

# A Rare Case of Sacrococcygeal Pilonidal Abscess Caused by Coinfection of *Actinomyces Turicensis* and *Actinotignum Schaalii*: A Case Report

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**Abstract:** Sacrococcygeal pilonidal abscesses are typically caused by *anaerobic* and Gram-negative bacteria due to their anatomical proximity to the anus; however, mixed infections involving *Actinomyces* and *Actinotignum* species are exceptionally rare, and to our knowledge, this is the first reported case of a sacrococcygeal pilonidal abscesses caused by *Actinomyces turicensis* and *Actinotignum schaalii*. The patient, an 18-year-old female, presented with one week of localized pain, redness, and swelling, which failed to respond to conventional antibiotics. Pelvic CT revealed an abscess, prompting surgical debridement and subsequent recovery. Rapid pathogen identification was achieved using Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS) from a single colony culture. This case underscores the importance of microbiological identification using tools like MALDI-TOF MS to recognize uncommon pathogens, which is critical for avoiding ineffective empiric antibiotics and guiding appropriate therapy. Further research is needed to optimize management strategies for such rare infections.

**Keywords:** pilonidal abscess, *actinomyces turicensis*, *actinotignum schaalii*, case report, coinfection

## Introduction

Pilonidal Disease (PD) is an acquired condition that predominantly affects the soft tissues of the sacrococcygeal region, specifically the natal cleft.<sup>1</sup> It was first described by Mayo<sup>2</sup> in 1833 and later termed “pilonidal sinus (PS)” by Hodges<sup>3</sup> in 1880. When the condition involves the sacrococcygeal region, it is referred to as sacrococcygeal pilonidal sinus (SPS), which may present as asymptomatic, acute abscess formation, or chronic subcutaneous inflammation, primarily affecting young individuals.<sup>4</sup> While Gram-positive bacteria are generally considered the most common cause of complicated skin and soft tissue infections,<sup>5</sup> PS infections are predominantly caused by intestinal flora, particularly *anaerobic* and Gram-negative bacteria.<sup>6</sup> The diagnosis and management of pilonidal abscesses typically rely on empirical regimens targeting common skin and intestinal flora.<sup>7</sup> However, the presence of fastidious and uncommon pathogens complicates diagnosis. Their slow growth and similarity to contaminants may result in missed identification, treatment delays, and standard antibiotic failure, necessitating greater clinical vigilance and advanced diagnostic techniques.

The genus *Actinomyces* comprises Gram-positive, facultatively *anaerobic*, non-spore-forming, and typically filamentous organisms that are part of the normal flora of the oral cavity, gastrointestinal tract, and female genital tract.<sup>8</sup> *Actinomyces turicensis* was first identified in 1995 and is a relatively common species among human

*actinomycetes*,<sup>9</sup> accounting for 18.5% of clinical isolates from *actinomycosis* cases.<sup>10</sup> Common clinical manifestations of *Actinomyces turicensis* infections include genital, urinary tract, and skin-related infections, with rare reports of infections at the PS site.<sup>11</sup>

*Actinotignum schaalii* is a Gram-positive, facultatively *anaerobic*, non-motile coccobacillus that was classified as a new genus in 1997, closely related to the genera *Actinomyces* and *Arcanobacterium*.<sup>12</sup> Due to its slow *anaerobic* growth and resemblance to normal bacterial flora on the skin and mucous membranes, *Actinotignum schaalii* is often overlooked or considered a contaminant.<sup>13</sup> It is currently recognized as a cause of urinary tract infections and skin abscesses,<sup>14</sup> with reported cases of severe infections such as bacteremia, cellulitis, discitis, and endocarditis.<sup>15</sup>

