# Normal Anatomy

# 2

In OPT, the evaluation of the masticatory normal anatomy is different for subjects of paediatric age and adults.

Indeed, subjects of paediatric age present a radiographic appearance which can be defined as '**mixed dentition**', in which **deciduous dental elements and permanent dental elements** coexist all together.

Therefore, in paediatric age, considerations of anatomic order and OPT possibilities are completely different from the ones applicable in the study of an adult subject.

We will firstly take into analysis the adult anatomy, with a completed dental development.

In the adult, the study of normal anatomy firstly is based on the definition of some general concepts, then subsequently a focused analysis on the following structures:

- **General anatomy of the tooth**
- **Anatomy of the support apparatus**
- **Anatomy of the mandible and the mandibular canal**
- **Anatomy of the surrounding structures** (paranasal sinuses, hard palate, nasal cavities, etc.)

## Concepts of General Anatomy

The radiographic anatomy of the tooth in the adult, achievable through OPT, does not present the same detail refinement of the radiographic anatomy evaluated through endoral radiograms. This is due to the technical peculiarity of the methodology which favours a global vision rather than a detailed evaluation.

However, even if facing this limitation, dental images achieved through OPT are sufficient to fully express the macroscopical characteristics of the dental element, in the majority of the diagnostic needs.

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On the anatomical point of view, it is obviously necessary to take each of the dental typologies (incisors, canines, premolars and molars) into account separately.

In order to easily identify the different dental elements, a classical scheme is considered. It visualises the subdivision of the radiogram in four quadrants which are indicated with progressive numbers (1, 2, 3, 4), from right to left, from bottom up and clockwise.

Each number is associated to the relative dental element of each hemiarch. Number 1 indicates the median incisor, number 2 indicates the lateral incisor, number 3 indicates the canine, etc.

According to this method, for example, the third inferior right molar is indicated with number 4.8, the superior left canine is indicated with number 2.3, etc. (Fig. 2.1).

Such methodology, in addition to facilitating the detection of a specific dental element (in the OPT report), is also extremely useful for evaluating cases with alterations regarding the dental number, both in excess and, more rarely, in defect.

## Descriptive and Radiographic Anatomy of the Dental Element

From the structural point of view, the tooth is an architectonical construction which comprises macroscopical and morphofunctional components. They have different purposes; therefore, they are constituted by different tissue types.

Indeed, the tooth is characterised by a visible component called **crown** and an intraosseous component called **root** (Fig. 2.2).

The dental crown represents the different functions of the tooth (shredding, stripping, section) through different morphologies (Fig. 2.3a, b).

The root is involved in the support apparatus and in the anchorage of the tooth to the jawbone.

The root end of the tooth is called **tooth apex** and it is characterised by a very thin hole which gives rise to the vascular-nervous axis.

The dental element, on its whole complex, is constituted by **dentin** which is an organic substance of mesodermic origin. It is covered by an external sheath called **enamel** (of ectodermal origin) in the crown and by the **cementum** (of mesodermic origin) in the root.

Therefore, the dentin is present both in the crown and in the root; it is composed of an organic component produced by the **odontoblasts** (about 30 %) and by a mineral component (about 70 %) which is composed of **hydroxyapatite crystals**.

Odontoblasts produce dentine in a dynamic manner both during the tooth's physiological development (**primary dentine**) and in pathological conditions (**secondary or reactive dentine**).

The enamel (produced by a cells called **ameloblasts**) covers the crown. Therefore, it turns out to be the seat of further mechanical stress; for this reason, it is composed of hydroxyapatite crystals for the 96 %.

Finally, the cementum is also composed of an organic matrix and a mineral component which determines the formation of the so-called mature cementum.

It covers the dentine at the level of the root axis line and is generated by **cementoblasts**. They are cellular elements placed in the tooth surface which are able to produce cementum for the whole life of the tooth.

Dental elements can be distinguished in monoradicular, biradicular and triradicular teeth.

As a general rule, even if subjected to numerous exceptions, it is possible to establish that incisors and canines of both arches turn out to be always monoradicular teeth. Moreover, all the premolars of the lower arch and the second premolars of the upper arch are monoradicular teeth, too.

Conversely, the first premolars of the upper arch generally have two roots (a vestibular one and a palatal one), while the first and the second molar of the lower arch (which are biradicular teeth, too) are characterised by a mesial and a distal root.

The first and the second molars of the upper arch always turn out to be triradicular teeth (having a mesial, a distal and a palatal root).

Finally, the third molars present a certain variability. They can be both monoradicular and, more rarely, biradicular teeth.

A transition area called **neck of tooth** or **cementoenamel junction** exists between the crown and the root. This is the area where the ameloblastic layer, represented by enamel, meets the root surface, which is constituted by the cement.

Inside the tooth, which presents a high radiopacity due to its structure, it is possible to recognise a radiolucency area which exist both in the crown and the root. Such area is, respectively, the expression of the **pulp chamber** and the **root canal** (Fig. 2.4).

The root canal is characterised by very thin horizontal and oblique collateral canals, called **lateral canals** (however, they are never radiographically visible).

Vascular-nervous elements exist both in the pulp chamber and in the root canal. Together with a connective support (of mesodermic origin) they constitute the **dental pulp**.

The dental pulp has three purposes: dentine formation (**dentinogenesis**) and both nutritive and sensorial functions.

To conclude this general analysis of the dental anatomy, it must be remembered that from a topographic point of view, each tooth is characterised by a face which is oriented towards the cheek, called **vestibular surface**, and another face which is oriented towards the tongue, called **lingual surface**.

Another face fulfils the mastication process and is particularly augmented in the molars. It is called the **occlusal surface** as it is influenced, in its morphology, by juxtaposition or **occlusal rapports** with the dental elements of the opposed arch.

Furthermore, two other faces exist. One face, directed towards the median line, is called **mesial surface** and another face, opposed to it, is called **distal surface**. They are interfaces between two dental elements, thereby called **interproximal surfaces** (Fig. 2.5).

As aforementioned, this distinction is also valid for the denomination of the root axis surfaces. Indeed, in a triradicular element, it is possible to distinguish the mesial root from the distal one, in addition to the third root, called palatal. The latter seems to be typically present at the level of the first and the second upper molars and it is not always demonstrable through OPT, for projective reasons.

Indeed, the **palatal root** develops itself in a different plane with respect to the other roots.

As it is placed farther from the detection plane, it will turn out to be radiographically less defined and rather enlarged (Fig. 2.6a, b).

It is obvious that the aforementioned expressions of topographic and semantic order are absolutely necessary in order to localise the morbid processes. Therefore, they are propaedeutical to a correct draft of the radiological report.

## Descriptive and Radiological Anatomy of the Support Apparatus or Periodontium

The anatomical and functional structure is responsible for the stability of the dental elements, and in final analysis, of the whole masticatory apparatus. It is constituted by the following components: the **gingiva**, the **periodontal ligament (PDL)** and the **alveolar bone**, which in turn is constituted by the spongiosa and the cortical plate (**lamina dura**). According to some experts, the cementum is part of the alveolar bone, too (Fig. 2.7).

