

# Surgical site infection following orthopedic surgery in a patient with acne: A challenging case

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## Abstract

*Propionibacterium acnes* is a typical component of the human body's flora and has been implicated as the causative infectious agent following a variety of medical operations. We present a case of a 21-year-old male with severe global acneiform eruption with a non-healing limb lesion near the orthopedic surgery incisions.

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**Abstract** *Propionibacterium acnes* is a typical component of the human body's flora and has been implicated as the causative infectious agent following a variety of medical operations, including device installation. We present a case of a 21-year-old male with severe global acneiform eruption with a non-healing limb lesion near the orthopedic surgery incisions. **Keywords:** *Propionibacterium acnes*, orthopedic surgery, surgical site infection

## Introduction

*Propionibacterium acnes* (*P. acnes*), also known as *Cutibacterium acnes*, is a gram-positive anaerobic bacillus that is commonly found near sebum and sweat glands, as well as hair follicles in seborrheic areas of the skin. This commensal bacterium is found in the conjunctiva, external auditory canal, respiratory and gastrointestinal tract (1-4). *P. acnes* is most commonly associated with acne vulgaris, a chronic skin disorder characterized by clogging and inflammation of pilosebaceous units. In addition to acne vulgaris, *P. acnes* is associated with several medical conditions such as chronic prostatitis, osteomyelitis, and sarcoidosis (5-7).

*P. acnes* may be responsible for implant-related and surgical site infections (SSI) associated with the implantation of cardiac, spinal, and orthopedic devices (8). Infection in these settings may be associated with an anaerobic environment, such as a buried implant during surgery, which is conducive to *P. acnes* development. Additionally, certain *P. acnes* strains are capable of forming biofilms (9). *P. acnes* surgical infection has previously been documented following orthopedic shoulder procedures, with a male predominance (10).

We present a case of multiple fractures exacerbated by *P. acnes* SSI with a dramatic response to oral rifampicin and isotretinoin treatment.

## Case Presentation

In July 2021, a 21-year-old man went to the emergency department with acute knee and elbow pain following a fall from a height. During the clinical examination, deformity and swelling were discovered in the left elbow and right knee. He had severe acne on his face, but he did not receive any medications. Neurological and vascular examinations of the limbs displayed no abnormalities, and there was no evidence of laceration or abrasion. At that point, radiography and computed tomography (CT) scan were requested revealing a trans olecranon fracture-dislocation of the elbow and a tibial plateau fracture Schatzker type 2.

Instantly, he was admitted to the orthopedic ward and underwent two separate operations. Primarily, the elbow was openly reduced with a single posterior skin incision, the olecranon was fixed with a locking anatomical plate, the radial head was fixed with two screws, and the lateral collateral ligament of the elbow was repaired with an anchor suture. In the second surgery, the tibial plateau fracture was reached with the anterolateral skin incision. Moreover, the fractured segment of the tibial plateau was anatomically reduced, and one cannulated, the partially threaded screw was applied from lateral to medial. The joint depression was then restored, and freeze-dried cancellous allografts were introduced into the defect via a bone window and impacted with tamping to resist the collapse of the articular surface. Afterward, plate osteosynthesis was performed. Besides, before the administration of surgeries, a prophylactic antibiotic (one generation of cephalosporin) was prescribed. Finally, the patient was discharged two days after the last surgery in good overall condition. During the postoperative period, the patient had to wear a long splint on the upper left limb and the right lower limb. In addition, the range of motion exercises for the elbow and knee began immediately following surgery, according to the protocol. After two weeks, the suture was removed.

Two months later, he presented with exacerbation of facial acne and disseminated papulopustular acneiform lesions of the upper trunk. Three months after the surgery, the patient developed two purulent superficial lesions at the site of the surgical incisions. The orthopedic team evaluated the patient's condition and ruled out device infection-based wound properties as well as normal erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and complete blood cell count (CBC). Eventually, the orthopedic surgeon referred the patient to a dermatologist.

