REVIEW AND CASE REPORT

RJME Romanian Journal of Morphology & Embryology http://www.rjme.ro/

Postoperative abdominal wall actinomycosis mimicking malignancy: a case report and literature review

DANIEL IOAN MIHALACHE[1)], LAURENŢIU AUGUSTUS BARBU[2,3)], TIBERIU ŞTEFĂNIŢĂ ŢENEA-COJAN[2,3)], NICOLAE DRAGOŞ MĂRGĂRITESCU[2,4)], STELIAN ŞTEFĂNIŢĂ MOGOANTĂ[2,4)], LIVIU VASILE[2,4)], NICULAE IORDACHE[5,6)]

[1)]*Doctoral School, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania*

[2)]*Department of Surgery, University of Medicine and Pharmacy of Craiova, Romania*

[3)]*Department of Surgery, Railway Clinical Hospital, Craiova, Romania*

[4)]*Department of Surgery, Emergency County Hospital, Craiova, Romania*

[5)]*Department of Surgery, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania*

[6)]*Department of Surgery, Sf. Ioan Emergency Hospital, Bucharest, Romania*

Abstract

Background/Objectives: Actinomycosis is an uncommon chronic bacterial infection that may present as an infiltrative mass mimicking malignancy. Abdominal wall involvement, particularly after abdominal surgery, is rare and may pose a considerable diagnostic challenge. *Study selection*: A focused narrative review of *PubMed* was conducted to identify reports of abdominal and abdominal wall actinomycosis, focusing on clinical presentation, predisposing factors, diagnosis, treatment, and outcomes. Eleven relevant case reports were included in the comparative analysis. *Case presentation*: We report a 72-year-old woman with a history of left hemicolectomy for colorectal carcinoma who developed a progressively enlarging painful mass of the left abdominal wall. Computed tomography revealed an infiltrative soft tissue lesion extending toward adjacent retroperitoneal structures, raising suspicion for recurrent malignancy or soft tissue sarcoma. Surgical excision was performed. Histopathological (HP) examination revealed "sulfur granules" with radiating filamentous structures and surrounding Splendore–Hoeppli material within a dense suppurative inflammatory reaction, associated with granulation tissue and reactive fibrosis. These findings supported the diagnosis of abdominal wall actinomycosis. The patient received prolonged Penicillin-based antibiotic therapy, with a favorable outcome. *Conclusions*: Abdominal wall actinomycosis should be considered in the differential diagnosis of infiltrative masses, particularly after abdominal surgery. HP examination and appropriate special stains are essential for distinguishing this rare infection from malignancy and other mimics.

Keywords: actinomycosis, abdominal wall, pseudotumoral mass, histopathology, sulfur granules.

Introduction

Actinomycosis is an uncommon chronic bacterial infection caused by anaerobic, filamentous, Gram-positive bacteria of the *Actinomyces* genus. These organisms normally colonize the oral cavity, gastrointestinal (GI) tract, and female genital tract but may become pathogenic when disruption of the mucosal barrier allows them to invade deeper tissues. The resulting infection is typically characterized by chronic suppurative inflammation, abscess formation, and progressive fibrosis [1, 2].

The cervicofacial region is the most frequently affected site, while abdominal actinomycosis accounts for approximately 20% of reported cases and most often involves the ileocecal region [2–4]. Abdominal surgery, GI perforation, inflammatory bowel disease (IBD), diverticulitis, appendicitis, trauma, and foreign bodies have all been recognized as predisposing factors, mainly by disrupting normal mucosal integrity and facilitating bacterial invasion [2, 5].

Clinical manifestations are often nonspecific and may include abdominal pain, fever, weight loss, or a palpable mass. Radiological findings can be equally misleading, as the infection frequently appears as an infiltrative soft tissue lesion or abscess that may be difficult to distinguish from malignancy or other inflammatory conditions [6, 7]. For this reason, diagnosis is rarely established before surgery. Histopathological (HP) identification of characteristic "sulfur granules" remains central to the diagnosis, whereas microbiological confirmation may be difficult because of the fastidious anaerobic growth requirements of *Actinomyces* and the potential influence of previous antibiotic exposure [8, 9]. Abdominal wall involvement is particularly uncommon, especially in the postoperative setting, and may present as a pseudotumoral lesion closely resembling recurrent malignancy or another inflammatory process [10–12].