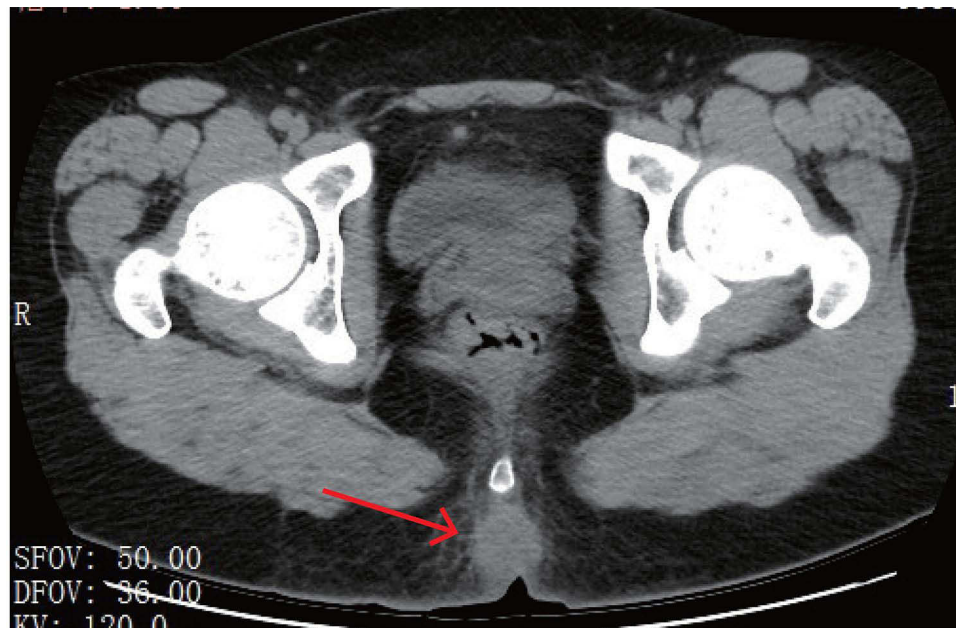
Therefore, we report the first case of a sacrococcygeal pilonidal abscess co-infected with *Actinomyces turicensis* and *Actinotignum schalii*. This case highlights the importance of considering fastidious, uncommon pathogens in treatment-resistant infections, the utility of advanced diagnostic methods like MALDI-TOF MS for accurate identification, and the need for tailored antibiotic therapy based on susceptibility profiles, which may deviate from standard empiric regimens.

## Case Report

The patient is an 18-year-old female who presented to our hospital on November 9, 2024, with persistent pain in the sacrococcygeal region. She had no fever but exhibited localized redness and swelling in the sacrococcygeal area. Initially, empirical anti-inflammatory treatment with intravenous ceftriaxone (2 g once daily for four days) was administered. However, the symptoms persisted, with no resolution of the swelling and worsening pain, which impaired her mobility. A pelvic CT scan (Figure 1) revealed an inflammatory mass in the sacrococcygeal region. Surgical debridement and drainage were performed, supplemented with antibiotics, wound care, and continuous drainage. The patient recovered well and was discharged after eight days, following a review of blood test results.

## Admission Physical Examination

Height: 170 cm; Weight: 83 kg; BMI: 28.72 kg/m<sup>2</sup>. A 6 cm × 6 cm red, swollen mass with tenderness and localized warmth was observed in the sacrococcygeal region, accompanied by fluctuance. A skin tag was noted anterior to the anal verge. Digital rectal examination revealed no hard masses within 6 cm of the anal verge. Anoscopy showed congested hemorrhoidal mucosa and subcutaneous venous dilation in the anal canal.



**Figure 1** Pelvic CT scan shows an inflammatory mass (marked by the red arrow) in the sacrococcygeal region.

## Past Medical History

In 2018, the patient was hospitalized in the endocrinology department due to excessive development. Endocrine hormone tests were normal, and obesity was diagnosed. Weight loss was recommended, but the patient showed no significant improvement.

## Laboratory Tests

The patient's laboratory findings on admission are presented in Table 1.

