

The use of lateral oblique radiographs in dental treatment planning for patients with special needs

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Abstract

This case series describes four cases on the use of oblique lateral radiographs as an alternative technique where intra-oral radiographs or an orthopantomogram (OPG) are not possible due to the patients' physical and/or intellectual disabilities. The cases represent patients across different age-groups (25-83 years), medical conditions (autism, dementia, intellectual disability) and varying clinical situations (assessment of third molars, decision to restore or extract teeth). The oblique lateral radiographs provided adequate radiographic information to confirm diagnosis and treatment. Due to the very short time exposure needed, oblique lateral radiographs are good alternatives to OPGs and still have a significant role in the diagnosis, treatment planning and therefore treatment outcomes for patients with special needs.

Key words: *Radiographs, special needs, diagnosis, treatment planning*

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Introduction

Radiographs are essential in the diagnosis and therefore treatment outcomes for patients. Modern digital radiographs and techniques are excellent for the general population where there is full patient co-operation and anatomy is within the normal range. However, these techniques may not be applicable to people with special needs, where anatomy may not be within the expected range and patient compliance may be poor or nil. Several tips on radiology for such challenging cases can be adopted as suggested by Greenwood (2013). These include using circular collimation instead of rectangular collimation to allow for slight movements; occlusal radiographs or large periapical radiographs using the bisecting angle technique; models and pillows.

Where intra-oral radiographs are not possible for children or patients with limited jaw opening, or adults with intellectual disabilities who are unable to cooperate/tolerate, cannot/will not open their mouths, or hold the film in position while intra-oral radiographs are being taken, the orthopantomogram (OPG) can provide an overview of the dental status. However, some patients may not be able to stand in position even for the duration of taking an OPG. Oblique lateral radiographs are often used as an alternative in such circumstances (Greenwood, 2013). Additional use for

this method is where the anatomy or physical posture of the patient does not allow the OPG to be taken, for example, patients with severe arthritis of the neck, patients who are wheel-chair users and patients with Down syndrome where the anatomy of the neck and shoulders may cause difficulty. Other patients who can utilise this method are those with cerebral palsy, Parkinson's disease, multiple sclerosis, Huntington's Chorea and other neurological impairments who are unable to remain still due to involuntary movements. The preferred radiographic option for patients in Australia with nil/poor compliance undergoing dental treatment under general anaesthesia (GA) would also be an oblique lateral radiograph. In some units, periapical and bitewing radiographs are also taken as necessary.

With the move towards digital direct capture, issues in continuing this method of radiography due to difficulty in maintaining the use of films/cassettes and intensifying screens or digital cassettes were raised (Dalley, 2009; Greenwood, 2009). The general belief is that with the advent of modern, digital techniques, 'old fashioned techniques' are outdated and no longer of use. However, these modern digital radiographs and techniques available to general patients cannot be used for people with special needs, where compliance or physical anatomy are barriers. This is due to the size of the digital plate available on the Australian

market (35 x 40 cm) which is too large to use for oblique lateral radiographs.

This case series describes the use of oblique lateral radiographs in four cases where intra-oral radiographs or an OPG were not possible due to the patients' physical and/or intellectual disabilities. The authors followed the oblique lateral technique as described by Whaites (2002) and complied with both the South Australian State regulations (Radiation Protection and Control (Ionising Radiation) Regulations 2015) and Federal recommendations on the code of practice and safety guide for Radiation Protection in Dentistry (Australian Radiation Protection and Nuclear Safety Agency (ARPANSA, 2005).

The patient's head was rotated to the side of interest to bring the contra-lateral ramus forward, avoiding its superimposition. The chin was raised to increase the triangular space between the back of the ramus and the cervical spine. The cassette was held against that side of the face, centred over the first molar, with the lower border of cassette parallel to the inferior border of mandible and about 2 cm below it. The central ray was directed towards the first molar region of the mandible from a point slightly underneath the opposite side of the mandible and directed as perpendicular to the horizontal plane as possible.

