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Case Series

Necrotising fasciitis in the COVID-19 era: A consequence of caution – A case series

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ABSTRACT

Necrotising fasciitis (NF) is a severe soft tissue infection that is associated with a high risk of morbidity and mortality. During the coronavirus disease 19 (COVID-19) pandemic, the population has been actively discouraged from presenting to emergency medical services unless absolutely necessary. While this was an important step in allowing for preservation of limited resources in a time of crisis, it may have resulted in immeasurable 'secondary victims' of the pandemic as patients with time-critical conditions delay hospital presentation. In this case series, we describe three patients that noted symptoms of soft tissue infection, but delayed seeking healthcare advice due to concerns regarding COVID-19 exposure. All three progressed to NF, requiring highly morbid wide surgical debridement and prolonged hospital admission, with a high risk of potential mortality. The findings of this series demonstrate the importance of consistently delivering appropriate and timely healthcare interventions to patients with non-COVID-19-related conditions. While efforts must be made to ensure preservation of valuable healthcare resources in a global pandemic, patients must also be empowered to seek timely care for non-COVID-19-related conditions even in this time of crisis.

1. Introduction

Necrotising fasciitis (NF) is a severe, life-threatening and rapidly progressive form of soft tissue infection that develops as a result of gas-forming bacteria in the subcutaneous tissues [1]. It is a surgical emergency that demands immediate intervention to prevent morbidity and mortality [1]. Management is by means of wide surgical debridement of non-viable tissue with appropriate antimicrobial and supportive therapy [2]. The most frequently affected anatomical sites are the extremities, trunk and perineum [2]. It is relatively uncommon, with an annual incidence of less than 1 in 100'000 [2]. Clinical presentation can vary widely, with classically described features such as bullae, purple skin discoloration and crepitus often absent [2]. Thus, the diagnosis can often be delayed with devastating consequences [2].

During the Coronavirus disease 19 (COVID-19) pandemic, the population has been actively discouraged from presenting to emergency medical services unless absolutely necessary [3]. While this has been an

important step in preserving valuable and limited healthcare resources in a time of crisis, it may also have resulted in immeasurable cases of progression of manageable diseases to imminently life-threatening conditions [3]. We present three cases of patients who presented to our institution, a tertiary referral university teaching hospital which provides a high volume of emergency care to a large catchment area, with NF over a one-month period (1st February 2021 to 28th February 2021) during a national lockdown, all of whom had initially noted symptoms of milder soft tissue infection but delayed presentation to the hospital due to public health advice. The following cases have been reported in line with the PROCESS 2020 guidelines [4].

1.1. Patient 1

A 50-year-old male with a past medical history of schizophrenia and respiratory tuberculosis presented to the emergency department (ED) with severe perineal pain, erythema and purulent discharge. He had

Abbreviations: NF, Necrotising fasciitis; COVID-19, Coronavirus disease 19; AKI, Acute kidney injury; OT, Operating theatre; ICU, Intensive care unit; AKA, Above knee amputation.

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initially attended his general practitioner three weeks beforehand with a perineal abscess but resisted ED attendance at that time, and was thus treated with a course of oral antibiotics. He subsequently presented to hospital after a sudden deterioration in his symptoms. He was tachycardic and pyrexial on initial assessment. Physical examination revealed severe perineal, scrotal and right groin erythema with foul-smelling discharge and crepitus (*Image 1*). Baseline investigations demonstrated dramatically elevated inflammatory markers and evidence of acute kidney injury (AKI). A clinical diagnosis of Fournier's gangrene was made. The patient was promptly transferred to the operating theatre (OT) for surgical management following commencement of broad spectrum intravenous antibiotics and appropriate fluid resuscitation.

Extensive debridement of necrotic tissue in the right groin, scrotum, perineum and perianal region was performed by a fellowship-trained consultant colorectal surgeon on the specialist division of the medical register with experience in managing severe perineal soft tissue infection. Both testes and the anal sphincters appeared viable intra-operatively and were preserved (*Image 2*). The patient was admitted to the intensive care unit (ICU) postoperatively. Re-examination of the wound was performed the following day with intra-operative consultant from the urology service. No further debridement was required and a sigmoid loop colostomy was created to prevent wound contamination. A vacuum-assisted closure (VAC) dressing was applied to the wound on a subsequent examination. The patient made a steady recovery, with eventual extubation and gradual withdrawal of inotropic support. He was medically fit for discharge on the 35th postoperative day with subsequent plastic surgery input in regards to reconstruction. Following undergoing local advancement flap, the patient was well at clinical follow-up 3 months postoperatively and is due to undergo colostomy closure.

