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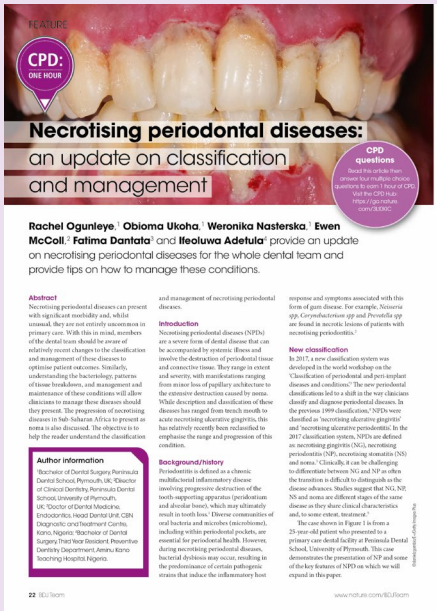
Article: *Necrotising periodontal diseases: an update on classification and management*



Necrotising periodontal diseases: an update on classification and management

Rachel Ogunleye,[1] Obioma Ukoha,[1] Weronika Nasterska,[1] Ewen McColl,[2] Fatima Dantata[3] and Ifeoluwa Adetula[4] provide an update on necrotising periodontal diseases for the whole dental team and provide tips on how to manage these conditions.

Abstract
Necrotising periodontal diseases can present with significant morbidity and, whilst unusual, they are not entirely uncommon in primary care. With this in mind, members of the dental team should be aware of relatively recent changes to the classification and management of these diseases to optimise patient outcomes. Similarly, understanding the bacteriology, patterns of tissue breakdown, and management and maintenance of these conditions will allow clinicians to manage these diseases should they present. The progression of necrotising diseases in Sub-Saharan Africa to present as noma is also discussed. The objective is to help the reader understand the classification and management of necrotising periodontal diseases.

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Introduction
Necrotising periodontal diseases (NPDs) are a severe form of dental disease that can be accompanied by systemic illness and involve the destruction of periodontal tissue and connective tissue. They range in extent and severity, with manifestations ranging from minor loss of papillary architecture to the extensive destruction caused by noma. While description and classification of these diseases has ranged from trench mouth to acute necrotising ulcerative gingivitis, this has relatively recently been reclassified to emphasise the range and progression of this condition.

Background/history
Periodontitis is defined as a chronic multifactorial inflammatory disease involving progressive destruction of the tooth-supporting apparatus (periodontium and alveolar bone), which may ultimately result in tooth loss.[1] Diverse communities of oral bacteria and microbes (microbiome), including within periodontal pockets, are essential for periodontal health. However, during necrotising periodontal diseases, bacterial dysbiosis may occur, resulting in the predominance of certain pathogenic strains that induce the inflammatory host response and symptoms associated with this form of gum disease. For example, *Neisseria spp, Corynebacterium spp* and *Prevotella spp* are found in necrotic lesions of patients with necrotising periodontitis.[2]

New classification
In 2017, a new classification system was developed in the world workshop on the 'Classification of periodontal and peri-implant diseases and conditions.'[3] The new periodontal classifications led to a shift in the way clinicians classify and diagnose periodontal diseases. In the previous 1999 classification,[4] NPDs were classified as 'necrotising ulcerative gingivitis' and 'necrotising ulcerative periodontitis.' In the 2017 classification system, NPDs are defined as necrotising gingivitis (NG), necrotising periodontitis (NP), necrotising stomatitis (NS) and noma.[5] Clinically, it can be challenging to differentiate between NG and NP as often the transition is difficult to distinguish as the disease advances. Studies suggest that NG, NP, NS and noma are different stages of the same disease as they share clinical characteristics and, to some extent, treatment.[5]

The case shown in Figure 1 is from a 25-year-old patient who presented to a primary care dental facility at Peninsula Dental School, University of Plymouth. This case demonstrates the presentation of NP and some of the key features of NPD on which we will expand in this paper.

Microbiology
NPDs arise due to mi a susceptible host. Pla the specific bacteria a and Vincent in 1896, involvement of the fa in the disease aetiolo zones of the disease h electron microscopy s zone (including gram bacteria); a neutrophi neutrophils, lymphocyt a necrotic zone (chan necrosis and presence fusiform bacteria); an infiltration zone (whe well preserved but *Sp* present).

Immune assays[10,11] chain reaction studie *ex vivo*[10] have confirm involvement. Other I *Prevotella intermedia Selenomonas* and *Fus* have been identified culture studies.[12] Hor beginning to underst of the interactions be the oral microbiome periodontitis,[1] with the commensal bacteria i strains such as *Preve* research is still unde of the bacteria involv opportunistic pathog in healthy patients, w importance of a bala and host susceptibil strains. Host inflamm be further enhanced factors, such as smok is not just the existen themselves.

Risk factors
Multiple predisposing

FEATURE

exposure of the underlying alveolar bone may occur. As is always the case, a thorough examination and special tests as necessary are indicated in order to develop a differential diagnosis. However, in our experience, the presentation of the disease is so distinct that the diagnosis is relatively straightforward.

The treatment of necrotising diseases should be approached in stages, including

be indicated. Metronidazole is selected as the first-line antibiotic treatment, effective against anaerobes, including the *Fusospirochetal* anaerobes associated with this disease. Antibiotics should only be prescribed following national guidelines when systemic involvement in the form of pyrexia, malaise, or lymphadenopathy is present.

