

Evaluation of Nonsyndromic Multiple Supernumerary Teeth Using Three-Dimensional Computerized Tomography: A Case Report and Literature Review

Wen-Mei Wang, BDS, MDS; Xiang Wang, BDS, MDS; Tie-Mei Wang, BDS

Abstract

Aim: The aims of this report are to present a case of nonsyndromic multiple supernumerary teeth and a discussion of the value of three-dimensional computerized tomography (3D CT) for precise radiographic imaging of the anomaly.

Background: Multiple supernumerary teeth without any associated syndromes are very rare. Exact radiographic presentations with an associated diagnosis of nonsyndromic multiple supernumerary teeth have not been well published.

Report: A young Chinese female patient presented with asymmetrical nonsyndromic multiple supernumerary teeth in the premolar and molar regions of her mouth. A 3D CT was used to evaluate the exact location and orientation of these teeth and to guide the treatment strategy.

Summary: The use of 3D CT for the evaluation of supernumerary teeth proved to be very useful in determining their size, location, and state of development, as well as their impact on adjacent teeth and tissues in a 15-year-old patient.

Clinical Significance: The 3D CT is a very useful radiological tool to assess nonsyndromic multiple supernumerary teeth.

Keywords: Multiple supernumerary teeth, nonsyndromic, premolars, molars, 3D CT, computer-assisted imaging



Citation: Wang W, Wang X, Wang, T. Evaluation of Nonsyndromic Multiple Supernumerary Teeth Using Three-Dimensional Computerized Tomography: A Case Report and Literature Review. *J Contemp Dent Pract* [Internet]. 2010 Jan; 11(1):081-087. Available from: <http://www.thejcdp.com/journal/view/volume11-issue1-wang>.

Introduction

Multiple supernumerary teeth are uncommon and often found in association with various syndromes such as cleidocranial dysplasia, cleft lip and palate, or Gardner's syndrome.¹⁻³ It is rare to find multiple supernumerary teeth in individuals without any

associated systemic conditions or syndromes. Nonsyndromic multiple supernumeraries occur in less than 1% of cases.^{1,2,4,5}

Complications or pathology associated with multiple supernumerary teeth mainly include dentigerous cysts, eruption anomalies, resorption of adjacent teeth, and secondary and periapical infections.⁵

Radiographic imaging plays an important role in assessing the location and nature of supernumerary teeth. Indeed, the required information can be obtained from periapical, occlusal, or panoramic radiographs, but these radiographs cannot provide complete information about the spatial relationship of the supernumerary teeth to surrounding structures, or to the associated complications.⁶ Computed tomography (CT) has been used to obtain more detailed information about supernumerary and ectopically impacted teeth.^{7,8} Recently introduced three-dimensional CT (3D CT) software enables 3D visualization of the root portion of the teeth through use of a differential in the threshold level of bone and the teeth.⁶

The aims of this report are to present a rare case of nonsyndromic multiple supernumerary teeth involving both jaws in a young Chinese female patient and to discuss the value of 3D CT to evaluate the exact location and orientation of multiple supernumerary teeth.

Case Report

A 15-year-old Chinese girl with a diagnosis of multiple supernumerary teeth was referred from a suburban clinic, in which she received pulp mummification treatment of her mandibular right first permanent molar for pulpitis one year ago. During that treatment a routine radiographic examination revealed six supernumeraries involving both jaws. The familial medical and dental history was noncontributory.

General physical and extraoral examinations were performed that revealed no sign of mental retardation, normal and symmetric facial appearances, no skeletal defects or abnormalities, an absence of any soft tissue tumor, or other physical abnormality. An intraoral examination revealed a permanent dentition of 28 teeth in

a Class I molar relationship with no soft tissue defects in the oral cavity. Therefore, most of the syndromes and developmental and pathological conditions were ruled out. The intraoral and extraoral photographs were taken along with the examination (Figures 1 and 2).

A panoramic radiograph revealed the presence of six impacted multiple supernumerary teeth in three quadrants: one in the mandibular right premolar region, two in the mandibular left premolar region, one in each mandibular molar region, and one in the maxillary left premolar region. The panoramic radiograph also revealed the presence of four impacted third molars (Figure 3).



Figure 1. Extraoral photographs of the patient.



Figure 2. Intraoral photograph showing a full permanent dentition.



Figure 3. Panoramic view of the location of the six supernumerary teeth (S).