1.2. Patient 2

A 60-year-old male presented to ED with clinical signs and symptoms concerning for NF of the left lower limb. He had a past medical history of a liposarcoma of the left thigh which was managed by surgical resection and radiotherapy, which resulted in the development of a chronic non-healing ulcer in this region. The patient had noted purulent discharge from the ulcer five days prior to ED presentation but did not seek medical assistance at this time due to concerns regarding COVID-19 exposure. Extensive erythema and swelling was evident on clinical examination. Lower limb computed tomography was performed which demonstrated extensive subcutaneous emphysema and extensive stranding of muscle compartments.

Following aggressive fluid resuscitation, commencement of inotropic support and administration of broad spectrum intravenous antibiotics, the patient was transferred promptly to the emergency theatre. Circumferential debridement and fasciectomy of necrotic tissue from the



Image 2. Patient 1 post-debridement with preservation of the testes and the anal sphincters.

inguinal ligament to the popliteal fossa was performed (*Image 3*) by a fellowship-trained consultant vascular surgeon on the specialist division of the medical register with extensive experience in the management of lower limb necrotising fasciitis. The underlying muscle was noted to be viable intraoperatively and thus preserved. Following a 48-h post-operative ICU admission, the wound was re-examined in the OT, with no further debridement required. A VAC dressing was applied to the wound at this time which was subsequently changed at 3 day intervals. The patient was transferred to the ward on the third postoperative day. Antibiotic therapy was discontinued 14 days postoperatively and the patient was transferred to the plastic surgery service for definitive wound management by skin grafting. Histopathological analysis of the resected tissue revealed no evidence of recurrent malignancy. The patient remained well on outpatient clinical review 3 months post-discharge.



Image 1. Patient 1 on presentation.



Image 3. Patient 2 post-debridement.



Image 4. Patient 3 on presentation.



Image 5. Patient 3 post AKA.

1.3. Patient 3

A 64-year-old male with a background of poorly controlled type 2 diabetes mellitus arrived to the hospital by ambulance following a collapse at home. Assessment revealed no evidence of neurological deficit or traumatic injury, but the patient reported a history of a right diabetic foot sepsis, the condition of which he admitted had been gradually deteriorating over the prior two months. He had wished to avoid hospital presentation at this time due to the ongoing pandemic. On examination, there was evidence of wet gangrene of the second digit and metatarsal region of the right foot, with a deep penetrating ulcer on the plantar aspect of the foot, at the base of which was exposed bone (*Image 4*). There was profound erythema, swelling and crepitus of the right leg from the foot to above the knee. Popliteal and pedal pulses were impalpable. The patient was haemodynamically stable but his inflammatory markers were markedly raised and he had developed an AKI. Cross-sectional imaging of the lower limb revealed extensive subcutaneous and subfascial air with evidence of muscle necrosis and osteomyelitis.

Based on these findings, the decision was made to perform an above-knee amputation (AKA) as opposed to soft tissue debridement. The patient was imminently transferred to the emergency theatre directly from the emergency department once haemodynamic stability had been achieved upon commencing inotropes. This was performed by a fellowship-trained consultant vascular surgeon on the specialist division

of the medical register with extensive experience in the management of lower limb necrotising fasciitis. He was transferred to the ICU post-operatively and made an uneventful recovery after this. He was gradually weaned from inotropic support and was subsequently extubated. His AKA wound healed well without any requirement for revision (*Image 5*). The patient was subsequently reviewed 3 months post-discharge in the outpatient department and remained well.

2. Discussion

The ongoing COVID-19 pandemic has presented healthcare systems across the globe with unprecedented challenges [3]. In response to this, hospitals have shifted resources in an effort to meet the influx of critically ill patients [3]. As part of these emergency measures, patients have been strongly discouraged from attending emergency health services unless absolutely necessary [3]. While this has been a valuable and worthwhile measure in ensuring that precious limited resources are available to treat a previously unencountered surge of critically ill patients in a time of crisis, this has also created the potential for 'collateral damage' in patients with unrelated conditions, where patients avoid ED presentation with conditions that typically may have warranted hospital admission [3,5–7]. An unfortunate consequence of this could be the progression of conditions that are relatively straightforward to manage, such as soft tissue infection requiring intravenous antibiotics or an abscess that requires drainage, to imminently life-threatening critical conditions, such as NF [3,5–7].