Prolonged Penicillin-based antibiotic therapy remains the mainstay of treatment, while surgery may be required when the diagnosis is uncertain or when extensive fibrosis, abscess formation, or other complications are present. When recognized and appropriately treated, the prognosis is generally favorable [13, 14].

Given the rarity of postoperative abdominal wall actinomycosis and its ability to closely mimic malignancy,

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we present this case to emphasize the diagnostic challenges posed by this condition and to correlate its clinical and radiological appearance with the characteristic HP findings. A focused review of previously reported cases is also provided to place the present case in the context of the available literature.

Literature search strategy

A focused narrative review was conducted using *PubMed* to identify relevant literature on abdominal and abdominal wall actinomycosis. The search combined the terms "actinomycosis", "abdominal actinomycosis", "abdominal wall actinomycosis", "postoperative actinomycosis", "abdominal surgery", "pseudotumoral mass", "malignancy", "histopathology", and "treatment". English-language articles addressing the clinical presentation, predisposing factors, diagnosis, HP findings, treatment, or outcomes were considered for inclusion, with particular emphasis on case reports and case series describing abdominal wall involvement or disease occurring after abdominal surgery. Reports involving exclusively non-abdominal sites or providing insufficient clinical information were excluded. The reference lists of relevant publications were also reviewed to identify additional eligible reports.

The literature search yielded 10 case reports considered relevant to the scope of the present review. Together, these reports highlight the wide variability in the clinical presentation, predisposing factors, treatment strategies, and outcomes of abdominal and abdominal wall actinomycosis and are summarized in Table 1. Despite its rarity, abdominal wall involvement often presents as an infiltrative or pseudotumoral lesion, closely resembling a malignant process and making the initial diagnosis particularly challenging.

Table 1 – ***Comparison of selected published cases of abdominal and abdominal wall actinomycosis with pseudotumoral or postoperative presentations***

Reference	Year	Location	Predisposing factor / relevant history	Treatment	Outcome
Filipović *et al.* [15]	2005	Anterior abdominal wall	Diabetes; no previous abdominal surgery	Surgery and antibiotics	No recurrence at one year
Acquaro *et al.* [16]	2010	Abdominal wall	Long-term intrauterine device use	Surgery and prolonged antibiotics	Favorable
Eskarous *et al.* [17]	2021	Abdominal wall and intra-abdominal sites	No definite factor identified	Antibiotics and CT-guided drainage; surgery	Radiological improvement
Pamathy *et al.* [18]	2021	Colon and adjacent abdominal tissues	No clear factor identified	Resection and prolonged Penicillin	Favorable
Sieniawski *et al.* [19]	2021	Anterior abdominal wall	Fish-bone perforation	En bloc resection and Penicillin	Favorable
AlNowaiser *et al.* [20]	2022	Disseminated intra-abdominal	Diabetes	Surgery and antibiotics	Favorable
Mansouri *et al.* [6]	2023	Pelvic/colonic	Intrauterine device	Colonic resection and antibiotics	Favorable
Fukunaga *et al.* [7]	2024	Abdominal wall and adjacent bowel	Previous rectal cancer surgery; mesh	En bloc resection and antibiotics	Favorable
Loukil *et al.* [21]	2025	Abdominal wall and adjacent viscera	No significant history	Resection and antibiotics	Favorable
Londoño Barrientos *et al.* [1]	2025	Abdominal wall and adjacent structures	No definite factor identified	Drainage, surgery and antibiotics	Favorable

CT: Computed tomography.

Case presentation

We report the case of a 72-year-old woman with a history of hypertension, type 2 diabetes mellitus, obesity, and dyslipidemia. Five years before the current presentation, she had undergone open left hemicolectomy for colorectal carcinoma (CRC). Approximately 18 months after surgery, she noticed a gradually enlarging swelling of the left abdominal wall, accompanied by intermittent pain in the left hypochondrium and flank. The mass continued to increase in size, eventually causing local discomfort and functional limitation. She reported no significant episodes of fever and had not received antibiotic treatment before admission.