OPT allows a panoramic evaluation of the normal anatomy and, consequently, of the pathological alterations related only to some of the aforementioned components.

Indeed, it is well known that the evaluation of the gingival apparatus is exclusively of clinical pertinence and also a direct radiographic visualisation of the periodontal ligament is not possible. As a consequence, the state of the periodontal ligament can be indirectly evaluated according to the extent of the periodontal space which, in a normal subject, turns out to be radiographically invisible or scarcely detectable.

Therefore, the radiographic representation of the periodontal apparatus is referred only to the analysis of the alveolar bone, which is constituted by **interdental and intraradicular cuspids**, with their relative components (spongiosa and lamina dura). Moreover, it is also referred to the evaluation of the periodontal space extent and to the state of the dental roots (Fig. 2.8).

The periodontal space is a thin radiolucent line which hosts the namesake ligament, constituted by collagen fibres produced by **fibroblasts**. Fibroblasts originate from the embryonic cellular elements which are contained in the dental sac.

The elements of the aforementioned ligament-fibrous apparatus (**Sharpey's fibres**) are hooked up to the cementum and to the cortical plate of the bundle bone at the level of the alveolar face.

## Descriptive and Radiographic Anatomy of the Mandible and the Mandibular Canal

The anatomy of the mandible, evaluable through OPT, can be synthetically described as follows.

Analogous with the classic anatomical literature, it is possible to distinguish the **ascending branch** or **mandibular ramus**. Anteriorly, it gives rise to the **coronoid apophysis** (insertion area of the **temporal muscle**) and posteriorly to the **intercondylar region** and the **mandibular condyle**, in which the articular relationships with the **glenoid cavity** are well rendered.

Distally, the ascending branch continues with the interposition of the **mandibular angle** (**angular region**), with the **mandibular body** or **horizontal branch**. At the level of the median line, there is the **symphysis menti** region.

In the angular region is present a superior surface with triangular morphology, covered by the gingiva. This angular region is set behind the last molar and is called **retromolar trigone**. It is the anatomical area of major importance for oncological implications.

Moreover, the mandibular angle, in the inferior lateral side, is characterised by irregular salience and roughness. It represents the insertion area of the **masseter muscle** (Fig. 2.9a, b).

In its complex, the mandible is constituted by a bundle of cortical bone tissue which is characterised by a major thickness in the lower part and by the sponge tissue which represents the medullary bone.

The sponge tissue presents a different architecture and a different grade of opacity, depending on the age, the nutritional state and the general skeletal trophism of the patients.

At the level of the horizontal branch and of the angular region, it is possible, in many subjects, to detect a major opacity band which indicates the **ridge** (**of insertion**) **of the mylohyoid muscle**. The band is situated at the level of the vestibular surface which is better evident in edentulous subjects for the hypotrophy of the surrounding bone (Fig. 2.10).

More cranially, in the ascending branch, it is possible to demonstrate the entry foramen of the **mandibular canal** and a little bone salience adjacent to it, called **Spix spine**. The Spix spine is the insertion of the **fibrous pterygomandibular raphe**, which in turn is never demonstrable through the OPT examination (Fig. 2.11).

Conversely, in almost all the patients, it is possible to radiographically demonstrate the mandibular canal into which the **inferior alveolar nerve** runs. The inferior alveolar nerve is the medial ramus of the **mandibular nerve**, which is the third branch of the **trigeminal nerve**.

As the mandibular canal is a bone channel delimitated by a thin cortical side, in OPT, it assumes the peculiar aspect of a canalicular structure. This structure has a low density and a diameter of 1.5–2 mm. Its proximal extremity is, in turn, characterised by a funnel morphology which is the entrance of the nerve (Fig. 2.12a, b).

As the mandibular canal runs into a spongeous bone tissue, its visibility in OPT is closely related to the opacity grade of the surrounding spongiosa.

In the subjects with a high level of osteopenia, which causes the absence of optimal contrast conditions, a scarce or absent visualisation of the mandibular canal can occur. In this case, the medical report cannot be considered pathological.

Conversely, in the presence of high bone density, the visibility of the channel can be better (Fig. 2.13a, b).

If radiological visibility is good, it is easy to visualise the curvilinear aspect of the canal in its horizontal portion, as well as the aforementioned funnel aspect of its proximal extremity. The anterior segment up to the opening of the **mental foramen** will also be visible. The mental foramen, most frequently, corresponds to the apex of the second premolar tooth (Fig. 2.14).

In regard to this, in the majority of cases, the missing visualisation of such foramen is due to projective reasons; therefore, it cannot be considered a pathological event.

A further consideration is represented by the possible variability of the mental foramen seat.

Indeed, if it is not perfectly matched with the typical position, it cannot be considered pathological but a normal anatomical variation.

As a matter of fact, the mental foramen can be located both in correspondence with the apex of the second premolar tooth and at a certain distance from it. More rarely, it can be placed at the apex of the first premolar tooth.

Errors related to such variability are infrequent and made only by inexpert observers who may wrongly interpret the mental foramen radiolucency as the periapical lesion of the second premolar tooth (Fig. 2.15a, b).

This can be easily avoided through comparison with the contralateral normal side. Obviously, the absolute normality of the dental element under exam must be evaluated.

As mentioned earlier, it is sometimes possible to provide evidence of the very thin **incisive canaliculus** as a characteristic of normal anatomy. It leads itself from the mental foramen towards the elements of the inferior incisive bundle (Fig. 2.16).

Moreover, the other **dental canaliculi** are rarely and occasionally visible in normal anatomy (Fig. 2.17).

An outstanding anatomical variant, to be considered in implantological planning, is represented by the **bend** that the **mandibular canal** accomplishes in its more distal portion, before its opening into the mental foramen.

In a few words, the canal, at such a level, can create a curve (also called **loop of the mandibular canal**). This is directed in front and towards the median line. It then folds back and returns to the mental foramen (Fig. 2.18).

It seems to be clear that, if this anatomical configuration is not indicated, it can negatively reverberate during an implantologic intervention in this region.

Indeed, it is known that the second inferior premolar is considered to be the external anatomical landmark, corresponding to the mental foramen, which identifies the distal limit of the alveolar nerve.

It is obvious that the presence of a marked **loop of the mandibular canal** places the nerve in a more mesial seat with respect to the second premolar tooth.

This configuration can determine the iatrogenic lesion of the nerve, as a consequence of surgical operations performed at such level.

The rare possibility of mandibular canal bifidity must always be remembered with regard to the anatomical variations. It is also considered to be an important anatomical variation in the programmes of implantologic planning (Fig. 2.19).

Finally, the duplicity of the mandibular canal represents a more significant and rare condition from the clinical point of view, as it is linked (demonstrated only in a few cases in literature) to the presence of neoformations of vascular origin (arterio-venous fistula). One of the two canals represents the course of the nerve; the other canal represents the path of the afferent vascular structures to the aforementioned lesions (Fig. 2.20).

