

Bilateral supernumerary maxillary fourth and fifth molars: A clinical case report and literature review

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ABSTRACT

Supernumerary teeth that are present in the molar region may be evident based on crowding and impaction, but most cases are asymptomatic and discovered as incidental findings during routine radiological examinations. This article reports the case of a 29-year-old woman who presented with a severe feeling of pressure in the region of the maxillary third molars that had been increasing in intensity for weeks. A clinical examination revealed crowding of the maxillary anterior teeth despite the completion of orthodontic treatment and an erupted third molar with localized gingivitis in the second quadrant. A radiographic examination revealed bilateral supernumerary maxillary fourth and fifth molars, so cone-beam computed tomography was performed to locate the supernumerary teeth precisely for a preoperative diagnosis and comprehensive treatment planning. This report presents the radiological and surgical case management of a rare case of bilateral supernumerary molars and reviews the literature regarding epidemiology and treatment options. (*Imaging Sci Dent* 2022; 52: 429-34)

KEY WORDS: Tooth, Supernumerary; Molar, Third; Surgery, Oral

The accurate localization of supernumerary teeth, which may be located in any part of the dental arch due to irregular odontogenesis, is essential for diagnosis, treatment planning, and subsequent surgical intervention. Supernumerary teeth can occur unilaterally or bilaterally in the upper or lower jaw in both primary and permanent dentition.¹ The literature indicates that the prevalence of supernumerary primary teeth ranges from 0.3% to 0.8%, while a prevalence of 1.5% to 3.8% has been reported for permanent dentition.² Supernumerary teeth occur more frequently in the maxilla, with males being more commonly affected than females (2 : 1 ratio).^{2,3} Large retrospective studies found that supernumerary molars were also more common in the maxilla (79.7%), were frequently impacted (88.7%), and occurred bilaterally in approximately 23% of cases.⁴ Supernumerary teeth may be evident based on crowding,

impaction, an abnormal eruption path, or ectopic position, but most cases are asymptomatic and discovered as incidental findings during routine radiological examinations.² The etiology of this anomaly is still unclear, but some theories suggest hereditary and environmental factors or abnormal embryonic development leading to hyperproliferation of the dental lamina.⁵

A routine preoperative radiographic examination often includes panoramic radiography, which provides an anatomic overview of the angulation, number and shape of roots, and the positional relationship between the third molar and adjacent vulnerable structures or other adjacent pathology. In addition, this 2-dimensional X-ray-based imaging modality can give a first impression of the patient's dental status, whether teeth are displaced or impacted, or whether supernumerary or missing teeth are present. In more complex cases, where certain radiographic risk features are evident, such as superimposition of anatomic structures, darkening of roots, discontinuous cortical integrity of the bony borders of the mandibular canal, diversion of the mandibular canal, or unclear space-occupying lesions, 2-dimensional imaging

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is not sufficient and 3-dimensional imaging is required.⁶ For this task, cone-beam computed tomography (CBCT), the gold standard for 3-dimensional visualization of hard tissues in the dentomaxillofacial region, provides a 3-dimensional cross-sectional view of the region of interest.^{7,8} Computed tomography (CT) - in particular, CBCT - is an excellent presurgical diagnostic tool for dimensional measurement and the localization of unerupted supernumerary teeth, providing accurate volumetric image data for planning and performing a surgical procedure when indicated, while simultaneously minimizing surgical time and perioperative complications.⁹

However, multimodal comprehensive therapy planning with indication-specific radiological assessment should always be considered in this context to enable optimized, personalized therapy for supernumerary teeth. This report presents the radiological and surgical case management of a rare case of bilateral supernumerary maxillary fourth and fifth molars and provides a review of the literature on the epidemiology and treatment options, such as a wait-and-see approach or surgery.

Case Report

A 29-year-old Eastern European female patient was referred by a general practitioner to the Clinic of Cranio-Maxillofacial and Oral Surgery, Center of Dental Medicine, University of Zurich, Zurich, Switzerland, with the chief complaint of a severe feeling of pressure in the region of the maxillary third molars on both sides that had been increasing in intensity for weeks. An intraoral clinical examination revealed a partially erupted third molar with localized gingivitis in the left maxillary area that was unlikely to erupt successfully and crowding of the maxillary anterior teeth despite completed orthodontic treatment. The rest of the dental examination revealed no caries or periodontal disease. From a general medical point of view, the patient was healthy, and her medical and family history was uneventful.