In these circumstances, metronidazole is the antibiotic of choice as it is effective against anaerobes as found in the *Fusospirochetal* complex found in NPDs. The prescription as per the British National Formulary should consist of metronidazole 400 mg, eight-hourly, for 3 days. Alternatively, amoxicillin may be used if metronidazole is deemed inappropriate.[13] Figure 2 is the same case as in Figure 1 which was treated initially with gentle debridement, oral hygiene instruction, metronidazole (as presented with pyrexia) and subsequent professional mechanical plaque removal. The reduction in inflammation and reconfiguration of papillary architecture can be noted.

Patients with necrotising diseases may also require the clinician to liaise with their physician and highlighting the unusual nature of the condition will be important. This is because the patient may potentially have an underlying immunocompromising condition (for example, acquired immune deficiency syndrome [AIDS], HIV-positive, leukaemia, cyclic neutropenia).[14]

Once stable, the maintenance phase will involve regular reviews to maintain and reinforce oral hygiene and reassess risk factors as necessary. The loss of papillary architecture may mean oral hygiene regimes have to be tailored accordingly and appropriate sizing of interdental brushes will be essential in this maintenance phase.

Necrotising stomatitis
NS is a further progression of the disease with risk factors as discussed previously. NS, as with the other diseases, is painful and when the gingival architecture is so severely compromised, this can lead to exposure of the underlying alveolar bone which can also necrose.[16,17] The clinical presentation is similar to the other necrotising periodontal diseases with a higher likelihood of pyrexia and cervical lymphadenopathy, with patients often feeling systemically unwell. There are no national guidelines for the treatment of NS; however, case reviews indicate successful treatment following a similar strategy to the other necrotising periodontal diseases.[18,19]

Fig. 2. Treated necrotising periodontitis case

Fig. 3. Noma presenting in Nigeria

'The disease is characterised by necrotising fasciitis, osteonecrosis and myonecrosis, that leads to severe facial disfigurement and disability.'

As always, the key is improving the patient's oral hygiene and home care and where there is pyrexia and systemic involvement, metronidazole prescription, as discussed previously, is indicated. As with the other NPDs, recall visits are essential, particularly given the damage to the periodontal architecture and surgery may be indicated to address this damage as far as possible.[20]

Noma
The World Health Organisation (WHO) describe noma as 'noma (from Greek to "devour") is a necrotising disease that destroys the mouth and the face.' This disease is characterised by necrotising fasciitis, osteonecrosis and myonecrosis, that leads to severe facial disfigurement and disability.[21] Figure 3 indicates presentation of the disease as it affects the circumoral soft tissue; in many cases, affecting the whole of the face.

Noma mostly affects children aged 2–6 years living in Sub-Saharan Africa, with an estimated incidence ranging from 30,000–140,000 cases annually.[22] However, many cases of noma are believed to be underreported due to lack of access to adequate healthcare, lack of awareness, neglect and stigma.[23] The WHO also estimated an 80–90% mortality rate of noma cases annually in the absence of treatment.[22] Affected patients may suffer severe dehydration, sepsis, aspiration pneumonia, respiratory insufficiency, or starvation and if not treated it can be life threatening.[24] Although noma is an infectious disease, there are several predisposing factors that have been linked to the occurrence and progression of this disease. These include chronic malnutrition, extreme poverty, poor living conditions, unsafe drinking water, poor oral hygiene, limited access to healthcare facilities, lack of childhood vaccinations and immunosuppression resulting from comorbidities, including measles, anaemia, malaria, kwashiorkor and HIV/AIDS.[21,23,24] Treatment of noma depends on the stage at which patients present; however, treatment usually includes non-surgical periodontal therapy, antibiotics and possibly surgical rehabilitation.[25] As is the case with many other oral diseases, noma is preventable through risk factor control. Unfortunately, many of the risk factors for noma are not due to the personal decisions of the patient but are due to greater political and social issues. Organisations like the ZeroNOMA initiative[26] in Nigeria are currently taking action to the fight against noma by raising awareness, conducting research and acting as advocates for noma patients.

Conclusion
NPDs are a rare but challenging conditions to manage. By understanding disease classification, aetiology and disease progression, clinicians should be equipped to manage conditions within their competence range and similarly the need to refer as appropriate.

Ethics declaration
The authors declare no conflicts of interest.
Written consent to publish was obtained for Figure 3.

Author contributions
Ewen McColl had the idea to write a paper on this subject matter and edited contributions from Rachel Ogunleye, Obioma Ukoha and Weronika Nasterska. Images of NP were provided from an undergraduate clinic at Peninsula Dental School. Fatima Dantata and Adetula Ifeoluwa wrote the section on noma and provided all images of noma.

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1. In the 2017 classification system, necrotising periodontal diseases (NPDs) are defined as:

A. necrotising gingivitis (NG)

B. necrotising periodontitis (NP)

C. necrotising stomatitis (NS)

D. all of the above

2. Which of the following is not one of the most common risk factors for NPD?

A. poor oral hygiene

B. smoking

C. stress

D. old age

3. Once a diagnosis of NG/NP has been made, it is essential to first begin by:

A. addressing the cause of the episode

B. prescribing antibiotics

C. referring to a secondary care setting

D. instigating aggressive full mouth scaling and polishing

4. In the acute phase of NPD:

A. mouthwash is ineffective and contraindicated

B. extractions are usually required

C. gentle debridement using a hand scaler or ultrasonic device is indicated

D. perversely, the patient is unlikely to complain of pain

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