Actinomycosis Mimicking Gynecological Malignancy: Imaging Patterns in Seven Cases

Nikhil Bhuskute, Ranjeet Shinde

ABSTRACT

Pelvic actinomycosis is uncommon and believed to be related to the use of intrauterine devices (IUDs). It may present as a complex gynecological mass either uterine or adnexal with or without local pelvic spread or with peritoneal dissemination, all features which mimic gynecological malignancy. We describe seven women with proven actinomycosis who presented to a single cancer center gynecological cancer multidisciplinary team meeting (MDTM) to illustrate these imaging appearances and highlight discriminant features of actinomycosis. A minority of women had concurrent use of an IUD. Involvement of the pararectal space was a feature of pelvic disease extension. We describe the value of image-guided core biopsy (IGCB) in confirming the diagnosis.

Keywords: Arteriovenous fistula, Fistula, Hemodialysis, Infection, Patency, Primary failure, Rates, Steal syndrome, Thrombosis, Vascular access.

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INTRODUCTION

Otto Bollinger described bovine actinomycosis in 1877 and in 1879, James Israel described the first human involvement. Actinomyces israelii is a gram-positive, anaerobic, non-acid fast filamentous bacterium. It is a common commensal in the oral cavity, vagina, and large bowel. Pelvic actinomycosis is an uncommon infection, most commonly described in association with use of IUDs, diverticular disease, cholecystitis, abdominal surgery, and penetrating trauma. We describe our experience of seven women with pelvic actinomycosis mimicking gynecological malignancy at a tertiary oncology center which, to the best of our knowledge, is the largest such series yet reported.

MATERIALS AND METHODS

Clinical

Over a 5-year period, seven cases of abdomino-pelvic actinomycosis were identified prospectively by one of the authors during attendance at the weekly MDTM. Five cases were histologically proven and two were assumed to be actinomycosis, based upon resolution of imaging abnormalities following specific antibiotic therapy. These two cases had no evidence of malignancy on multiple core biopsies which showed only a mixture of acute and chronic inflammation. No other organism was isolated from vaginal or uterine swabs. Because of a strong clinical and imaging suspicion of the diagnosis, the women were treated as actinomycosis with penicillin with excellent clinical recovery and complete or partial resolution of the imaging abnormalities. No other cases of proven pelvic urogenital actinomycosis were identified in a search of the pathology department database for this period.

The average age at presentation was 43 years (32–54 years). One woman had an IUD in place at presentation and two women had prior use of IUDs. All seven were referred to the regional MDTM with a provisional diagnosis of gynecological malignancy. Five women were suspected to have adnexal cancer and two to have suspected cervical cancer. One woman had prior grade II cervical carcinoma, treated by hysterectomy. Four women presented from our own local gynecology team and three were referral cases having already been discussed in other local cancer unit MDTM. No patient had a history of fever. The tumor marker CA-125 was raised in only two cases while the inflammatory marker C-reactive protein was raised in four of the seven cases. In five cases, the white cell count was raised (12.4−18.9 × 10⁹/L) and in all cases, differential white cell count showed neutrophilia.

One woman was thought to have pelvic inflammatory disease (PID) after initial MDTM review and was treated in her local hospital as such. While undergoing antibiotic therapy, she required exploratory surgery for unremitting pain and for drainage of pelvic suppuration. Another woman with a complex pelvic mass suspected to represent ovarian cancer developed small bowel obstruction necessitating emergency surgery a few days after discussion in the MDTM. Both these patients were found to have actinomycosis on examination of the surgical specimens. Diagnosis in the remaining five patients was made by
image-guided biopsy or gynecological biopsy directed by imaging features. These women avoided surgery.

Confirmatory histology was thus obtained using IGCB in three women, from operative specimens for two women and image-guided biopsy for the other two women. They both had an abnormal cervix and uterus on imaging as well as on clinical examination, but with no clinical evidence of malignancy. After MDTM discussion, they underwent cervical and parametrial biopsy and/or uterine curettages, which showed inflammatory material only. Subsequent imaging in these two women showed resolution of abnormalities after antibiotic therapy.

