International Journal of Surgery Case Reports 131 (2025) 111380

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.elsevier.com/locate/ijscr

Case report

# A rare case of *Haemophilus parainfluenzae* periprosthetic joint infection: A case report with literature review

Teddy Cheong *, Ing How Moo

*Department of Orthopaedic Surgery, Changi General Hospital, 2 Simei St 3, 529889, Singapore*

ARTICLE INFO

*Keywords:*
*Haemophilus parainfluenzae*
Periprosthetic joint infection
Case report

ABSTRACT

*Introduction: Haemophilus parainfluenzae* is a common commensal of the upper respiratory tract and is an extremely rare cause of periprosthetic joint infections (PJI).

*Case presentation:* A 92-year-old male presented with five days of right knee pain, reduced knee range of motion and raised inflammatory markers. He was diagnosed with a right total knee arthroplasty (TKA) PJI caused by *Haemophilus parainfluenzae* via knee aspiration fluid culture and was treated with debridement, antibiotics and implant retention (DAIR). Surgery was uneventful and he was treated with a six-week course of intravenous antibiotics followed by six months of suppression via oral antibiotics. At the one-year post-operative mark, there was no recurrence of infection.

*Discussion:* There are only five reported cases of *Haemophilus parainfluenzae* PJI, of which only one case had no immunocompromised state or prior dental work. Our case is the second case in existing literature that involves PJI from this bacterium in a healthy individual with no identifiable risk factors. Though *Haemophilus parainfluenzae* is a rare cause of PJI, principles of surgical intervention and treatment in PJI still apply.

*Conclusion:* PJI caused by *Haemophilus parainfluenzae* is a rare occurrence. Prompt microbiological diagnosis is vital in ensuring favourable outcomes through surgical debridement combined with culture-directed antimicrobial agents in the treatment of rare infections such as this.

## 1. Introduction

Periprosthetic joint infection (PJI) is a serious complication with high morbidity occurring in 1–2 % of primary arthroplasties [1]. As the demand for primary arthroplasties continues to grow, the number of PJI complications also continues to rise [2]. The most implicated organisms are gram-positive bacteria such as *Staphylococcus aureus* and *Staphylococcus epidermidis* [3,4]. *Haemophilus parainfluenzae* is a gram-negative coccobacillus pathogen commonly found in the upper respiratory tract and oral cavity. It can also be found on other mucosal surfaces such as the vagina and urethra [5]. It is an exceedingly rare cause of PJI with very few reported cases in existing literature, especially in patients who are immunocompetent with no risk factors or preceding dental procedures [6–9]. We present a rare case of PJI of the knee caused by *Haemophilus parainfluenzae* in an immunocompetent elderly with no identifiable risk factors. This article has been reported in line with the Surgical Case Report (SCARE) guidelines [10]. Informed consent was obtained from the patient for participation and publication purposes of this article. According to the research guidelines determined by the local ethics review board, studies involving one patient do not require an ethical review and approval.

## 2. Case presentation

This article includes a 92-year-old male with a medical history of hypertension, diabetes, chronic kidney disease (CKD), and the use of chronic anti-platelet medication (clopidogrel) for a history of a transient ischemia attack in 2016. In 2019, the patient underwent a right total knee arthroplasty (TKA) for primary osteoarthritis and has been independently ambulant with the aid of a walking stick ever since. The patient's medical conditions were well-controlled prior to this admission and there was no history of recurrent medical admissions. The patient had no symptoms of decompensated heart function or CKD such as shortness of breath on exertion, chest pain or recurrent limb oedema and diabetes was well-controlled in the outpatient setting with a good Hba1c value of 6.2.

In 2024, the patient was admitted to the hospital due to right knee pain for five days. On admission, the patient had a fever of 38 °C while

* Corresponding author.
*E-mail address:* teddycheong9@hotmail.com (T. Cheong).

https://doi.org/10.1016/j.ijscr.2025.111380
Received 13 March 2025; Received in revised form 10 April 2025; Accepted 25 April 2025
Available online 25 April 2025

the rest of the vitals were unremarkable. With regards to physical examination, supra-patella effusion was present with a positive cross-fluctuance test and reduced range of motion of the right knee of 20–40°. The skin was intact and there was no erythema or induration. Distal neurovascular status was intact, and examination of the hips was unremarkable. Systemic review was unremarkable and there was no other identifiable source of infection. As *Haemophilus parainfluenzae* is a common commensal from the upper respiratory tract/oral cavity, the patient was referred to the department of Oral and Maxillofacial Surgery (OMS) for specialist assessment for any potential sources of infection. Their assessment was that the patient had no odontogenic sources of infection and no intervention from the OMS team was required.