Computerized tomography (CT) scans were obtained using a Somatom Esprit Plus high-speed CT system (Siemens Medical Systems, Inc., Erlangen, Germany) at 60 mAs and 130 kV, with a scanning slice thickness of 2 mm and using the high-resolution bone algorithm. The patient was scanned in the supine position between the periapical regions of the upper teeth and lower teeth. Axial CT images were generated to determine the location of the supernumerary teeth and reveal direct contact of the supernumerary teeth with the adjacent permanent teeth (Figure 4).

The acquired two dimensional CT (2D CT) data were transformed into 3D images using SYNGO 3D software (Siemens Medical Systems, Inc., Erlangen, Germany). These 3D CT images revealed the location of the supernumerary teeth as follows (Figure 5):

- Two supernumeraries were located near the distal-lingual aspects of each mandibular second premolar and first molar respectively (total of 4).
- One supernumerary was located slightly lingually between the mandibular left first and second premolars.
- One supernumerary tooth was located palatally between the maxillary first and second premolars.

These findings could not be seen on the panoramic and periapical radiographs because of image superimposition. The 3D CT images also showed the roots of the six supernumeraries had formed incompletely and all resembled premolars based on the configuration of their crowns. The adjacent

permanent teeth were not affected by any associated complication or pathology and were not problematic. As a result, they were left in place and the patient was advised to visit the dentist regularly for periodic evaluation of the teeth.

Discussion

Following a review of the English language literature, Yusof⁹ stated that nonsyndromic multiple supernumerary teeth (more than five) tended to occur in the mandible, with the most predominant location being in the premolar region. Other reports also support these findings.^{5,10-14}



Figure 4. Axial CT images revealed direct contact of the supernumerary teeth (S) and the adjacent permanent teeth without evidence of resorption of the adjacent teeth.

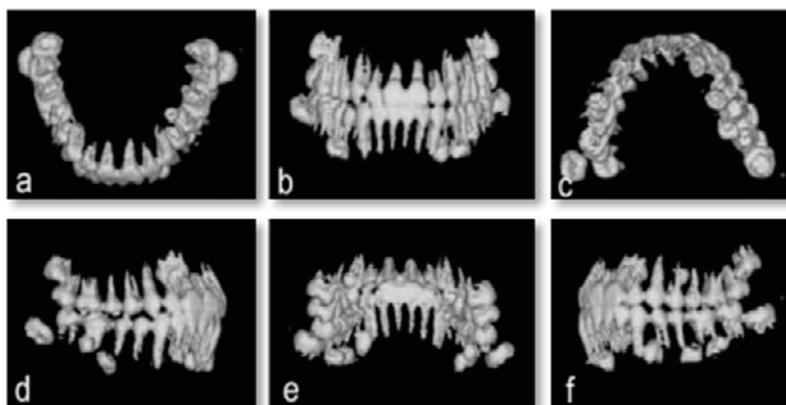


Figure 5. 3D CT images of the both dentitions show the exact location and potential eruption orientation of the supernumerary teeth.

Views: (a) superior, (b) anterior, (c) inferior, (d) right lateral, (e) posterior, (f) left lateral.

The higher tendency of occurrence of supernumerary teeth in Asian populations has been mentioned by Zhu et al.² However, the presence of nonsyndromic multiple supernumerary teeth in Asian patients is also very rare. A recent study from Korea suggested that the prevalence of nonsyndromic multiple mandibular supernumerary premolars was 0.029%.¹⁵

Different gender ratios of supernumerary teeth have been reported in the general Caucasian population, with most authors supporting the finding that males are more commonly affected.^{1,12,16,17} In some Asian populations, an even higher gender ratio for males was found.^{15,18,19}

In the present study, most supernumeraries involved the premolar region, especially the mandibular premolar region, which was in agreement with previous studies.^{5,9-14} However, the case had two supernumeraries in the mandibular molar region, which was uncommon. In addition, four of the six supernumeraries appeared on the left side and all the supernumeraries were impacted, which was interesting. It was of interest to find that no significant complication was linked to the supernumerary teeth, which was in accordance with a recent study.⁵ In a study involving 32 cases of multiple (two or more) mandibular supernumerary premolars, Hyun et al.¹⁵ found the rate of related complications to be higher compared with previous studies and recommended that surgical intervention should be considered to prevent unwanted sequelae in the presence of any signs of complication.

