

## Abdominal Abscesses Due to Actinomycosis after Laparoscopic Cholecystectomy: Case Reports and Review

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**We describe 2 patients who presented to a health care facility with abdominal abscesses years after undergoing laparoscopic cholecystectomy that was complicated by gallstone spillage. In both patients, sample cultures yielded *Actinomyces* species and enteric organisms. In 1 patient, crystallographic analysis of abscess debris confirmed the presence of gallstones. *Actinomyces* species is a rare cause of abdominal abscesses that should be considered in this patient population.**

A small percentage of patients who undergo laparoscopic cholecystectomy present to health care facilities with complications that include primarily bile duct injury. Serious infectious complications, including abdominal wall, subphrenic, and retroperitoneal abscesses, have been recently (but infrequently) reported. A subset of these infections has been associated with dropped gallstones. In many cases, gram-negative organisms have been identified as the etiologic agent. We describe 2 patients who presented to a health care facility a significant time after surgery, in whom *Actinomyces* species were cultured from abdominal abscesses. *Actinomyces* species may not be easily cultured or identified, and infection may not respond well to antibiotics that are commonly prescribed for “routine” abdominal abscesses.

**Case reports.** Patient 1 was a 55-year-old woman who presented to the hospital with a 14-day history of right lower back pain and a tender “lump” in this area. Her past medical history was unremarkable except for a laparoscopic cholecystectomy

performed 30 months earlier in which gallstone spillage was documented and an endoscopic retrograde cholangiopancreatography performed 12 years earlier for a common biliary duct obstruction. The patient denied having fever, chills, or trauma.

On admission to the hospital, her temperature was 38.2°C (100.8°F). The only relevant finding by physical examination was an erythematous subcutaneous mass (~3 × 4 cm) in the lower right region of her back. Laboratory testing revealed a leukocyte count of 5000 cells/mm<sup>3</sup>. Abdominal CT revealed a right retroperitoneal mass (3.8 × 4.6 cm) with enhancing ring (figure 1A, *top*) and subcutaneous tissue inflammation over the right paraspinal muscles (figure 1A, *bottom*). A percutaneous drain was inserted, which yielded purulent fluid; Gram staining of the fluid revealed filamentous, gram-positive rods (figure 2A). Culture of the purulent fluid that was retrieved revealed *Klebsiella pneumoniae* and *Escherichia coli*, and anaerobic culture of the fluid sample grew *Actinomyces naeslundii*, with speciation determined by indirect immunofluorescence (figure 2C). Communication of the retroperitoneal abscess with the collection of purulent material in the subcutaneous tissue was demonstrated with injection contrast dye and radiography (data not shown). Crystallographic examination of pigmented solid material draining from the abscess revealed cholesterol (40%) and bile pigment as calcium bilirubinate (60%). The patient had a history of severe rash after receiving amoxicillin and, therefore, was given levofloxacin and doxycycline. Fifteen days later, she was well and afebrile. The drain was removed, but her wound continued to drain over the next several months, the contents of which included gallstone fragments. Levofloxacin therapy was discontinued 4 weeks after removal of the drain. She continued to receive doxycycline and to undergo additional abdominal CT imaging on the 35th, 168th, 257th, and 355th day after admission to the hospital (figures 1B–E), which revealed only modest change in the size of the fluid collection. Despite prolonged antimicrobial therapy, surgical excision of the sinus tract and debridement of the intra-abdominal fluid collection was performed on the 404th day after admission. Multiple stones were removed from the sinus tract base. Intraoperative cultures failed to yield organisms. The patient continued to receive doxycycline; an additional CT scan performed on the 494th day after the initial hospital admission (figure 1F) identified no residual collection. Doxycycline therapy was discontinued, and follow-up CT (614th day) revealed no recrudescence of infection (figure 1G).

