International Journal of Women's Health

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CASE REPORT

Large Douglas Abscess with Distinctive Bilateral Salpingitis in a Young Virginal Woman 6 Months Following Small Bowel Perforation at the Level of the Jejunojejunostomy After Roux-en-Y Gastric Bypass: A Case Report

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Abstract: Douglas abscesses (DA) involving the ovaries and/or fallopian tubes and tubo-ovarian abscesses (TOA) constitute a very rare finding in virginal females. Underlying conditions are suspected to play a role in their development; often however, the exact pathomechanism remains hypothetical or unknown. We report the case of a 19-year-old virginal female who was referred to our outpatient clinic for further clarification of a 6-month ongoing secondary amenorrhea. In the course of the investigations, a large Douglas abscess with distinctive bilateral salpingitis was diagnosed as an incidental finding in a basically oligosymptomatic patient. Laparoscopic abscess drainage was performed and appropriate antibiotic therapy administered. Intraoperatively collected specimens revealed *Escherichia coli* to be the responsible pathogen and detected foreign body giant cell reaction to intestinal contents on histopathological workup. Retrospectively, a small bowel perforation at the level of the jejunojejunostomy after Roux-en-Y gastric bypass with spillage of intestinal contents and positive cultures for *Escherichia coli*, 6 months prior to her referral, was identified as the triggering event. This case, however unique its pathomechanism may be, demonstrates that a history of intestinal leakage in the context of bowel surgery should be considered a relevant risk factor for the development of DA and TOA in virginal females, even if the primary cause lies several months in the past. It is under these circumstances that the clinical presentation can be atypical and misleading, making it all the more difficult to diagnose. Nonetheless, considering the possibility of this rare condition in light of medical history is crucial.

Keywords: Douglas abscess, tubo-ovarian abscess, virginal female, *Escherichia coli*, small bowel perforation, Roux-en-Y gastric bypass

Introduction

The formation of an abscess in the lesser pelvis involving the ovaries and/or fallopian tubes, such as a Douglas abscess (DA) or tubo-ovarian abscess (TOA), is a possible complication of ascending upper genital tract infections causing pelvic inflammatory disease (PID). It is typically associated with sexual activity.[1–4] In virginal females, on the other hand, it is very rare and to date only case reports and case series have addressed this topic,[3–7] leaving its true incidence and prevalence unknown.[7] Pathogenetic considerations include bacterial translocation from the bowel,[6] ascending lower genital tract infections[8,9] and vaginal voiding[3] or chronic vaginal pooling of urine due to recessed urethra and obesity in combination with urinary tract infections (UTIs).[10,11] In most cases, however, it is not possible to provide a proof of concept of the suspected pathomechanism, thus it remains a hypothesis. Nevertheless, correct and prompt diagnosis is essential to providing optimal treatment without delay, as the sequelae can have a large impact on future fertility and quality of life.[1–4,6,12,13]

Received: 18 August 2024
Accepted: 23 December 2024
Published: 27 December 2024

Here, we present the unique case of a 19-year-old virginal female with a large DA and concomitant distinctive bilateral salpingitis 6 months following small bowel perforation at the level of the jejunojejunostomy after Roux-en-Y gastric bypass, causing intraabdominal contamination with intestinal content and bacteria.

Case Presentation

In April 2024, a 19-year-old woman was referred to our outpatient clinic for the further investigation of a 6-month ongoing secondary amenorrhea. She reported dysmenorrhea-like pain in the lower abdomen each time her period was expected to begin. This was a pain she was familiar with from her menses before the amenorrhea set in. Further, she had noticed an increased yellowish vaginal discharge in the weeks prior to her visit. Micturition and defecation had been uneventful according to the patient. Menarche had been at 16 years of age, and, up until October 2023, she had had regular menses. To present, she had not been sexually active.

Her medical history revealed that in April 2023 she had had surgery for morbid obesity in the form of laparoscopic Roux-en-Y gastric bypass, with an initial weight loss of 32 kg. In October 2023, an emergency surgery had to be performed due to small bowel perforation at the level of the jejunojejunostomy. Cultures of the intraoperatively-taken swabs for the purpose of microbiological workup revealed the growth of *Escherichia coli (E. coli), Klebsiella pneumoniae* and *Enterococcus gallinarum*. Resistance-testing for the *E. coli* showed resistance to ampicillin and amoxicillin-clavulanate. Thus, she was treated with intravenous piperacillin/tazobactam for which it proved to be susceptible. Antibiotic treatment was administered for a total of 7 days, and she was dismissed from hospital on the day of completion of the antibiotic therapy. This episode caused her to lose another 24 kg, adding up to a total weight loss of 56 kg (her initial weight was 110 kg).

On physical examination, her vitals were normal, she was afebrile, and her abdomen was soft with a slight pain in the right lower abdomen, provocable on deep palpation. Transabdominal ultrasound performed routinely for further investigation of the secondary amenorrhea revealed an inhomogeneous tumor with mixed echogenicity, 67 × 53 mm in size, dorsal the uterus (Figure 1). This incidental finding led to the decision to perform an additional transrectal ultrasound after getting consent from the patient. The sonography results showed that the inhomogeneous mass was located in the pouch of Douglas and was strongly adherent to almost the complete posterior uterine wall. It also displayed direct and

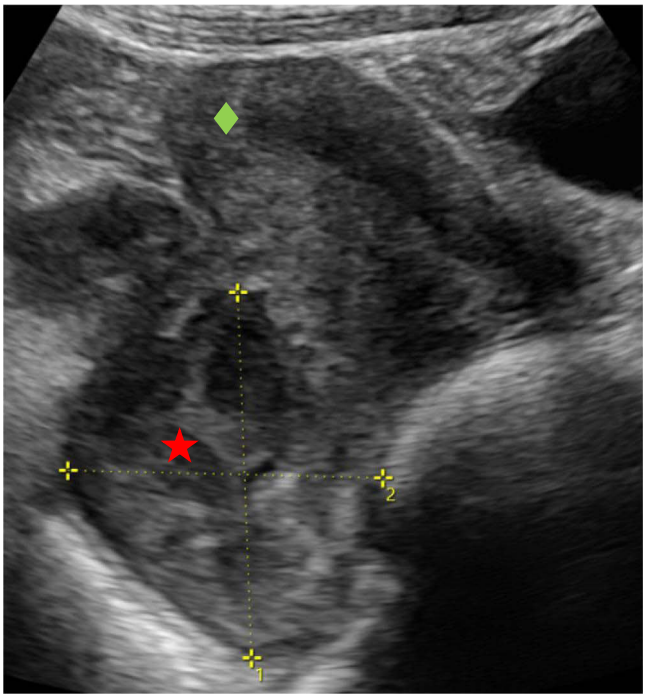

Figure 1 Transabdominal ultrasound showing the ventrally lying uterus (green diamond) with an inhomogeneous tumor (red star) directly adjacent to the posterior uterine wall in the pouch of Douglas. The tumor seems to be tightly adherent to the uterus.