Multiple consolidating papules, pustules, and tiny nodules were present on the face and trunk, as well as scattered pustules on the upper and lower limbs around the surgical incision (**Figure 1**). Biopsies were taken from peri-incisional cutaneous lesions and sent to the laboratory for culture and polymerase chain reaction (PCR) analysis. The usual laboratory evaluation revealed no evidence of bacterial infection, deep mycosis, or atypical mycobacteriosis. Biopsy revealed significant irregular epidermal hyperplasia, intraepidermal and dermal microabscesses, suppurative granulomas, and a mixed infiltration of inflammatory cells and giant cells. The impression of *P. acnes*-induced SSI was made based on clinical suspicion, severe acneiform eruption around the surgical incision, and resistance to conventional treatments. The patient received 300 milligrams of rifampicin twice a day and 20 milligrams of oral isotretinoin, which resulted in the complete resolution of all skin lesions. After three months, significant improvement was observed, and the rifampicin was discontinued but the oral isotretinoin treatment was continued. After nine months of follow-up, the condition did not recur (**Figure 2**).

## Discussion

We described a case of severe acne with two chronic lesions at the site of orthopedic surgery.

We treated the patient empirically for *P. acnes* due to the patient's negative culture and clinical presentation. Acne is one of the most common skin conditions; about one out of every five dermatological consultations is for acne treatment. Acne typically manifests during adolescent hormonal shifts; nevertheless, it is also a very frequent adult-onset disorder. Acne can last for years and has a severe psychosocial impact, including low self-esteem, despair, and social disengagement. *P. acnes* can infect the skin in a variety of ways. Apart from acne, *P. acnes* may contribute to post-operative infections and device failure (8). Due to the sluggish growth of *P. acnes*, it cannot be discovered in regular laboratory evaluations, and even when *P. acnes* is isolated from a clinical specimen, it is considered contamination of the skin flora (9).

Due to the excellent outcome and concurrent elimination of acneiform lesions, we assume that *P. acnes* was responsible for SSI in our patient. Furthermore, orthopedic implants were not contaminated in our case because both ulcers cleared spontaneously and the patient exhibited no systemic symptoms of infection, as WBC count, ESR, and CRP were all within normal limits. Implant-associated infections caused by *P. acnes* have been documented in the setting of shoulder prosthetic joint, cerebrovascular shunt, and cardiovascular device infections (10). The primary mechanism by which *P. acnes* causes these opportunistic infections is its ability to create biofilms. Exact diagnosis may need a longer culture time of up to 14 days for implant biopsy specimens, as well as sophisticated molecular techniques, such as broad-range 16S rRNA gene PCR (8). *P. acnes* is susceptible to a broad spectrum of antibiotics, including beta-lactams, quinolones, clindamycin, and rifampin, although clindamycin resistance is growing (10). The most effective treatment for *P. acnes* infection of an implanted device is a combination of surgical debridement and a prolonged antibiotic course. However, multiple studies have established that device removal is the best treatment approach, particularly for neurosurgical shunt infections (11). Among the drugs discussed previously, rifampicin is the best option due to its high penetration into the biofilm (12). Piper et al. demonstrated that delayed post-implantation infection caused by *P. acnes* typically occurs between three and twenty-four months after implantation. Our patient developed SSI approximately three months following surgery. Additionally, the majority of *P. acnes*-associated opportunistic infections have been recorded in male patients, implying that sex is a risk factor (13). However, earlier research indicates that surface sterilizing before surgery does not eliminate the bacterium, which is found deep within the sebaceous glands.

## Conclusion

We recommend that patients with active acne undergo appropriate treatment to reduce the risk of *P. acnes*-related opportunistic infection, particularly following orthopedic surgery.

**Figure 1 :** a) Multiple papulopustules of face compatible with acne, b) Multiples acneiform lesion near and ulcer near incision site, c) Fluctuant lesion on the incision site of lower limb.

**Figure 2:** Skin lesions result after 3 months of therapy with rifampicin and isotretinoin.

## Abbreviations

Propionibacterium acnes: *P. acnes*, surgical site infections: SSI, computed tomography: CT, erythrocyte sedimentation rate: ESR, C-reactive protein: CRP, complete blood cell count: CBC, polymerase chain reaction: PCR

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None to declare.

## Authors' contributions

SD wrote the manuscript. SD and LO wrote and corrected the manuscript for its scientific basis. MJ collected the data for the study. FB and MJ revised the manuscript for grammar and syntax mistakes. All authors read and approved the final manuscript.

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## Availability of data and materials

The data and materials used in the current study are available from the corresponding author on reasonable request.

## Ethics approval and consent to participate

The patient consent has been taken and the consent form is with the editor and available on request.

## Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

## Competing interests

The authors declare that they have no competing or conflict of interests.

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