Minimally invasive extraction with the Benex system

Case report involving a patient at risk of medication-related osteonecrosis of the jaw

This case involves minimally invasive extraction procedures in a patient who was receiving anti-vascular endothelial growth factor (anti-VEGF) targeted therapy as part of his cancer treatment. Tooth extraction in patients receiving this kind of therapy puts them at risk of medication-related osteonecrosis of the jaw (MRONJ). Extraction may result in exposed bone caused by reduced blood supply. The Benex extraction system was used to preserve bone and soft tissue and minimise postoperative complications.

Case presentation

A 69-year-old man was referred to the Oral Surgery Department of the Birmingham Dental Hospital and School (UK) for the extraction of retained roots in the maxilla. He had a history of pain and infection related to the retained roots. He was using a removable denture, with which he was satisfied. He was anxious about extraction due to his medical condition. He had been diagnosed with adenocarcinoma of the rectosigmoid with liver and lung metastases 10 years ago; he was receiving palliative chemotherapy which included anti-vascular endothelial growth factor, an anti-angiogenic agent.

An extraoral examination of the patient did not show any abnormalities or pathology. Intraoral examination revealed erythema (redness) of soft tissues around the roots of 13, 14, 23 and 24, suggesting inflammation. Radiological examination showed retained roots with periapical radiolucency and no sign of root fillings (Figure 1).

Diagnosis

The retained roots of 13, 14, 23 and 24 were unrestorable and hopeless, showing chronic apical periodontitis, and required extraction. Due to his medication, the patient was at risk of MRONJ, and he consented to a treatment plan involving extraction under local anaesthesia over two visits.

Planning

1. Consultation with oncologist regarding a ‘drug holiday’
2. Blood test including full blood count and clotting screen, no more than five days before extraction
3. Five-day course of antibiotics starting two days before surgery

The oncologist advised that the patient continued anti-angiogenic medication and commenced treatment four weeks after his last course of chemotherapy. Blood test results were normal, and treatment was performed with conventional extraction on the right side and extraction with the Benex system (Figure 2) on the left side.

Follow-up appointments were scheduled every four weeks to assess soft mucosal coverage, which is the measure of a successful outcome of this procedure.

Aim

Our aim was to clinically evaluate healing times of the extraction socket with conventional extraction and the Benex system.

Procedure

Extraction was performed using a minimally invasive approach. The Benex system was used to provide a less painful extraction procedure and preserve bone and soft tissue. Root extraction forceps and luxators can put pressure on the socket wall; Benex instruments do not come into contact with the extraction socket, as the root is removed along the axis with the instrument.

The first round of extractions (retained roots 13 and 14) was performed using a conventional technique. The second round (retained roots 23 and 24) was performed with Benex 12 weeks after the first procedure (after observation of mucosal coverage of extraction socket). Figures 3, 4 and 5 present clinical views before and after extraction.

Results

In our practice the soft mucosal coverage of extraction sockets in patients at risk of MRONJ is the measure of a successful outcome.

In this case, the healing process for the conventional extraction was observed after 12 weeks; with the Benex system, healing was observed after 8 weeks. The four-week clinical evaluation revealed the presence of exposed bone where the conventional method had been used, whereas the extraction socket was almost healed where the Benex system had been used (Figure 6).

<table>
<thead>
<tr>
<th>Conventional procedure</th>
<th>Benex system</th>
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<tbody>
<tr>
<td>Local anaesthetic</td>
<td>Local anaesthetic</td>
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<tr>
<td>- immobilisation with luxator</td>
<td>- preparation of roots 23 and 24 with drill</td>
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<tr>
<td>- spontaneous haemostasis</td>
<td>- insertion of screw according to the size of the root</td>
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<tr>
<td>- extraction with forceps</td>
<td>- impression with alginate</td>
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<tr>
<td>- spontaneous haemostasis</td>
<td>- spontaneous haemostasis</td>
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<td>15 min</td>
<td>25 min</td>
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Right, Figure 1: Periapical radiograph of 23 and 24 retained roots.

Katarzyna Gurzawska, DDS, PhD, graduated from the Medical University of Lodz (MUL), Poland in 2006. She has a PhD in implant nanotechnology (University of Copenhagen, 2013) and a PhD in 3D modelling and biomechanics (MUL, 2014). In 2014 she received the Marie Sklodowska-Curie Fellowship at Charite University, Berlin. Member of the EAO Junior Committee, and Academic Clinical Lecturer at the University of Birmingham, UK (4-year Oral Surgery Registrar Training Post).

Harlene Kaur, BDS, MSc, graduated from the School of Dentistry, University of Birmingham (UK) in 2007 and completed her Masters in Oral Surgery at the University of Central Lancashire (UK) in 2015. In 2016, Harlene commenced a 3-year Oral Surgery Registrar Training Post as an Academic Clinical Fellow at the University of Birmingham.
Discussion

Over the past several years, anti-VEGF targeted therapies have been incorporated into advanced cancer treatment paradigms (Pal, Figlin et al. 2010). These medications inhibit blood vessel formation within tumours, thereby reducing metastasis. However, anti-angiogenic agents may also hinder bone healing after tooth extraction and are considered risk factors for MRONJ.

MRONJ, according to guidelines from a position paper published by the American Association of Oral and Maxillofacial Surgeons (AAOMS) in 2014 (Ruggiero, Dodson et al. 2014), may occur in patients with:

1. Current or previous treatment with anti-resorptive or anti-angiogenic agents
2. Exposed bone or bone which can be probed through an intraoral or extraoral sinus tract in the maxillofacial region which has persisted for more than 8 weeks
3. No history of radiation therapy to the jaws or obvious metastatic disease of the jaws

The AAOMS propose management strategies for preventing MRONJ, and suggest that procedures which involve direct osseous injury should be avoided (Ruggiero, Dodson et al. 2014).

Patients at risk of MRONJ and diabetes (for whom bone loss must be minimised, due to the risk of complications arising during healing) are suitable candidates for the Benex system. Teeth with a lack of apical pathology and minimal structure for restoration could also be considered suitable for extrusion using the Benex system.

Conclusion

The Benex extraction system has the potential to offer reduced healing times and could be considered as a viable treatment option to reduce risk factors for MRONJ. However, in our experience the method has a longer procedure time compared with conventional tooth extraction. A randomised controlled trial including clinical and radiological parameters describing soft and hard tissue healing is necessary to determine healing times for extractions using the Benex system as a method for MRONJ prevention.

References