Eleanor Osborne, Christina Bilalian, Amelia Cussans and Lucy Ostlere

Pseudomonas folliculitis: a complication of the lockdown hot tub boom?

Lessons from a patient

E Osborne, BA Hons, medical student, St George's, University of London, London. **C Bilalian**, MRCGP, GP, Wandsworth Medical Centre, London. **A Cussans**, DTM&H, senior house officer, Northwick Park Hospital, Harrow. **L Ostlere**, MD, FRCP, consultant dermatologist, Department of Dermatology, St George's Hospital, London.

Address for correspondence

Eleanor Osborne, St George's, University of London, Cranmer Terrace, London SW17 0RE, UK.

Email: edcosborne@gmail.com

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CASE PRESENTATION

An otherwise fit 58-year-old male presented with a sudden-onset rash on the buttocks and tenderness under the arms and left breast. His 25-year-old son had a similar rash on his torso and tenderness around the nipples bilaterally. Both patients were apyrexial. Over the next 24 hours redness developed at the site of tenderness under the arms and around the areolae. The family had bought a hot tub 3 weeks earlier and the father and son had longer immersion in the water compared with other family members, who were not affected.

On examination there were tender erythematous nodules in the axillae (Figure 1) and around the left areola (Figure 2). There was follicular erythema with pustules over the buttocks (Figure 3). The son had similar changes in the axillae and around the areolae bilaterally with papules and pustules over the back (Figure 4).

After 2 days pus started to discharge from the breast nodule of the son and a swab grew *Pseudomonas aeruginosa*. A diagnosis of *Pseudomonas* folliculitis with mastitis and axillary lymphadenopathy was given. Both patients took 500 mg ciprofloxacin twice daily for a week with complete resolution of the affected areas.

The hot tub was drained, cleaned with domestic bleach products, and rinsed.

Figure 1. Erythematous nodules in the axilla.

Figure 2. Erythema and induration of the peri-areola skin.

However, the pump was not cleaned, with some water remaining in the internal mechanism of the tub. The family continued to use the hot tub and 2 weeks later the father had a recurrence of his symptoms, suggesting re-infection from the same source. A second course of ciprofloxacin was prescribed and the symptoms resolved.

DISCUSSION

The COVID-19 pandemic may have begun with a rush to buy toilet paper but the latest hot commodity is hot tubs. Many households have utilised free time during the lockdown to improve their outdoor spaces, embracing the concept of 'staycation' while coming to terms with cancelled travel plans. Hot tub sales have resultantly increased by 480% during the UK lockdown.[1] As such, an increase in the prevalence of hot tub folliculitis may be anticipated and clinician awareness of this condition is becoming increasingly relevant. Hot tubs are used year-round; therefore, disease incidence is not confined to the summer months.

These patients showed the classic triad of hot tub-acquired *P. aeruginosa* infection: folliculitis; breast tenderness; and axillary lymphadenopathy. The clinical syndrome of 'hot tub folliculitis' may also be associated with upper respiratory tract symptoms and fever.[2] However, in less severe infections, patients may present with only folliculitis.

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Patient consent

The patients gave consent for publication of this article and its images.

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An association between the gram-negative bacterium *P. aeruginosa* infection and exposure to contaminated recreational water in hot tubs, both in commercial and domestic settings, has been well documented since the 1970s,[3] with cases of otitis externa[4] and genitourinary tract infections,[5] as well as respiratory tract infections, including a fatal pneumonia[6] in a previously fit patient, reported to have been caused by *P. aeruginosa* acquired from hot tubs. The warm, wet environment of hot tubs provide the ideal conditions for *P. aeruginosa* to proliferate[7] and the complex plumbing systems may facilitate biofilm formation and pose a significant decontamination challenge, as seen in this case.[8]

It has been postulated that apocrine sweat glands and the modified apocrine glands of the mammary tissue and areola (glands of Montgomery) are particularly vulnerable to infection because of their larger size and their communication with hair follicles.[9] The wet fabric of swimsuits may aid in inoculation of the skin by occlusion of the follicles,[7] as does the softening and dilating effect of the warm water.[4] Swimsuits should therefore be removed and washed straight after use. Shower heads,[8] sponges, neoprene wet suits,[7] and pool toys[10] may also all harbour *P. aeruginosa*. Because *P. aeruginosa* is also found in soil, hot tub owners should be mindful of the potential for cross-contamination.[11] Adequate chlorination is also crucial to prevent proliferation, yet household hot tubs may be monitored less carefully than their commercial counterparts, making them more vulnerable to fluctuations in chlorine levels.[9] Moreover, it has been suggested that chlorine's antimicrobial efficacy is reduced by the turbulent water flow, high temperatures, and alkaline environment of the hot tub.[4,8]

Figure 3. Pustules and follicular papules with surrounding erythema over buttock.

Figure 4. Papules and pustules over back.

Folliculitis (inflammation around the hair follicles) presents as a red papule (which may be tender), with or without a pustule, and it can have a variety of causes. Non-bacterial causes of folliculitis include *pityrosporum* infection, which generally affects the torso. Sterile folliculitis can affect any hair-bearing area but commonly involves the buttocks, where it can be persistent. It may be caused by hair removal or the occlusive effects of adhesive plasters or thick ointments. Other causes of folliculitis-like eruptions include topical and oral steroids, eosinophilic folliculitis, peri-oral dermatitis, and acne.

Staphylococcus aureus is the most common cause of bacterial folliculitis; however, it is important to identify cases caused by *P. aeruginosa*, which will not respond to first-line antimicrobial treatment for *S. aureus*. Patients presenting with a sudden-onset pustular folliculitis should be asked about exposure to potential sources. If *P. aeruginosa* is suspected, a swab should be taken from a punctured pustule for microscopy, culture, and sensitivity. Uncomplicated *P. aeruginosa* folliculitis can be self-limiting. However, antimicrobial creams such as Dermol (shown to be effective against *P. aeruginosa* in vitro) or polymyxin may be prescribed. Where the folliculitis is complicated by mastitis, lymphadenopathy, or systemic symptoms such as fever, then antibiotic treatment with ciprofloxacin is recommended. Clinicians who have made this diagnosis should also encourage their patients to seek advice on disinfecting and maintaining their hot tub to prevent recurrences.

Provenance

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Competing interests

The authors have declared no competing interests.