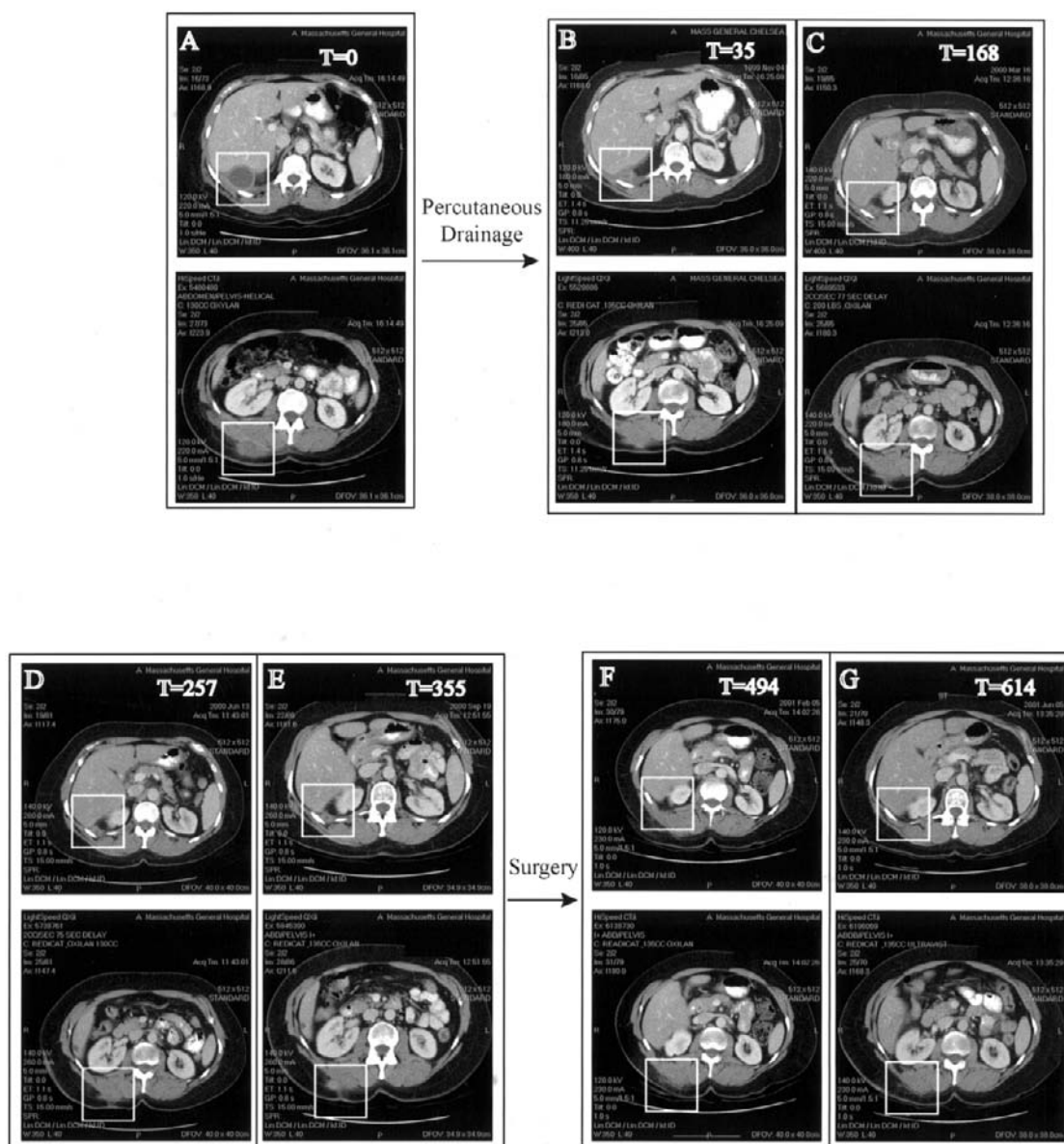
Patient 2 was a 65-year-old woman with a history of chronic hemolytic anemia who was healthy until she developed acute