extensive contact with the dorsally-lying rectosigmoid (Figure 2A). The mass measured a total of 70 × 44 × 57 mm. On color Doppler imaging, no blood flow could be detected in the center of the lesion, indicating a cystic nature, the surrounding capsule, however, showed very strong vascularization (Figure 2B). Cranially to the mass on both sides and, connecting directly to it, were hypoechoic, distinctive tubular structures (Figure 2C), particularly on the right side (Figure 2D). Retrospectively, these structures were identified as bilaterally massively distended fallopian tubes. Both ovaries were laterally adherent to the cystic mass in the pouch of Douglas, but other than that, they had a normal sonographic appearance (Figure 3). The entire site was very immobile on sonopalpation, in the sense of a frozen pelvis. The uterus was normal in size (56 × 32 × 34 mm) and shape and the endometrial layer was 5 mm thick.

In view of the sonographic findings, a more thorough anamnesis was carried out, revealing subfebrile temperatures of approximately 38°C four days prior to presentation as well as slightly increased pelvic pain in the preceding weeks.

Laboratory findings showed a leukocytosis with a white blood cell count (WBC) of 13.5 Giga/L (normal values: 2.6–7.8 Giga/L) and a C-reactive protein (CRP) of 83 mg/L (normal values: <5 mg/L). The pregnancy test in the urine came back negative, there were no signs of a urinary tract infection in the urinalysis and a culture of the urine and vaginal discharge detected no bacterial growth.

The results of these aforementioned examinations combined, lastly, gave rise to the presumption that an infectious condition in the lesser pelvis had led to the formation of an abscess in the pouch of Douglas. Taking into consideration her virginity and the slight tenderness to palpation in the right lower abdomen as well as the very prominent tubular structure cranially to the abscess on the right side on transrectal ultrasound (Figure 2D), the initial suspected diagnosis was perforated appendicitis with an accompanying DA. Hence, a computed tomography (CT) scan was ordered to clarify the mechanism of the abscess formation. The CT scan, in accordance with the transrectal ultrasound, suggested that the

