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# The Characteristics of Bisphosphonate Patients Developing Bisphosphonate-Related Osteonecrosis of the Jaw Attending an OMFS Department

**Abstract:** This case series considers the incidence of patients taking bisphosphonate medication that suffer with bisphosphonate-related osteonecrosis of the jaw (BRONJ) following an exodontia procedure. Forty five such patients who attended the Wigan Royal Albert Edward Infirmary (RAEI) Oral and Maxillofacial Surgery (OMFS) department for an exodontia procedure were examined. A patient's age, gender, exodontia technique, bisphosphonate route (Oral/IV), smoking status and reason for taking the bisphosphonates, eg osteoporosis/cancer/arthritis was considered. All of the patients that experienced BRONJ were smokers.

**Clinical Relevance:** Bisphosphonates are now widely accepted for the management of medical conditions, including arthritis, osteoporosis and various forms of cancer. Such patients are regularly referred to OMFS departments for dental extractions.

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Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is a recognized side-effect of bisphosphonate use.<sup>1</sup> Oral bisphosphonates may be prescribed to treat conditions such as arthritis/osteoporosis and intravenous (IV) bisphosphonates are now widely used in the treatment of various forms of cancer, eg breast and prostate cancers.

Such patients are regularly referred to the OMFS department for dental extractions. This case study aims to give an insight into the risk factors for the development of BRONJ that affect patients taking oral and IV bisphosphonate medication following dental extraction.

■ To provide data for the second national audit in support of the revalidation report November 2010, for the British Association of Oral and Maxillofacial Surgeons National Audit on Bisphosphonate-related Osteonecrosis of the Jaw ([www.baoms.org.uk](http://www.baoms.org.uk)).

## Aims/objectives

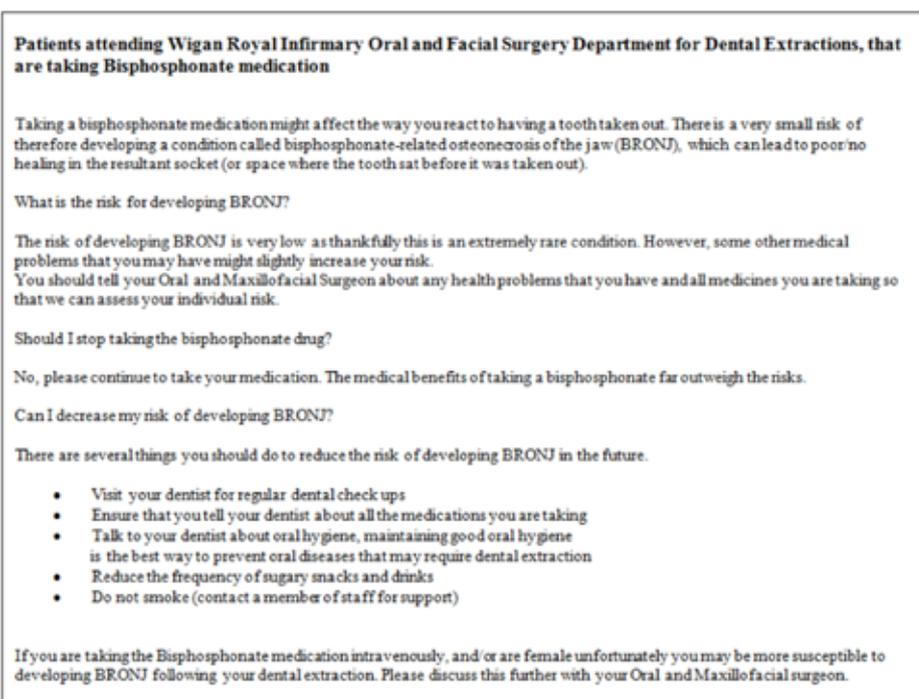
- To consider new patient cases of BRONJ in patients undergoing a dental extraction at RAEI OMFS department between 01/08/2011 and 01/08/2012.
- To give an indication of local incidence of BRONJ within age/gender/extraction type/bisphosphonate route type strata and potential association with smoking.
- To use local data obtained in the production of a patient information leaflet.

## Criteria/standards

Patients were considered to have BRONJ if all of the following three characteristics are present:<sup>2</sup>

1. Current or previous treatment with a bisphosphonate;
2. Exposed, necrotic bone in the maxillofacial region that has persisted for more than eight weeks;
3. No history of radiation therapy to the jaws.