The aims of this case series were to:

- Highlight the challenges of dental management of people with special needs, including diagnosis and treatment planning
- Describe the challenges of dental radiography among people with special needs
- Emphasise the need for alternate strategies like the use of oblique lateral radiographs in dental treatment planning for patients with special needs.

Case 1

A 25-year-old male with autism had experienced a possible assault. He had no other medical condition of significance. About three months later, mandibular swelling was noted by his parents. There was no complaint of pain. He was taken to a general medical practitioner who prescribed amoxicillin that was continued for a month. He was then seen by a Specialist (Special Needs Dentistry). He presented with a draining sinus on the left chin and the mandible was deviated slightly to the left. His parents reported that he scratched the skin around the sinus. The drainage had been present for four months, but the swelling was no longer present and the patient had been eating normally. Due to poor compliance for other methods, oblique lateral radiographs were taken which showed a mandibular fracture between mandibular left canine and first premolar (Figure 1).

The patient was referred to an oral surgeon, who made a diagnosis of osteomyelitis and a bony union of fractures in the mandibular left first premolar region. A swab was sent to the laboratory for microscopy, culture and sensitivity of the skin wound, which showed microaerophilic streptococcus and mixed anaerobic bacteria. Accordingly, he was prescribed the antibiotic metronidazole for a week. At two-week review, the soft tissues had healed well with no further infection.

Figure 1: Oblique lateral showing a mandibular fracture between mandibular left canine and first premolar



Case 2

A visiting dentist to a nursing home noted a dislodged bridge on a 70-year-old female resident with dementia. She was referred to a Specialist (Special Needs Dentistry) for the removal of the dislodged bridge. As periapical radiographs would not be possible, oblique lateral radiographs were taken. An OPG would not have been possible due to the patient's large wheel chair. The right oblique lateral (Figure 2a) showed a dislodged bridge with maxillary right second molar as abutment tooth, which was extracted in the dental chair under a local anaesthetic. The left oblique lateral (Figure 2b) showed multiple decayed roots, but were not extracted as they appeared asymptomatic.

Case 3

This case involved an 83-year-old male resident at a nursing home with dementia and the need to assess symptomatic roots and teeth. The resident's wife was concerned about possible pain and discomfort from decayed teeth and roots as his diet had been reduced to only liquids. Based on the limited oral examination due to poor patient compliance, a general dentist assessed the teeth as being unrestorable and referred him to an oral surgeon for the removal of all teeth under a GA.

Generally, an OPG is taken prior to full dental clearance, but was not possible in this case due to the patient's use of a large sized wheel-chair. The patient was then referred to a Specialist (Special Needs Dentistry) who took oblique lateral films (Figures 3a and 3b). Although the oblique lateral films were far from ideal, they showed decayed maxillary right first and second molars and maxillary left first molar, which were extracted in the dental chair under local anaesthesia. Remaining anterior restorations were completed at subsequent visits, without the need for a GA as requested in the initial referral.

Figure 2a: Oblique lateral showing dislodged bridge with maxillary right second molar as abutment tooth