On physical examination, a large, firm, poorly defined, and tender mass was palpable in the left abdominal wall. The lesion was fixed to the underlying tissues and associated with skin retraction and visible distortion of the abdominal contour. Given these findings and the patient's history of CRC, recurrent malignancy or a soft tissue sarcoma was initially considered.

Laboratory investigations showed mild inflammatory abnormalities, including an elevated C-reactive protein (CRP) level and moderate leukocytosis, consistent with an ongoing inflammatory process.

Contrast-enhanced abdominal computed tomography (CT) revealed an infiltrative soft tissue mass involving the left abdominal wall and extending toward the adjacent properitoneal structures. The lesion had irregular margins and heterogeneous attenuation, with infiltration of the surrounding musculo-adipose tissues (Figures 1 and 2). Additional axial images demonstrated diffuse thickening of the abdominal wall extending toward the pelvic region, together with inflammatory changes in the adjacent soft tissues (Figure 2). In view of its infiltrative appearance and poorly defined boundaries, the imaging findings were considered suspicious for malignancy, particularly a soft tissue sarcoma or recurrent tumor (Figures 1 and 2).

The patient underwent surgical exploration and excision of the mass. On gross examination, the resected specimen measured approximately 15×15×4.5 cm and consisted of a firm, infiltrative lesion with a gray-whitish cut surface and poorly defined margins extending into the surrounding musculo-adipose tissue.

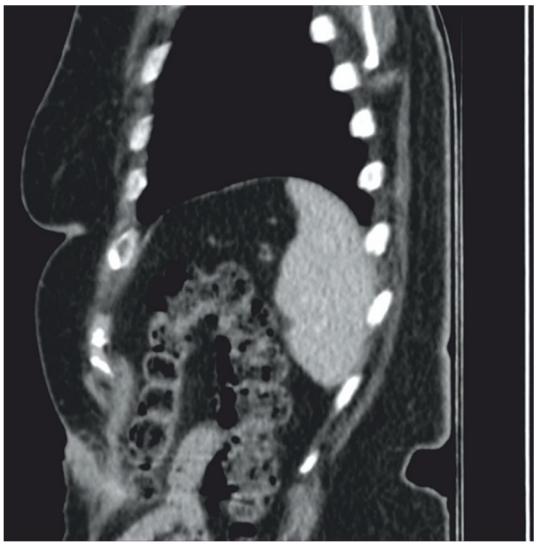

Figure 1 – ***Sagittal CT image of the upper abdomen showing an infiltrative soft-tissue lesion involving the abdominal wall with extension toward adjacent properitoneal structures and sigmoid colon. CT: Computed tomography.***

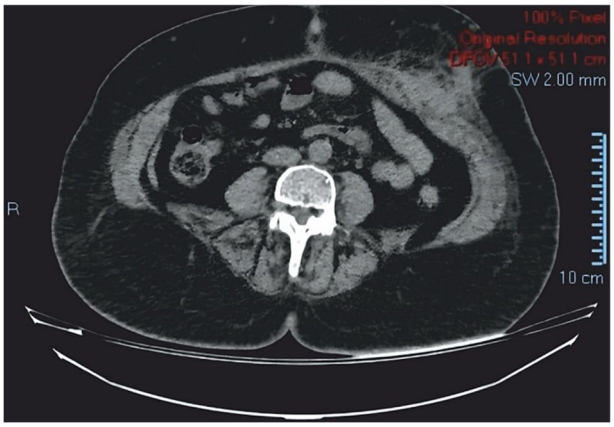

Figure 2 – ***Axial CT image demonstrating irregular soft tissue infiltration of the abdominal wall with involvement of surrounding musculo-adipose tissues.***

HP examination revealed extensive suppurative inflammation, predominantly composed of neutrophils, with admixed lymphocytes, plasma cells, and macrophages and occasional multinucleated giant cells (Figures 3 and 4). The inflammatory process extended into the surrounding adipose and soft tissues of the abdominal wall and was accompanied by reactive stromal changes (Figure 4).

Within the areas of inflammation, bacterial colonies morphologically compatible with *Actinomyces* spp. were identified. They exhibited the characteristic radiating filamentous architecture of so-called "sulfur granules" and were surrounded by a dense inflammatory infiltrate. Peripheral eosinophilic club-shaped material, consistent with the Splendore–Hoeppli phenomenon, was also present (Figure 5).

