well as the characterization and differential diagnosis of abdominal bruits based on the patient's age, history, and features of the bruit.

**Figure 1.** CT Angiography Abdomen/Pelvis revealing extensive atherosclerotic disease.



**Table 1.** Etiologies of abdominal bruits.<sup>3-6</sup>

Etiologies of Abdominal Bruits
Atherosclerotic narrowing of iliac or mesenteric arteries
Celiac artery compression syndrome
Abdominal arteriovenous aneurysm
Aortic dissection
Renal artery stenosis
Fibromuscular dysplasia
Liver tumors, particularly highly vascular hepatomas
Pancreatic carcinomas
Splenomegaly with tortuous splenic arteries
Incidental benign finding

**Table 2.** Location of, description of, and impact of various maneuvers on abdominal bruits of different etiologies.<sup>3-6</sup>

<b>Etiology</b>	<b>Location</b>	<b>Description</b>	<b>Impact of Maneuvers</b>
<b>Renal artery stenosis</b>	Epigastrium with radiation to right or left upper quadrants, less likely in flank	Loud, high-pitched, continuous with systolic accentuation, or purely systolic	-
<b>Celiac artery stenosis</b>	Epigastrium	Arterial	Louder on expiration
<b>Splenic artery occlusion</b>	Epigastrium, left upper quadrant	Loud, short, systolic	-
<b>Benign incidental finding</b>	Epigastrium, rarely spreading to sides	Low to medium intensity, systolic	-
<b>Cardiac murmur</b>	Epigastrium, Generalized	Mimics the primary cardiac murmur	-
<b>Large hepatic artery aneurysm</b>	Epigastrium, right upper quadrant	Loud, arterial	-
<b>Aortic atherosclerosis</b>	Generalized	Loud, high intensity	-
<b>Abdominal aortic aneurysm</b>	Generalized	Loud, high intensity	-
<b>Iliac artery narrowing</b>	Iliofemoral	Loud, high pitched, arterial	-
<b>Pancreatic carcinoma</b>	Left upper quadrant	Short, systolic	-
<b>Hepatic tumors</b>	Right upper quadrant, epigastrium	Loud, harsh, arterial, continuous with systolic accentuation	No change with position, respiration, or compression
<b>Cirrhosis</b>	Right upper quadrant	Low pitched, continuous venous hum	Changes with position and respiration, decreases with compression
<b>Intra-abdominal arteriovenous fistula</b>	Varies	Continuous with systolic accentuation	-

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