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**Figure 1.** A patient information leaflet distributed to patients susceptible to developing BRONJ following exodontia.

## Materials and methods

The clinical records of 45 patients, who were taking bisphosphonate medication and attended the Wigan Royal Infirmary OMFS department for dental extractions between 1/8/2011 and 1/08/2012, were examined. The following data were recorded:

- The incidence of patients presenting with BRONJ in the RAEI OMFS department following exodontia;
- The affected patient's age, gender, bisphosphonate route (oral/IV) and smoking status;
- The reason for taking the bisphosphonates, eg osteoporosis/cancer/arthritis;
- Exodontia technique, surgical/simple forceps;
- Multiple extractions/single extractions.

Antibiotic prophylaxis (Co-Amoxiclav 625 mg) was used pre/post-operatively for all patients considered to be at risk of developing BRONJ. Lidocaine-adrenaline 1:80 000 was the local anaesthetic of choice for all dental extraction procedures undertaken on this group of patients. Patients that had undergone radiotherapy to the head and neck area and diabetic patients were excluded.

A patient information leaflet based on current guidance,<sup>3,4</sup> has been produced to be distributed to patients susceptible to developing BRONJ following exodontia, attending the RAEI OMFS department for dental extraction (Figure 1).

## Results

Of the 45 patients included in this case study, 11 (24%) were taking bisphosphonates for arthritis, 22 (49%) for osteoporosis and 12 (27%) for cancer: 19 (42%) were smokers.

Five (11%) of the patients experienced BRONJ following their exodontia procedure. Of these five patients, four of the patients that experienced BRONJ were taking the bisphosphonate intravenously as part of their management for cancer, and the remaining one was taking the bisphosphonate medication orally for osteoporosis. Four female patients were affected and one male. All of the patients that experienced BRONJ were smokers.

Whether surgical or non-surgical treatment was carried out had no difference on the outcome. All of the patients that

developed BRONJ did so as a consequence of having a single tooth extracted, as opposed to multiple extractions.

All of the patients that developed BRONJ were smokers. It was also noted that patients were more likely to develop BRONJ if they were female, taking IV bisphosphonates for cancer, and were in the age group 51–70.

## Current literature review

A review of the current literature for further information regarding smoking and BRONJ related to dental extractions was undertaken.

A MEDLINE search via OVID was undertaken from 1987 to the present day. The following search terms were used:

- Bisphosphonates or BRONJ;
- Dental extractions or exodontia;
- Smoking;
- Bisphosphonates or BRONJ and dental extractions or exodontia and smoking.

Papers written in any language other than English were excluded, the abstract of every paper was read, the relevant publications were read fully and the reference list was examined in order to obtain any further references that may have been found in the MEDLINE search.

In total, five papers were identified, one retrospective study, one literature review and one article of expert opinion; the remaining papers were concerned with areas of research that could be related to BRONJ.

Thumbigere-Math *et al* conducted a retrospective study evaluating frequency and risk factors of osteonecrosis of the jaw in 576 cancer patients receiving IV bisphosphonates, in 2012. They concluded that smoking, and prior dental extractions, may play a role in BRONJ development, but noted the limitations of the reliability of the evidence presented owing to the nature of the research, and the difficulties with ethical considerations of conducting higher levels of research.<sup>5</sup>

Adamo *et al* undertook a review of epidemiologic data concerning the pathobiology, risk factors, diagnosis and management of BRONJ by using PubMed and MEDLINE databases to identify articles, in 2008.<sup>6</sup> They concluded that BRONJ was thought to be related to bisphosphonate-induced suppression of normal bone

remodelling and impairment of bone blood flow, in which smoking can play a role. Dental extractions, daily masticatory traumas, oral infections, chemotherapy and anti-angiogenic drugs can also play an active role.<sup>6</sup>

There appears to be a lack of high quality evidence in this area.<sup>7</sup> Although many factors have been associated with BRONJ, there is currently no high-quality evidence supporting how much any of them, alone or in combination, may actually contribute to BRONJ risk.<sup>3</sup> It is known that females are more likely to experience BRONJ than males.<sup>3-8</sup>

### Conclusion

Owing to this lack of high quality evidence, it is difficult to identify specific risk factors for the development of BRONJ. Dental practitioners should consider all potential complicating factors

for patients at risk of developing BRONJ and refer/seek advice as necessary.

### References

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