The adjacent tissue showed prominent granulation tissue and reactive fibrosis, with dense collagen deposition and fibroblastic proliferation (Figures 6 and 7). Chronic fibro-inflammatory changes extended into the musculo-adipose tissue, with involvement of both adipose tissue and skeletal muscle by inflammatory cells and fibrotic stroma (Figure 8).

Special histochemical stains were used to further characterize the microorganisms. Periodic Acid–Schiff (PAS) staining highlighted the radiating filamentous structures within the bacterial colonies, supporting their morphological compatibility with *Actinomyces* spp. (Figures 9 and 10). Giemsa staining did not reveal distinct coccoid or bacillary microorganisms. Gram staining was inconclusive, whereas Ziehl–Neelsen staining was negative for acid-fast organisms, providing no histochemical support for *Nocardia* infection. Tissue samples were also submitted for anaerobic culture, but no bacterial growth was obtained. Molecular identification by polymerase chain reaction (PCR) or sequencing was not performed, as these methods were not routinely available at our institution at the time of diagnosis. Species-level identification was therefore not possible.

Taken together, the characteristic "sulfur granules" with radiating filamentous structures, the surrounding suppurative inflammatory response, and the supportive PAS findings were consistent with abdominal wall actinomycosis. The final HP diagnosis was a chronic suppurative infection with bacterial colonies morphologically compatible with *Actinomyces* spp., accompanied by granulation tissue and prominent reactive fibrosis.

Following surgery, the patient was treated with high-dose Penicillin, followed by oral Amoxicillin for several weeks. Her postoperative course was uneventful, with progressive clinical improvement and resolution of the inflammatory signs. At follow-up, she remained clinically well, with no evidence of persistent infection or recurrence.

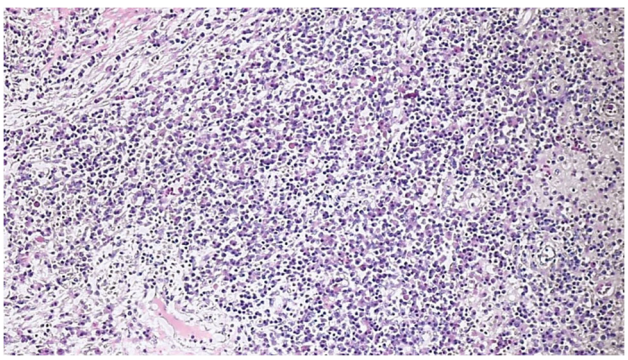

Figure 3 – ***Dense suppurative inflammatory infiltrate composed predominantly of neutrophils, lymphocytes, plasma cells and macrophages within the surrounding soft tissue. Hematoxylin–Eosin (HE) staining, ×100.***

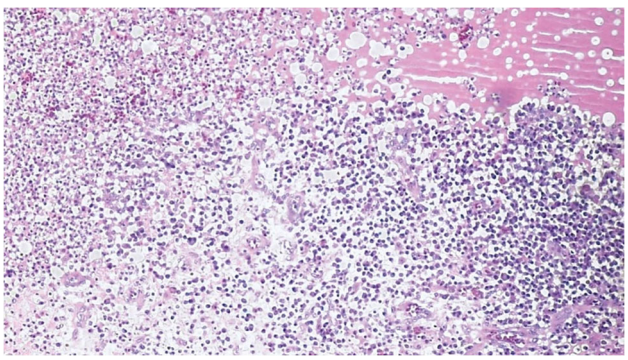

Figure 4 – ***Extension of suppurative inflammatory infiltrate into the surrounding adipose and soft tissue of the abdominal wall, with numerous neutrophils and macrophages and reactive stromal changes. HE staining, ×100.***