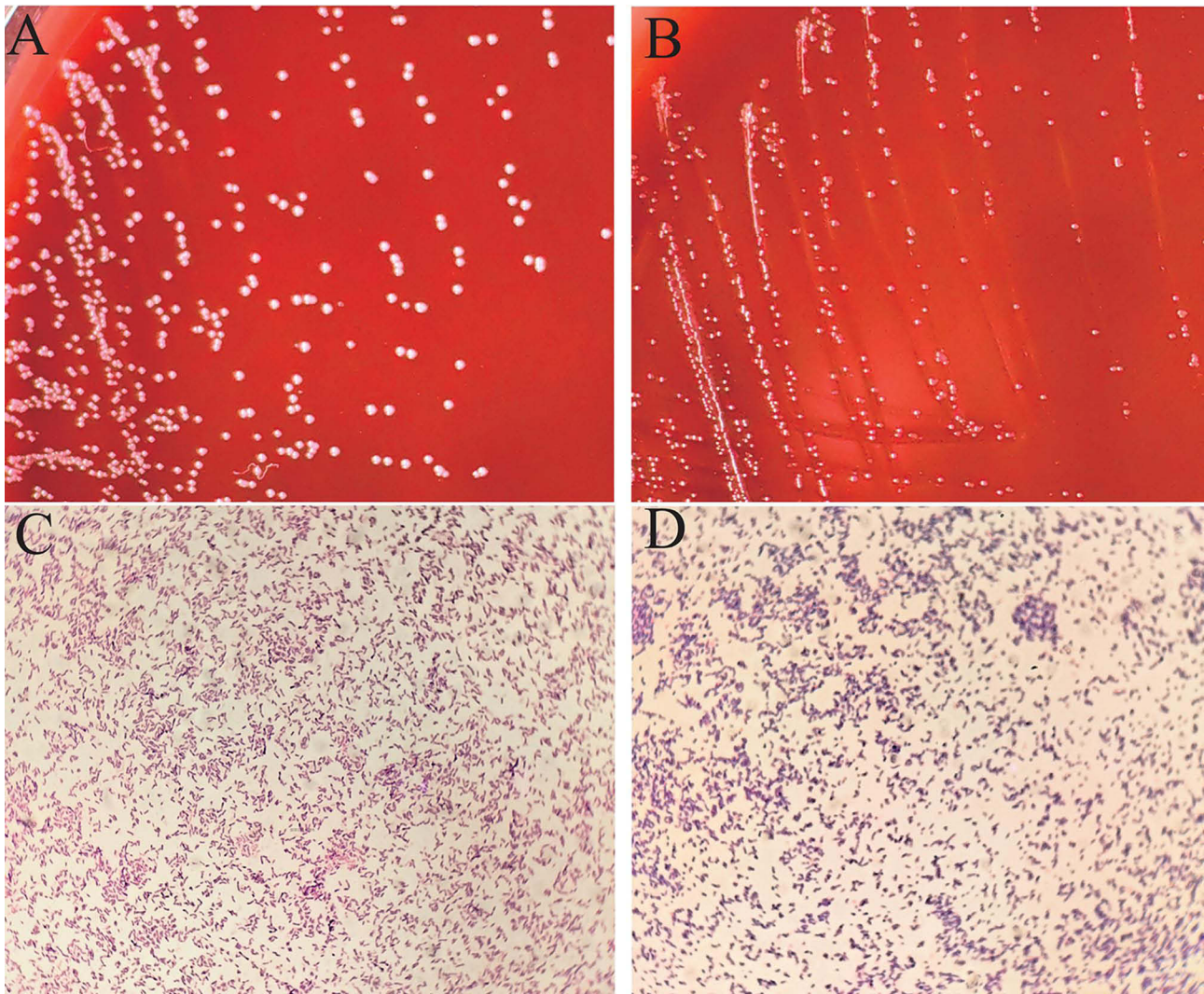
## Treatment

After four days of intravenous ceftriaxone treatment without improvement and worsening symptoms, a sacrococcygeal pilonidal abscess was suspected. Surgical debridement and drainage were performed. Postoperatively, the wound was dressed daily, and open drainage was maintained. Intravenous azlocillin (2 g once daily) combined with intravenous metronidazole (0.5 g three times daily) was administered. On postoperative day 4, the pus culture revealed a mixed infection of *Actinomyces turicensis* and *Actinotignum schaalii*. Susceptibility testing indicated sensitivity to penicillin, so azlocillin was continued, and metronidazole was discontinued. On postoperative day 5, the patient's follow-up laboratory tests demonstrated improvement. Detailed results can be found in Table 1. The wound was clean with no drainage, and the patient's condition was stable Azlocillin