Image-guided biopsies were taken following local anesthesia under either ultrasound (US) or computed tomography (CT) guidance; US-guided biopsy was diagnostic. For one woman, CT-guided biopsy was initially performed and showed nonspecific chronic inflammatory changes, but a repeat US-guided biopsy was diagnostic of actinomycosis. For IGCB, an 18-gauge cutting needle incorporating a spring-loaded device was used, producing a core of up to 1.8-cm-long specimen. Biopsies were taken from the infracolic omental cake (1), liver (1), and a pelvic mass.1 The number of biopsy cores that were taken was at the discretion of the operator, but the aim was to provide material equivalent of two full biopsy cores. The IGCB was only performed after MDTM review and when there was imaging evidence of dissemination of the disease process.

The institutional review board granted a waiver to review the case notes in further detail in a retrospective fashion.

Pathology

The sections were initially routinely processed in paraffin and stained with hematoxylin and eosin (H&E), followed by Gram, Grocott, Hexamine silver, and extended periodic acid–Schiff stains. Actinomyces colonies were readily identified as distinct “sulfur granules” on histological examination and these were typically surrounded by inflammation, granulation tissue, and fibrosis. This formation of an inflammatory mass may mimic a malignant tumor on macroscopic examination. The diagnosis of actinomycosis was made on microscopic examination of the specimen by the presence of sulfur granules and the absence of neoplastic cells. The sulfur granules comprised a central eosinophilic core surrounded by radiating gram-positive bacterial filaments (Fig. 1A). The diagnosis of actinomycosis was confirmed by the highlighted slender filaments of actinomyces on silver and Gram stains (Fig. 1B).

Imaging Features

The presentations mimicking as gynecological malignancy are summarized in Table 1.

<table>
<thead>
<tr>
<th>Imaging feature</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features of primary cancer</strong></td>
<td></td>
</tr>
<tr>
<td>Adnexal mass</td>
<td>5</td>
</tr>
<tr>
<td>Uterine/cervical mass</td>
<td>2</td>
</tr>
<tr>
<td><strong>Features of local extension</strong></td>
<td></td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>2</td>
</tr>
<tr>
<td>Pelvic sidewall involvement</td>
<td>2</td>
</tr>
<tr>
<td>Pelvic fluid collections</td>
<td>2</td>
</tr>
<tr>
<td>Involvement of sigmoid mesentery</td>
<td>1</td>
</tr>
<tr>
<td>Involvement of pararectal spaces</td>
<td>3</td>
</tr>
<tr>
<td>Hydronephrosis</td>
<td>2</td>
</tr>
<tr>
<td><strong>Features of dissemination</strong></td>
<td></td>
</tr>
<tr>
<td>Ascites: pelvic</td>
<td>2</td>
</tr>
<tr>
<td>Ascites: upper abdominal</td>
<td>0</td>
</tr>
<tr>
<td>Omental masses</td>
<td>2</td>
</tr>
<tr>
<td>Liver surface deposit</td>
<td>1</td>
</tr>
</tbody>
</table>
There were complex adnexal masses with solid components which showed abnormal Doppler flow on US and abnormal gadolinium enhancement at magnetic resonance imaging (MRI) (Figs 2 and 3). The solid components included mural nodules or mural thickening and irregularity exceeding 3 mm in thickness. Pelvic lymphadenopathy was seen in two women, one with solid lymphadenopathy and the
other with multiple small areas of micro-necrosis in enlarged nodes (Fig. 3).