A panoramic radiograph revealed the presence of a supernumerary fourth and fifth maxillary molar in each hemiarch, resulting in a total of 4 supernumerary molars, in addition to 2 erupted mandibular third molars (Fig. 1). The disto-

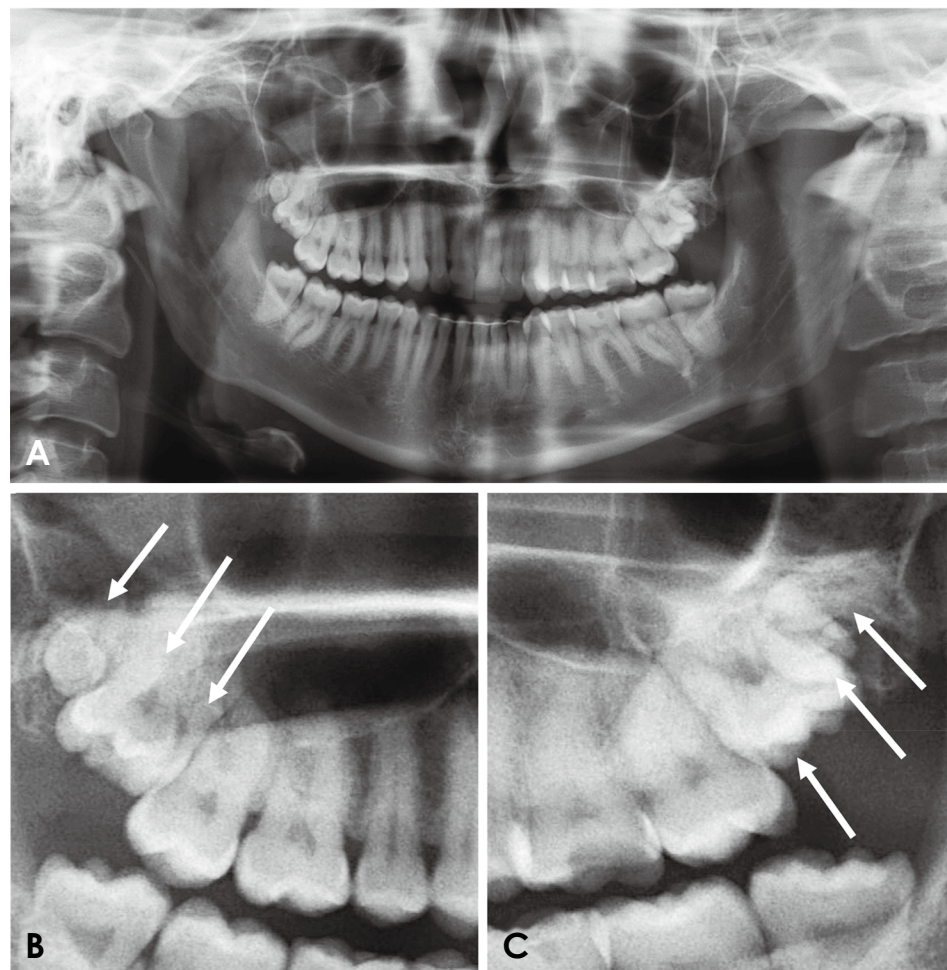


Fig. 1. A. Panoramic radiograph of a 29-year-old female patient shows the presence of supernumerary fourth and fifth maxillary molars in each hemiarch. B. A cropped panoramic radiograph illustrates the right maxillary quadrant and C. A cropped panoramic radiograph depicts the left maxillary quadrant. The arrows point to the maxillary third molars and the supernumerary fourth and fifth molars.