Anatomical variants are often deprived of any pathological significance, but sometimes they are the cause of clinical sintomathology and/or of complications after tooth extraction.

Considering those variants, the mandibular canal and the third molar tooth can interface between them in numerous ways. Indeed, according to this variability, some risks can occur. These include the transference of pathological events from the dental element to the canal and iatrogenic damages related to tooth extraction.

It is obvious that the relevance of the security distance between the tooth and the canal involves minor risks (Fig. 2.21).

Conversely, a close adjacency between the dental element and the canal determines major risk conditions (Fig. 2.22a–c).

In regard to this, disappearance of one of the canal cortical, in adjacency to the tooth is an important semeiological finding.

Such disappearance could indicate the real contact between the two structures. Conversely, where the cortical is visible, even in correspondence with the tooth, it must be considered that the structures are not in contact but only superimposed projectively.

Briefly, such semeiological sign is an extension of the **silhouette sign**, very well known in general radiographic semeiotics (Fig. 2.23a, b).

Finally, the aforementioned iatrogenic risks become more relevant in case of anomalies of position and orientation of the third molar tooth.

In particular, the inclusion of the third molar tooth, increasing the proximity of the tooth to the canal, represents a significant risk condition, along with its frequency (Fig. 2.24a–c).

Furthermore, it has to be to be considered that CT can exhaustively define the real space relations between the tooth and the canal, thanks to its tridimensional approach. This is not possible using OPT as it is only able to define the aforementioned relations bidimensionally.

## Anatomy of the Surrounding Structures

Therefore, the surrounding structures of the dental arches which are visible in OPT mainly include **maxillary sinuses**, **nasal cavities**, **hard palate**, **pterygoid apophysis**, **pterygopalatine fossae**, **temporomandibular joints** and **zygomatic arches** (Fig. 2.25a, b).

It is obvious that the analytical evaluation of the aforementioned structures (except the temporomandibular joints, whose analysis does not belong to the aims of the following text) is not the fundamental aim of OPT, as the imaging of such areas always pertain to other techniques of major efficiency such as CT and MR.

However, it is evident that the radiologist must be able to recognise such anatomical structures and their more common variants (Fig. 2.26); in addition, he must be able to detect any possible anomalies, indicating the most suitable imaging techniques.

From this viewpoint, some alterations of the skeletal components of the facial bones seem to be paradigmatic, such as those related to fibrous dysplasia, osteolytic lesions, palatoschisis and osteomatous formations (Figs. 2.27, 2.28, and 2.29).

The content of the maxillary sinuses can also be the seat of pathological events which generically occur as endoluminal opacity. Most of the times they are considered innocuous **retentive pseudocysts**, but they can be in differential diagnosis both with other pathological events (polyposis, neoplasia) and with particular anatomical variations (Fig. 2.30a, b).

Finally, the possibility of anomalies of odontogenic origin must not be ignored. These anomalies are characterised by an endosinusal development and will be discussed subsequently in the text.

## Radiographic Anatomy in Paediatric Age

As previously explained, the aspect of the masticatory apparatus in paediatric age turns out to be very different to that of the adult.

As a consequence, both age groups have entirely distinct radiographic cases and descriptive terminology.

However, for both age groups, the same scheme is used for the function of identifying and enumerating the dental elements.

The study sector can be subdivided into four quadrants: considering as number 5 the superior right hemiarch, number 6 the superior left hemiarch, number 7 the inferior left hemiarch and number 8 the inferior right hemiarch.

As the deciduous dental elements are 5 for each hemiarch, they are detected (similarly to the adults) with the following numbers: 5.1 refers to the superior median right incisor, 6.1 refers to its corresponding left tooth and so on (see Fig. 2.31).

This calculation must obviously consider the fact that the development of molar teeth does not precede the appearance of deciduous dental elements.

Also from the morphological point of view, there is a substantial difference between the deciduous dental elements and the permanent ones. The deciduous dental elements present minor dimensions; they have a somewhat squat aspect and some distinct morphological connotations: for example, a characteristic of the deciduous premolar teeth is a biradiculated aspect.

In addition, the deciduous elements, under the push of the underlying permanent elements, present a variable grade of radicular reabsorption, which is called **rhizolysis** or **physiological apicolysis** (it has to be distinguished from the **pathological**

**rhizolysis** which can appear in the adult in presence of periapical-flogistic lesions) (Fig. 2.32).

Also the permanent dental elements, while still in the phase of dehiscence, present significant morphological and dimensional differences, with respect to the same elements already developed.

They present a more or less incomplete development of the radicular axes, which appear to be short or not present, when compared to their fully developed state. For the same reason, the apical foramen is very wide (Fig. 2.33).

In order to better understand the main morphological characteristics of the permanent tooth still in phase of dehiscence, some preliminary remarks are essential in regard to the embryogenetic development.

The dental germ (both the deciduous and permanent one) originates from an introflexion of the dental ridge. It turns out to be entirely surrounded by a thin membrane called **dental sac** (or **alveolar sac**). Its primary function is protection.

In its interior, the dental germ appears further lined by a membrane composed of an internal layer attached to the crown germ. This is the seat of ameloblasts (cells of ectodermic origin, responsible for the formation of the enamel). The dental germ is also covered by an external layer in contact with the dental sac.

Between the aforementioned membranes, there is a certain amount of mesenchymal tissue which basically has a trophic function, called **stellate reticulum**.

The aforementioned anatomical-functional structure takes the name of **organ of the enamel** and it is responsible for the whole tooth development. In particular it is responsible for the construction of the normal enamel shell of the crown dentine.

Even if it varies in relation to the evolutionary state, it is nearly always radiographically detectable (Fig. 2.34).

The organ of the enamel represents a critical structure. This is due to the cystic degeneration of the mesenchymal component, which constitutes the stellate reticulum, and is the basis for odontogenic follicular cyst formation.