The etiology of supernumerary teeth remains unknown. The localized and independent hyperactivity of the dental lamina is the most accepted cause for the development of supernumerary teeth.^{11,17} Although some available data confirmed that supernumerary traits had a strong hereditary component without following a simple Mendelian pattern,^{1,12,14,20} there was occasionally an autosomal dominant pattern of inheritance.¹³ Some authors consider that a combination of genetics and environmental factors contribute to the occurrence of supernumerary teeth.²⁰

The use of radiography is essential to locate and assess supernumerary teeth. However, 2D CT imaging has been found to be superior

to conventional radiography in providing more precise and complete information that more accurately represents the morphology, inclination, and intraosseous location of supernumerary or impacted teeth and in determining their relationship to adjacent anatomical structures.^{6,7,21-23} Although 2D CT images as a diagnostic tool are more useful and helpful than conventional radiography, it is still difficult to determine the intact extent of the supernumerary teeth and their relationships to adjacent normal teeth. Kim et al.⁶ recently stated that 3D CT images, in contrast to conventional 2D CT images, were beneficial for visualization of an entire structure under consideration as well as for understanding the anatomical relationships of associated structures. The detailed images generated by the 3D CT provided more information about the supernumerary anomaly, which in turn facilitated a more complete understanding of the anatomical scenario that led to an accurate diagnosis and an appropriate treatment plan.

If supernumerary teeth are asymptomatic or the risks of surgery outweigh the benefits of removal, they can be left *in situ* and kept under observation.²⁴ The six supernumeraries in the present report were left in place and the patient was advised to visit regularly in accordance with this recommendation. Should any resorption of the roots of adjacent teeth occur, potential treatment options would include the surgical removal of impacted and supernumerary teeth, even orthodontic treatment if necessary.

The 3D CT is a very useful radiological tool to investigate and assess nonsyndromic multiple supernumerary teeth. Compared with conventional radiography, CT scanning can increase patients' radiation exposure.⁶ As a result of this limitation, cone-beam CT (CBCT) has been increasingly used in place of multislice computed tomography (MSCT) to decrease the exposure dose for the patient. Exposure levels of the CBCT are between those of MSCT and conventional radiography.^{25,26} Moreover a reduction in radiation dose of CBCT can be achieved by using the lowest exposure settings and narrow collimation.²⁷ Advantages and disadvantages of the three types of imaging methods for supernumerary teeth are presented in Table 1.

Table 1. Comparison of three types of imaging methods for supernumerary teeth.

	CR	MSCT	CBCT
Advantage	Lower exposure dose and cost	With 3D imaging, sufficient information, and good image quality	With 3D imaging, sufficient information, good image quality and a lower exposure dose
Disadvantage	Without 3D imaging and sufficient information	Higher exposure dose	Higher cost
Legend: CR, Conventional radiography; MSCT, multislice computed tomography; CBCT, cone-beam computed			

Summary

The use of 3D CT for the evaluation of supernumerary teeth proved to be very useful in determining their size, location, and state of development, as well as their impact on adjacent teeth and tissues in a 15-year-old patient.

Clinical Significance

The 3D CT is a very useful radiological tool to assess nonsyndromic multiple supernumerary teeth.

References

- Rajab LD, Hamdan MA. Supernumerary teeth: review of the literature and a survey of 152 cases. *Int J Paediatr Dent.* 2002; 12(4):244-54.
- Zhu JF, Marcushamer M, King DL, Henry RJ. Supernumerary and congenitally absent teeth: a literature review. *J Clin Pediatr Dent.* 1996; 20(2):87-95.
- Kantor ML, Bailey CS, Burkes EJ Jr. Duplication of the premolar dentition. *Oral Surg Oral Med Oral Pathol.* 1988; 66(1):62-4.
- Scheiner MA, Sampson WJ. Supernumerary teeth: a review of the literature and four case reports. *Aust Dent J.* 1997; 42(3):160-5.
- Açikgöz A, Açikgöz G, Tunga U, Otan F. Characteristics and prevalence of non-syndromic multiple supernumerary teeth: a retrospective study. *Dentomaxillofac Radiol.* 2006; 35(3):185-90.
- Kim KD, Ruprecht A, Jeon KJ, Park CS. Personal computer-based three-dimensional computed tomographic images of the teeth for evaluating supernumerary or ectopically impacted teeth. *Angle Orthod.* 2003; 73(5): 614-21.
- Schmuth GP, Freisfeld M, Köster O, Schüller H. The application of computerized tomography (CT) in cases of impacted maxillary canines. *Eur J Orthod.* 1992; 14(4):296-301.
- Traxler M, Fezoulidis J, Schadelbauer E, Reichsthaler J. Unerupted and displaced teeth in CT-scan. *Int J Oral Maxillofac Surg.* 1989; 18(3):184-6.
- Yusof WZ. Non-syndromic multiple supernumerary teeth: literature review. *J Can Dent Assoc.* 1990; 56(2):147-9.
- Moore SR, Wilson DF, Kibble J. Sequential development of multiple supernumerary teeth in the mandibular premolar region—a radiographic case report. *Int J Paediatr Dent.* 2002; 12(2):143-5.
- Solares R, Romero MI. Supernumerary premolars: a literature review. *Pediatr Dent.* 2004; 26(5):450-8.
- Hegde SV, Munshi AK. Late development of supernumerary teeth in the premolar region: a case report. *Quintessence Int.* 1996; 27(7):479-81.
- Batra P, Duggal R, Parkash H. Non-syndromic multiple supernumerary teeth transmitted as an autosomal dominant trait. *J Oral Pathol Med.* 2005; 34(10):621-5.
- King NM, Lee AM, Wan PK. Multiple supernumerary premolars: their occurrence in three patients. *Aust Dent J.* 1993; 38(1):11-6.
- Hyun HK, Lee SJ, Ahn BD, Lee ZH, Heo MS, Seo BM, Kim JW. Nonsyndromic multiple mandibular supernumerary premolars. *J Oral Maxillofac Surg.* 2008; 66(7):1366-9.
- Zilberman Y, Malron M, Shteyer A. Assessment of 100 children in Jerusalem with supernumerary teeth in the premaxillary region. *ASDC J Dent Child.* 1992; 59(1):44-7.
- Liu JF. Characteristics of premaxillary supernumerary teeth: a survey of 112 cases. *ASDC J Dent Child.* 1995; 62(4):262-5.