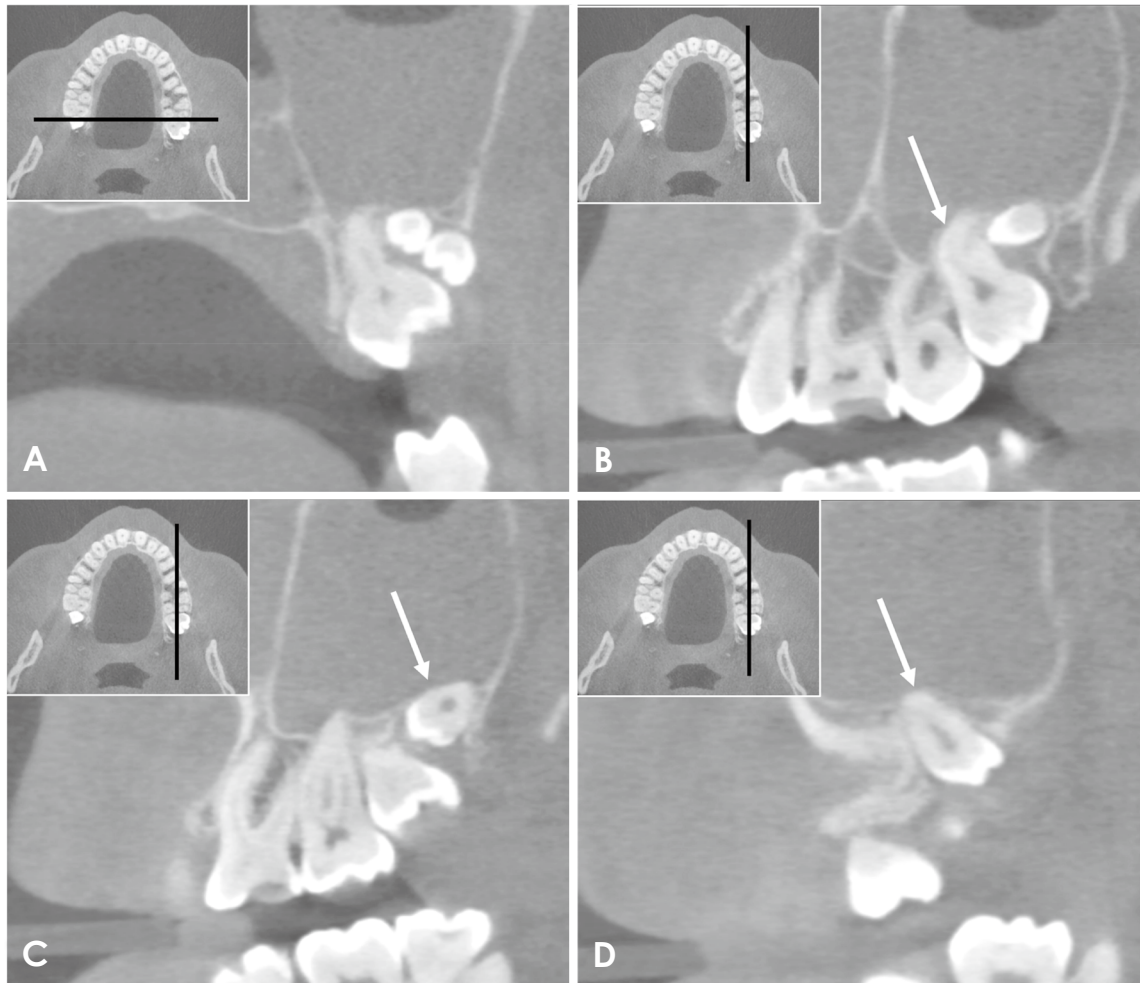


Fig. 2. A. Coronal reconstruction of the patient's cone-beam computed tomography shows the maxillary third, fourth and fifth molars in the left maxillary quadrant. Sagittal reconstruction images show the maxillary third (B), fourth (C), and fifth (D) molars in the left maxillary quadrant.

molars had significantly smaller morphology than the third molars, but the crowns and roots were developed. Partially fused roots and fused crowns of the third and fourth molars were present in the right maxillary area. The patient was not aware of the supernumerary teeth and had no knowledge of other dental anomalies in her family.

