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Necrotising soft tissue infection in the head and neck region, 2017–2023

SHORT REPORT

NADJA TANOVIC

nadjatanovic@gmail.com
Department of Otorhinolaryngology
Drammen Hospital, Vestre Viken Hospital Trust
Author contribution: concept, design, data collection and interpretation, literature search, drafting and revising the manuscript, and approval of the submitted version
Nadja Tanovic, specialty registrar in otorhinolaryngology
The author has completed the ICMJE form and declares no conflicts of interest.

ELLEN KVESTAD

Department of Otorhinolaryngology
Oslo University Hospital, Rikshospitalet
Author contribution: concept, design, interpretation of data, drafting and revising the manuscript, and approval of the submitted version
Ellen Kvestad PhD, specialist in otorhinolaryngology, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

TRINE KÅSINE

Department of Anaesthesiology and Intensive Care Medicine
Department of Emergencies and Critical Care
Oslo University Hospital, Rikshospitalet
Author contribution: concept, design, interpretation and analysis of data, drafting and revising the manuscript, and approval of the submitted version
Trine Kåsine PhD, specialist in anaesthesiology, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

GORM HANSEN

Department of Microbiology
Oslo University Hospital, Rikshospitalet
Author contribution: concept, design, interpretation of data, drafting and revising the manuscript, and approval of the submitted version
Gorm Hansen, specialist in medical microbiology, infectious diseases and internal medicine, senior consultant
The author has completed the ICMJE form and declares no conflicts of interest.

BØRRE FEVANG

Section for Clinical Immunology and Infectious Diseases
Oslo University Hospital, Rikshospitalet
and
Institute of Clinical Medicine
University of Oslo
Author contribution: concept, design, interpretation of data, drafting and revising the manuscript, and approval of the submitted version
Børre Fevang, specialist in internal medicine and infectious diseases, senior consultant and professor II
The author has completed the ICMJE form and declares no conflicts of interest.

Background

Necrotising soft tissue infection is a rare and severe infectious condition affecting the skin and underlying soft tissues. Since the COVID-19 pandemic, an increase has been reported internationally in cases caused by *Streptococcus pyogenes* (Group A Streptococcus, GAS). We have investigated the incidence, aetiology and resistance patterns of necrotising soft tissue infections in the head and neck region at the Department of Otorhinolaryngology, Oslo University Hospital, Rikshospitalet for the period 2017–2023.

Material and method

Retrospective review of medical records of patients treated for necrotising soft tissue infection before the pandemic (1 January 2017 to 11 March 2020), during the pandemic (12 March 2020 to 12 February 2022) and after the pandemic (13 February 2022 to 31 December 2023).

Results

Fifty-three patients with necrotising soft tissue infection were included in the study: 21 pre-pandemic, 7 during the pandemic and 25 post-pandemic. Group A Streptococcus was found in 27 patients, and all isolates were susceptible to penicillin.

Interpretation

In line with reports from other countries, the results from our department may indicate an increase in necrotising soft tissue infections caused by group A Streptococcus in the period following the pandemic.

Main findings

Between 2017 and 2023, 53 patients were treated for necrotising soft tissue infection in the head and neck region at the Department of Otolaryngology, Oslo University Hospital, Rikshospitalet: 21 before the COVID-19 pandemic, 7 during and 25 after.

Group A streptococci were found in 8 of 21 patients in the pre-pandemic period and 18 of 25 in the post-pandemic period. All group A streptococcal isolates were susceptible to penicillin.

Necrotising soft tissue infections are severe and potentially fatal bacterial infections of the skin and soft tissues. Patients with comorbidities such as diabetes or immunodeficiency are particularly at risk (1, 2). There are no internationally accepted diagnostic criteria, and the nomenclature is ambiguous, as necrotising forms of cellulitis, fasciitis and myositis are all encompassed by the term (3). The absence of clear diagnostic criteria complicates comparisons across studies, but an incidence of 2–5 per 100,000 population per year has been reported in Scandinavia (1).

Necrotising soft tissue infections are characterised by a rapidly progressing clinical course that typically requires intensive care, surgery and antibiotics. The bacteria enter the soft tissue through broken skin or a mucosal barrier, either spontaneously or in connection with trauma or medical procedures (4, 5). The pathophysiology involves potent bacterial toxins that induce a cytokine storm, followed by impaired microcirculation, bacterial invasion of multiple tissue layers, ischemia and necrosis (4, 6).

Since the COVID-19 pandemic, international reports have indicated an increase in necrotising soft tissue infections overall, and particularly in cases caused by *Streptococcus pyogenes* (group A streptococci, GAS) (7–9). Invasive group A streptococcal infections are notifiable diseases in Norway, and national MSIS data have shown a post-pandemic increase (10).

The aim of our study was to investigate the incidence, aetiology and antimicrobial resistance patterns of necrotising soft tissue infections in the head and neck region in patients treated at the Department of Otolaryngology, Oslo University Hospital, Rikshospitalet, in the period 2017–23.