Blood investigations revealed an elevated white blood cell (WBC) of $12.7 \times 10^3$ μL and C-reactive protein (CRP) level of 33.6 mg/L. Procalcitonin of 0.08 μg/L. Other laboratory tests such as urine analysis, blood and urine cultures and serum uric acid level were unremarkable. Plain radiographs of the right knee joint revealed no obvious fracture, osteomyelitis or implant loosening (Fig. 1).

Right knee aspiration was performed yielding 18 milliliters of turbid fluid and was sent for various tests (Fig. 2). Gram stain revealed calcium pyrophosphate crystal deposition (CPPD) crystals, fluid analysis revealed >10,000 cell count with 90 % neutrophil. After a period of incubation, the fluid culture grew *Haemophilus parainfluenzae* that was susceptible to amoxiclav, ampicillin, ceftriaxone and ciprofloxacin. Empirical antibiotics were started after the knee aspiration was performed, followed by culture-directed antibiotics after the fluid culture result was finalised. Over the first few days of admission, inflammatory markers rose significantly (Fig. 3).

The patient underwent surgical debridement, antibiotics and implant retention (DAIR) on day five of admission. Intra-operatively, there was a significant amount of turbid fluid and synovitis. The implants were observed to be stable with no loosening or peri-prosthetic fractures. Intra-operative right knee tissue cultures were taken. All cultures grew no bacteria.

Infectious disease specialists recommended a total of six weeks of intravenous antibiotics (ceftriaxone) followed by six months of oral antibiotic suppression. The patient recovered well with good progress with the physiotherapist and decreasing inflammatory markers. At the one-year post-operation follow-up, there was no evidence of recurrence of PJI.

## 3. Discussion

*Haemophilus parainfluenzae* is a gram-negative coccobacillus pathogen commonly found in the upper respiratory tract and oral cavity. It can also be found on other mucosal surfaces such as the vagina and urethra [5]. It is a rare cause of PJI. There were only five cases reported in the literature which consists of four TKA and one total hip arthroplasty (THA) PJIs [6–9,11]. Notably, three of these cases had a dental procedure prior to PJI, which could have been a possible source of infection [6,9,11]. One case involved a patient with an immunocompromised state due to history of chronic lymphoid leukaemia [7]. This article presents the second case in literature that involves a PJI from *Haemophilus parainfluenzae* in a well and immunocompetent patient with no prior risk factors such as dental procedures or immunocompromised state (e.g. active chemotherapy/immunosuppressants/steroids/poorly controlled comorbidities/malignancy). Literature review was performed, and a summary of the existing cases has been provided (Table 1).

There are various surgical options for the treatment of PJIs and the rationale for choosing a specific surgical procedure is based on duration of symptoms, patient profile, microbiological data and implant stability. Though *Haemophilus parainfluenzae* is a rare cause of PJI, the outlined principles of surgical interventions in PJI still apply. In this article's case, DAIR was indicated as the symptom duration was less than three weeks, the implant was stable, the bacterium was considered of low virulence and antibiotic sensitivity was known.

It is unclear what the source of the patient's infection was. There was no history of recent prior dental work and the patient was not in an immunocompromised state. In fact, the patient was reviewed by the oral


**Fig. 1.** Admission radiographs of the right knee joint (a – antero-posterior view, b – lateral view).


**Fig. 2.** Clinical pictures of the case (a – anterior view of the right knee, b – lateral view of the right knee, c – joint aspiration fluid).