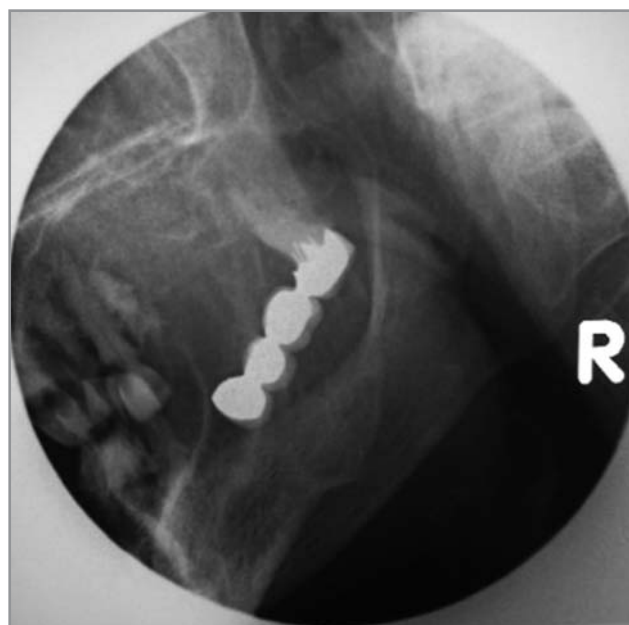


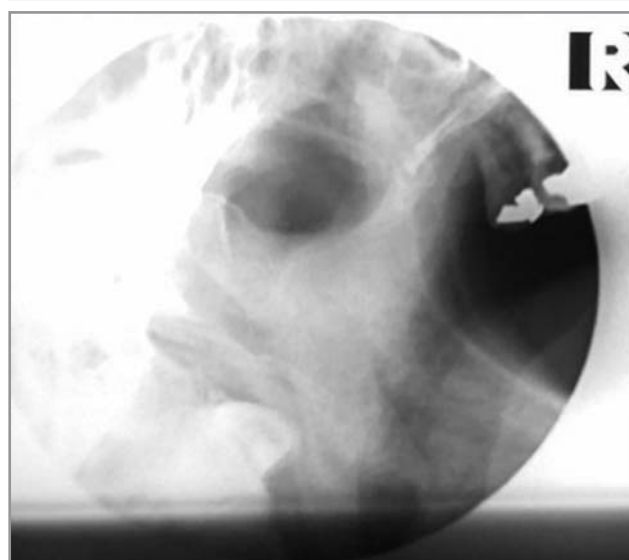
Figure 2b: Lateral oblique showing multiple decayed roots



Case 4

This case involved a 26-year-old female with intellectual disability requiring pre-general anaesthetic assessment. On a routine dental examination by a general dentist, decay was noted on the mandibular right third molar. The patient was referred to a Specialist (Special Needs Dentistry) for dental management. Again, as other methods were not possible due to poor compliance, oblique lateral radiographs (*Figures 4a and 4b*) were taken, which confirmed the need to extract the mandibular right third molar. As the opposing maxillary right third molar was non-functional both maxillary and mandibular third molars on the right side were planned for extractions under a GA. An unerupted supernumerary mandibular right pre-molar was noted, but it was decided to leave it in situ, as it was having no adverse effects to the patient.

Figure 3a: Oblique lateral showing decayed maxillary right first and second molars



Discussion

This case series describes the use of oblique lateral radiographs in four cases where intra-oral radiographs or an OPG were not possible due to the physical and/or intellectual disabilities and poor compliance of the patients. Where possible, modelling and adjuncts like pillows are used, but this was not possible with the cases presented. Radiographs were taken by a consultant in Special Needs Dentistry in compliance with both the South Australian State regulations (Radiation Protection and Control (Ionising Radiation) Regulations 2015) and Federal recommendations on the code of practice and safety guide for Radiation Protection in Dentistry (ARPANSA 2005). Using lead gloves, the operator held the cassette in place for all cases and the exposure button was pressed by a dental assistant qualified in dental

Figure 3b: Oblique lateral showing decayed maxillary left first molar

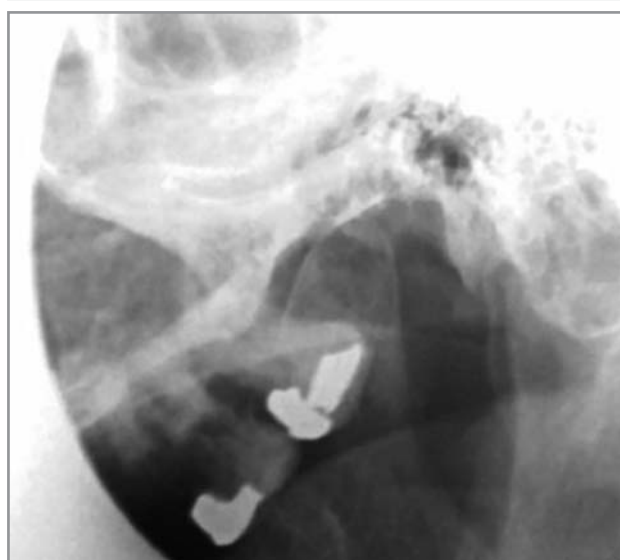


Figure 4a: Oblique lateral showing decayed mandibular right third molar and supernumerary premolar

