

Role of MDCT with Dentascan software and volume rendering (VR) reconstruction in the surgical planning of third mandibular molar dysodontiasis.

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Purpose

Third mandibular molar dysodontiasis is an anomalous tooth eruption causing inflammatory pathology of the pericoronal sac. Pericoronaritis is almost always present during the third molar eruption (it is an exception for the other teeth).

Third inferior molar eruption is almost constantly anomalous (dysodontiasis) mainly because of the insufficient space where the tooth has to erupt. This does not happen for the third superior molar because the tooth can use the maxillary tuberosity as a space to locate itself.

Sometimes a third molar in anomalous position does not erupt, remaining included. The dental germ, giving origin to the third molar, develops from the gubernaculum dentis of the second molar germ (posteriorly) or from a posterior proliferation of the primitive dental lamina.

This anomalous origin locates third molar germ obliquely at the level of mandibular angle with a major axis inclined medially, compared to the second molar major axis. Third molar drives mandibular development during its formation and calcification.

The tooth erupts along the curved line with an antero-superior concavity, called Capdepon's straightening line: in this way the crown of the third molar tends to be reflected against the second molar crown and then to straighten, continuing its eruption until the normal occlusal plane.

During his journey the tooth lifts and pierces the gingival mucosa that covers its surface and that will be involved in inflammation and infections by mouth germs.

Our purpose is to evaluate the support of MDCT with Dentascan software and VR reconstruction in the treatment planning of patients with third molar dysodontiasis.

Methods and Materials

From January 2007 to October 2009 220 patients with orthopantomographic survey of third molar dysodontiasis, underwent to MDTC with Dentascan software and VR reconstruction to study the jaw (Fig.1;5)

Selection criteria were age over 17 years, bilateral maxillary third molars with complete root apices and normally erupted first and second molars with normal occlusions on panoramic radiograms, and CT scans from the crown to root apex, showing no pathology in the maxilla. Patients with craniofacial deformities, including cleft palate, were excluded, as were patients with a history of surgery of the maxilla or maxillary sinus.

Consequently, 62 patients (28 women, 34 men; mean age 29 years, range 19-69) were enrolled in the following analyses as uninfected subjects.

In the examined patients we found the sequent abnormal positions of the third molar:

- 1) Mesioversion (172 patients) with the crown facing forward and the roots pointing back;
- 2) Distoversion (20 patients) with the crown facing back and the roots pointing forward (Fig.4);
- 3) Linguoversion (18 patients) with the crown on the lingual side (Fig.3);
- 4) Vestibular version (10 patients) with the crown on the vestibular side (Fig.2).

Complications sequent to dysodontiasis are:

- Simple congestive pericoronaritis: pain in the retromolar region, increased by chewing, with mucosal edema and reddening;
- Suppurative pericoronaritis: much intense pain (radiating to the ear), clenching jaws due antalgic contracture of the masseter and medial pterygoid muscle, dysphagia and difficulty in chewing. There is also the possibility of a submucosal abscess.

Images for this section:



Fig. 1: OPT image shows dysodontiasis of the left superior and inferior third molars with pericoronal reaction.



Fig. 2: CT axial image reveals vestibular version of 28 with cortical bone interrupted by the tooth crown.



Fig. 3: CT axial image shows linguoversion of 28 with pericoronitis signs.



Fig. 4: CT scans show dysodontiasis of included 18 and 28 with inflammatory reaction. 18 presents a low-attenuated lesion surrounding the crown due to a follicular cyst.



Fig. 5: VR reconstruction shows mesioversion of 38 and 48 which are still included.

Results

The obtained data were: spatial angulation towards the second molar (78% mesioversion, 15% distoersion, 7% horizontal dislocation), relationship with the mandibular canal, vertical distance from the edge and vertical distance from the superior crown's edge of the second molar (36% Class A, 30% Class B, 34% Class C). VR reconstructions allowed a better evaluation of roots rotation towards the mandibular axis.

The appearance of CT and Panoramic radiograms was:

Vertical position, categorized into three types according to the location of the most inferior part of the third molar on panoramic radiograms. It was defined as position A when the most inferior part of the third molar (usually the occlusal surface) was positioned at the level equal to that of the adjacent second molar. When the most inferior part was observed between the occlusal surface and cervix of the second molar, it was defined as position B.

In position C, the third molar was positioned more superiorly to the adjacent second molar cervix.

The vertical position was evaluated in reference to the bifurcation of the first molar at the most inferior level at which the roots could be observed separately. The position was defined as position 1 or 2 when the third molar could be seen between the cervix and apex, or between the cusp and cervix, respectively. It was deemed to be position 3 if the third molar could not be seen.

Buccopalatal inclination was determined on the slice in which the crown showed the maximum area. "Buccal inclination" and "palatal inclination" were defined basing on the direction of the crown surface. When more than two-thirds of the crown periphery was observed, it was defined as a "vertical inclination." A third molar crown with more than half of the root visualized was defined as a "horizontal inclination".

Conclusion

Pericoronaritis may evolve into a phlegmon with purulent tissue separating submucosal spaces and spreading into the adjacent spaces between masseter and mandibular angle. This may lead to the formation of peritonsillar, subtonsillar and anterior pharyngeal abscesses. Oral mucosa, surrounding the erupting third molar, can be affected by ulcer-membranous or ipsilateral neutrophic gingivitis, due to irritation of the vegetative component of the third branch of trigeminum.

According to the molar position we can distinguish different ways of diffusion:

- Disto-linguoversion: lateropharyngeal space, tonsillar lodge, pterigomandibular space.
- Disto-vestibular version: abscess under and behind masseter.
- Mesio-linguoversion: mouth floor and submaxillary lodge.
- Mesio-vestibular version: external mandibular surface and buccinator muscle.

Third molar extraction may cause neurological complications, which consist in temporary or permanent sensorial alterations due to damage of the mandibular nerve. MDCT with dedicated software and VR reconstructions proved to be essential for the proper treatment planning.

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