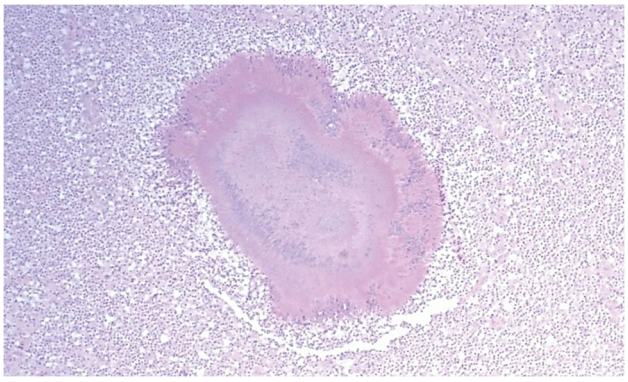

Figure 5 – *Actinomycotic bacterial colony ("sulfur granule") with radiating filamentous structures surrounded by dense inflammatory infiltrate composed predominantly of neutrophils and chronic inflammatory cells. Peripheral eosinophilic club-shaped projections corresponding to the Splendore–Hoeppli phenomenon are present. HE staining, ×100.*

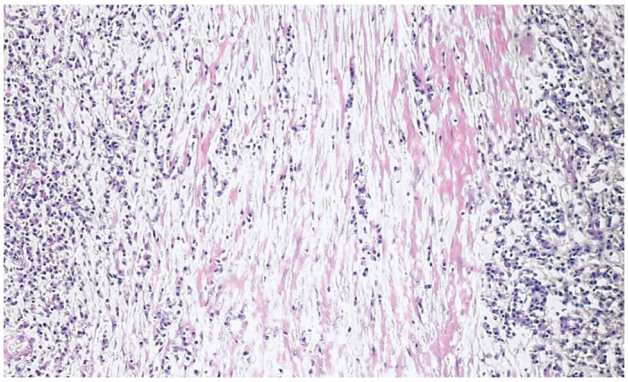

Figure 6 – *Reactive fibrosis with dense collagen deposition and fibroblastic proliferation in the surrounding connective tissue. HE staining, ×100.*

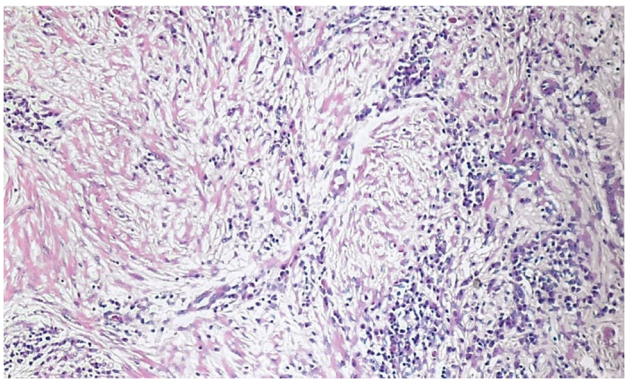

Figure 7 – *Chronic fibro-inflammatory reaction with irregular collagen bundles, fibroblastic proliferation and mixed inflammatory infiltrate in the surrounding connective tissue. HE staining, ×100.*

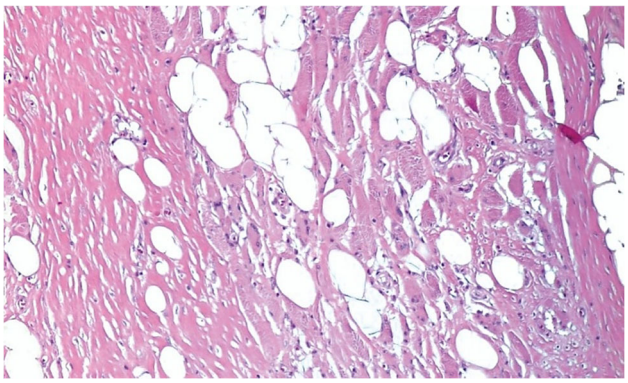

Figure 8 – *Extension of chronic fibro-inflammatory changes into the surrounding musculo-adipose tissue of the abdominal wall, showing infiltration of adipose tissue and skeletal muscle fibers by inflammatory cells and fibrotic stroma in actinomycotic infection. HE staining, ×100.*

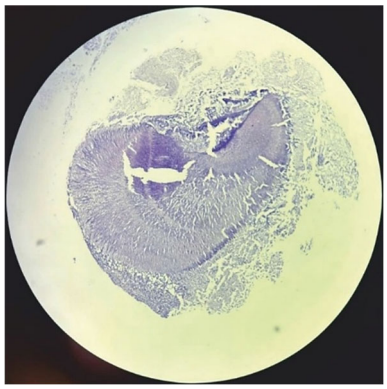

Figure 9 – *Parietal actinomycosis (×10): PAS staining showing inflammatory infiltrate with bacterial colonies surrounded by eosinophilic material (Splendore–Hoeppli phenomenon).*