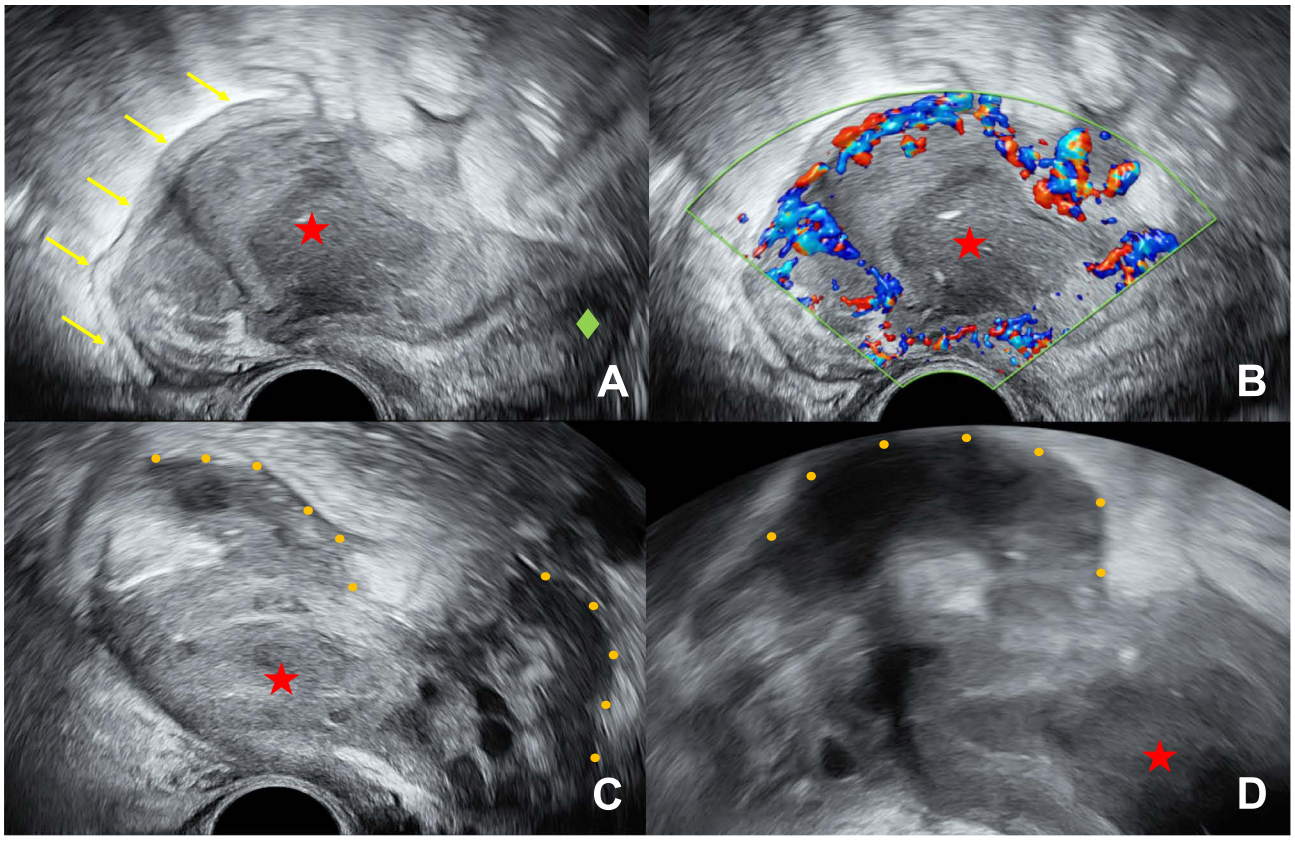

Figure 2 Transrectal ultrasound. **(A)** Inhomogeneous mass (red star) in the pouch of Douglas. The mass is ventrally confined by and tightly adherent to the posterior uterine wall (green diamond). Dorsally, the mass has direct and extensive contact to the rectosigmoid (yellow arrows). **(B)** On color Doppler imaging no blood flow can be detected in the center of the inhomogeneous mass (red star), underlining its cystic nature. However, in the periphery there is very strong perfusion. **(C)** Hypoechoic tubular structures (Orange dots) to the left and right connect to the inhomogeneous mass (red star) in the middle. **(D)** Closer image of the prominent hypoechoic tubular structure on the right (orange dots), connecting to the inhomogeneous mass (red star).

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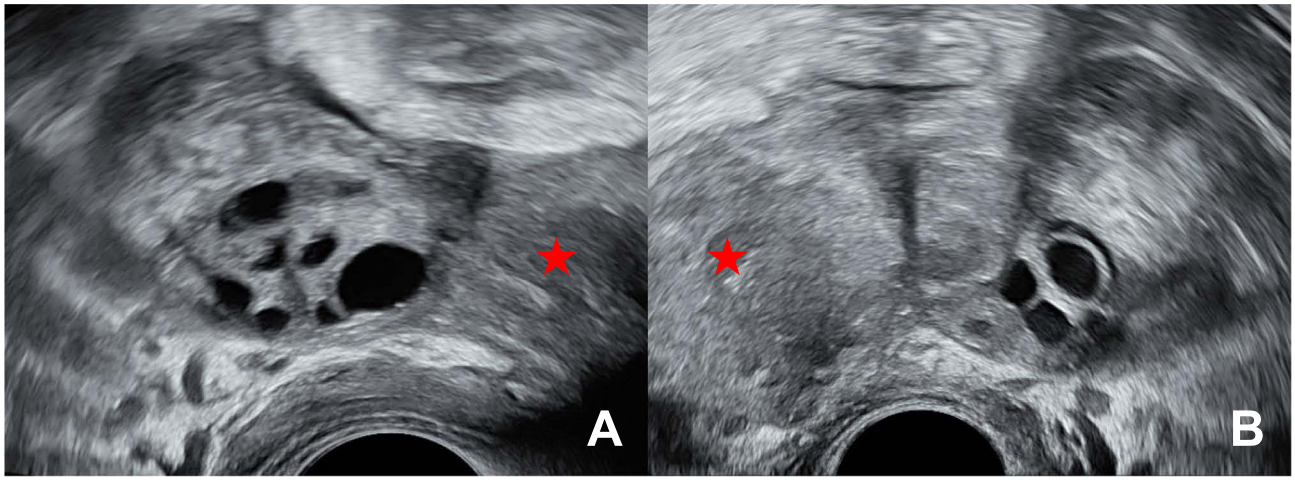

Figure 3 Transrectal ultrasound. **(A)** Right and **(B)** left ovary adjacent to the inhomogeneous mass in the lesser pelvis (red star).

retrouterine mass was a DA with bilateral distinctive salpingitis and pyosalpinx, respectively (Figure 4A). The appendix, however, was completely normal (Figure 4B), and no gas was detected, neither in the abscess nor in the abdominal cavity, leaving the origin of the infectious process unclear.

As the pathomechanism and thus the pathogen, despite all investigations and examinations, remained unknown, the decision was made to surgically address the abscess. Laparoscopy was performed, confirming the abscess in the pouch of Douglas with accompanying massive salpingitis (Figure 5A). The entire retrouterine space was obliterated by the infection, causing a frozen pelvis. The prominent tubular structures on ultrasound, in particular on the right side (Figure 2D), could intraoperatively unambiguously be assigned to the bilaterally massively distended, inflamed fallopian tubes. Macroscopically, the appendix (Figure 5B) and the anastomosis from the Roux-en-Y gastric bypass (Figure 5C) appeared unremarkable and showed no signs of infection or perforation. In addition, unclear, firm peritoneal lesions were detected in the area of the sacral promontory (Figure 5D).

Meticulous adhesiolysis was required in order to fully drain the abscess and spare the uterus, tubes, ovaries and rectum from any or further damage (Figure 6A–D). The ovaries themselves, although they formed the lateral boundaries of the abscess, were not an actual part of it. Intraoperative swabs and tissue samples for microbiological workup were collected and biopsies from the abscess walls as well as the peritoneal lesions were taken for histological examination.

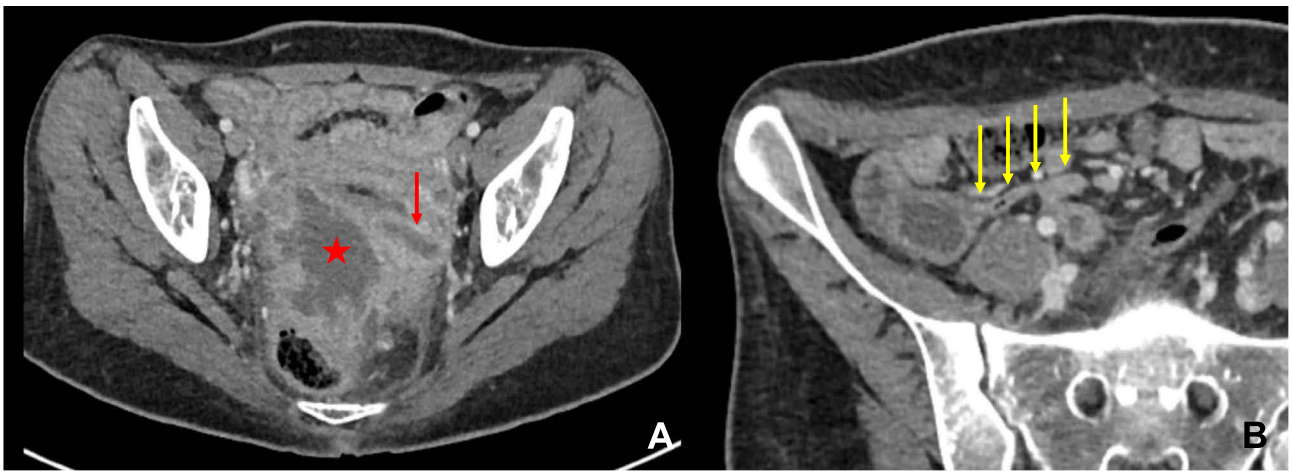

Figure 4 Computed tomography (CT) images. **(A)** Cystic mass (red star) in the lesser pelvis with peripheral enhancement, suspicious of an abscess. Additionally, left salpingitis with pyosalpinx (red arrow) is also visible in this image. **(B)** The appendix is slim and shows no signs of inflammation (yellow arrows).