Material and method

The study was a retrospective review of patients treated for necrotising soft tissue infection at the Department of Otolaryngology in the period 1 January 2017 to 31 December 2023. Patients with a discharge diagnosis of M72.6 Necrotising fasciitis (ICD-10) were identified from electronic patient records. Inclusion criteria were the need for intensive care and at least one of the following perioperative findings: fat necrosis, poorly demarcated tissue layers with pus formation, necrotic oedema ('dishwater' fluid), microthrombosis, fascial thickening and nonviable muscle tissue. The COVID-19 pandemic period was defined as 12 March 2020 to 12 February 2022 (11).

Data collected included age, sex, comorbidities, body mass index, date of symptom onset and hospital admission, blood test results, microbiological findings and antimicrobial therapy.

The study was approved by the data protection officer at Oslo University Hospital as a quality assurance project. It was submitted to the Regional Committee for Medical and Health Research Ethics, which determined that prior review was not required.

Results

Sixty-six patients were identified, of whom 53 met the inclusion criteria and were included in the study: 21 patients (40 %) were treated for necrotising soft tissue infection pre-pandemic, 7 (13 %) during and 25 (47 %) post-pandemic (Table 1). During the study period, an average of 0.6 patients were treated per month. The monthly average was 0.5 pre-pandemic, 0.3 during the pandemic and 1.1 post-pandemic.

Bacterial growth in pus was found in 48 patients (91 %), and eight patients (15 %) had a positive blood culture. Patient characteristics and bacterial findings are summarised in Table 1.

Group A streptococci were identified in blood cultures or from pus/tissue fluid from the surgical site in 27 patients (51 %) (Figure 1). Other microbes were found in an additional 23 patients: *Streptococcus constellatus* (*n* = 11), *Streptococcus anginosus* (*n* = 6), *Cutibacterium acnes* (*n* = 2), *Haemophilus influenzae* (*n* = 2), *Staphylococcus epidermidis* (*n* = 1) and *Staphylococcus aureus* (*n* = 1).

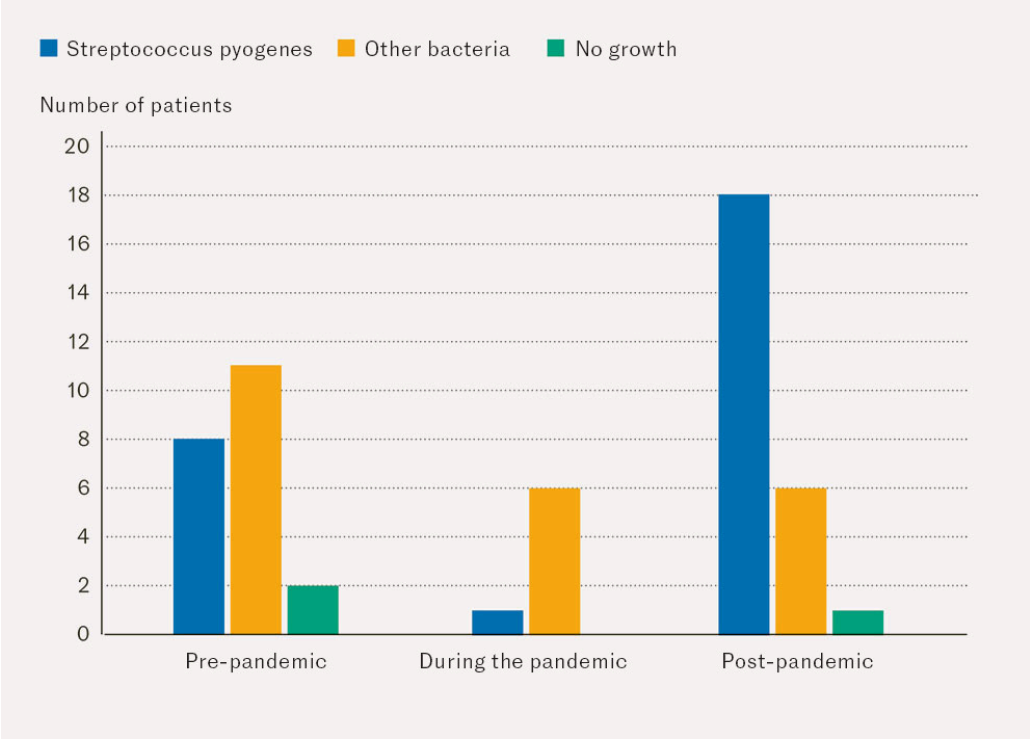

Figure 1 Microbiological findings in 53 patients treated for necrotising soft tissue infection in the head and neck region at Oslo University Hospital, Rikshospitalet, 2017–2023

All group A streptococcal isolates were susceptible to penicillin. In the period 2017–2022, the most common antibiotic regimen was a combination of cefotaxime, clindamycin and metronidazole, while in 2023 most patients received piperacillin–tazobactam and clindamycin (Figure 2).