**Table 1** Laboratory Tests at Admission and Postoperative Follow-Up

| Laboratory Test (Reference Range)   | First Admission (November 9) | Postoperative Follow-up (November 18) |
|-------------------------------------|------------------------------|---------------------------------------|
| WBC (3.5–9.5×10 <sup>9</sup> /L)    | 9.8                          | 6.7                                   |
| NE% (40.0%-75.0%)                   | 68.5                         | 64.6                                  |
| LY% (20.0%-50.0%)                   | 26.2                         | 29.2                                  |
| NEU (1.80–6.30×10 <sup>9</sup> /L)  | 6.70                         | 4.33                                  |
| LYC (1.10–3.20×10 <sup>9</sup> /L)  | 2.56                         | 1.95                                  |
| MONO (0.10–0.60×10 <sup>9</sup> /L) | 0.45                         | 0.33                                  |
| PLT (125–350×10 <sup>9</sup> /L)    | 217                          | 238                                   |
| CRP (0–8.0 mg/L)                    | 15.9                         | 3.4                                   |
| PCT (0–0.046 ng/mL)                 | 0.020                        | 0.040                                 |
| TC (2.84–5.20mmol/L)                | 4.24                         | /                                     |
| TG (0.56–1.70mmol/L)                | 0.75                         | /                                     |
| HDL-C (1.03–1.55mmol/L)             | 1.52                         | /                                     |
| LDL-C (1.55–3.36mmol/L)             | 2.12                         | /                                     |
| ESR (0–20mm/h)                      | 7                            | /                                     |
| Blood culture                       | Negative                     | /                                     |
| I,3-beta-D-glucan                   | Negative                     | /                                     |
| Galactomannan                       | Negative                     | /                                     |

**Abbreviations:** WBC, White Blood Cells; NE%, Neutrophil Percentage; LY%, Lymphocyte Percentage; NEU, Neutrophil; LYC, Lymphocyte; MONO, Monocyte; PLT, Platelet; CRP, C-Reactive Protein; PCT, Procalcitonin; TC, Total Cholesterol; TG, Triglycerides; HDL-C, High-Density Lipoprotein Cholesterol; LDL-C, Low-Density Lipoprotein Cholesterol; ESR, Erythrocyte Sedimentation Rate.



**Figure 2** Colony (A) White, round, convex, smooth-edged colonies approximately 0.5 mm in diameter, moist, and non-hemolytic. Colony (B) Tiny, pinpoint, round, convex, smooth colonies <0.5 mm in diameter, non-hemolytic. (C) Exhibits slightly curved short rods. (D) Exhibits curved or short branched forms.

was discontinued, and routine wound care continued. The patient was discharged on postoperative day 8. At 12 weeks post-surgery, the patient had fully recovered and was clinically well.

## Microbiological Analysis

Secretions were collected and inoculated onto Columbia blood agar, MacConkey agar, chocolate agar, and Sabouraud agar plates, then incubated at 35°C in a 5% CO<sub>2</sub> incubator. After 48 hours, small white colonies of varying sizes were observed on Columbia blood agar (Figure 2A and B). Two distinct colonial morphologies were observed. Colony A appeared as white, round, convex colonies with smooth edges, approximately 0.5 mm in diameter, exhibiting a moist texture and no evidence of hemolysis. In contrast, Colony B presented as tiny, pinpoint colonies less than 0.5 mm in diameter; they were round, convex, and smooth, and demonstrated non-hemolytic growth on MacConkey agar, chocolate agar, and Sabouraud agar. Gram staining revealed Gram-positive short rods of varying lengths (Figure 2C and D). MALDI-TOF MS (matrix-assisted laser desorption/ionization time-of-flight mass spectrometry, Bruker) analysis identified the isolates as *Actinomyces turicensis* and *Actinotignum schaalii* (Supplementary Figure 1A and B).

**Table 2** Drug Susceptibility Testing of *Actinobaculum Schaalii* and *Actinomyces Turicensis* Strains

| Antibiotics                       | Category and MIC Breakpoints, µg/mL |     |       | <i>Actinotignum Schaalii</i> MIC (µg/mL) | Results | <i>Actinomyces Turicensis</i> MIC (µg/mL) | Results |
|-----------------------------------|-------------------------------------|-----|-------|--|---------|---|---------|
|                                   | S                                   | I   | R     |  |         |   |         |
| Penicillin                        | ≤0.5                                | 1   | ≥2    | 0.064                                    | S       | 0.25                                      | S       |
| Amoxicillin-Clavulanate Potassium | ≤4/2                                | 8/4 | ≥16/8 | 0.064                                    | S       | 0.125                                     | S       |
| Ceftriaxone                       | ≤16                                 | 32  | ≥64   | 0.064                                    | S       | 1   | S       |
| Clindamycin                       | ≤2                                  | 4   | ≥8    | >256                                     | R       | >256                                      | R       |
| Meropenem                         | ≤4                                  | 8   | ≥16   | 0.032                                    | S       | 0.125                                     | S       |
| Tetracycline                      | ≤4                                  | 8   | ≥16   | 0.125                                    | S       | 0.5                                       | S       |