## Image Gallery

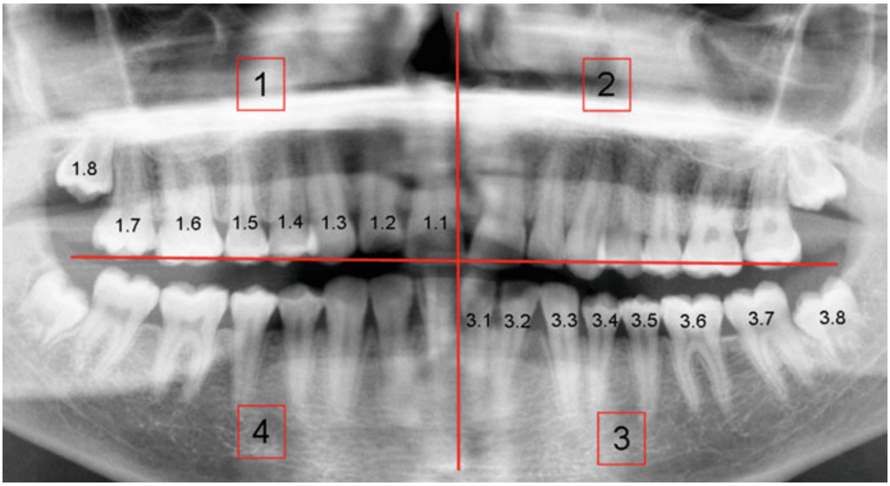



**Fig. 2.1** Scheme showing the topographic detection of the dental elements

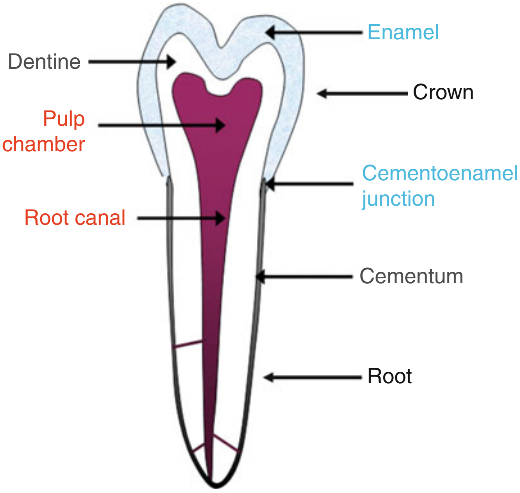



**Fig. 2.2** Schematic diagram which illustrates the different morphological and structural components of the tooth

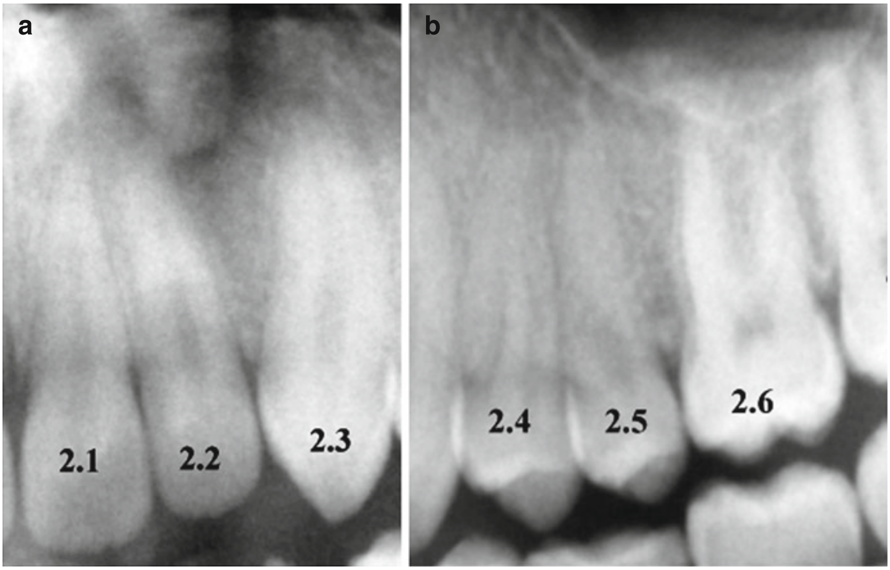



**Fig. 2.3** (**a**) Crown morphology of the median and lateral incisors and of the left canine (2.1, 2.2 e 2.3) aiming at stripping. (**b**) Crown morphology of the premolars 2.4 and 2.5 and of the first left molar (2.6) aiming at shredding

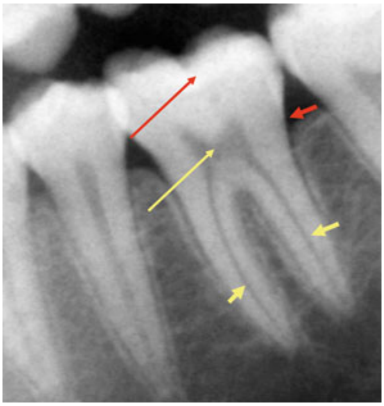


**Fig. 2.4** The *long red arrow* indicates the enamel characterised by maximum opacity. The *short red arrow* indicates the cementoenamel junction. The *long yellow arrow* indicates the pulp chamber. The *short yellow arrows* indicate the radicular canals

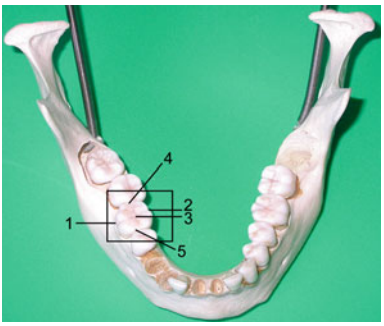



**Fig. 2.5** *1* Vestibular surface. *2* Lingual (or palatal) surface. *3* Occlusal surface. *4* Distal surface. *5* Mesial surface

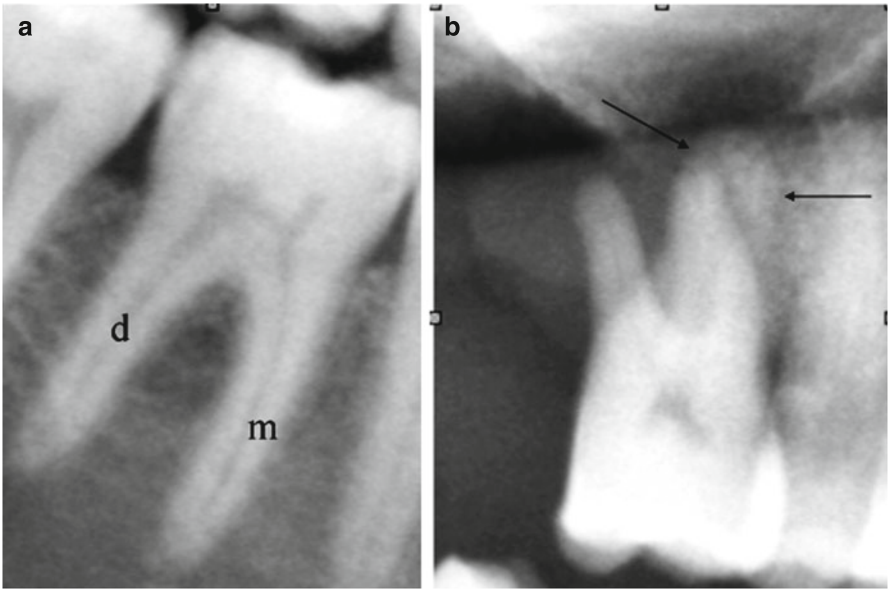



**Fig. 2.6** (**a**) The image shows the biradicular tooth; letter ‘d’ indicates the distal root; letter ‘m’ indicates the mesial root. (**b**) The image shows the triradicular tooth. The palatal root (indicated by *arrows*) seems to be enlarged with blurred outlines