Based on the clinical and 2-dimensional radiographic presentation of this rare finding, 3-dimensional cross-sectional images of the affected region were obtained using CBCT to allow improved planning and guidance of the surgical intervention (Figs. 2 and 3). Treatment planning included the removal of all maxillary third molars and all distomolars. Photorealistic 3-dimensional reconstructions of the patient's cone-beam computed tomography were created using cinematic rendering to provide an improved spatial depiction of the surgical area (Fig. 4). Surgery was performed in a single procedure under regional block of the upper

posterior alveolar nerves and aseptic conditions, without perioperative complications. After complete removal of the teeth, there was no evidence of oroantral communication, so the surgical site was sutured (polytetrafluoroethylene 4-0). The patient was prescribed a chlorhexidine mouth rinse (0.12%) 2 times daily for 7 days, and an analgesic (ibuprofen, 600 mg) for postoperative pain management. The sutures were removed 1 week postoperatively, and the 2-month follow-up examination was uneventful. Hence, the patient was referred for orthodontic therapy to adjust the crowding in the maxilla.

Discussion

Data on supernumerary molars are heterogeneous, with their reported prevalence ranging between 1% and 2% in the literature.^{2,3,10} Fourth, fifth, sixth, and even seventh

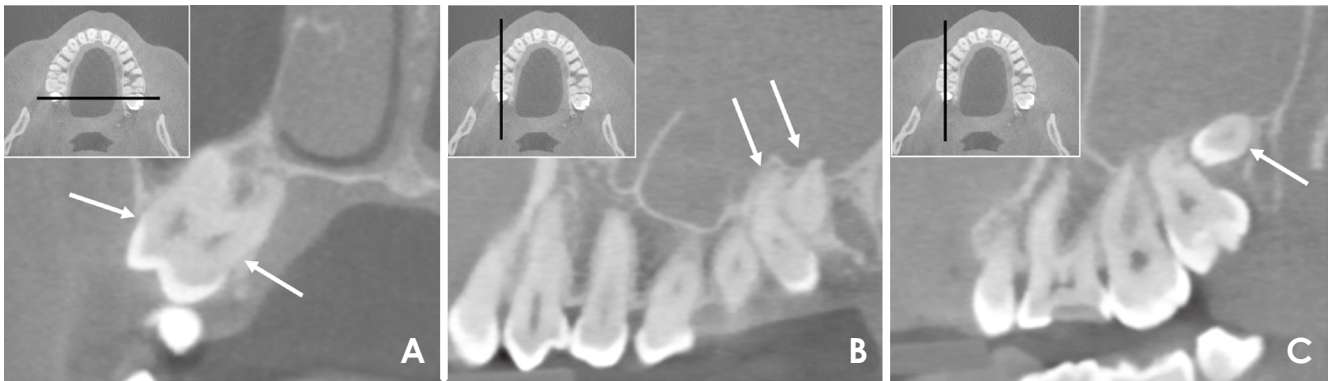


Fig. 3. A. Coronal cone-beam computed tomographic (CBCT) reconstructed image of the patient’s right maxillary quadrant, with partially fused roots and fused crowns of the third and fourth molars. B. A sagittal reconstruction CBCT image shows the partially fused roots and fused crowns of the third and fourth molars. C. A sagittal reconstruction CBCT image reveals the fifth molar.