18. Davis PJ. Hypodontia and hyperdontia of permanent teeth in Hong Kong schoolchildren. *Community Dent Oral Epidemiol.* 1987; 15(4):218-20.
19. Saito T. A genetic study on the degenerative anomalies of deciduous teeth. *Japan J Hum Genet.* 1959; 4:27-30.
20. Hattab FN, Yassin OM, Rawashdeh MA. Supernumerary teeth: report of three cases and review of the literature. *ASDC J Dent Child.* 1994; 61(5-6):382-93.
21. Bodner L, Sarnat H, Bar-Ziv J, Kaffe I. Computed tomography in pediatric oral and maxillofacial surgery. *ASDC J Dent Child.* 1996; 63(1):32-8.
22. Bayrak S, Dalci K, Sari S. Case report: Evaluation of supernumerary teeth with computerized tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2005; 100(4):e65-9.
23. Preda L, La Fianza A, Di Maggio EM, Dore R, Schifino MR, Campani R, Segù C, Sfondrini MF. The use of spiral computed tomography in the localization of impacted maxillary canines. *Dentomaxillofac Radiol.* 1997; 26(4):236-41.
24. Orhan AI, Ozer L, Orhan K. Familial occurrence of nonsyndromal multiple supernumerary teeth. A rare condition. *Angle Orthod.* 2006; 76(5):891-7.
25. Schulze D, Heiland M, Thurmann H, Adam G. Radiation exposure during midfacial imaging using 4- and 16-slice computed tomography, cone beam computed tomography systems and conventional radiography. *Dentomaxillofac Radiol.* 2004; 33(2):83-6.
26. Silva MA, Wolf U, Heinicke F, Bumann A, Visser H, Hirsch E. Cone-beam computed tomography for routine orthodontic treatment planning: a radiation dose evaluation. *Am J Orthod Dentofacial Orthop.* 2008; 133(5):640. e1-5.
27. Palomo JM, Rao PS, Hans MG. Influence of CBCT exposure conditions on radiation dose. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008; 105(6):773-82.

About the Authors

Wen-Mei Wang, BDS, MDS (Corresponding Author)



Dr. Wang is a member of International College of Dentists and a vice-dean of the School of Stomatology of Nanjing University Medical Centre in Nanjing City, Jiangsu Province, China. She is a professor in the Department of Endodontics and Oral Medicine. Dr. Wang received her BDS from the Nanjing Medical University in 1982 and her master's degree from the School of Stomatology at Wuhan University in 1990.

e-mail: wenmei-wang@hotmail.com

Xiang Wang, BDS, MDS



Dr. Wang is a resident in the Department of Endodontics and Oral Medicine of the School of Stomatology of Nanjing University Medical Centre in Nanjing City, Jiangsu Province, China. He received his master's degree from the School of Stomatology at Jilin University in 2006.

Tie-Mei Wang, BDS



Dr. Wang is the head of and a professor in the Department of Oral Radiology of the School of Stomatology of Nanjing University Medical Centre in Nanjing City, Jiangsu Province, China. She received her BDS from the Nanjing Medical University in 1982.