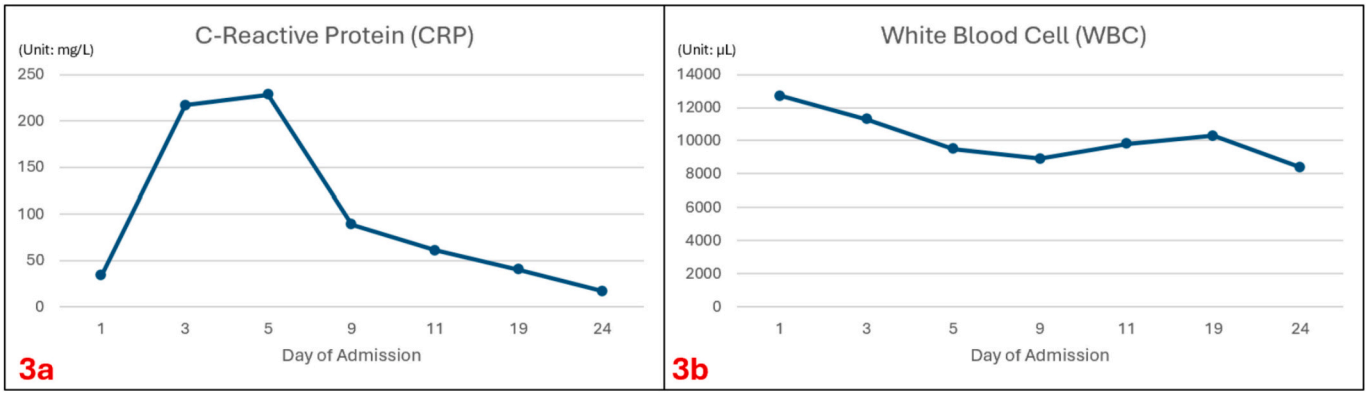


**Fig. 3.** Trend in inflammatory markers (a – C-reactive protein trend, b – white blood cell trend).

and maxillofacial surgery team and was cleared for any possible source of infection present in the oral cavity. Although the patient was 92 years old, he was well and independently mobile.

*Haemophilus parainfluenzae* has been shown to have antimicrobial resistance. Limitations of macrolides, azalide and ketolide agents, tetracyclines and selected β-lactams against this bacterium have been reported [12]. Hence, antibiotic sensitivity testing is essential. In this case, the knee joint fluid was aspirated early and thus led to early diagnosis which prevented delays in surgery and antibiotic treatment. This case report highlights the importance of early diagnosis and treatment with surgical debridement and culture-directed antibiotics to facilitate a good outcome for patients who suffer from PJI from this rare organism.

## 4. Conclusion

In summary, *Haemophilus parainfluenzae* is an exceedingly rare cause of PJI with only five reported cases, of which only one case had no immunocompromised state or prior dental work. The case involved in this article is the second case in existing literature that involves PJI from this bacterium in a healthy 92-year-old male with no identifiable risk factors. Prompt microbiological diagnosis is vital in ensuring favourable outcomes through surgical debridement combined with culture-directed antimicrobial agents in rare infections such as this.

## Abbreviations

PJI Periprosthetic joint infections

**Table 1**
*Haemophilus parainfluenzae* periprosthetic joint infections in literature.

| | Age/ gender | Risk factor | Implant | Surgical treatment | Antibiotic treatment | Outcome |
|---|---|---|---|---|---|---|
| Medel-Plaza [8] | 67/male | No | TKA | DAIR | • 7 days of IV ceftriaxone + ciprofloxacin<br>• 6 months of PO ciprofloxacin + cotrimoxazole<br>Total ~ 6 months | Cure |
| Manian [9] | 72/male | Dental work | TKA | Refused surgery | • 6 months of PO cephalexin<br>• 2 months IV ceftriaxone<br>• PO ciprofloxacin<br>Total > 2 years | Chronic infection |
| Pravda [11] | 78/female | Dental work | TKA | Arthroscopic debridement and washout | • 1 month of IV ampicillin<br>• 2 months PO amoxicillin<br>Total ~ 3 months | Cure |
| Bailey [7] | 75/male | Immunocompromised | TKA | 2-Stage arthroplasty | • 6 weeks PO flucloxacillin + rifampicin<br>• 3 doses of PO cefuroxime<br>Total ~ 6 weeks | Cure |
| Jellicoe [6] | 78/female | Dental work | THA | 2-Stage arthroplasty | • 10 months of PO flucloxacillin + ampicillin<br>Total ~ 10 months | Cure |
| Presented case | 92/male | No | TKA | DAIR | • 6 weeks IV ceftriaxone<br>• 6 months PO suppression<br>Total ~ 7 months | Cure |

TKA, total knee arthroplasty; THA, total hip arthroplasty; DAIR. debridement antibiotics and implant retention; IV, intravenous; PO, oral.

| | |
|---|---|
| SCARE | Surgical case report |
| CKD | Chronic kidney disease |
| TKA | Total knee arthroplasty |
| DAIR | Debridement, antibiotics and implant retention |
| OMS | Oral and maxillofacial surgery |
| WBC | White blood cell |
| CRP | C-reactive protein |
| CPPD | Calcium pyrophosphate crystal deposition |
| THA | Total hip arthroplasty |

## CRediT authorship contribution statement

TC was involved in data curation, methodology, writing, review and editing.