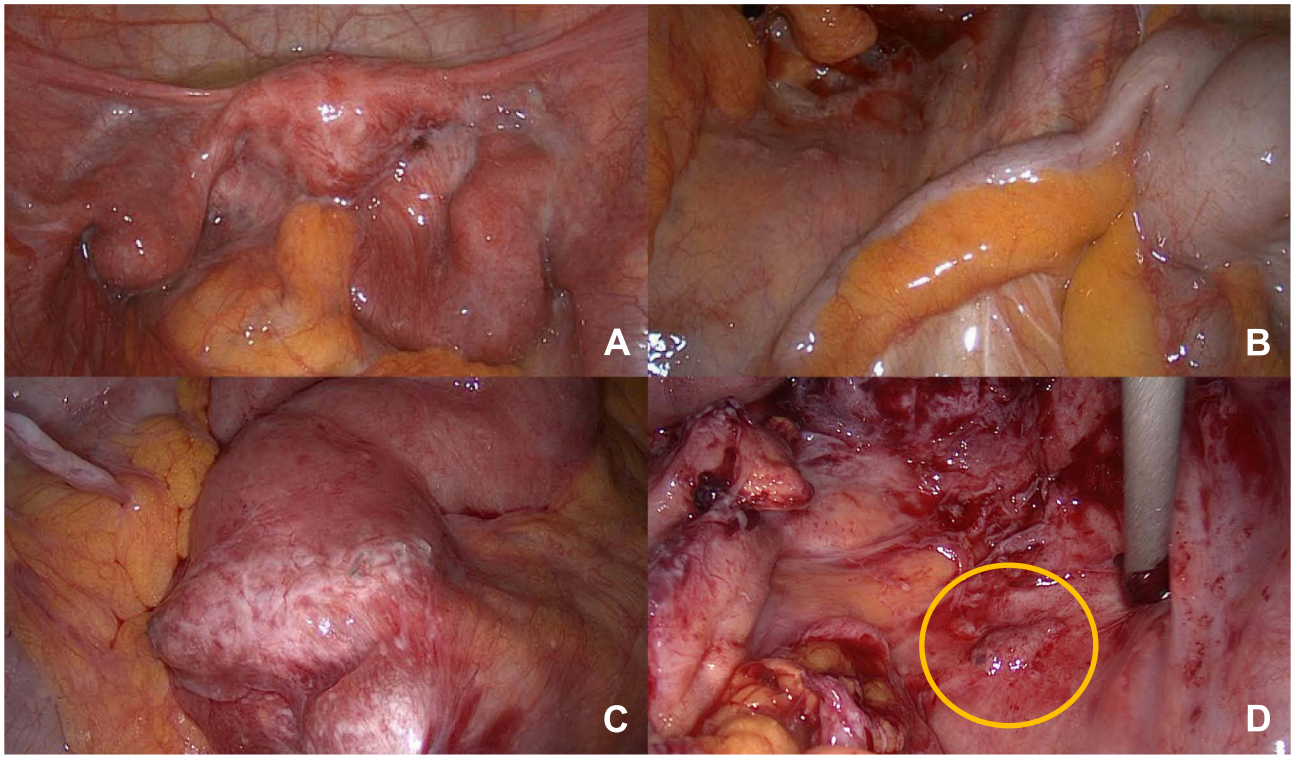

Figure 5 Intraoperative findings. **(A)** Overview of the lesser pelvis showing the extensively adherent structures. The fallopian tubes, especially the right one, are massively inflamed and distended. It is the situation of a frozen pelvis. **(B)** Unremarkable appendix with no signs of inflammation. There is no connection of the appendix to the abscess. (**C**) Site of the revised jejunojejunostomy after Roux-en-Y gastric bypass. There are no signs of acute inflammation or perforation in this area. **(D)** Area of the sacral promontory with unclear, firm peritoneal lesions (yellow circle).

The abscess pocket and abdomen were irrigated with 8 liters of sterile solution, and a drain was placed in the pouch of Douglas.

Postoperatively, the patient was empirically started on piperacillin/tazobactam i.v. (4.5 g every 8 hours) as well as doxycycline i.v. (100 mg every 12 hours). Additionally, a single dose of ceftriaxone i.v. 2 g was administered, according to the guidelines on antibiotic treatment of PID, as the definitive results of the microbiological specimen were still pending. Doxycycline i.v. was discontinued after the testing for *Chlamydia trachomatis* deoxyribonucleic acid (DNA) came back negative. The final abscess cultures exclusively grew an *E. coli*, susceptible to piperacillin/tazobactam, however resistant to ampicillin and amoxicillin-clavulanate as well as ceftazidime and cefuroxime. *Neisseria gonorrhea* DNA, like *Chlamydia trachomatis* DNA, was not detected in any of the samples.

The histological examination of the abscess wall as well as of the peritoneal lesion from the promontory region revealed an acute and chronic granulomatous inflammation with foreign body giant cell reaction to foreign material, most likely intestinal contents (Figure 7A–D). Together with the culture of an ampicillin and amoxicillin-clavulanate resistant *E. coli* such as the one cultured in October 2023, this histological finding was proof of the fact that the small bowel perforation at the level of the jejunojejunostomy following Roux-en-Y gastric bypass was the triggering event ultimately leading to DA formation in this virginal woman, albeit 6 months later.