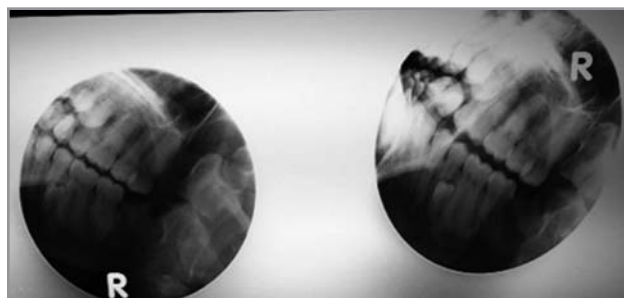
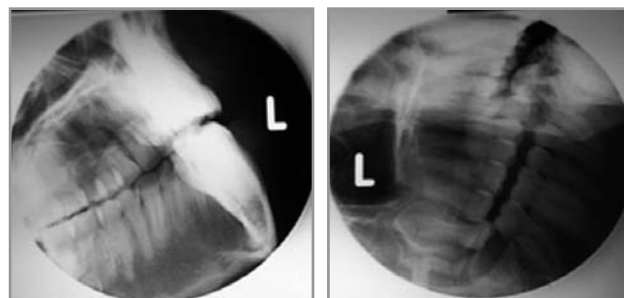


Figure 4b: Oblique lateral showing tooth wear on mandibular left canine



radiography. Although this is not a 'normal' technique for an operator to hold a film, at the Special Needs Unit, it is often adopted as the last option to avoid or justify a dental treatment under GA. A patient family member or carer does assist with positioning of the x-ray plate when the patient is compliant and this is the preferred outcome. In such cases, information is provided for any such parent or accompanying adult to ensure that they were aware of the risks involved and were willing to incur the small exposure that they will receive. The assisting adult is given a lead apron. They are instructed to keep all parts of his or her body out of the main x-ray beam and are not positioned in the path of the x-ray beam. All procedures are carried out only after informed consent is obtained from the person responsible.

Dental professionals who regularly take radiographs staying with the patients, as in these cases, should wear a lead apron, a protective hand sleeve and a personal radiation monitoring device and this was the case for both authors in these cases. At the South Australian Dental Service, the monitoring devices are measured every three months. Operators record an annual dose between 0 and .0015 mSv per year well below an allowable dose of 20 mSv. The exposure factors for an oblique lateral radiograph using Phosphor plates match an anterior intra-oral x-ray average of 70kV, 7mA, at 0.16s. This is close to lowest dose created for any imaging procedure.

In cases with excessive head and hand movements, an additional person (often the accompanying carer) is needed to assist with the procedure, by supporting the head or hands as needed. The short procedure requires great teamwork between the operator, patient, dental assistant and accompanying carer to achieve a diagnostic radiograph. Lack of coordination by any member of the team can result in undiagnostic radiographs (Figure 5). In such cases, radiographs will then be taken in theatre using portable dental X-ray units, where oblique lateral radiographs remain a good alternative to an OPG.

However, the literature suggests that very few dentists seem to be using the oblique lateral technique (Dalley, 2009; Greenwood, 2009). At the facility where the authors worked, 24cm x 30 cm cassettes were used and the images were printed on that size film stock. Due to the infrequent use of this technique, film stock reached its shelf life resulting in wastage and OPG cassettes are now being used as described in Case 4. If this technique was used more widely by dentists for similar patients, perhaps the radiographic industry would make appropriate digital sensors and cassettes more widely available (Dalley, 2009). Modern digital techniques are available, but are expensive and may not be acceptable or appropriate for people with special needs as described in this case series.

Figure 5: Undiagnostic radiograph



Conclusion

Oblique lateral radiographs provide adequate radiographic information in the diagnosis of oral conditions in patients with special needs. Due to the very short exposure time needed, oblique lateral radiographs are good alternatives to OPG and intra-oral radiographs and still have a significant role in the diagnosis, treatment planning and therefore treatment outcomes for patients with special needs.

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