**Fig. 2.7** Schematic diagram which represents the periodontium

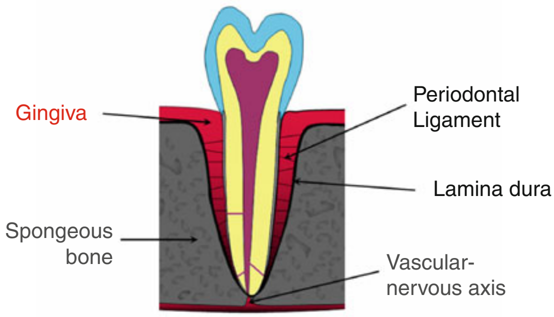



**Fig. 2.8** Radiographic representation of the periodontal apparatus. The *arrowhead* indicates the periodontal space; the *yellow arrow* indicates the lamina dura; the *green star* indicates the spongiosa of the interadicular cuspid; the *asterisk* indicates the spongiosa of the interdental cuspid

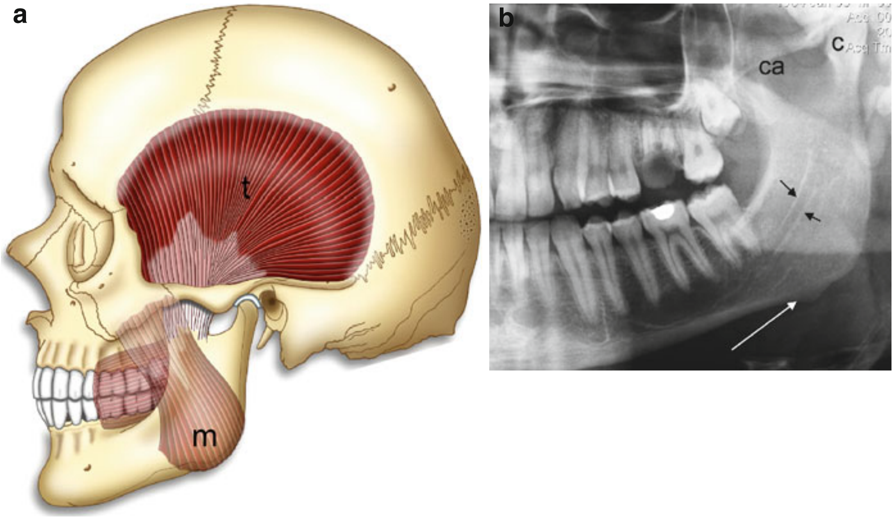



**Fig. 2.9** (**a**) Anatomical diagram which shows the insertion of the masseter muscle (*m*) into the angular region of the mandible. The temporal muscle (*t*) inserts itself into the coronoid apophysis. (**b**) Radiogram which shows the main elements of the mandible: Letter 'c' stands for condyle; letters 'ca' stands for coronoid apophysis; the *short arrows* indicate the mandibular canal; the *long arrow* indicates the cortical roughness which is due to the insertion of the masseter muscle

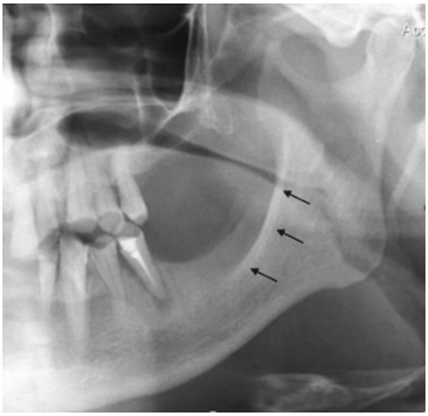


**Fig. 2.10** The mylohyoid muscle ridge (indicated by *arrows*) is clearly visible

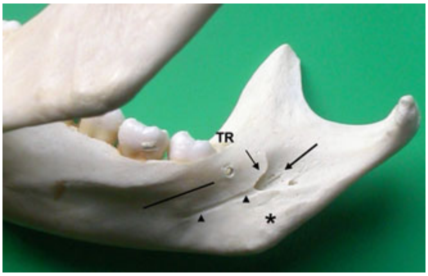



**Fig. 2.11** Anatomical photo which shows the entry foramen of the mandibular canal (indicated by *long arrow*). The *short arrow* indicates the Spix spine. The *arrow heads* indicate the sulcus of the mylohyoid nerve. The *asterisk* indicates the insertion area of the internal pterygoid muscle. *TR* retromolar trigone. The black line indicates the mylohyoid bony ridge

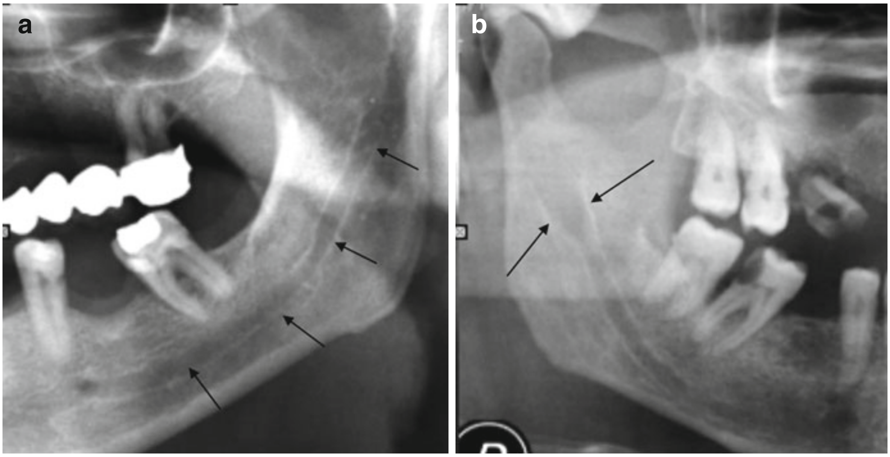



**Fig. 2.12** (**a**) Good visibility of the mandibular canal (indicated by *short arrows*). (**b**) Funnel aspect of the mandibular canal in its proximal extremity (indicated by *long arrows*)

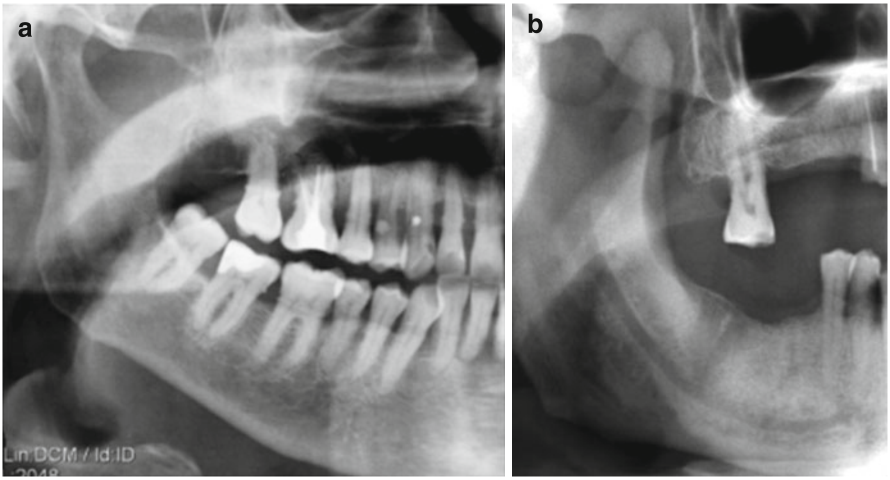



**Fig. 2.13** (**a**) Scarce visibility of the mandibular canal in (a) patient with hypotrophy of the spongiosa. (**b**) Optimal visibility of the mandibular canal due to the sclerosis of the surrounding spongiosa