The post-operative course was uncomplicated and uneventful. After 72 hours, the antibiotic treatment was oralized to ciprofloxacin (500 mg every 12 hours) and metronidazole (500 mg every 8 hours) in accordance with the resistance testing of the *E. coli*.

The patient was discharged on post-operative day 4 at her own request, however closely followed as an outpatient. On the day of discharge, the CRP and WBC levels were 218 mg/L and 8.8 Giga/L, respectively. However, on day 7 the CRP level had dropped to 28 mg/L and the WBC count was already within the normal range (6.3 Giga/L). Oral antibiotics were continued until post-operative day 14, and in the final examination on day 21 the CRP level had normalized as well

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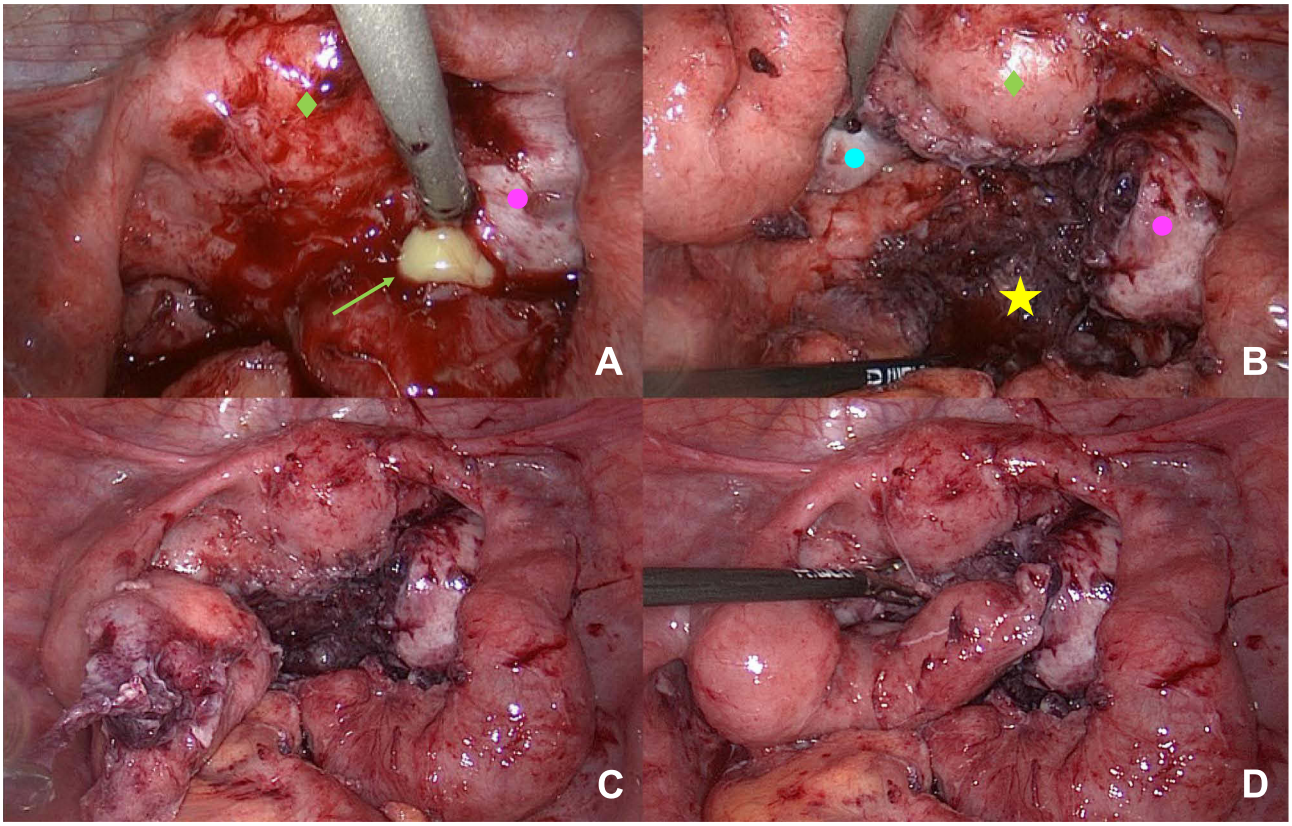

Figure 6 Intraoperative findings. (**A**) Site of the lesser pelvis after partial adhesiolysis. The dorsal uterine wall (green diamond) is partially freed. The abscess cavity has been entered medial to the right ovary (pink dot), leading to the spillage of pus (green arrow). (**B**) Further adhesiolysis has been performed. The pouch of Douglas is freed (yellow star), the abscess is completely opened and drained. The right (pink dot) and left (blue dot) ovary lateral to the uterus (green diamond) are now visible. (**C**) and (**D**) show the site after abscess drainage, irrigation and complete adhesiolysis.

(< 5 mg/L). The patient reported to be completely asymptomatic, she had remained afebrile, the abdomen was soft and not tender to palpation and on transabdominal ultrasound no retrouterine mass or fluid collection could be visualized any longer.

To address the issue of the secondary amenorrhea, a follow-up after resolution of the infectious situation in the lesser pelvis is planned.

Discussion

TOAs or DAs involving the ovaries and/or fallopian tubes represent a possible severe complication of PID and are thus the result of an ascending genital tract infection in the majority of cases. Other possible etiologies of TOA and DA exist such as previous pelvic surgery, pelvic malignancy, extension from adjacent infections (eg appendicitis and diverticulitis) and hematogenous spread from distant infectious sites, however, PID remains the most common cause.[1,14,15]

Characteristically, TOA and DA are found in women in their reproductive years and the risk factors include sexual activity, multiple sexual partners, IUD insertion and history of upper genital infections or PID. Although *Neisseria gonorrhea* and *Chlamydia trachomatis* are found in most cases with PID, interestingly they can only occasionally be isolated from the abscess fluid. The cultures from within the abscesses are typically polymicrobial, with predominant growth of anaerobic bacteria. Common pathogens are, inter alia, *E. coli, Bacteroides fragilis, Bacteroides* species, *Peptostreptococci*, *Peptococci*, and aerobic *Streptococci*.[1–4,9,16]

In virginal females, DAs with tubal/ovarian involvement or TOAs are a rare occurrence and to date, a review of the literature reveals a little over 50 reported cases, our case included.[3–7] Various scenarios have been proposed with regard to the pathomechanism, most of them assuming an underlying predisposing condition making the patients susceptible to