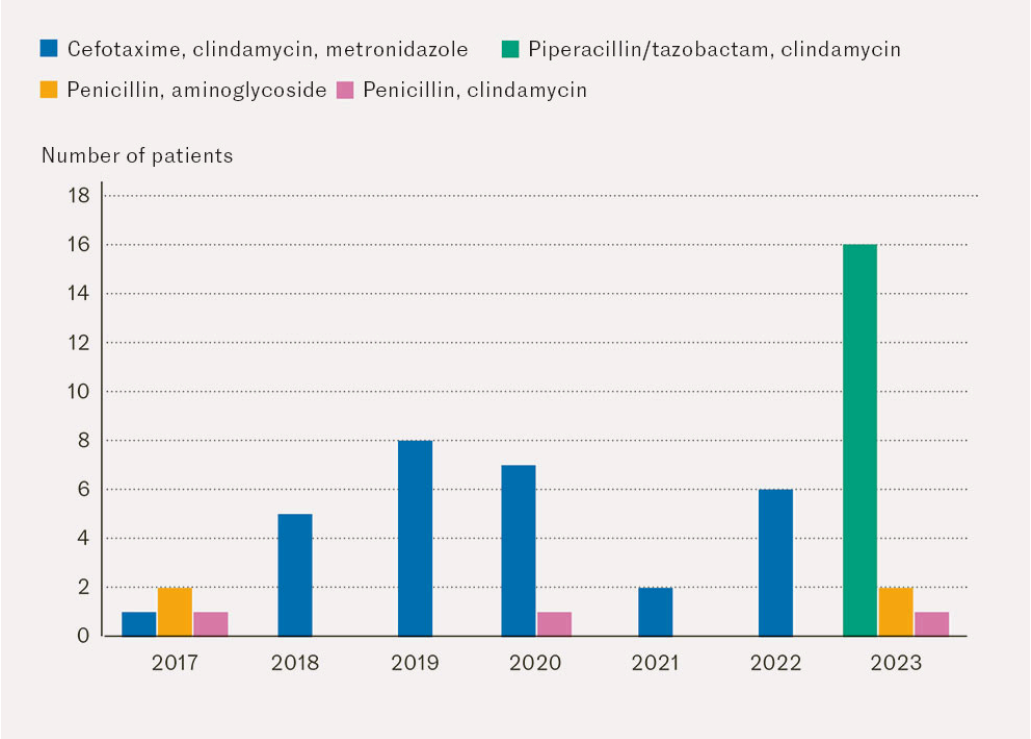

Figure 2 Antibiotic treatment in 53 patients treated for necrotising soft tissue infection in the head and neck region at Oslo University Hospital, Rikshospitalet, 2017–2023

Discussion

Among patients treated for necrotising soft tissue infection in the head and neck region at Rikshospitalet, group A streptococci were isolated in 18 of 25 during the nearly two years following the COVID-19 pandemic, compared with 8 of 21 in the approximately three years preceding the pandemic. Several countries have reported a post-pandemic increase in the incidence of necrotising soft tissue infections (7–9), including Sweden, where infection control measures were less restrictive than in Norway (7, 9).

The cause of this increase remains unclear, but possible contributing factors include reduced herd immunity to group A streptococci due to lower exposure during the pandemic, changes in bacterial virulence factors and increased susceptibility to bacterial infections following COVID-19 infection (12–14).

Beta-lactam resistance in group A streptococci is extremely rare. As all strains in our study were susceptible to penicillin, resistance development does not appear to explain the post-pandemic hospitalisations for necrotising soft tissue infections. No clindamycin-resistant group A streptococci were found in our material. In light of the 2023 NORM report, which documented 2.9 % clindamycin resistance among 382 blood culture isolates, we consider this a minor issue in the context of clinical empirical treatment (15). In December 2022, the national guidelines for antibiotic use in hospitals were revised, recommending piperacillin–tazobactam and clindamycin for severe soft tissue infections in the head and neck region (16). Antibiotic use at our department was in line with current guidelines throughout the study period.

In terms of age, sex and comorbidity, we found no obvious variation among patients before, during or after the pandemic (Table 1). In South-Eastern Norway Regional Health Authority, patients with necrotising soft tissue infections of the head and neck are primarily treated at the Department of Otorhinolaryngology, Oslo University Hospital, Rikshospitalet. During the relatively short study period, no changes were made to the catchment area or referral procedures, nor were any new diagnostic criteria established. It is therefore unlikely that the results were influenced by changes in clinical practice or patient selection.

The study's limitations include its retrospective design and reliance on data extracted from unstructured patient records. Data were limited to the South-Eastern Norway Regional Health Authority catchment area, and there were therefore few patients in each period. Consequently, no conclusions can be drawn regarding changes in incidence, and the results should be interpreted with caution. We believe the findings are, nevertheless, interesting. To the best of our knowledge, no other data have been published on this patient group in Norway during the same period, and the medical community has called for further studies on this population (6).

Even after intensive and comprehensive treatment, patients with necrotising soft tissue infections experience significant morbidity and mortality. National prospective studies, involving collaboration across health regions, medical

specialties and expert groups, are needed to improve understanding of the aetiology, refine diagnostics and develop more effective treatment for these severely ill patients.

The article has been peer-reviewed.

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