**Abbreviations:** S, susceptible; I, intermediate; R, resistant.

## Antimicrobial Susceptibility Testing

The minimum inhibitory concentration (MIC) breakpoints for *anaerobes* from the Clinical and Laboratory Standards Institute (CLSI)<sup>16</sup> M100-S33 were used as reference. E-tests were performed using a 0.5 McFarland standard bacterial suspension. After 48 hours of incubation, MICs for six antibiotics were determined: penicillin, meropenem, Amoxicillin-Clavulanate Potassium, tetracycline, clindamycin, and ceftriaxone (Details are shown in Table 2). Both isolates were resistant to clindamycin but susceptible to the other five antibiotics (detailed susceptibility results are shown in Supplementary Figure 2).

## Discussion

Sacroccygeal PD is a common condition, with its name derived from the Latin term meaning “nest of hair”. It is frequently encountered in primary care, emergency departments, and surgical clinics.<sup>17</sup> During the Second World War, the condition was often diagnosed in jeep drivers, earning it the nickname “jeep disease”.<sup>18</sup> A recent retrospective study in Germany analyzed regional hospitalization rates for sacroccygeal PD over 13 years, revealing that in 2017, 56 out of 100,000 individuals were hospitalized, with 18 out of 100,000 requiring surgery.<sup>19</sup> Risk factors for the disease include hirsutism, coarse hair, poor hygiene, Caucasian ethnicity, obesity, prolonged sitting, family history, and repetitive trauma.<sup>20</sup> Studies have shown that individuals with hirsutism who sit for more than six hours daily and bathe twice a week or less have a 219-fold higher risk of developing sacroccygeal PD compared to those without these risk factors. The condition typically presents between the ages of 15 and 30, with a notable gender disparity: males are four times more likely to be affected than females, despite a recent rise in prevalence among women.<sup>20,21</sup> Our patient, an 18-year-old adolescent female with a history of obesity and unsuccessful weight management (current BMI > 28 kg/m<sup>2</sup>), also had the risk factor of sitting for more than six hours daily due to her studies, which likely contributed to her condition.

*Actinomyces turicensis* has the potential to penetrate tissues and induce pathogenicity, leading to *actinomycesis*. *Actinomycesis* is considered a chronic disease, often resulting in granulomatous abscess formation with purulent discharge. This infection can cause necrosis, fibrosis, adhesion to adjacent tissues, or the formation of draining sinuses.<sup>22</sup> A study<sup>23</sup> on the antibiotic resistance of *Actinomyces* species found that *Actinomyces turicensis* is largely insensitive to metronidazole (79/83), partially resistant to clindamycin (23/83), completely resistant to moxifloxacin (3/3), and rarely resistant to carbapenems (2/86). Therefore, the current recommended treatment for *actinomycesis* involves high-dose β-lactam antibiotics. For patients with penicillin allergies and mild diseases, tetracyclines may be used as an alternative, while carbapenems or newer compounds like tigecycline may be suitable for severe infections.<sup>23–25</sup>

The co-infecting pathogen in our patient, *Actinotignum schaalii*, is increasingly being detected. As a commensal bacterium in the human urogenital tract, it is recognized as an emerging pathogen in urinary tract diseases.<sup>26</sup> Studies on its resistance profile indicate susceptibility to β-lactams, tetracyclines, vancomycin, linezolid, nitrofurantoin, rifampin, and selected fluoroquinolones (levofloxacin and moxifloxacin), but high resistance to metronidazole, ciprofloxacin, trimethoprim-sulfamethoxazole, erythromycin, and clindamycin.<sup>14,27</sup> While these pathogens are known individually, their coinfection, particularly in a pilonidal abscess, has not been previously reported. Given the known resistance

patterns of both pathogens, we opted not to test for metronidazole resistance and instead focused on conventional and alternative antibiotics. Our study found that both pathogens were resistant to clindamycin but remained susceptible to carbapenems.

