Generalized tooth sensitivity associated with distoproximal primary carious lesions in eight teeth observed on a digital panoramic radiograph

ABSTRACT
This report is of the difficulties associated with establishing the cause of generalized tooth sensitivity to temperature changes in a patient presenting with previous extensive restorative treatments, carious lesions, generalized extensive alveolar bone loss, and periodontal pockets. A digital panoramic radiograph assisted in the location of coronal and proximal root surface carious lesions which were thought to be responsible for the sensitivity of vital teeth, and reduced the radiation dose associated with the use of multiple intraoral radiographs. An unusual aspect of this patient was the presence of eight vital teeth with distoproximal primary carious lesions.

Key words: Dental caries; Dentin sensitivity; Radiography, panoramic

Introduction
For some patients, it may be difficult to determine from the dental history and by initial clinical examination the exact location and cause of generalized tooth sensitivity to temperature changes in vital teeth. In such instances, multiple intraoral radiographs are sometimes taken as part of the process of differential diagnosis. However, initial screening using a single digital panoramic radiograph is faster and results in less irradiation exposure for the patient. As the diagnostic accuracy of digital panoramic radiographs is lower than that of intraoral radiographs, specific regions of interest observed from the initial screening can be supplemented by taking additional, but considerably fewer, intraoral radiographs. A combination of panoramic and intraoral bitewing radiographs has been found to offer the optimum diagnostic yield for many pathological dental conditions, and the optimum diagnostic yield for proximal caries was achieved with intraoral radiographs.

This report demonstrates the diagnostic use of digital panoramic radiography in a patient with generalized tooth sensitivity, and the unusual distribution of many proximal primary carious lesions present in vital teeth.

Case report
A 45-year-old Chinese woman presented in 2009 for dental treatment to the College of
Stomatology, Nanjing Medical University, Nanjing, China, with sensitivity to cold and hot foods and drinks in most of her teeth. Her previous dental history included endodontic and restorative treatments at irregular intervals by various dental practitioners over many years, the complete details of which she was uncertain. However, she thought that metal-ceramic crowns were placed on teeth 25 and 26 in November 2008 and that endodontic therapy was completed for tooth 24 in July 2009, which was her last dental visit. She stated that she did not like sweet foods, had a healthy diet, and that she used a toothbrush twice each day. Her father and sister also had many restorations. Her medical history was unremarkable.

The widespread extent of the sensitivity reported could not be related entirely to the exposed root surfaces and the coronal carious lesions detected visually and on initial probing. Several recurrent carious lesions appeared to involve endodontically treated teeth. Therefore, the patient was advised to have a digital panoramic radiograph taken using the ORTHOPHOS XG 5 (Sirona, Bensheim, Germany), with settings of 66 to 68 kVp, 9.9 to 13.7 mA and an exposure time of 14.1 seconds. SIDEXIS XG (Sirona) image processing software was used to enhance image contrast and brightness. The radiograph revealed additional carious coronal and proximal root surfaces in many teeth (Fig 1). An additional, intraoral radiograph was then taken of the primary carious lesions observed in the mandibular posterior teeth on the right side (Fig 2). After careful probing, carious primary lesions were confirmed in the distoproximal surfaces of vital teeth 21, 22, 23, 35, 44, 45, 46 (root surface), and 47 (root surface). Recurrent carious lesions were also confirmed in three of the seven endodontically treated teeth, namely 14, 15, and 36, which were not relevant to the sensitivity problem however. The radiograph also showed generalized extensive alveolar crestal bone loss, and that all third molars were absent. The tooth sensitivity resolved following restoration of the vital carious teeth.

Discussion

It might be difficult to assess the presence and extent of symptomatic carious lesions in patients with heavily restored dentition that may conceal plaque-covered root surface lesions, and when generalized alveolar bone loss and periodontal pockets are also present. It might also be difficult to determine which heavily restored teeth with recurrent caries have been endodontically treated. In this situation, taking a digital panoramic radiograph is helpful, as it has been shown to increase the diagnostic yield when compared with taking bitewing radiographs alone for new adult patients. The diagnostic yield was significantly increased for patients with increasing numbers of teeth, with a clinical suspicion of periapical lesions, increasing numbers of clinically evident carious lesions, partially erupted teeth, a partially dentate status, and the presence of artificial crowns (P<0.001). In some instances (teeth 36 and 37 in Fig 2), proximal root surface caries observed on radiographs might be confused with ‘cervical burnout’, where the loss of adjacent
alveolar crestal bone results in decreased attenuation of the primary X-ray beam and an apparent increased radiolucency of the bone-divested root surface. Cervical burnout is more often observed with the smaller roots of premolar teeth.

The differential diagnosis of the possible cause of tooth sensitivity to temperature changes includes dental caries, cracked restorations and teeth, pulpitis related to tooth whitening procedures and to acute maxillary sinusitis, and exposed dentin associated with active tooth erosion, toothbrush/dentifrice abrasion, and tooth grinding. Recently placed restorations, although not present in this patient, might also result in tooth sensitivity to temperature changes in vital teeth.

The occurrence in this patient of eight primary carious lesions, all in the distoproximal surfaces of vital teeth, is unusual, but the probability increases for patients at high risk for dental caries. Although this patient stated that she did not like sweet foods, had a healthy diet of rice, vegetables and meat, and brushed her teeth twice each day, it was obvious that she was at high risk for primary and recurrent carious lesions and for progressive periodontitis. Further investigation of her diet, and encouraging effective preventive measures and regular recalls are essential to control future carious lesions and the progression of periodontitis. Posterior bitewing radiographs will be taken after 1 year and, depending on her responses to preventive treatments at her recalls, at 1- to 3-year intervals thereafter. The intervals between radiographic examinations must be individually determined, even for populations with a low prevalence of caries.

**Conclusion**

A digital panoramic radiograph assisted in the location and diagnosis of widespread tooth sensitivity caused by dental caries in a patient with extensively restored dentition and advanced periodontal disease. An unusual aspect of this patient was the presence of eight vital teeth with distoproximal primary carious lesions.

**Declaration**

The authors declared that they have no financial or other conflicts of interest.

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**References**