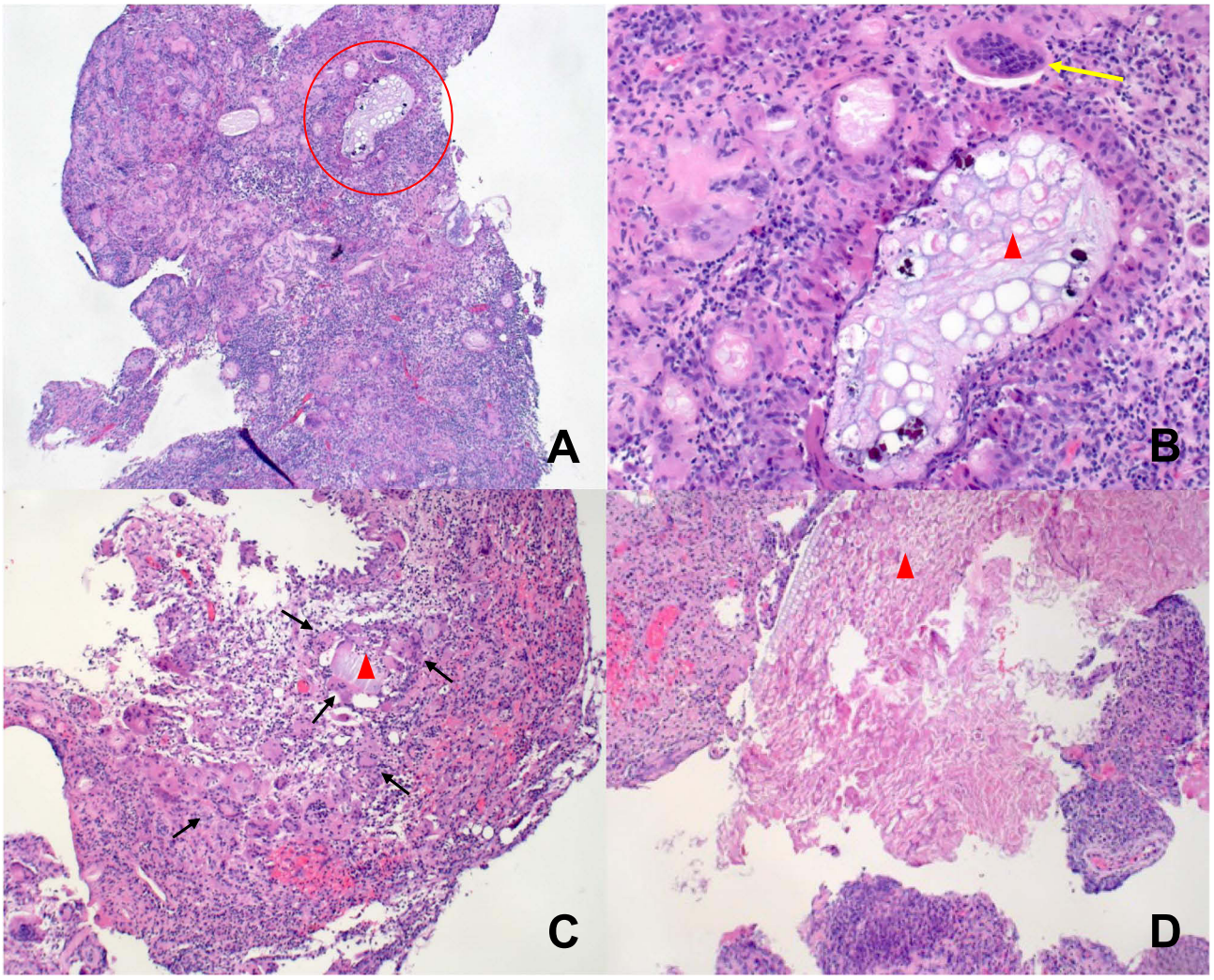

Figure 7 Microscopic findings, Hematoxylin and eosin staining. **(A)** Extensive acute and chronic granulomatous inflammation in the vicinity of foreign material (red circle). **(B)** Close-up of the foreign material in (**A**) (red triangle). Directly adjacent is a foreign body giant cell (yellow arrow). **(C)** Foreign material (red triangle) with a considerable number of foreign body giant cells (black arrows) surrounding it. **(D)** Large piece of foreign material (red triangle).

ascending urogenital tract infections, translocation of bacteria from the gastrointestinal tract or hematogenous spread.[3–11,15,17,18] In the case series by Hakim et al that reported on 16 non-sexually active adolescents with TOA, 13 patients were found to have comorbid conditions such as obstructed hemivagina and ipsilateral renal agenesis, renal or urinary tract anomalies and active or recent appendicitis, rendering them more vulnerable to the development of TOA. Most abscess fluid cultures in this patient collective were polymicrobial or grew *E. coli*, in one case *Corynebacterium* was cultivated.[7] Hartmann et al suspected the inflammatory bowel disease M. Crohn to be the origin of hematogenous seeding of bacteria causing TOA in a virginal female in one of their two cases (abscess culture: *Bacteroides uniformis*, coagulase-negative staphylococci, *and Streptococcus milleri*). In the other case, the suspected mechanism of TOA formation was vaginal pooling of urine due to vulvar obesity with recession of the urethral meatus and concomitant recurrent urinary tract infections (UTI) (abscess culture: *E. coli*).[10] The case reported by Moore et al of TOA ocurring in an adolescent virginal female, also described the most likely cause of abscess formation as being vaginal voiding due to a recessed urethra with pooling of urine in the posterior vagina (abscess culture: *E. coli*).[11] In the case series by Cho et al comprising 5 virginal women with TOA, the authors found no apparent reason for abscess formation in 4 out of 5 patients. In one case, however, they suspected UTI and vaginal voiding to be the pathomechanism of TOA development (abscess culture: negative).[3] The case of TOA in a sexually inactive adolescent, reported by Arda et al, showed concomitant UTI with

