

Case Report

C1-C2 arthrodesis after spontaneous *Propionibacterium acnes* spondylodiscitis: Case report and literature analysisPaolo di Russo, Carlo Tascini¹, Maria Elena Benini, Carlotta Martini², Paolo Lepori²Department of Neurosurgery, University of Pisa, AOUP, Pisa, ¹Department of Infectious Diseases, Cotugno Hospital, Naples, ²GSpine4, IRCCS Istituto Ortopedico Galeazzi, Milan, Italy

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Abstract**Background:** *Propionibacterium acnes* (*P. acnes*) is a microaerophilic anaerobic Gram-positive rod responsible for acne vulgaris. Although it is often considered to be a skin contaminant, it may act as a virulent agent in implant-associated infections. Conversely, spontaneous infectious processes have been rarely described.**Case Description:** Here, we describe a 43-year-old female with C1-C2 spondylodiscitis attributed to *P. acnes* infection. Despite long-term antibiotic treatment, computed tomography demonstrated erosion of the C1 and C2 vertebral complex that later warranted a fusion. One year postoperatively, the patient was asymptomatic.**Conclusions:** Clinical knowledge of *P. acnes* virulence in spontaneous cervical spondylodiscitis allows early diagnosis, which is necessary to prevent or reduce complications such as cervical deformity with myelopathy or mediastinitis.**Key Words:** Atlantoaxial fusion, cervical spinal cord, *Propionibacterium acnes*, spondylodiscitis**Access this article online****Website:**www.surgicalneurologyint.com**DOI:**

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Quick Response Code:**INTRODUCTION**

Propionibacterium acnes (*P. acnes*) is increasingly recognized as a source of musculoskeletal and vertebral infections, particularly associated with the use of spinal instrumentation.^[2,9,10,12] It is a Gram-positive anaerobic rod that is commonly found on the skin (e.g., acne).^[1,11] Despite its low virulence, this pathogen may cause chronic and/or recurrent infections, particularly involving spinal implants.^[12,15] Here, we present a case involving the spontaneous onset of a C1-C2 spondylodiscitis attributed to *P. acnes*.

CASE REPORT

A 43-year-old female had received both local and oral corticosteroid treatment for facial acne 1 month before

presenting with neck/pharyngeal pain and progressive dysphagia. Magnetic resonance imaging (MRI) showed a T2-hyperintense signal involving the dens (C2), accompanied by an extensive inflammatory reaction involving the retropharyngeal space [Figure 1a]. Computed tomography (CT) scan also documented early dens erosion [Figure 1b and c]. Although blood cultures

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were negative, the C-reactive protein (CRP) level was elevated (29.3 mg/dl), and erythrocyte sedimentation rate (ESR) was 120 mm/h. The patient was afebrile on steroids, but was not on any antibiotics.

Biopsy and culture of the C2 lesion

A biopsy was performed of the C1-C2 level through the posterior oral pharynx. Although the histological finding was consistent with inflammation, cultures remained negative (e.g., for common aerobic and anaerobic pathogens). Ten days later, however, the cultures grew *P. acnes*, sensitive to linezolid. A second confirmatory biopsy confirmed this diagnosis.

Treatment

The patient was treated for 20 days with linezolid 600 mg, and was placed in a Halo-vest for atlantoaxial instability. Three months later, although laboratory tests documented resolution of the infection, both the MRI [Figure 2a] and CT scans [Figure 2b and c] confirmed marked erosion of left C1-C2 joint/dens that required a transarticular C1-C2 posterior arthrodesis (Magerl's technique in

combination with Gallie fixation with heterologous bone graft, Organizzazione Toscana Trapianti OTT). Three and 6 months later, the CT scan showed fusion [Figure 3], the patient was clinically improved, and both CRP and ESR laboratory studies were normal.

DISCUSSION

Several conditions such as diabetes mellitus, immunosuppressive states, intravascular devices, and instrumentation/foreign body implants may result in spontaneous spondylodiscitis.^[7,8] *P. acnes* is a commensal Gram-positive rod found on the skin, and therefore, is typically considered a local contaminant rather than a pathogen when spondylodiscitis is encountered.^[11] Here, however, the patient had acne on the chin that seeded the C1/C2 vertebral complex resulting in vertebral abscess/osteomyelitis with retropharyngeal extension, ultimately warranting posterior cervical fusion despite 3 months of antibiotic therapy (e.g. C1-C2 arthrodesis).