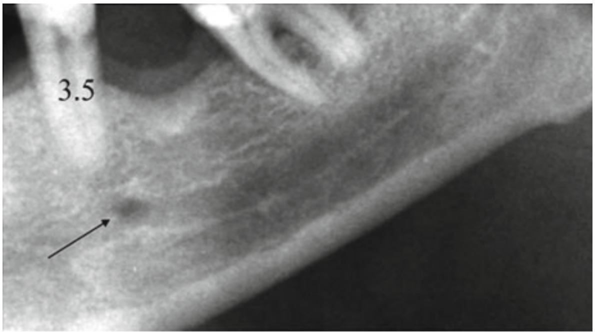



**Fig. 2.14** Mental foramen (indicated by *arrow*) in its typical collocation which is in proximity to the apex of the second premolar (3.5)

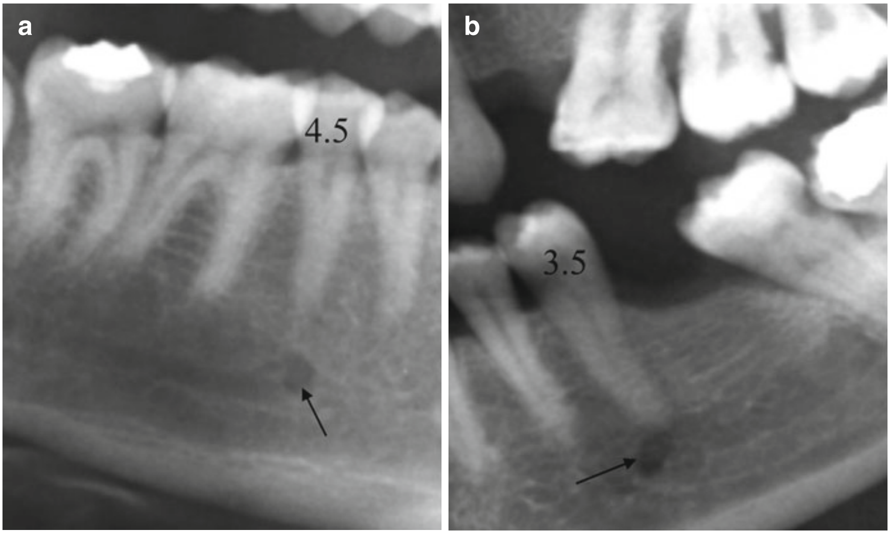



**Fig. 2.15** (**a**, **b**) Variability of the mental foramen seat (indicated by *arrows*). In (a) the mental foramen is at a certain distance from the apex of the second inferior right premolar (4.5). In (b) the foramen is adjacent to the second inferior left premolar (3.5) and it must not be interpreted as a periapical area of bone resorption

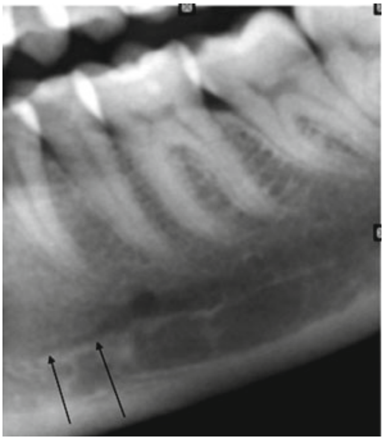


**Fig. 2.16** It is possible to provide evidence of the incisive canaliculus (indicated by *arrows*) which leads itself from the mental foramen towards the inferior central elements

**Fig. 2.17** Occasional visibility of a dental canaliculus (represented by *arrow*) in normal anatomy

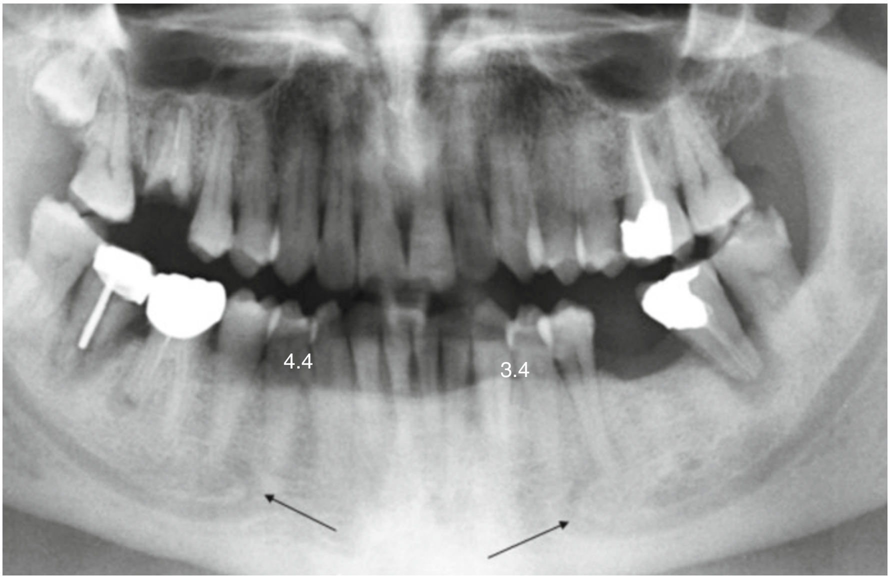



**Fig. 2.18** Bend of the mandibular canal (indicated by *arrows*). This configuration determines the mandibular canal's approach to the region corresponding to the first premolar on each side (3.4 e 4.4)

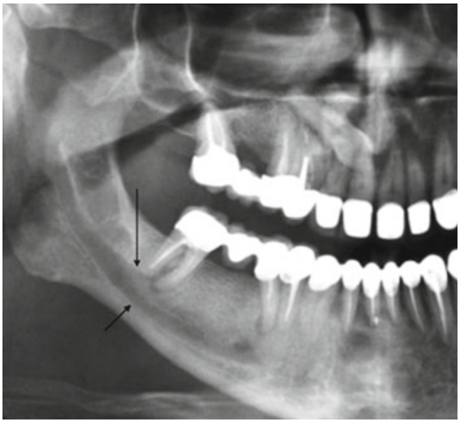


**Fig. 2.19** Bifidity of the right mandibular canal (indicated by *short arrow*) following a fistulous path towards the apex (indicated by *long arrow*) of the mesial root of the 4.6