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E. coli as sole risk factor for abscess development (abscess culture: *E. coli*).[17] Dogan et al suspected an ascending infection from the lower genital tract to be the cause of TOA in their case of a sexually inactive girl (abscess culture: *E. coli*, α-hemolytic streptococci).[8] Similarly, Simpson-Camp et al proposed direct ascension from the lower genitourinary tract to have given rise to the TOA in their case of an adolescent virgin (*Streptococcus viridans*).[9] Direct spread from the gastrointestinal or genitourinary tract (abscess culture: *Abiotrophia/Granulicatella* species) as postulated by Gensheimer et al,[15] as well as bowel translocation (abscess culture: *E. coli*) reported by Goodwin et al,[6] are also considered possible origins of TOA in non-sexually active females, according to the literature. In 2 case reports, bacteriaemia was the suspected cause of TOA in virginal females; in one case they found *Staphylococcus aureus* (*S. aureus*) in the blood stream (abscess culture: *S. aureus*),[5] in the other *Pasteurella multocida*, secondary to cat scratch disease (abscess culture: *Pasteurella multocida*).[18] The majority of the published cases, however, lacked proof of causality concerning the suspected pathogenesis of TOA development and it remained a hypothesis. Table 1 summarizes the above mentioned cases of the literature[3–11,15,17,18] and their characteristics (Table 1).

In our case, on the other hand, the pathomechanism can be conclusively reconstructed. Given the available evidence it seems most likely that the triggering event for the formation of a DA with concomitant bilateral salpingitis was the small bowel perforation at the level of the jejunojejunostomy following Roux-en-Y gastric bypass 6 months previously. The perforation led to spillage of small bowel contents and bacteria into the peritoneal cavity. From the swabs collected during the revision operation in October 2023 an ampicillin and amoxicillin-clavulanate resistant *E. coli* could be cultivated. In April 2024, during laparoscopic abscess drainage, the acquired specimens for microbiological and histological workup not only detected an ampicillin and amoxicillin-clavulanate resistant *E. coli* but also foreign material consistent with intestinal contents. In our opinion, this is proof of the causality. It is presumable that the *E. coli* survived in the sense of a low-grade infection in the fallopian tubes as the fimbriae were in direct contact with the peritoneal fluid at the time of perforation, and slowly, and therefore probably oligosymptomatically, developed into a DA after a latency phase of 6 months. To the best of our knowledge, this is the first report of such a pathogenesis.

The bacteria cultured from abscesses of virginal females predominantly include the microbiological spectrum of the gastrointestinal and genitourinary tract: *E. coli*, α-hemolytic streptococci, coagulase-negative staphylococci, *Streptococcus milleri, Bacteroides fragilis, Bacteroides uniformis, Prevotella, Streptococcus viridans, Abiotrophia/Granulicatella* species, *Corynebacterium*.[3,4,6–11,15,17] In the cases with hematogenous spread not originating from the gastrointestinal tract, *S. aureus* and *Pasteurella multocida* have been isolated.[5,18] The cultures are often polymicrobial; however, as shown above and by our case, *E. coli* is the most commonly solitarily detected pathogen. Aside from the possible yet seldom detection of *Chlamydia trachomatis* and *Neisseria gonorrhea*, the microbiological spectrum of DA and TOAs in virginal females does not differ greatly from the one found in sexually active women.

Examining the cases described in literature, the most common presenting symptoms include acute pelvic or generalized abdominal pain, fever, nausea, vomiting and diarrhea,[3–7] corresponding to the presenting symptoms of DA and TOA in sexually active women.[1,2] This makes sense, as this type of infectious disease typically has an acute course. In our case, however, the DA was an accidental finding in the context of the investigation of a 6-month ongoing secondary amenorrhea. The patient was basically oligosymptomatic despite the large DA. In our opinion, the slow development and progression of the infection and the DA in the lesser pelvis over a total of 6 months could be an explanation for this atypical clinical presentation.

Nonetheless, despite their rarity and possibly uncommon presentation, early and correct diagnosis is of utmost importance as the sequelae of DA with concomitant salpingitis, and TOA in virgins can have detrimental impact on prospective family planning and future quality of life, analogous to sexually active women. Postinfectious adhesions in the lesser pelvis with possible impairment of tubal patency significantly increase the risk of infertility due to tubal factor as well as ectopic pregnancy. Further, such adhesions can be the cause of recurrent lower abdominal pain or even chronic pelvic pain, potentially with great impact on everyday quality of life.[1,3,4,12,13]

What remains unclear to date in our case is whether the secondary amenorrhea was due to the persistent infectious situation in the lesser pelvis or to the weight loss following bariatric surgery.

Table 1 Summary of the Cases and Their Characteristics of the Literature References[3–11,15,17,18]

Author, year of publication	Number of patients	Age (years)	Leading symptoms	Localization of abscess	Abscess culture	Suspected pathomechanism	Treatment	Reference number
Cho et al, 2017	5	14y - 24y	Case 1: fever, abdominal pain, urinary frequency, dysuria; Case 2: acute lower abdominal pain; Case 3: abdominal pain for 3 weeks; Case 4: left lower abdominal pain for 3 weeks with acute aggravation; Case 5: worsening dysmenorrhea and lower abdominal pain	3 cases with pyosalpinx; 1 case with ovarian abscess; 1 case with DA and pyosalpinx	Negative	Unknown in 4 of 5 cases; Case 1: UTI and vaginal voiding	Surgery and antibiotic therapy (cephalosporin plusaminoglycoside with or without metronidazole) for all patients	[3]
Fei et al, 2021	10	7y - 24y	Abdominal pain, fever, nausea, vomiting, diarrhea	TOA	Anaerobic gut flora (*E. coli*, *Prevotella*, *B. fragilis*, *P. anaerobius*, *P. magnus*, *S. anginosus*)	3 cases with remote gastrointestinal surgery; 2 cases with congenital genitourinary anomalies; 1 case with immunosuppression	7 cases treated with surgery and antibiotic therapy, 3 cases treated only antibiotically (antibiotic therapy: broadspectrum intravenous antibiotics, discharged with doxycycline and metronidazole or clindamycin	[4]
Murata et al, 2021	1	13y	Fever for 1 month, no pain	Right ovarian abscess	*S. aureus*	Bacteriaemia with S. aureus	Surgery and antibiotic therapy (intravenous cefmetazole and oral cefaclor)	[5]
Goodwin et al, 2013	1	13y	Abdominal pain, vomiting	Left TOA and right pyosalpinx	*E. coli*	BOWEL translocation (chronic constipation)	Surgery and antibiotic therapy (intravenous clindamycin and gentamycin, followed by oral amoxicillin and clavulanate)	[6]
Hakim et al, 2019	16 (one patient presented twice)	< 21y	Abdominal pain, fever, vomiting	TOA	Most cases: polymicrobial and *E. coli* (5 cases); one case: *Corynebacterium*	13 cases with comorbidities: obstructed hemivagina and ipsilateral renal agenesis; renal or urinary tract anomalies; active or recent appendicitis	Drainage by surgery or interventional radiology in 14 cases, all cases received intravenous antibiotics (piperacillin/tazobactam or gentamycin and clindamycin), 3 cases treated with antibiotics alone; 15 patients continued with oral antibiotics	[7]

