

Ceftriaxone-Induced Gallstones: Case Report and Literature Review

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Abstract

We report a case of gallbladder and common bile duct stones occurring in a 14-year-old male who was exposed to ceftriaxone for 6 weeks. Ceftriaxone-induced gallstones are under-reported and remain an important cause of gallstones in patients exposed to this antibiotic. Gallstone development should be considered in the appropriate clinical context.

Introduction

Gallstones are most commonly seen in middle-aged multiparous women who are obese. Cholesterol-containing stones are most common. Liver disease and hemolysis are risk factors for black pigment stones, and biliary infections can cause mixed pigment stones. Gallstones in children are relatively uncommon. We report a case of a young male with antibiotic-induced gallstones after exposure to ceftriaxone for 6 weeks.

Case Report

A 14-year-old male sustained a right anterior cruciate ligament (ACL) tear during a soccer match and underwent a partial physeal-sparing anatomic ACL reconstruction using his own hamstrings. Two weeks later, he presented with an infected joint and underwent incision and drainage with hardware removal. Cultures grew *Serratia marcescens*; the patient had a peripherally inserted central catheter (PICC) line placed and was discharged on 6 weeks of ceftriaxone 2 gm IV daily.

During the last week of his ceftriaxone therapy, he developed intermittent right upper quadrant (RUQ) pain without nausea. His third attack in 72 hours prompted an emergency room visit. On exam, he was fit and thin with a non-toxic appearance, without fever, tachycardia, or hypotension. He was anicteric and had RUQ tenderness. The remainder of his exam was normal. He had no history of liver disease or hemolysis. There was no family or personal history of gallstones.

His laboratory tests showed a normal hemogram without leukocytosis. His electrolytes, blood urea nitrogen (BUN), and creatinine were normal. His total bilirubin was 1.2 mg/dL, alanine transaminase (ALT) 270 IU/L, and aspartate transaminase (AST) 463 IU/L. His amylase and lipase were normal. CT scan showed several densely calcified gallstones in the gallbladder (Figure 1) and 1 stone in the distal common bile duct (Figure 2) without evidence of acute cholecystitis. He was admitted to the hospital and underwent an ERCP with biliary sphincterotomy and extraction of yellow-green stone material (Figure 3), which did not appear like typical cholesterol, mixed pigment, or black pigment stones. He had no anatomic biliary abnormalities. He did well and underwent uneventful laparoscopic cholecystectomy the next day.

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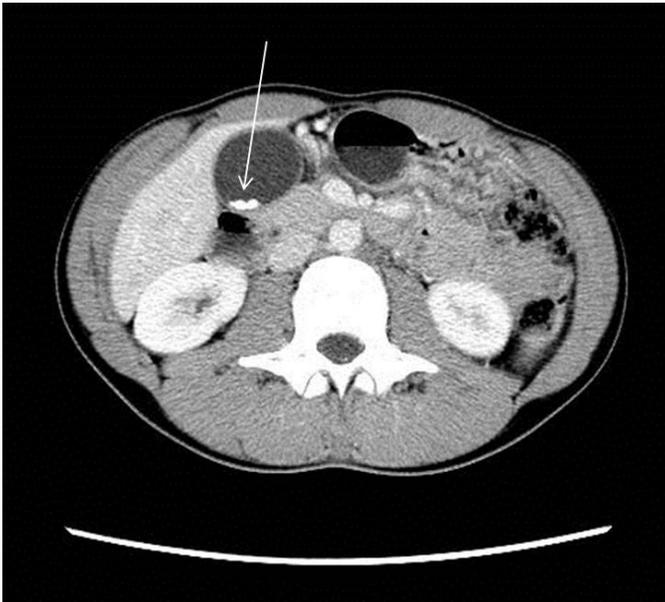


Figure 1. CT showing multiple high density stones in the gallbladder (arrow).

Discussion

The radiologic and phenotypic appearance of this patient's stones and the timing of prolonged ceftriaxone therapy—along with absence of any risk factors for cholesterol, mixed pigment, or black pigment stones—strongly suggest that his stones were secondary to the antibiotic treatment. Ceftriaxone has been associated with the formation of biliary precipitates, which Park et al identified as the calcium salt of ceftriaxone in 4 gallbladder specimens using thin-layer chromatography, high-performance liquid chromatography



Figure 2. CT showing a high density defect in the distal common bile duct (arrow).



Figure 3. Endoscopic appearance of yellow/green stone material swept from the common bile duct during ERCP.

(HPLC), and electron microprobe analysis.¹ The high levels of calcium in ceftriaxone leads to high density on imaging in contrast to typical cholesterol stones. Forty percent of the drug is excreted into the bile, where concentration and dehydration can occur in the gallbladder and lead to precipitation.² In animal models, ceftriaxone may inhibit gallbladder contractility, further favoring the formation of precipitates.³ The incidence of precipitates may be up to 46% and appears to be higher in the pediatric population.⁴ Although there are no time studies or dose–response relationship studies, biliary precipitates can occur after relatively short exposures to the drug (weeks) and can be asymptomatic⁵ or lead to symptoms including biliary colic, cholecystitis, pancreatitis, and cholangitis.^{6–9} Spontaneous resolution has been reported.^{5,8–10}

Ceftriaxone-induced gallstones are an uncommon but recognized complication of therapy with this antibiotic. Patients should be counseled regarding the possibility of this complication and informed to recognize and report biliary-type symptoms early during the course of treatment. Doctors need to be vigilant for these symptoms in patients on prolonged therapy.

Disclosures

Author contributions: A. Nayak prepared the manuscript. A. Slivka supervised the clinical care of this patient and the creation of this manuscript, and is the article guarantor.

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Informed consent was obtained for this case report.

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