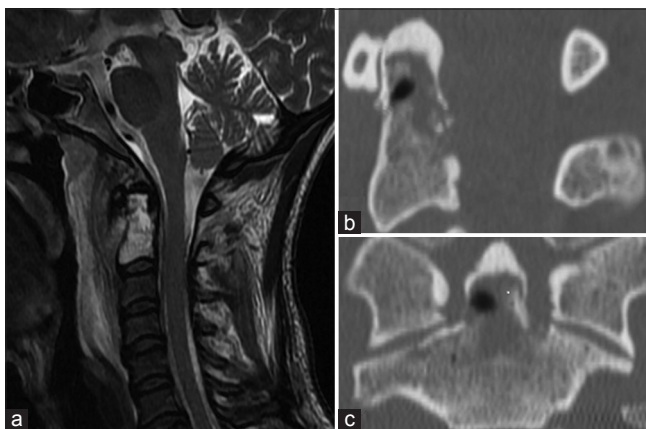


Figure 1: (a) Sagittal T2-weighted MR image (Short T1 Inversion Recovery, STIR) performed at recovery revealing an extensive inflammatory process involving C2 and the retropharyngeal space. Sagittal (b) and coronal (c) CT scan showing osteolytic lesion of the dens of C2

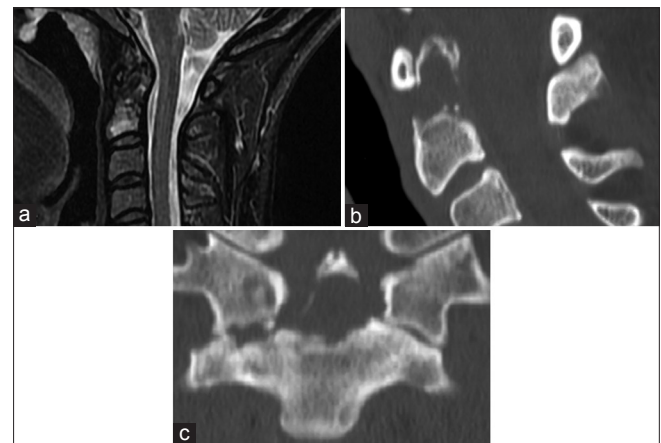


Figure 2: (a) Sagittal T2-weighted MR image (STIR) performed at the end of antibiotic therapy showing a reduction of the inflammatory process but initial ongoing of deformity of the dens. Sagittal (b) and coronal (c) CT scan showing pronounced increasing of the erosion of the dens of C2

Table 1: Summary of cervical spine infections attributed to *P. acnes* unrelated to previous surgery collected from the literature including present case

Authors	Number of patients	Sex/age	Cervical level involved	ESR (mm/h)	Antibiotics	Duration of antibiotic therapy	Surgical treatment
Serushan <i>et al.</i> ^[13]	1 case	M/27	C4-C7	Not reported	Penicillin	40 days	Not required
Honan <i>et al.</i> ^[6]	3 cases	F/54	C4-C6	104	Clindamycin	6 weeks	Not required
		M/54	C5-C6	4	Vancomycin	6 weeks	Not required
		M/41	C5-C6	70	Vancomycin	6 weeks	Not required
Tsai <i>et al.</i> ^[14]	2 cases	M/62	C4-C6	Not reported	Ciproxin + Augmentin	16 weeks	C4-C7 anterior and posterior arthrodesis
		M/77	C3-C5	Not reported	Vancomycin + Augmentin	6 weeks	C3-C5 anterior arthrodesis
di Russo <i>et al.</i>	1 case	F/43	C1-C2	120	Linezolid	20 days	C1-C2 trans-articular screwing + Gallie fixation

M, male; F, female; ESR, erythrocyte sedimentation rate



Figure 3: Sagittal CT scan performed 3 months after surgery

Other cases of cervical spine infections attributed to *P. acnes* [Table 1] were identified in the literature. Harris *et al.* reported the primary role of *P. acnes* in spondylodiscitis after lumbar discectomy performed without fusion.^[5] Mhaidli and Hahn highlighted the role of *P. acnes* as a primary virulent agent in delayed infections typically following secondary spinal fusions.^[3,10] Only six cases of nonsurgery-related primary cervical spine infection caused by *P. acnes* have been reported.^[6,13,14] Harifi described one case of spontaneous cervical C1-C2 spondylitis/osteomyelitis attributed to acne (e.g., SAPHO syndrome; synovitis, acne, pustulosis on the skin, hyperostosis, osteitis).^[4]

CONCLUSIONS

P. acnes may contribute to spontaneous cervical spondylitis in patients with skin lesions. In this and similar cases, a longer incubation period for microbiological cultures is required if *P. acnes* is suspected as the cause of infection. Early diagnosis is critical to allow for initiation of appropriate antibiotic therapy for preventing subsequent life-threatening complications.

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Conflicts of interest

There are no conflicts of interest.

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