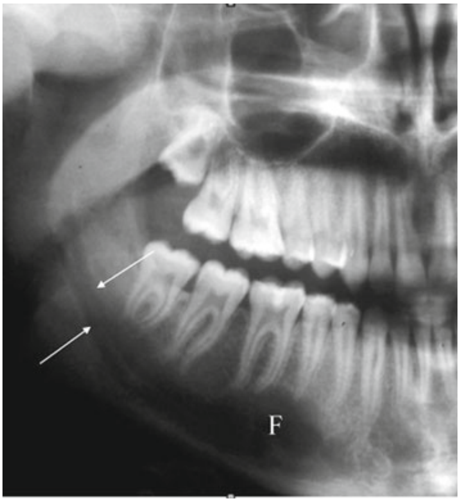



**Fig. 2.20** Real duplicity of the mandibular canal (indicated by *arrows*). The superior canal gives way to the path of vascular structures and widens into a lacunar image (*F*), which is the expression of the arteriovenous fistula

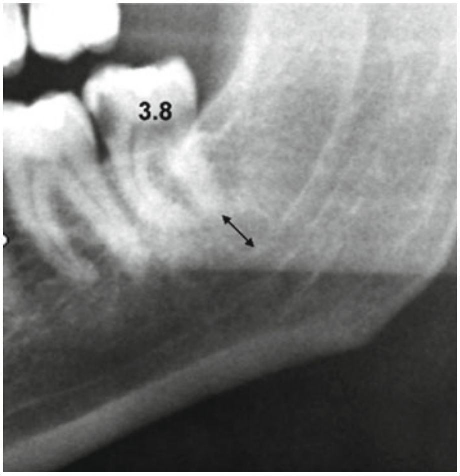



**Fig. 2.21** Wide security distance between the apex of the 3.8 and the mandibular canal double side *arrow*

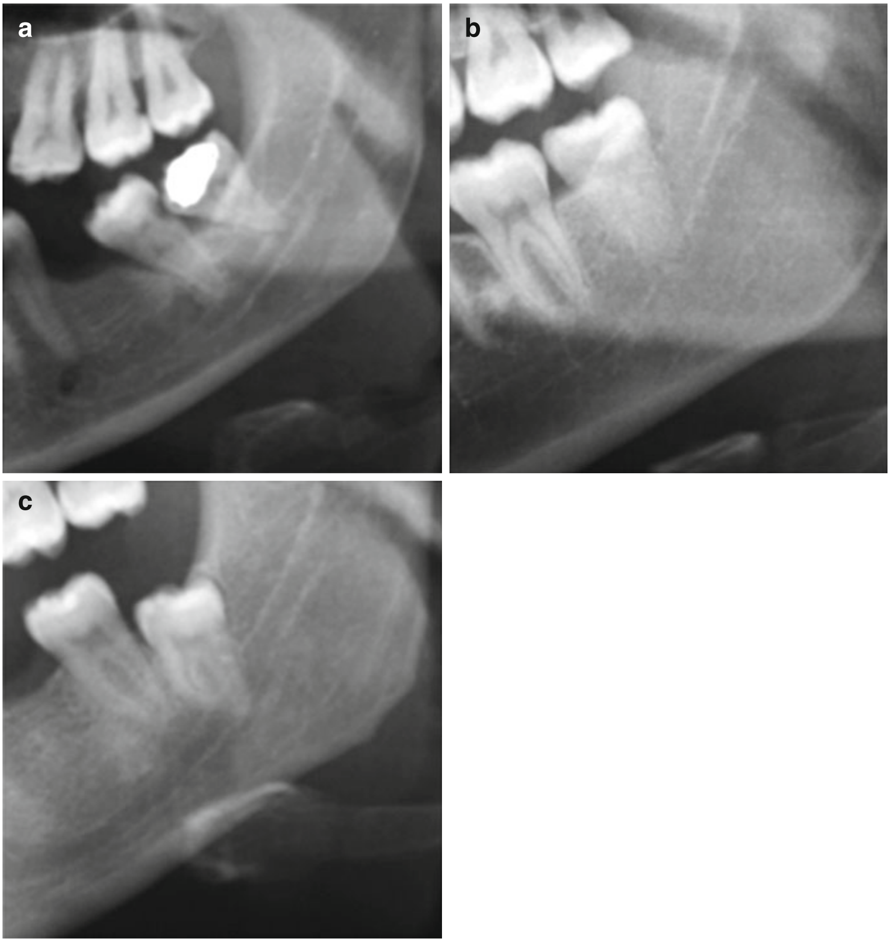



**Fig. 2.22** (**a**–**c**) Different 'critical' situations of the rapports between the third molar (3.8) and the mandibular canal

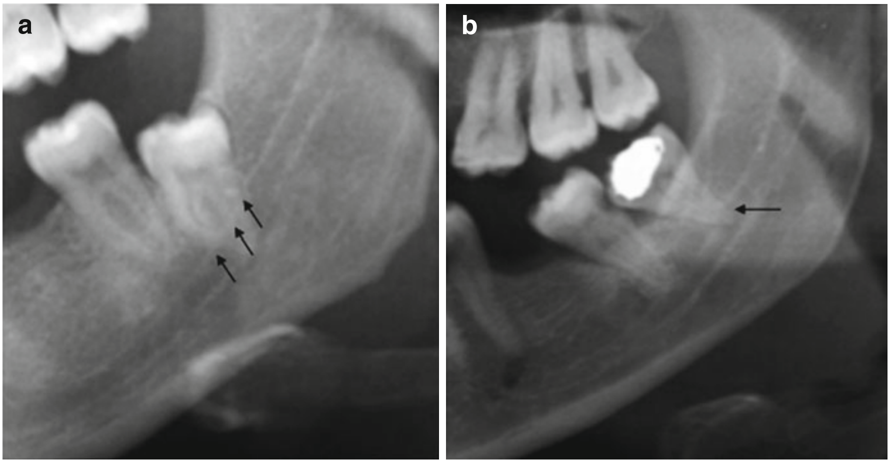



**Fig. 2.23** In (**a**) the cortical of the mandibular canal (indicated by *arrows*) is detectable, even if projectively superimposed to the dental element. In (**b**) the cortical turns out to be focally deleted in correspondence to the radicular axis of 3.8 (indicated by *arrow*)

