

# Culture-negative hand abscesses in immunocompetent individuals

Ho YMS<sup>1</sup>, MBBS, MRCSE, *Sebastin SJ*<sup>2</sup>, MRCS, FAMS, *Lim AYT*<sup>2</sup>, MBBS, FAMS

**ABSTRACT** Gonococcal infection is a common sexually-transmitted infection in the older male population in our local setting. It is caused by *Neisseria gonorrhoeae*, and results in fever, dysuria and a foul-smelling discharge from the external urethral meatus. Occasionally, it may also present with disseminated gonococcal infection – dermatitis, septic arthritis and even meningitis or endocarditis. We present two unusual cases, where the primary presentation was that of multiple subcutaneous hand and wrist abscesses. This illustrates the need for competent history-taking, especially in culture-negative patients. We also recommend the use of gonococcal polymerase chain reaction tests in patients who demonstrate negative routine cultures, or in lieu of gonococcal culture when the diagnosis is equivocal or urgently required.

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## INTRODUCTION

Gonorrhoea, which is caused by *Neisseria (N.) gonorrhoeae*, is the most common reportable infectious disease in our local setting.<sup>(1)</sup> *N. gonorrhoeae* is a Gram-negative, intracellular, aerobic diplococcus. It mainly affects the host's columnar or cuboidal epithelium. A number of factors influence the pathogenicity of *gonococci*: (1) Pili help in the attachment of *gonococci* to mucosal surfaces and prevent ingestion by neutrophils; (2) Opacity-associated proteins promote invasion into host cells and down-regulate the immune response; (3) Porin channels (*porA*, *porB*) have inherent resistance to normal human serum and an increased ability to invade into epithelial cells, thus resulting in bacteraemia.<sup>(2)</sup>

*Gonococci* attach to the host mucosal cells and penetrate through and between cells into the subepithelial space. A typical host response is characterised by invasion with neutrophils, followed by epithelial sloughing, formation of submucosal microabscesses along the urethral lining and purulent discharge. If left untreated, macrophage and lymphocyte infiltration replaces the neutrophils.<sup>(2)</sup>

In a patient who presents with multiple synchronous abscesses, one would typically investigate for an immunocompromised state, such as diabetes mellitus, chronic steroid use, human immunodeficiency virus (HIV), or a unique infection such as melioidosis. We present two cases of hand abscesses occurring in immunocompetent patients, one with synchronous bilateral hand abscesses and the other, a hand abscess occurring synchronously with knee septic arthritis.

## CASE REPORTS

### Case 1

A 52-year-old Chinese man with no significant medical history

or drug use presented with a ten-day history of bilateral hand and wrist swelling and pain. There was no antecedent trauma. He was first seen by the Rheumatology Department on suspicion of gouty arthritis, but was subsequently referred to the Hand Surgery team after imaging suggested abscess collections in both hands. He underwent an uncomplicated debridement, which yielded copious amounts of pus from both hands. There was no joint involvement to suggest septic arthritis. The patient required two further debridements due to the poor state of wound healing. In the interim, routine blood and multiple tissue cultures did not show any bacterial or fungal growth. Diabetes screen and HIV serology were negative. The patient was first started on intravenous (IV) cloxacillin and crystalline penicillin, which was later converted to IV Augmentin. Finally, a sample was sent for gonococcal polymerase chain reaction (PCR) after repeated negative tissue and blood cultures; a history of contact with a commercial sex worker one month ago was gleaned from the patient. His antimicrobial therapy was then switched to IV benzylpenicillin, to which he responded well. He was discharged two weeks following admission.

### Case 2

A 55-year-old Chinese man with a history of gout presented with pain and swelling in the right knee, without a preceding febrile episode. He underwent an aspiration of his knee effusion and was treated for gouty arthritis with colchicine and oral non-steroidal anti-inflammatory drugs, which provided symptomatic relief. He was discharged the next day but was recalled when cultures from his knee aspirate grew *gonococci*. He developed fever and a swelling in his left hand, and was started on IV benzylpenicillin. Upon further questioning, he revealed recent contact with commercial sex workers in Batam, Indonesia. He underwent an

<sup>1</sup>Section of Plastic, Reconstructive and Aesthetic Surgery, <sup>2</sup>Department of Hand Reconstructive and Microsurgery, National University Health System, Singapore

**Correspondence:** Dr Ho Yew Ming Samuel, Registrar, Section of Plastic, Reconstructive and Aesthetic Surgery, Department of General Surgery, National University Health System, 1E Kent Ridge Road, Singapore 119228. lilming2000@gmail.com

arthrotomy of his right knee as well as incision and drainage of his left hand abscess at the same surgical sitting. Cultures taken from the patient's left hand showed a negative growth in routine culture, but PCR analysis of the same samples taken from his left hand were positive for *gonococcus*. He required further wound debridement but was eventually discharged well.

## DISCUSSION

Gonococcal infections are common sexually transmitted infections, particularly in middle-aged men in our local population. Disseminated gonococcal infections (DGIs), as in our patients, occur in 1%–2% of mucosal infections following haematogenous spread from the primary site.<sup>(3)</sup> Bilateral hand abscesses, such as that in our first patient, are uncommon occurrences. The mechanism by which *gonococci* attach to epithelial cells and invade via the opacity-related proteins and pili, and subsequent formation of microabscesses in the urethral lining, may form the basis by which the subcutaneous abscesses form in distal sites in DGI.<sup>(3)</sup>

The presentation of bilateral synchronous hand and wrist abscesses is a rare occurrence of DGI, especially in an era where antimicrobial therapy is readily available. The formation of submucous abscesses is usually limited to the periurethral region where the bacteria most commonly attach. There have been sporadic reports of abscess formation in distant sites, such as in the epidural or perianal space,<sup>(4,5)</sup> but not of the hand. A bilateral presentation, as in our first case, is most unusual. The importance of a clear and precise history taken from the patient is emphasised; in both cases, a history of prior sexual contact with commercial sex workers was revealed only after a prolonged period of treatment. This was likely due to the social stigma attached to obtaining and giving such a history. As a special culture medium is required for *gonococci*, if proper history is obtained, this could be ordered in lieu of a much costlier PCR analysis.

The diagnosis of a gonococcal-related abscess was further hampered by multiple negative tissue cultures, which could have resulted from the relatively special conditions that *N. gonorrhoeae* requires for growth: fresh moist specimen, high carbon dioxide concentrations and Thayer-Martin culture

medium vs. blood agar.<sup>(6)</sup> As such, we recommend that, in the event of an unusual presentation of synchronous abscesses in an immunocompetent patient, there should be a high index of suspicion for gonococcal infection, especially if a suggestive sexual history is present. Moreover, in the event of a negative culture with high clinical likelihood for gonococcal infection, a low threshold for use of gonococcal PCR should be undertaken due to its higher sensitivity. This is aptly illustrated in our second case, where the same tissue samples yielded a negative culture growth but a positive PCR analysis. The drawbacks of PCR testing would be a higher rate of detection of other *Neisseria* spp. and the relatively higher cost.<sup>(7,8)</sup>

In conclusion, gonococcal infections are common sexually transmitted infections that could result in systemic manifestations. Although these systemic presentations usually do not involve the formation of abscesses in distal sites, it is vital to exclude them as a cause in a patient with a suggestive clinical history so as to avoid delaying directed antimicrobial therapy. Precise history-taking is vital in the treatment of these patients. Gonococcal PCR assay is an important tool in the rapid detection of these infections. In negative routine cultures, one should consider sending for gonococcal cultures or PCR tests.

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