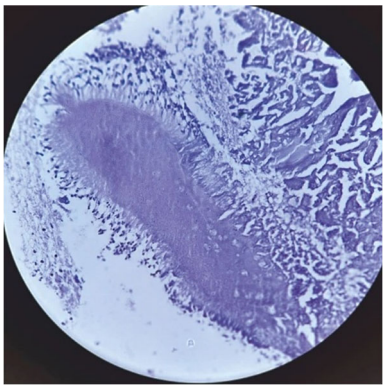

Figure 10 – *Parietal actinomycosis (×40): PAS staining highlighting filamentous, branching bacteria arranged in radiating patterns, characteristic of Actinomyces spp.*

Discussions

The present case illustrates an unusual presentation of abdominal wall actinomycosis in a 72-year-old woman with a history of colorectal surgery, in whom the clinical and radiological findings initially raised strong suspicion of recurrent malignancy. Abdominal actinomycosis accounts for approximately 20% of actinomycotic infections and most commonly affects the ileocecal region [22, 23]. Involvement of the abdominal wall is considerably less frequent and has been described in association with previous abdominal surgery, chronic inflammatory processes, GI perforation, trauma and foreign bodies [24]. In our patient, the previous open left hemicolectomy was therefore considered the most relevant potential predisposing factor.

The cases identified in our literature review illustrate the considerable variability in both the presentation and underlying clinical setting of abdominal and abdominal

wall actinomycosis (Table 1). Previous reports have described the disease following GI procedures or other forms of mucosal injury [11, 25], while the frequently polymicrobial nature of the infection may facilitate tissue invasion and contribute to the chronic suppurative response [3, 19–21]. Chronic or inadequately treated intra-abdominal inflammatory processes have also been implicated [10, 12, 26, 27], as have foreign bodies and implanted materials [28] and chronic inflammatory disorders of the GI tract [26]. Once established, the infection may spread contiguously across anatomical planes and eventually involve the abdominal wall, pelvis, or retroperitoneum [26, 28, 29]. Nevertheless, as shown by the cases summarized in Table 1, a recognizable predisposing factor is not always identified.

Our patient was 72 years old at diagnosis and had previously undergone surgery for CRC. This clinical background substantially influenced the initial diagnostic assessment. In an older patient with a previous malignancy, the appearance of a progressively enlarging and infiltrative abdominal wall mass naturally raises concern for recurrent or secondary neoplastic disease. In this setting, neither the patient's age nor her oncological history suggested an infectious etiology, which contributed to diagnostic difficulty.

The location and pattern of extension were also noteworthy. The lesion predominantly involved the left abdominal wall, infiltrating the surrounding musculo-adipose tissues and extending toward the adjacent retroperitoneal and pelvic structures. Previous cases have involved a variety of sites, including the anterior abdominal wall, *rectus abdominis*, greater omentum, small bowel mesentery, transverse colon, pelvic and colonic regions, as well as more extensive intra-abdominal or peritoneal disease. Although abdominal wall involvement remains uncommon, it may occur as a primary process or through contiguous spread from an intra-abdominal focus [10, 30–32]. The tendency to extend across conventional anatomical boundaries, also observed in our patient, is an important feature of actinomycotic infection and partly explains its tumor-like appearance.

The previous abdominal operation provides a plausible context for the development of the infection. *Actinomyces* spp. are normally commensal organisms with relatively low pathogenic potential, and invasion generally follows disruption of mucosal or tissue barriers. Surgery may facilitate this process through local tissue injury, anatomical alteration, fibrosis, or persistent low-grade inflammation. In the present case, the previous open left hemicolectomy could therefore have contributed to the subsequent infection. However, the long interval between the surgical procedure and clinical presentation, together with the absence of microbiological or molecular evidence establishing a direct relationship, prevents a definite causal association. The postoperative context should consequently be regarded as a plausible predisposing circumstance rather than a proven cause.