Local pelvic infiltration extended into sigmoid mesentery, pararectal and mesorectal spaces, or laterally to the pelvic sidewall (Fig. 4). The infiltrative process also involved the ureter causing hydronephrosis in two women (Fig. 5). When disease was predominant in the subperitoneal space of the pelvis, there was marked enhancement of the pelvic peritoneum and florid stranding of the fascial and fat spaces above and below this (Fig. 6).

Figs 4A and B: (A) Contrast-enhanced CT scan shows a right adnexal mass with large areas of necrosis. Also note the right pelvic side wall involvement and a “tongue-like” direct extension though the right para-rectal space to the sacrum, again an odd feature for primary adnexal malignancy and (B) an axial T2-weighted MRI shows the same process. The adnexal mass has intermediate signal intensity with some regions of high signal intensity.

Figs 5A to D: The adnexal mass causing hydronephrosis on various modalities.
Omental masses and liver surface deposits were seen in two women (Fig. 7). Notably on CT, the omental masses were nodular, more like “buns” than “cakes,” and these showed central low attenuation (Fig. 6). This feature correlated histologically with central necrosis. Ascites were minimal or absent.

The MR signal characteristics were varied. There was bland T1-signal in the solid elements of pelvic
anatomical barriers. This property may result in condi-
tive and granulomatous disease which does not respect
management. Pelvic actinomycosis is a chronic suppura-
tive disease in both clinicoradiological presentation and
between actinomycosis and advanced gynecological
antibiotic therapy for PID. There are thus similarities
pain and pelvic sepsis which did not respond to standard
for small bowel obstruction and another for unremitting
of our seven cases required surgery for symptoms, one
intervention and surgery to manage complications. Two
term medical (antibiotic) therapy and may necessitate
is a very rare, but serious infections may require long-
all presented to a gynecological oncology MDTM in a

Thus, in some cases, unnecessary radical cancer surgery
been performed.7,8

With a firm histological diagnosis, the primary
treatment plan was medical/interventional and thus
five of the seven women avoided unnecessary cancer
surgery. One woman had percutaneous placement of a
ureteric stent and another had CT-guided insertion of

DISCUSSION

While 20% of IUD users have actinomyces-like organisms
as part of their normal genital flora,4 pelvic actinomycosis
is a very rare, but serious infections may require long-
term medical (antibiotic) therapy and may necessitate
intervention and surgery to manage complications. Two
of our seven cases required surgery for symptoms, one
for small bowel obstruction and another for unremitting
pain and pelvic sepsis which did not respond to standard
antibiotic therapy for PID. There are thus similarities
between actinomycosis and advanced gynecological
malignancy in both clinicoradiological presentation and
management. Pelvic actinomycosis is a chronic suppura-
tive and granulomatous disease which does not respect
anatomical barriers.5 This property may result in condi-
tion being mistaken for a malignant “frozen pelvis.”
Thus, in some cases, unnecessary radical cancer surgery
has been performed.7,8

The unifying feature of our seven cases is that they
all presented to a gynecological oncology MDTM in a
Cancer Unit with suspicion of new or recurrent cancer.
None had features of a septic condition, none had fever,
and only mild neutrophilia was present. One was sus-
pected to be complex PID after initial MDTM discussion
and one was suspected to have ovarian cancer, but there
were uncertainties in diagnosis for the five women who
proceeded to core biopsy. Three were diagnosed based on
IGCB and two from core biopsies which were taken by a
gynecologists from sites of concern identified on MRI at
the MDTM review.

Some clinical and some imaging aspects of these
cases did not fit with the typical presentations of gyne-
cological cancer. Only two cases had a raised CA-125
level. This is rare with ovarian malignancy, especially
when it has spread to the peritoneum and this further
raised concerns.