The primary pathogens in PS infections are typically *anaerobic* and Gram-negative bacteria, with rare occurrences of *Actinomyces* or *Actinobacillus*. Mixed Gram-positive/Gram-negative infections have been associated with higher treatment costs and longer hospital stays.<sup>28</sup> In cases involving *Actinomyces*, the chronic indurated tissue and dense aggregates of bacteria, known as “sulfur granules”, can impede antibiotic penetration, often necessitating surgical debridement as an adjunct to treatment.<sup>29</sup> Current management of PS abscesses involves a combination of surgery and antibiotics, although the optimal duration of antibiotic therapy remains unclear. Antibiotic use can be shortened following surgical intervention, but the duration should be guided by clinical and wound assessments.<sup>30,31</sup> Some studies even suggest that uncomplicated subcutaneous abscesses can be managed with surgical drainage alone, without postoperative antibiotics, to mitigate antibiotic resistance.<sup>32,33</sup> In light of this, we prioritized surgical intervention, proceeding with thorough debridement and drainage after a brief preoperative antibiotic course failed. Postoperatively, antibiotics were administered briefly and discontinued after assessing the patient’s recovery and wound healing. Fortunately, the patient recovered well after 12 weeks of follow-up.

While PS abscesses are rarely life-threatening, they can cause prolonged discomfort and embarrassment. If not treated promptly or effectively, the condition can become chronic, impacting the patient’s quality of life, work, and interpersonal relationships. Therefore, we recommend that patients prioritize exercise and weight loss after recovery to reduce the risk of PS recurrence. However, this study has limitations. As a single-case report, generalizability is limited—the presentation and treatment response may not be representative. Although short-course antibiotics were effective here, optimal therapy requires validation in larger studies. Pathogen identification relied on MALDI-TOF MS, which is unavailable in some settings and may affect reproducibility. Nonetheless, this case provides valuable insights into diagnosing and treating rare pilonidal co-infections.

## Conclusion

This case report documents a rare co-infection of *Actinomyces turicensis* and *Actinotignum schaalii* in a sacrococcygeal pilonidal abscess. The patient responded well to surgical debridement and drainage after a brief, unsuccessful course of antibiotic therapy. This case highlights the feasibility of reducing postoperative antibiotic use following thorough surgical debridement and drainage in uncomplicated sacrococcygeal pilonidal abscesses. It also underscores the importance of considering atypical pathogens, such as *Actinomyces* or *Actinotignum*, in such cases to avoid inappropriate antibiotic treatment. Additionally, this report emphasizes the need to promote physical activity and weight management in adolescents struggling with obesity to prevent the occurrence and progression of this condition.

## Abbreviations

MALDI-TOF MS, Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry; PD, Pilonidal Disease; PS, pilonidal sinus; SPS, sacrococcygeal pilonidal sinus; MIC, minimum inhibitory concentration; CLSI, Clinical and Laboratory Standards Institute; WBC, White Blood Cells; NE%, Neutrophil Percentage; LY%, Lymphocyte Percentage; NEU, Neutrophil; LYC, Lymphocyte; MONO, Monocyte; PLT, Platelet; CRP, C-Reactive Protein; PCT, Procalcitonin; TC, Total Cholesterol; TG, Triglycerides; HDL-C, High-Density Lipoprotein Cholesterol; LDL-C, Low-Density Lipoprotein Cholesterol; ESR, Erythrocyte Sedimentation Rate.

## Data Sharing Statement

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation. For data inquiries, please contact 429381659@qq.com.

## Ethics Approval and Consent to Participate

All procedures performed in the study involving human participants were in accordance with the ethical standards of the Ethics Committee of the Shangyu People's Hospital of Shaoxing, and no institutional approval is needed to publish the details of this case.

## Consent for Publication

Written informed consent was obtained from the individual, for the publication of any potentially identifiable images or data included in this article.

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## 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.

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## Disclosure

The authors report no potential conflicts of interest in this work.

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