A review of hospital admission data demonstrated that, prior to the COVID-19 pandemic, it would have been usual to observe between one and two cases of NF per annum in our institution. However, during a one-month period of national lockdown, we observed three cases of NF. All of the described patients admitted to having recognised symptoms of soft tissue infection, but did not attend hospital until their symptoms had significantly deteriorated due to fears regarding COVID-19 exposure. This is an important finding as, while resource perseverance in a time of crisis is essential, appropriate medical intervention for patients with time-critical conditions will not only significantly reduce morbidity and mortality, but also prevent such conditions to evolving to a point where patients will require prolonged ICU admissions, further straining resources [3]. To our knowledge, this is the first series that has demonstrated an increase in the occurrence of NF that may be directly attributed to the COVID-19 pandemic.

The consequences of hospital avoidance during the current healthcare crisis have also been observed amongst other conditions [3,5–7]. A higher incidence of perforated appendicitis has been observed due to delayed presentation, resulting in greater morbidity, a prolonged inpatient length of stay, a higher rate of conservation to open surgery and an increased incidence of postoperative intra-abdominal collections requiring radiological drainage [5]. Similarly, likely as both a consequence of curtailed elective screening services, a greater proportion of colorectal cancer has been observed to present acutely with obstruction, perforation or bleeding, which could have potentially devastating impacts on long-term survival outcomes [6]. It has also been demonstrated that patients with acute myocardial infarctions delayed hospital presentation during the pandemic, resulting in an increased risk of future complications such as left ventricular dysfunction and cardiovascular death [7]. It is clear from these studies that there are many 'secondary victims' of the COVID-19 pandemic, but the full extent of this may not become fully apparent for a number of years [3,5–7].

The findings of this series demonstrate the importance of consistently delivering appropriate and timely healthcare interventions to patients with non-COVID-19-related conditions even in this time of crisis, as deviation from recognised treatment interventions may ultimately result in the progression of conditions to a point that will result in greater morbidity, a higher risk of mortality and ultimately be more resource-intensive than treatment at an earlier presentation would have been. Future larger volume retrospective studies from the prior waves of the

COVID-19 pandemic and prospective studies in potential future waves may allow further delineation of the potential impact of hospital avoidance in public health-mandated lockdowns on the incidence of NF and severe soft tissue sepsis. The threat of COVID-19 should not interfere with the delivery of safe and effective care to other critical conditions. It is important that public health advice should also focus on educating the population that life-threatening conditions may still occur during a global pandemic, and patients with urgent medical issues should be empowered and encouraged to seek early and prompt care so that they are not harmed by a fear of COVID-19 rather than by COVID-19 itself.

3. Conclusion

In our series, we observed a sharp increase in the presentation of NF during a one-month period of national lockdown. All of the described patients admitted to experiencing symptoms of soft tissue infection but initially decided to delay hospital presentation due to concerns regarding COVID-19 exposure. All unfortunately progressed to a critical condition that ultimately required extensive and highly morbid surgical debridement with a prolonged hospital admission. While efforts must be made to ensure preservation of valuable healthcare resources in a global pandemic, patients must also be empowered to seek timely care for non-COVID-19-related conditions even in this time of crisis.

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Ethical approval

Our institutional review board does not require case series or case reports to be submitted for ethical approval.

Consent

Informed consent was obtained from all patients for inclusion in this case series.

Author contribution

Gerard Feeney: Study design, study conceptualisation, data collection, writing of the article, final approval of the article for submission.

Enda Hannan: Study design, study conceptualisation, data collection, writing of the article, final approval of the article for submission.

John Fallon: Data collection.

Eimear Curran: Data collection.

Helen Meagher: Data collection.

Jean Sheehan: Data collection.

John Calvin Coffey: Study design, study conceptualisation, final approval of the article for submission.

Eamon Kavanagh: Study design, study conceptualisation, final approval of the article for submission.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ijso.2022.100488>.

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