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# Spontaneous Osteonecrosis of the Maxilla

**Abstract:** In the past decade there has been a rise of osteonecrosis of the jaws (ONJ) predominately related to bisphosphonate therapy and osteoradionecrosis secondary to radiotherapy. However, osteonecrosis can occur in the absence of these agents. A case of idiopathic osteonecrosis of the maxilla is reported and the literature discussed.

**CPD/Clinical Relevance:** *It is not always possible to make a definitive diagnosis.*

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Osteonecrosis of the jaw (ONJ) is identified as 'non-healing exposed necrotic bone in the maxillofacial region'.<sup>1</sup> ONJ has received much publicity in the dental literature recently owing to its induction via various identified medications, eg bisphosphonates, denosumab and bevacizumab, and has now led to the new accepted acronym of MRONJ (Medication Related Osteonecrosis of the Jaw). Radiotherapy is also a common cause for ONJ and is referred to as OsteoRadioNecrosis (ORN). There remain other causes for ONJ but these are uncommon. A spontaneous case of ONJ due to vascular ischaemia is presented.

## Case report

A 94-year-old-male was referred by his general dental practitioner to the Head and Neck clinic at Guy's Hospital due

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to exfoliation of his upper central incisors and exposed non-healing bone in the pre-maxilla, as a malignant process was suspected. Prior to exfoliation of the teeth, the patient experienced spontaneous intra-oral bleeding from the maxillary midline region.

A medical history revealed a patient with modest memory impairment. In the past he had undergone a quadruple coronary artery bypass and currently suffered from hypertension. His medication included; bisoprolol, atorvastatin, clopidogrel, aspirin, nicorandil, isosorbide mononitrate, GTN spray, omeprazole, Adcal-D3. He did not smoke or consume alcohol.

Extra-oral examination was unremarkable. Intra-oral exam revealed two separate areas of exposed necrotic alveolar bone. The largest was in the upper incisor region (Figure 1) with a smaller necrotic area in the upper left first molar region (Figure 2). There was no purulent discharge and the tooth sockets in the pre-maxillary region were intact with no evidence of bony erosion. There was no oro-nasal communication and both oral and denture hygiene were deemed satisfactory.

The appearance was identical to MRONJ or ORN, but these therapies had not been provided and were confirmed by the general medical practitioner. Investigations included; blood assays (full blood count, urine, electrolytes, liver function tests, bone profile,

thyroid and parathyroid function tests, auto-antibody screens, ESR, CRP, PSA and sickle cell). No cause for ONJ could be identified.

Imaging (dental panoramic tomograph and a cone beam CT) showed bony destruction of the anterior maxilla back to the molar teeth with right-sided sinusitis. A chest X-ray excluded metastatic disease and tuberculosis and a nuclear medical scan revealed increased activity in the pre-maxilla in line with the confirmed ONJ.

Biopsy of the exposed bone and adjacent soft tissue from the margin of the necrotic area concluded sequestration and non-specific inflammation with no evidence of malignancy. There were no signs of local or systemic infection to indicate osteomyelitis.

A diagnosis of ischaemic osteonecrosis of the pre-maxilla of unknown cause was made by exclusion.

Owing to the patient's deteriorating mental state and the lack of symptoms, a conservative approach was adopted. Under local anaesthetic, the sharp and protruding edges of the exposed bone were reduced using piezoelectric surgery, without the need to raise soft tissue flaps, to avoid diminishing the blood supply further. Debridement was followed by a post-operative course of oral doxycycline (100 mg) and chlorhexidine gluconate 0.2% mouthwash.

On 3-month review, the patient



**Figure 1.** Presenting image of osteonecrosis upper incisor region.



**Figure 2.** Presenting image of osteonecrosis upper left first molar region.

reported no symptoms and examination revealed an improved appearance of the soft tissue with early suggestion of the necrotic bone improving.

## Discussion

The pathophysiology of ONJ is complex and poorly understood. Theories include progressive osteocyte destruction resulting from bone and bone marrow infarction secondary to compromised bone vasculature.<sup>2</sup> It is this reason which is thought to explain why ONJ is twice as likely to occur in the mandible compared to the more vascularized maxilla.<sup>3</sup> Other hypotheses emphasize the role of infections, altered fat metabolism and toxic damage of the soft tissue, amongst others.<sup>4</sup>

The two most common predisposing factors for ONJ are medication-related or radiotherapy. Oncology patients treated with intravenous bisphosphonates have a higher prevalence of ONJ following tooth extraction, ranging from 1.6–14.8% compared to that of patients prescribed oral bisphosphonates (between 1 in 10,000 to 1 in 100,000).<sup>3</sup> Advancements in drug therapy have added further causative agents such as denosumab and bevacizumab and it is likely that more drugs producing a similar