Imaging features which were “out of character” for
malignancy were: (i) Invasion of the pelvic side wall
musculature or necrotic sidewall lymphadenopathy
related to an adnexal mass, features more associated
with an advanced primary cervical cancer (Fig. 4); (ii)
a liver surface lesion without ascites and intervening
omental cake that would be expected with typical spread
of primary ovarian cancer (Fig. 7); (iii) invasion of the
adnexal mass into the mesorectum or pararectal spaces,
compartment usually respected by untreated ovarian
cancer; and (v) cavitating omental masses in a patient who
had not undergone treatment (Fig. 6). These discordant
imaging features (Table 2) prompted the need for a firm
histological diagnosis prior to treatment.

With a firm histological diagnosis, the primary
treatment plan was medical/interventional and thus
five of the seven women avoided unnecessary cancer
surgery. One woman had percutaneous placement of a
ureteric stent and another had CT-guided insertion of

<table>
<thead>
<tr>
<th>Features</th>
<th>Acute PID</th>
<th>Actinomycosis</th>
<th>Primary ovarian malignancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary disease site</td>
<td>Uniform, thick-walled</td>
<td>Ill-defined cystic or solid masses.</td>
<td>Usually well defined, solid, cystic, or mixed. Fascial planes offer longer resistance to local spread for smaller masses</td>
</tr>
<tr>
<td></td>
<td>predominantly cystic.</td>
<td>No respect for fascial planes in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occasional thickening of</td>
<td>spite of smaller primary mass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>peritoneal folds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omental disease</td>
<td>Usually fine peritoneal</td>
<td>Masses like “buns” with or without</td>
<td>Large omental cakes or wispy disease.</td>
</tr>
<tr>
<td></td>
<td>thickening and enhancement</td>
<td>cavitations</td>
<td>Rarely cavitate prior to treatment</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>Reactive</td>
<td>Micro-abscess within nodes or solid nodes</td>
<td>Usually solid with exception of cervical cancer</td>
</tr>
<tr>
<td>Liver surface disease</td>
<td>Rarely seen except in Fitz-</td>
<td>Liver surface disease in absence of</td>
<td>Liver surface or parenchymal disease</td>
</tr>
<tr>
<td></td>
<td>Hugh-Curtis syndrome</td>
<td>ascites</td>
<td>almost always with ascites</td>
</tr>
<tr>
<td>Mesorectal invasion</td>
<td>Rare, thickening of</td>
<td>Mesorectal invasion out of proportion to</td>
<td>Unusual with adnexal masses, seen more</td>
</tr>
<tr>
<td></td>
<td>uterosacral fold common</td>
<td>size and site of primary mass</td>
<td>commonly in cervical cancer</td>
</tr>
<tr>
<td></td>
<td>with posterior extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelvic sidewall</td>
<td>In the form of enlarged</td>
<td>Involvement out of proportion to</td>
<td>Commoner with cervical cancer than other</td>
</tr>
<tr>
<td>involvement</td>
<td>reactive nodes</td>
<td>size and site of primary mass</td>
<td>adnexal masses</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>Rare</td>
<td>Seen in solid masses</td>
<td>Unusual feature of solid ovarian mass</td>
</tr>
</tbody>
</table>
Actinomycosis Mimicking Gynecological Malignancy

Actinomycosis is a chronic inflammatory disease that can involve various parts of the body. It is caused by Actinomyces species, which are Gram-positive, anaerobic, filamentous bacteria. In women, actinomycosis can present as a gynecological condition, mimicking malignancy.

**RESULTS**

In our series, we diagnosed actinomycosis in seven women, all of whom presented with pelvic symptoms. The diagnosis was confirmed by histopathology and culture. The imaging features of pelvic actinomycosis include abscess formation, granulomas, and peritoneal thickening. These features can be similar to those seen in gynecological malignancy, making diagnosis challenging.

**CONCLUSION**

Pelvic actinomycosis can mimic gynecological malignancy, presenting as a pelvic abscess, granuloma, or peritoneal thickening. The diagnosis requires a combination of clinical, imaging, and microbiological evidence to confirm the diagnosis. Multidisciplinary team review is essential to prevent delays in diagnosis and treatment.

**REFERENCES**