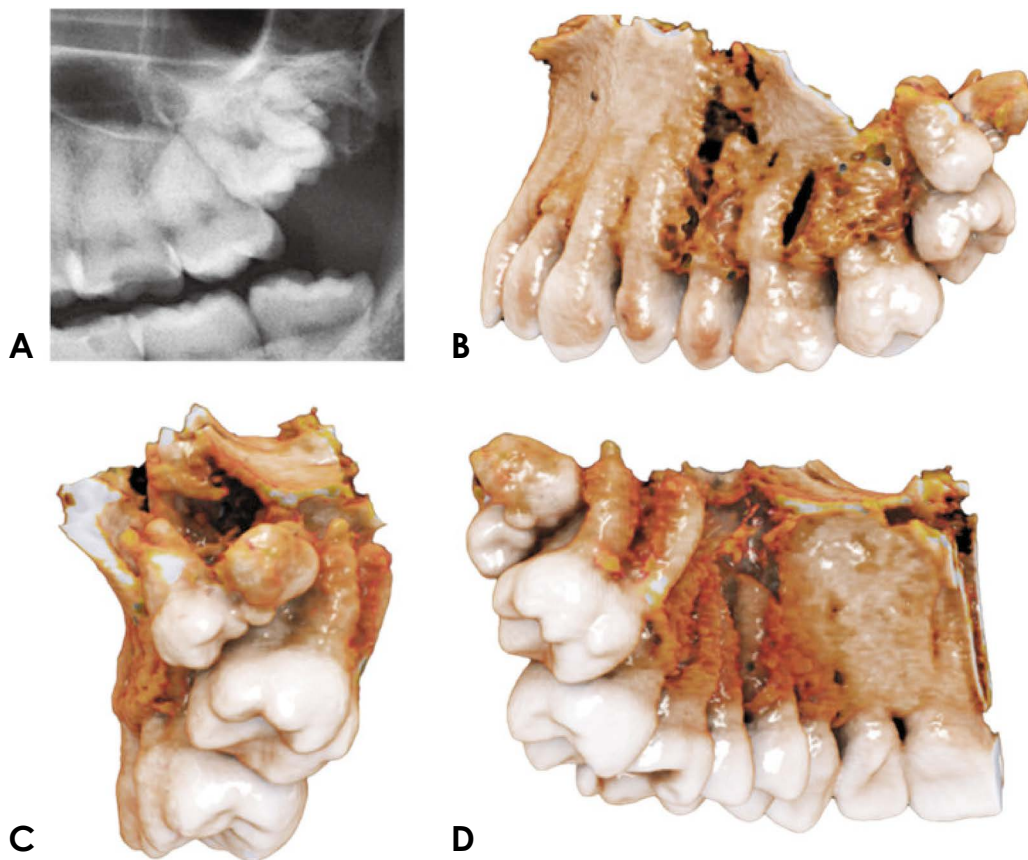


Fig. 4. A. Cropped panoramic radiograph of the maxillary molar region. Sagittal (B) and coronal (C and D) photorealistic 3-dimensional reconstruction images of the patient’s cone-beam computed tomography using cinematic rendering.

molars have been reported,^{4,11} with first distomolars being the most common.¹² However, the occurrence of multiple maxillary distomolars in an individual is observed in fewer than 1% (0.84% to 0.95%) of cases¹³ and is rare in individuals without any other related disorders or syndromes. The present article reports a rare case of a patient with bilateral

supernumerary maxillary fourth and fifth molars.

The etiology and molecular mechanisms underlying the formation of supernumerary teeth are still subject to research and are largely unknown, but there are several theories proposing a phylogenetic component, a genetic predisposition, an aberrant response to tooth trauma, environmen-

tal factors, or hyperactivity of dental laminae.^{5,14} However, it is hypothesized that multiple supernumerary teeth primarily have a genetic component and may occur particularly in association with Gardner syndrome, cleidocranial dysplasia, or Ehlers-Danlos syndrome.¹⁴ However, the case presented in this article was not associated with any syndrome.

Based on their location and anatomical features, supernumerary teeth in the molar region can cause complications, such as crowding, eruption disorders, retention, disturbed root formation, and cyst formation; thus, distomolars are usually surgically extracted.¹⁵ From a radiological point of view, the typical position of distomolars, the assessment of surrounding bone thickness, and the positional relationships with adjacent teeth and vulnerable structures, such as the inferior alveolar nerve and maxillary sinus, require accurate 3-dimensional preoperative localization.¹⁶ Since supernumerary teeth are often incidental radiologic findings, several imaging procedures often precede the use of CBCT. However, CBCT-based computer-assisted navigation surgery in oral and maxillofacial surgery has the potential to facilitate the choice of surgical technique and improve the accuracy and predictability of the outcome, while reducing perioperative risks and shortening the operative time.¹⁷⁻¹⁹ Considering the efforts to minimize or even eliminate radiation exposure in biomedical imaging, several promising imaging modalities such as low-dose CBCT²⁰ or radiation-free magnetic resonance imaging have recently been implemented in dental imaging workflows,²¹ providing high-quality diagnostic information with an improved risk-benefit ratio in oral and maxillofacial surgery.²²⁻²⁵ In addition, CT or CBCT data can be combined with novel volume-rendering techniques such as cinematic rendering, which provides more photorealistic visualization with a better depiction of image findings than conventional reconstructions (Fig. 4).^{26,27} Thereby, improved spatial depiction of the surgical area through photorealistic 3-dimensional cinematic rendering could provide the performing surgeon with a better preoperative understanding of anatomy and pathology, leading to improved outcomes.