One of the most striking features of this case was the difficulty in distinguishing the lesion from malignancy before surgery. Actinomycosis may produce infiltrative masses, abscesses, and extensive fibrosis, all of which can closely resemble soft tissue tumors or recurrent malignant disease [3, 33]. This problem was particularly relevant in our patient because of her history of CRC. The firm and poorly defined mass, associated with skin retraction, together with the irregular infiltrative appearance on CT and extension toward neighboring structures, initially suggested recurrent malignancy or a soft tissue sarcoma. The differential diagnosis of such lesions is broad and includes colorectal malignancies, infectious and inflammatory intra-abdominal processes, and gynecological disorders presenting as complex masses [34–38]. Moreover, radiological findings are generally nonspecific, and CT may demonstrate irregular infiltrative masses or abscess-like lesions that cannot reliably be distinguished from neoplastic processes [12, 39]. Similar pseudotumoral presentations in previously published cases further illustrate why the diagnosis is frequently established only after surgical intervention.

Histopathological diagnosis and diagnostic challenges

HP examination remains central to the diagnosis of actinomycosis. The characteristic finding is the presence of "sulfur granules" containing branching Gram-positive filamentous bacterial colonies surrounded by neutrophils and chronic inflammatory cells, sometimes accompanied by the Splendore–Hoeppli phenomenon [1, 39, 40]. The adjacent tissue usually shows a variable combination of suppurative and granulomatous inflammation, granulation tissue, abscess formation, and prominent reactive fibrosis. Together, these changes may produce a pseudotumoral lesion that closely resembles malignancy [2, 3, 7, 33]. Histochemical stains such as PAS and Grocott's Methenamine Silver (GMS) can assist in demonstrating filamentous microorganisms, whereas microbiological confirmation may be difficult because of the strict anaerobic growth requirements of *Actinomyces* and other technical limitations [41, 42]. The frequent coexistence of anaerobic or facultative organisms may further contribute to tissue invasion and the chronic inflammatory response [43].

In the present case, the diagnosis became apparent only after surgical excision. Histological examination revealed "sulfur granules" with radiating filamentous structures surrounded by a dense suppurative inflammatory infiltrate, together with Splendore–Hoeppli material, granulation tissue, and marked reactive fibrosis. PAS staining highlighted the filamentous structures within the colonies. Gram staining was inconclusive, while Ziehl–Neelsen staining was negative for acid-fast organisms. Anaerobic cultures yielded no bacterial growth, and molecular identification was not available. Species-level identification was therefore not possible, and the diagnosis relied on the characteristic morphological appearance supported by the histochemical findings.

The HP differential diagnosis includes nocardiosis, botryomycosis, filamentous fungal infections, foreign body granulomatous reactions, tuberculosis, IBD, diverticular abscesses, and malignant tumors [3, 18, 22, 44]. *Nocardia* spp. may be particularly difficult to distinguish morphologically from *Actinomyces*, as both may show branching filamentous structures. Unlike *Actinomyces*, however, *Nocardia* is typically weakly or partially acid-fast and can be demonstrated using Ziehl–Neelsen or modified acid-fast staining. Botryomycosis may also produce eosinophilic granules surrounded by Splendore–Hoeppli material, although its colonies are predominantly composed of non-filamentous bacteria and lack the characteristic branching architecture of *Actinomyces*. Filamentous fungal infections represent another important mimic, but fungal hyphae are generally broader and can be more readily demonstrated using PAS and GMS stains.

In foreign body granulomas, multinucleated giant cells surround exogenous or refractile material without the characteristic bacterial colonies.

Histochemical stains are therefore best regarded as complementary to morphological assessment rather than interpreted in isolation. Gram staining may demonstrate the Gram-positive branching filaments of *Actinomyces*, although staining can be variable or inconclusive in tissue sections. PAS can improve visualization of the colonies but lacks specificity because fungal organisms may also be PAS-positive. GMS is particularly useful for demonstrating fungal structures and may also enhance the visualization of filamentous microorganisms. Ziehl–Neelsen or modified acid-fast staining is useful when *Nocardia* is considered, as partial acid-fastness favors nocardiosis over actinomycosis [45]. The final interpretation should therefore integrate the morphology of the "sulfur granules", the accompanying suppurative inflammatory reaction, histochemical findings, microbiological results, and molecular identification when available.