IHM was involved in conceptualisation, review, editing and supervision.

## Declaration of patient consent

Informed consent was obtained from the patient. The privacy and confidentiality of patient records were adhered to in managing the clinical information in conducting this research.

## Consent to participate

Informed consent for participation was obtained from the subject involved.

## Consent to publish

The authors affirm that the human research participant provided informed consent to publish the images in figures.

## Ethical approval

According to the research guidelines determined by the local ethics review board, studies involving one patient do not require an ethical review and approval.

## Guarantor

Dr TC
Dr IHM.

## Research registration number

1. Name of the registry: N.A.
2. Unique identifying number or registration ID: N.A.
3. Hyperlink to your specific registration: N.A.

## Funding

No funding was received to assist with the preparation of this manuscript. The authors have no relevant competing financial or non-financial interests to disclose.

## Declaration of competing interest

There are no conflicts of interest to declare. All authors declare that they did not receive support from any organization for the submitted work.

## References

[1] P. Izakovicova, O. Borens, A. Trampuz, Periprosthetic joint infection: current concepts and outlook, EFORT Open Rev. 4 (7) (2019) 482–494, https://doi.org/10.1302/2058-5241.4.180092.
[2] S. Kurtz, K. Ong, E. Lau, F. Mowat, M. Halpern, Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030, J. Bone Joint Surg. Am. 89 (4) (2007) 780–785, https://doi.org/10.2106/JBJS.F.00222.
[3] J. Gallo, E. Nieslanikova, Prevention of prosthetic joint infection: from traditional approaches towards quality improvement and data mining, J. Clin. Med. 9 (7) (2020) 2190, https://doi.org/10.3390/jcm9072190.
[4] J. Lourtet-Hascoët, M.P. Félicé, A. Bicart-See, A. Bouige, G. Giordano, E. Bonnet, Species and antimicrobial susceptibility testing of coagulase-negative staphylococci in periprosthetic joint infections, Epidemiol. Infect. 146 (14) (2018) 1771–1776, https://doi.org/10.1017/S0950268818001437.
[5] Chapter 213 - Haemophilus species (including chancroid), in: G.L. Mandell, J. E. Bennett, R. Dolin (Eds.), Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases, 5th ed. vol. 2, Churchill Livingstone, 2000, pp. 2378–2380.
[6] P.A. Jellicoe, A. Cohen, P. Campbell, Haemophilus parainfluenzae complicating total hip arthroplasty: a rapid failure, J. Arthroplast. 17 (1) (2002) 114–116, https://doi.org/10.1054/arth.2002.29314.
[7] C. Bailey, S. Duckett, S. Davies, R. Townsend, I. Stockley, Haemophilus parainfluenzae prosthetic joint infection. The importance of accurate microbiological diagnosis and options for management, J. Inf. Secur. 63 (6) (2011) 474–476, https://doi.org/10.1016/j.jinf.2011.08.009.
[8] M. Medel-Plaza, A. Auñón, A. Blanco, J. García-Cañete, L. Salar-Vidal, J. Esteban, Periprosthetic joint infection caused by Haemophilus parainfluenzae. Case report and literature review, Rev. Esp. Quimioter. 36 (3) (2023) 325–328, https://doi.org/10.37201/req/127.2022.

[9] F.A. Manian, Prosthetic joint infection due to Haemophilus parainfluenzae after dental surgery, South. Med. J. 84 (6) (1991) 807–808, https://doi.org/10.1097/00007611-199106000-00044.
[10] C. Sohrabi, G. Mathew, N. Maria, A. Kerwan, T. Franchi, R.A. Agha, et al., The SCARE 2023 guideline: updating consensus surgical CAse REport (SCARE) guidelines, Int. J. Surg. 109 (2023) 1136–1140, https://doi.org/10.1097/JS9.0000000000000373.
[11] J. Pravda, E. Habermann, Hemophilus parainfluenzae complicating total knee arthroplasty. A case report, Clin. Orthop. Relat. Res. 243 (1989) 169–171 (PMID: 2721057).
[12] S. Tristram, M.R. Jacobs, P.C. Appelbaum, Antimicrobial resistance in Haemophilus influenzae, Clin. Microbiol. Rev. 20 (2) (2007) 368–389, https://doi.org/10.1128/CMR.00040-06.