(*Continued*)

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Table 1 (Continued).

Author, year of publication	Number of patients	Age (years)	Leading symptoms	Localization of abscess	Abscess culture	Suspected pathomechanism	Treatment	Reference number
Dogan et al, 2004	1	19y	Abdominal pain, nausea, vomiting	Right TOA	*E. coli*, α-hemolytic *Streptococci*	Ascending infection from the lower genital tract	Surgery and antibiotic therapy (intravenous ceftriaxone and metronidazole followed by oral cefprozil and metronidazole)	[8]
Simpson-Camp et al, 2012	1	14y	Fatigue for 3 months, low-grade fevers, mild pelvic pain, dysuria, amenorrhea for 2 months	Right TOA	*Streptococcus viridans*	Direct ascension from the lower genitourinary tract	Surgery and antibiotic therapy (doxycycline and cefoxitin, followed by cefotaxime)	[9]
Hartmann et al, 2009	2	Case 1: 16y; Case 2: 12y	Case 1: suprapubic and right lower quadrant abdominal pain for 3 weeks; Case 2: diffuse lower abdominal pain, nausea, vomiting, fever for 1 day	Case 1: right ovarian abscess; Case 2: bilateral TOA	Case 1: Bacteroides uniformis, coagulase-negative *Staphylococci*, and *Streptococcus milleri*; Case 2: *E. coli*	Case 1: Crohn's disease with hematogenous seeding of bacteria; Case 2: vaginal pooling of urine due to vulvar obesity with recession of the urethral meatus and concomitant recurrent UTI	Case 1: surgery and antibiotic therapy (intravenous doxycycline, gentamycin, cefotaxime and metronidazole followed by oral doxycycline and metronidazole); Case 2: surgery and antibiotic therapy (intravenous doxycycline, gentamycin, cefotaxime and metronidazole followed by oral doxycycline and metronidazole)	[10]
Moore et al, 1999	1	15y	Abdominal pain, nausea, vomiting, dysuria and fever for 3 weeks; 3 episodes of cystitis in the previous month	Left TOA and right pyosalpinx	*E. coli*	Vaginal voiding due to a recessed urethra (obesity) with pooling of urine in the posterior vagina	Surgery and triple antibiotic therapy	[11]
Gensheimer et al, 2010	1	20y	Right lower Quadrant abdominal pain for 3 weeks, low-grade fever for 10 days	Right TOA	*Abiotrophia/ Granulicatella* species	Direct spread from the gastrointestinal or genitourinary tract	Surgery and intravenous antibiotic therapy (piperacillin/ tazobactam and metronidazole)	[15]
Arda et al, 2004	1	15y	Right lower abdominal pain, dysuria, fever for 2 days	Right TOA	*E. coli*	Concomitant UTI (with urine cultures positive for E. coli)	Intravenous antibiotic therapy with ceftriaxone and amikacin, surgery	[17]
Teng et al, 1996	1	47y	Right lower quadrant pain, worsening over 3 weeks, diarrhea, low-grade fevers	Right TOA	*Pasteurella multocida*	Bacteriaemia following cat scratch disease	Surgery and antibiotic therapy (intravenous ampicillin, gentamycin and clindamycin followed by oral amoxicillin-clavulanic acid)	[18]

Abbreviations: *B. fragilis*, *Bacteroides fragilis*; DA, Douglas abscess; E. coli, Escherichia coli; P. magnus, Petococcus magnus; P. anaerobius, Peptostreptococcus anaerobius; S. aureus, Staphylococcus aureus; S. anginosus, Streptococcus anginosus; TOA, tubo-ovarian abscess; UTI, urinary tract infection.

Conclusion

DAs involving the ovaries and/or fallopian tubes and TOAs are very rare in virginal females. The long-term sequelae, however, can have a massive impact on future quality of life as they can be the cause of infertility, ectopic pregnancies and chronic pelvic pain. Thus, it is of crucial relevance to make the correct diagnosis without delay and initiate an effective therapy. Particularly in the presence of predisposing conditions, classical presenting symptoms should prompt the suspicion of such a diagnosis, however unlikely it may seem.

With regards to our specific case, a history of spillage of intestinal contents in the context of bowel surgery should be considered a relevant risk factor for the development of DAs and TOAs. In virginal females with a corresponding history, symptoms of pelvic pain and possibly a pelvic mass on ultrasound should lead one to consider the differential diagnosis of DA or TOA, despite the fact that the suspected triggering event lies several months in the past. Additionally, it should be kept in mind that in the case of a slowly developing infection or abscess the patient could lack the typical symptoms of pelvic pain and fever.

Abbreviations

CRP, C-reactive protein; CT, computed tomography; DA, Douglas abscess; DNA, deoxyribonucleic acid; E. coli, Escherichia coli; PID, pelvic inflammatory disease; S. aureus, Staphylococcus aureus; TOA, tubo-ovarian abscess; UTI, urinary tract infection; WBC, white blood cells.

Data Sharing Statement

The original data used for this article (complete patient history as well as ultrasound and intraoperative images) are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

Institutional approval for the publication of the case details was not required.

Consent for Publication

Written informed consent was obtained from the patient for publication of her case as well as the accompanying images.

Acknowledgments

We would like to thank Carolyn Nabholz for English language corrections.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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