Treatments always rely on the type and position of supernumerary teeth, as well as their potential impact on neighboring hard and soft tissue structures. Sometimes supernumerary teeth can cause complications such as caries in the neighboring teeth, which may require restoration or endodontic treatment. However, in addition to surgical extraction, there is always the possibility of regular radiological follow-up, particularly in cases of asymptomatic teeth, mainly if they do not affect the function, occlusion, and

aesthetics,² especially considering the risks associated with the surgical procedure such as damage to neighboring teeth, injury to adjacent anatomical structures or postoperative bleeding.

Therefore, several guidelines should be carefully considered before deciding to perform surgical extraction or periodic radiological monitoring alone. Relevant factors include the age and compliance of the patient and the associated development of the roots, the location of the supernumerary teeth and their positional relationship. In addition, the patient's medical history, comorbidities, and previous interventions in the region of interest should always be considered to make the most suitable decision for the individual patient. From a radiological perspective, it should always be kept in mind that 3-dimensional imaging modalities - although considered an indispensable diagnostic tool - must always complement the clinical examination and not serve as a "stand-alone" diagnostic modality. The most suitable initial radiological diagnostic tool is panoramic radiography. However, in complex cases with multiple supernumerary teeth and other pathologic changes, indication-specific modality-oriented 3-dimensional imaging should be performed to provide the surgeon with additional accurate perioperative diagnostic information, to avoid ineffectiveness and minimize risks, allowing improved personalized therapeutic approaches.

Conflicts of Interest: None

References

1. Garvey MT, Barry HJ, Blake M. Supernumerary teeth - an overview of classification, diagnosis and management. *J Can Dent Assoc* 1999; 65: 612-6.
2. Ata-Ali F, Ata-Ali J, Peñarrocha-Oltra D, Peñarrocha-Diago M. Prevalence, etiology, diagnosis, treatment and complications of supernumerary teeth. *J Clin Exp Dent* 2014; 6: e414-8.
3. Kokten G, Balcioglu H, Buyukertan M. Supernumerary fourth and fifth molars: a report of two cases. *J Contemp Dent Pract* 2003; 4: 67-76.
4. Grimanis GA, Kyriakides AT, Spyropoulos ND. A survey on supernumerary molars. *Quintessence Int* 1991; 22: 989-95.
5. Primosch RE. Anterior supernumerary teeth - assessment and surgical intervention in children. *Pediatr Dent* 1981; 3: 204-15.
6. Dula K, Bornstein MM, Buser D, Dagassan-Berndt D, Ettlin DA, Filippi A, et al. SADMFR guidelines for the use of cone-beam computed tomography/ digital volume tomography. *Swiss Dent J* 2014; 124: 1169-83.
7. Susarla SM, Dodson TB. Preoperative computed tomography imaging in the management of impacted mandibular third molars. *J Oral Maxillofac Surg* 2007; 65: 83-8.
8. Ohman A, Kivijärvi K, Blombäck U, Flygare L. Pre-operative