CAUSES	SUB-CATEGORY
Trauma	Physical <sup>7</sup> Chemical <sup>7</sup> Thermal <sup>7</sup>
Infections	Bacteria <sup>8</sup> Viral (HIV, HZV, hepatitis) <sup>7,10</sup> Infectious osteomyelitis <sup>7</sup>
Neoplasia	Bone tumours or metastases <sup>7</sup> Oral cancer <sup>7</sup>
Nutritional	Malnutrition <sup>7</sup> Alcoholism <sup>7,10</sup>
Vascular	Ischaemia <sup>10</sup> Occlusion <sup>10</sup> Coagulopathy (DIC) <sup>9</sup> Haemoglobinopathy (sickle cell) <sup>7,10</sup>
Immunological	Hypersensitivity reactions SLE/RA/IBS <sup>7,10</sup>
Genetic/Developmental	Gaucher <sup>7,10</sup>
Metabolic	Altered lipid metabolism <sup>10</sup> Fat emboli <sup>7</sup>
Endocrine	Long-term steroid use <sup>7</sup>
Periodontal disease	Gingivitis, periodontitis, ANUG <sup>9</sup>
Drugs	Bisphosphonates (eg zoledronic acid) <sup>8</sup> RANKL Inhibitors (eg denosumab) <sup>8</sup> Anti-neoplastics (eg bevacizumab, sunitinib, cabozantinib) <sup>8</sup> Corticosteroids <sup>7,10</sup>
Radiation	Head and neck radiotherapy <sup>10</sup>
Iatrogenic	
Idiopathic	

**Table 1.** Factors associated with sporadic ONJ.

complication are to follow.<sup>5</sup> Following radiotherapy the incidence of ORN has ranged between 4.74–37.5%.<sup>6</sup> It has been suggested that modern delivery systems with higher precision radiation doses, such as Intensity-Modulated-Radiotherapy (IMR), may reduce the risk of necrosis but there is little evidence to support this supposition at present.

Apart from oncological therapy, sporadic ONJ has been linked with a wide range of factors (Table 1).

Cases describing nicorandil ulceration associated with osteonecrosis have been reported but this was with a background of bisphosphonate use.<sup>11</sup> In the current case there was no history of bisphosphonate use

and no mucosal ulceration noted prior to this.

In the present case, no explanation could be found except an idiopathic vascular ischaemic event. What is peculiar is that usually the maxilla has a richer blood supply in comparison to the mandible and so is protected from ischaemic insults. The patient was elderly but otherwise well with no underlying pathology that might predispose to infarction of small blood vessels.<sup>12</sup> A similar clinical picture has been reported in sub-Saharan Africa.<sup>13</sup> Recent studies of the exfoliated specimen suggest an atypical form of tuberculosis (TB) can produce the same clinical picture. The

necrotic tissue removed in the present case was reported as negative for TB.

## Conclusion

Once iatrogenic events related to cancer therapy are excluded, the rare and sporadic causes of ONJ are mainly related to underlying haematological pathology, fat emboli or haemaglobinopathies leading to clots and subsequent ischaemia.<sup>14</sup>

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## CPD ANSWERS

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|------|-------|
| 1. A | 6. B  |
| 2. B | 7. C  |
| 3. D | 8. C  |
| 4. A | 9. B  |
| 5. C | 10. B |

## Book Review

**Esthetic Dentistry – A Clinical Approach to Techniques and Materials 3rd edn.** By Kenneth W Aschheim. London: Elsevier, 2015 (600pp; £230.75 h/b). ISBN 9780323091763.

This large book professes to cover every aspect of aesthetic dentistry, with 47 contributors to the 30 or so chapters and an interesting introduction from Gorden Christensen. As a third edition, it clearly has been added to and certainly also refers to the changes in aesthetic dentistry that have occurred for reasons of technology and economy – interesting and more on that later.

The book covers virtually every aspect of contemporary and traditional aesthetic dentistry, from white spots to full mouth wear and re-habilitation and from the principles of aesthetics to practice management. There is excellent coverage of functional aspects of planning and executing simple and complex cases. I also really liked the step-by-step photos of preparation, impression and bonding procedures – all done beautifully. There is also a very nice interactive online section from Elsevier where you can watch

videos/animations related to the book and subject matter and discuss content with other users. This is truly an excellent addition.

Chapters of note are 'Esthetics and Oral/Maxillofacial Surgery' by Daniel Buchbinder and 'Esthetics and Periodontics' by Rosenberg and Torosian. However, this book is clearly aimed at the US market. Not a single contributor is from Europe. Is this a problem? This reviewer thinks so because there are fundamental differences in how dentistry is practised in the US and Europe. Of course we are always converging but the fact is European educators are commonly leading the way in aesthetic dentistry and it seems a huge omission not to include a single one. As a result, the artistry of anterior direct composite and layering seems to be missing. This is one of the most single important aspects of aesthetic dentistry. There is no mention of the Dahl principle as a modality in the treatment of wear. To be fair, this is not a treatment often used in the USA, but it highlights the point made above about the unbalanced contribution.

There is not a single mention of the term 'Align, bleach and bond' and

hardly a case even to show this concept. This is incredible really when you think what an impact that concept has had in the UK and Europe. To underline this, the Orthodontic chapter (a single one) also has no real mention of the aesthetic value of Anterior Alignment Orthodontics. I realize that I am biased as this is a concept that is my primary option on a progressive pathway in smile design. However, vast numbers of dentists also use this methodology and it seems to be completely ignored here.

In conclusion, this is a beautifully illustrated book with contributions from some of the USA's leading talent, however, it highlights some obvious contrasts in the way aesthetic dentistry is now carried out in Europe. Which leads us back to an important point. In Europe, did a recession make us practise more conservatively and with more consideration of a patient's financial position? The forewords seem to infer that this is what has happened in the USA. I'd like to think that we are that way inclined anyway.

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