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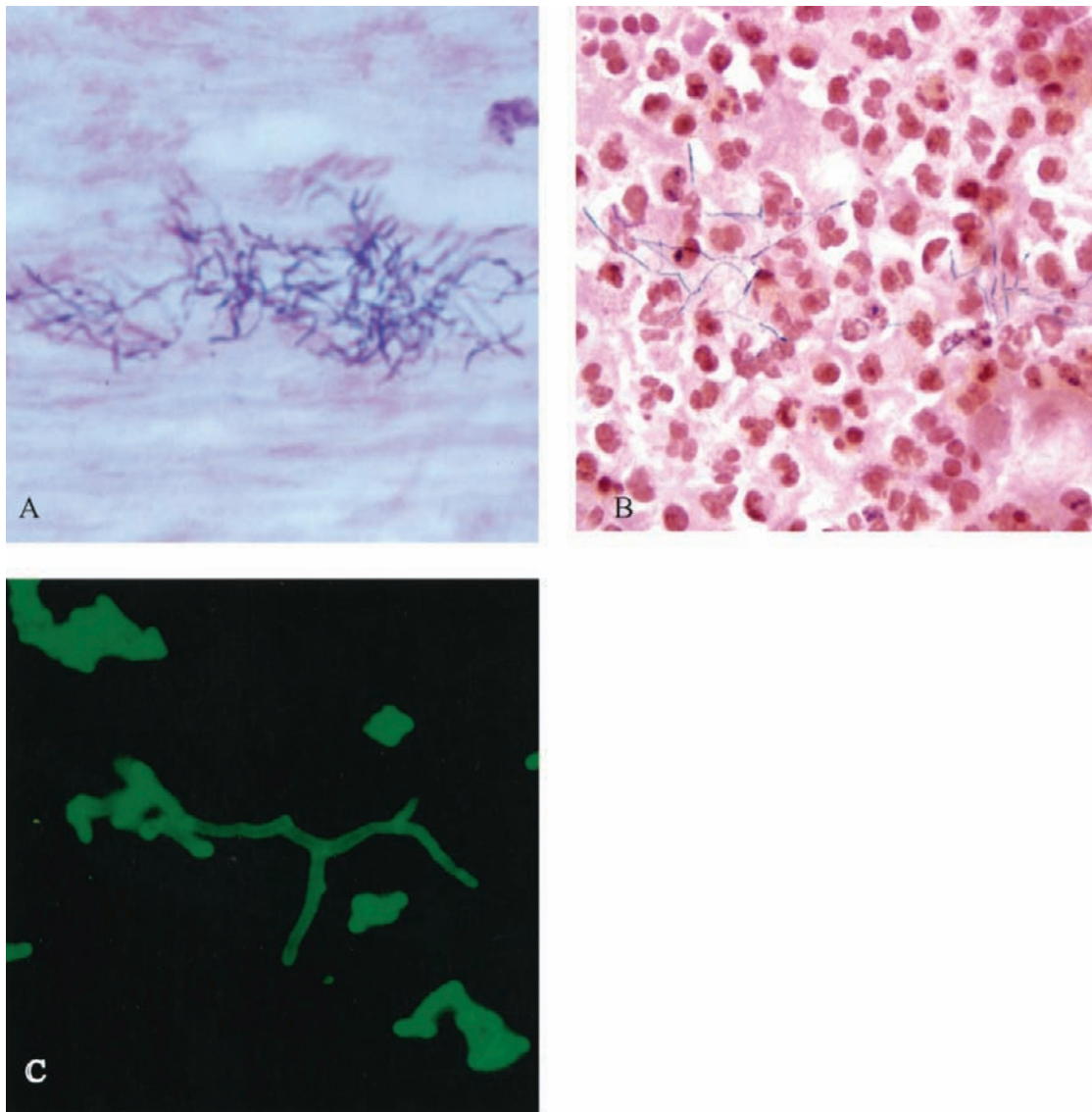


**Figure 1.** Abdominal CTs from patient 1 that demonstrate serial abscesses over time. The top panels in the series are CT images in which the perihepatic collection can be best visualized, and the bottom panels reveal the soft-tissue fluid collection. The white box indicates the site of abscess for both locations. Each CT is labeled with the indicated time (T; in days) from initial presentation to the hospital. The patient underwent percutaneous drainage in the time between what is represented by panels A and B and underwent surgical excision of the tract, remaining gallstones, and the abscess between the times represented by panels E and F.

cholecystitis. She underwent urgent laparoscopic cholecystectomy, which recovered a gangrenous gallbladder and 80 mL of pus. Sample cultures grew *E. coli* and *Enterococcus* species.

The patient remained asymptomatic until 18 months later, when she developed episodic, sharp right upper quadrant pain. She developed anorexia and experienced minimal weight loss without fever, sweats, or chills. A urinary tract infection was diagnosed, and the patient received 10 days of levofloxacin treatment, but symptoms recurred when antibiotic therapy was discontinued.

Seven weeks after the onset of symptoms, she presented to a local clinic with similar complaints and was found to have mildly elevated liver enzyme levels (aspartate transaminase level, 50 U/L; alanine transaminase level, 75 U/L) and an alkaline phosphatase level of 206 U/L. Total bilirubin level was at her baseline level of 2.2 mg/dL. Findings of an abdominal ultrasound were normal, and she was advised to take ibuprofen for pain. Ultimately, an abdominal CT revealed a perihepatic fluid collection (3.7 × 7.0 cm). Ciprofloxacin and metronidazole therapy was initiated, and she was referred for percuta-