- radiographic evaluation of lower third molars with computed tomography. *Dentomaxillofac Radiol* 2006; 35: 30-5.
9. Raupp S, Kramer PF, de Oliveira HW, da Rosa FM, Faraco IM Jr. Application of computed tomography for supernumerary teeth location in pediatric dentistry. *J Clin Pediatr Dent* 2008; 32: 273-6.
 10. Menardía-Pejuan V, Berini-Aytés L, Gay-Escoda C. Supernumerary molars. A review of 53 cases. *Bull Group Int Rech Sci Stomatol Odontol* 2000; 42: 101-5.
 11. Yusof WZ. Non-syndrome multiple supernumerary teeth: literature review. *J Can Dent Assoc* 1990; 56: 147-9.
 12. Bamgbose BO, Okada S, Hisatomi M, Yanagi Y, Takeshita Y, Abdu ZS, et al. Fourth molar: a retrospective study and literature review of a rare clinical entity. *Imaging Sci Dent* 2019; 49: 27-34.
 13. Mitsea A, Vardas E, Papachatzopoulou A, Kalfountzos G, Leventis M, Tsiklakis K. The frequency of non-syndromic distomolar teeth in a Greek population sample? *J Clin Exp Dent* 2015; 7: e589-94.
 14. Cassetta M, Altieri F, Giansanti M, Di-Giorgio R, Calasso S. Morphological and topographical characteristics of posterior supernumerary molar teeth: an epidemiological study on 25,186 subjects. *Med Oral Patol Oral Cir Bucal* 2014; 19: e545-9.
 15. Park SY, Jang HJ, Hwang DS, Kim YD, Shin SH, Kim UK, et al. Complications associated with specific characteristics of supernumerary teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2020; 130: 150-5.
 16. Liu DG, Zhang WL, Zhang ZY, Wu YT, Ma XC. Three-dimensional evaluations of supernumerary teeth using cone-beam computed tomography for 487 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 103: 403-11.
 17. Landaeta-Quinones CG, Hernandez N, Zarroug NK. Computer-assisted surgery: applications in dentistry and oral and maxillofacial surgery. *Dent Clin North Am* 2018; 62: 403-20.
 18. Piattelli A, Tetè S. Bilateral maxillary and mandibular fourth molars. Report of a case. *Acta Stomatol Belg* 1992; 89: 57-60.
 19. Cavalcanti AL, de Alencar CR, de Carvalho Neto LG. Bilateral maxillary and mandibular fourth molars: a case report and literature review. *J Investig Clin Dent* 2011; 2: 296-9.
 20. Al-Haj Husain A, Döbelin Q, Giacomelli-Hiestand B, Wiedemeier DB, Stadlinger B, Valdec S. Diagnostic accuracy of cystic lesions using a pre-programmed low-dose and standard-dose dental cone-beam computed tomography protocol: an ex vivo comparison study. *Sensors (Basel)* 2021; 21: 7402.
 21. Al-Haj Husain A, Solomons M, Stadlinger B, Pejčic R, Winklhofer S, Piccirelli M, et al. Visualization of the inferior alveolar nerve and lingual nerve using MRI in oral and maxillofacial surgery: a systematic review. *Diagnostics (Basel)* 2021; 11: 1657.
 22. Al-Haj Husain A, Sekerci E, Schönegg D, Bosshard FA, Stadlinger B, Winklhofer S, et al. Dental MRI of oral soft-tissue tumors-optimized use of black bone MRI sequences and a 15-channel mandibular coil. *J Imaging* 2022; 8: 146.
 23. Al-Haj Husain A, Schönegg D, Valdec S, Stadlinger B, Gander T, Essig H, et al. Visualization of inferior alveolar and lingual nerve pathology by 3D double-echo steady-state MRI: two case reports with literature review. *J Imaging* 2022; 8: 75.
 24. Al-Haj Husain A, Stadlinger B, Winklhofer S, Piccirelli M, Valdec S. Magnetic resonance imaging for preoperative diagnosis in third molar surgery: a systematic review. *Oral Radiol (in press)*.
 25. Schönegg D, Ferrari R, Ebner J, Blumer M, Lanzer M, Gander T. Proximity of the middle meningeal artery and maxillary artery to the mandibular head and mandibular neck as revealed by three-dimensional time-of-flight magnetic resonance angiography. *Oral Maxillofac Surg* 2022; 26: 139-46.
 26. Stadlinger B, Valdec S, Wacht L, Essig H, Winklhofer S. 3D-cinematic rendering for dental and maxillofacial imaging. *Dentomaxillofac Radiol* 2020; 49: 20190249.
 27. Steffen T, Winklhofer S, Starz F, Wiedemeier D, Ahmadli U, Stadlinger B. Three-dimensional perception of cinematic rendering versus conventional volume rendering using CT and CBCT data of the facial skeleton. *Ann Anat* 2022; 241: 151905.