In this setting, the pathologist has a central role in establishing the final diagnosis, particularly when clinical and radiological findings strongly suggest malignancy. Recognition of the characteristic "sulfur granules" and filamentous bacterial colonies, together with the appropriate use and interpretation of special histochemical stains, is essential for distinguishing actinomycosis from important morphological mimics such as nocardiosis and filamentous fungal infections. The present case therefore highlights the importance of including actinomycosis in the differential diagnosis of an infiltrative abdominal wall mass, especially in patients with a history of abdominal surgery.

Long-standing actinomycotic infection may be accompanied by extensive fibrosis, microabscesses, central necrosis, sinus tract formation, and extension across adjacent tissue planes [3, 30, 31, 46–50]. These changes contribute to the infiltrative appearance of the disease and provide a pathological explanation for its frequent resemblance to malignancy on imaging. In our patient, the marked fibrosis and extension into adjacent soft tissues correlated well with the irregular infiltrative appearance observed on CT.

Management varies according to the extent of disease, associated complications, and the degree of diagnostic certainty. Prolonged antimicrobial therapy remains the mainstay of treatment, and high-dose Penicillin followed by an oral Penicillin derivative such as Amoxicillin is commonly recommended for several weeks or months [51–54]. Surgery is generally reserved for large or complicated lesions, abscesses requiring drainage, or situations in which malignancy cannot be confidently excluded. The cases summarized in Table 1 reflect this variability: most patients underwent surgical treatment followed by antibiotics, whereas selected cases were managed with prolonged antimicrobial therapy combined with image-guided drainage or surgery for associated complications.

In our patient, the size and infiltrative appearance of the abdominal wall mass, together with the strong suspicion of recurrent malignancy or soft tissue sarcoma, justified surgical excision. Once the HP diagnosis had been established, prolonged antibiotic therapy with high-dose Penicillin followed by oral Amoxicillin was administered. The subsequent course was favorable, with progressive clinical improvement and no evidence of persistent or recurrent infection during follow-up. This evolution is consistent with the favorable outcomes reported in most of the cases included in our review when appropriate antimicrobial therapy, with or without surgery, was instituted.

When considered alongside previously published cases, the present case is notable for the combination of advanced age, predominant abdominal wall involvement, a remote history of colorectal surgery, and a pseudotumoral presentation strongly suggestive of recurrent malignancy. At the same time, it shares several features with earlier reports, particularly the infiltrative spread across tissue planes, difficulty in establishing the diagnosis preoperatively, reliance on HP examination for definitive diagnosis, and favorable response to combined surgical and antimicrobial treatment. These similarities emphasize the importance of considering abdominal wall actinomycosis in the differential diagnosis of an infiltrative abdominal wall mass in previously operated patients, even when a considerable interval has elapsed since the original surgical procedure.

Conclusions

Abdominal wall actinomycosis is a rare condition that may closely mimic malignancy, making preoperative diagnosis particularly challenging. HP examination remains central to diagnosis, and the pathologist plays a key role in recognizing the characteristic "sulfur granules" and filamentous bacterial colonies and in interpreting special histochemical stains within the appropriate morphological context. Actinomycosis should therefore be considered in the differential diagnosis of infiltrative abdominal wall masses, particularly in patients with a history of abdominal surgery. Appropriate antibiotic therapy, combined with surgery when indicated, is generally associated with a favorable outcome.

Conflict of interests

The authors declare that they have no conflict of interests.

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Corresponding authors

Laurenţiu Augustus Barbu, Assistant Lecturer, MD, PhD, Department of Surgery, University of Medicine and Pharmacy of Craiova, 2 Petru Rareş Street, 200349 Craiova, Dolj County, Romania; Phone +40766–072 985, e-mail: laurentiu.barbu@umfcv.ro

Liviu Vasile, Lecturer, MD, PhD, Department of Surgery, University of Medicine and Pharmacy of Craiova, 2 Petru Rareş Street, 200349 Craiova, Dolj County, Romania; Phone +40744–636 001, e-mail: vliviu777@yahoo.com

Received: February 15, 2026

Accepted: September 7, 2026