**Figure 2.** Gram stain of material drained from both patients and indirect immunofluorescence of culture material. Gram stains of purulent samples from patient 1 (A) and patient 2 (B) demonstrate branching, gram-positive organisms characteristic of actinomycosis. Indirect immunofluorescence using antibodies specific for *Actinomyces naeslundii* demonstrates reactivity, as determined by fluorescence microscopy (C).

neous drainage of the fluid collection. Gram staining revealed abundant polymorphonuclear cells and few long, thin, filamentous, beaded, gram-positive rods (figure 2B); anaerobic culture ultimately grew few *Actinomyces* organisms, which could not be speciated. The patient received intravenous penicillin (3 million U every 4 h for 8 weeks), followed by oral penicillin VK (500 mg 4 times per day) and probenecid (500 mg 4 times per day) for an additional 6 months, which was well tolerated. The drain was removed 2 weeks after insertion. Resolution of the fluid collection was confirmed by CT after 8 weeks. The patient was clinically well 6 months after completion of oral penicillin VK and probenecid therapy, and findings from a follow-up CT were unremarkable.

**Discussion.** Laparoscopic cholecystectomy has become the method of choice for gallbladder removal and enjoys a low rate of complications [1]. Spilled gallstones during removal of the gallbladder occur infrequently; the standard of practice is not to retrieve these stones or treat with antibiotics for an extended period. Reports have described intra-abdominal infections related to these spilled gallstones [2–7]; only 1 case report, to our knowledge, has identified *Actinomyces* species as an etiologic agent [8].

Actinomycosis is a chronic disease characterized by indolent suppuration that crosses tissue planes, fibrosis, and draining sinuses. Intra-abdominal actinomycosis is observed after surgical procedures, following blunt abdominal trauma, or after viscus

perforation; the appendix is a frequent site of infection. Abdominal actinomycosis is an uncommon infection today, likely a result of better surgical care. Hematogenous retroperitoneal actinomycosis without intra-abdominal involvement is rare, and only a few cases have been reported in the literature [8–10].

The microbiological diagnosis of actinomycosis typically requires that anaerobic cultures be performed, despite *Actinomyces* species being a facultative organism. The organism is relatively slow to grow (5–14 days) and may be missed if antibiotics are administered. The demonstration of filamentous bacteria and the presence of sulfur granules (radiating eosinophilic projections) on a Gram stain may suggest the organism and prompt the performance of anaerobic culture. In our first case, the patient's abscess and draining sinus leading to soft-tissue infection were culture-positive for *A. naeslundii*. *A. naeslundii* has been reported to produce empyema of the gallbladder and acute cholecystitis [11]. The presence of gallstone debris in the abscess material suggests that *A. naeslundii* on gallstones was a nidus for slow-growing, late infection originating from gallbladder flora. Interestingly, we performed anaerobic cultures of fluid and stones from 12 gallbladders from consecutive patients that had been resected for acute cholecystitis and failed to isolate *Actinomyces* species from any of them (data not shown). Thus, one cannot entirely rule out the possibility that sterile gallstones fell into the abdominal cavity and were subsequently seeded from another focus; however, this seems unlikely. In our 2 cases, gallstone spillage occurred 30 and 18 months prior to the clinical presentation, suggesting that the delayed clinical course of actinomycosis may be related to the slow-growth characteristics of the pathogen.

The treatment of choice for actinomycosis is penicillin. Long courses of treatment, sometimes with probenecid, have been typically prescribed, although a recent report suggests that shorter courses of a few weeks to 6 months may be adequate, especially for cervicofacial disease, if infection is detected early [12]. In patients who are allergic to penicillin, tetracyclines and clindamycin have been most frequently used successfully. Aggressive surgical procedures are not generally recommended; invasive procedures are typically limited to drainage of collections for culture-aided diagnosis. This approach was sufficient in 1 of our patients; however, the first case patient required additional surgery, perhaps related to large amounts of gallstone debris. Although complete cultures were performed in both cases, we did not identify any classic "companion pathogens," such as *Actinobacillus actinomycetemcomitans*.

In summary, 2 patients developed abdominal/retroperitoneal actinomycosis several months after documented gallstone spillage during laparoscopic cholecystectomy. Infectious diseases specialists should consider that this old disease may occur as a complication of laparoscopic cholecystectomy, a procedure resulting from medical progress. Both patients experienced positive outcomes by undergoing percutaneous drainage and long-term antibiotic therapy. Actinomycosis should be considered in the differential etiologic diagnosis of retroperitoneal or abdominal abscesses in patients who have had previous laparoscopic cholecystectomy. Anaerobic culturing and Gram staining may be helpful in this diagnosis.

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