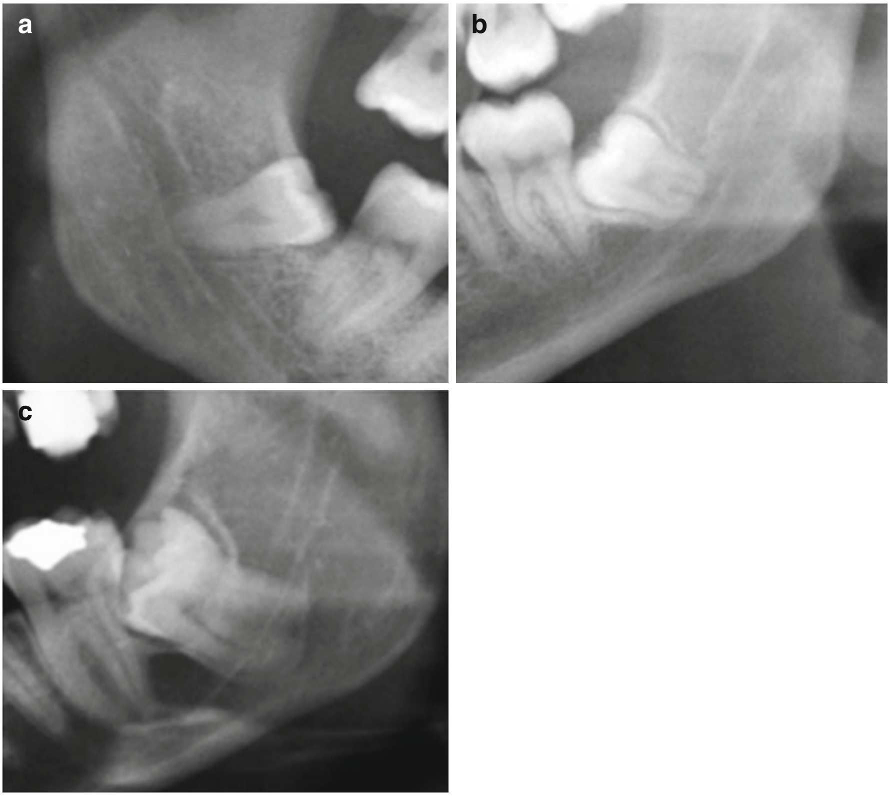



**Fig. 2.24** (**a**–**c**) 'Critical' relations between the inclusive elements and the mandibular canal. In c 3.8 turns out to be a triradicular tooth. In all three cases disappearance of the mandibular canal's cortical occurs, which is indicative of the adjacency between the latter and the inclusive teeth

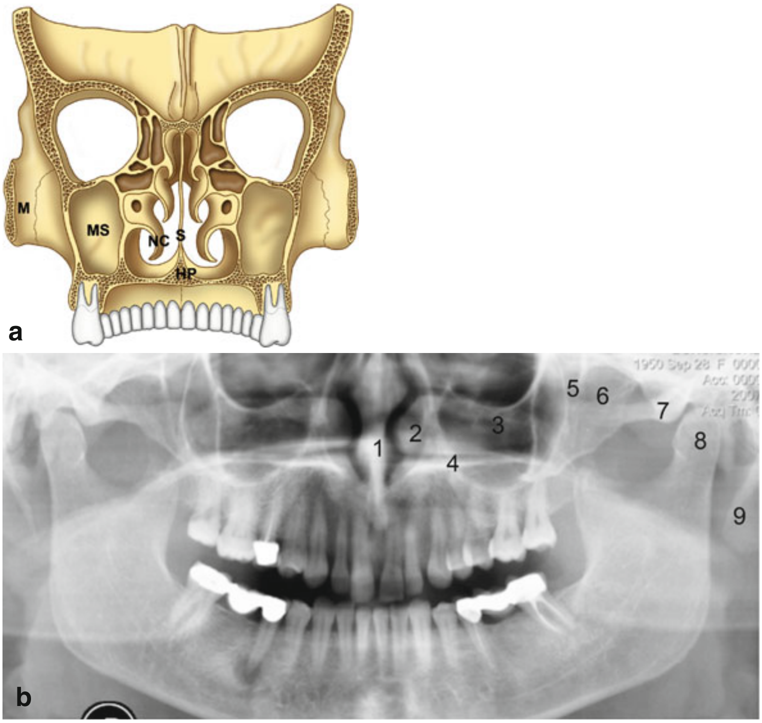



**Fig. 2.25** (**a**) Schematic diagram which illustrates the main anatomical structures of the facial bones which are visible in OPT: *M* malar bone, *MS* maxillary sinus, *NC* nasal cavity, *S* nasal septum, *HP* hard palate. (**b**) Radiologic representation of the main anatomical structures visible in OPT: *1* nasal septum, *2* nasal cavity, *3* maxillary sinus, *4* hard palate, *5* pterygopalatine fossae, *6* pterygoid apophysis, *7* zygomatic arch, *8* mandibular condyle, *9* styloid apophysis

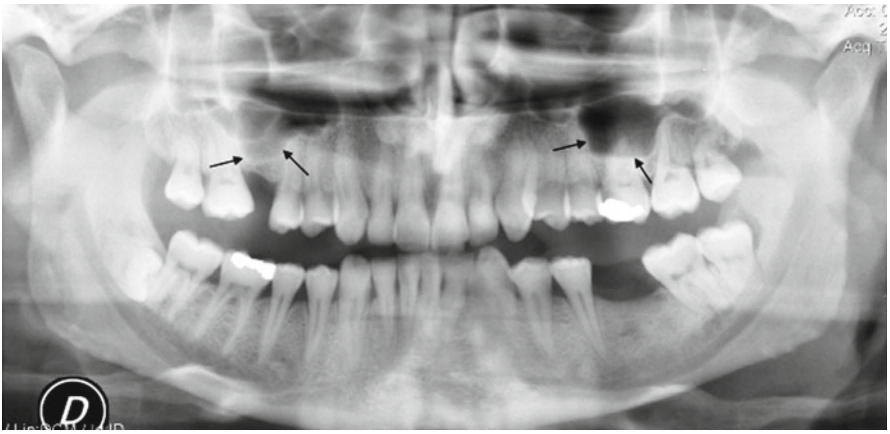


**Fig. 2.26** Anatomical variation due to abnormal downward expansion of the maxillary sinuses (indicated by *arrows*). This situation can sometimes simulate the presence of radicular cysts

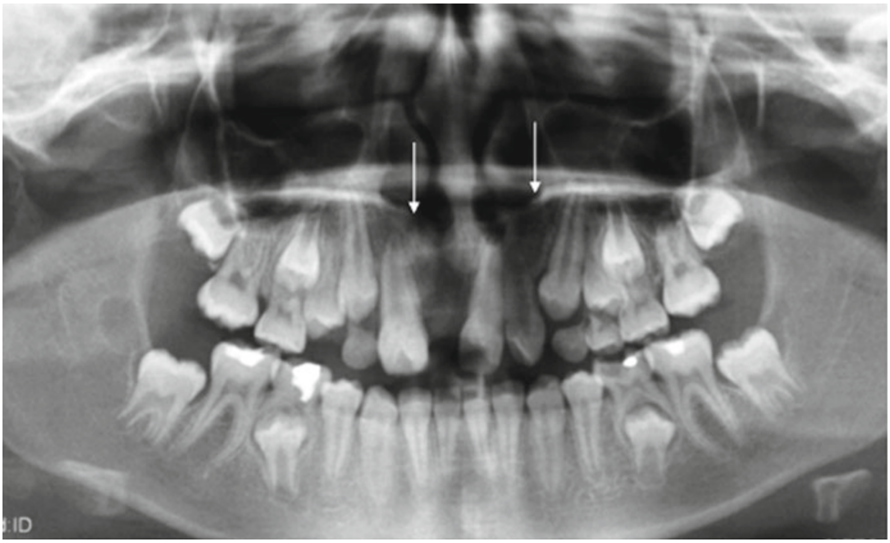
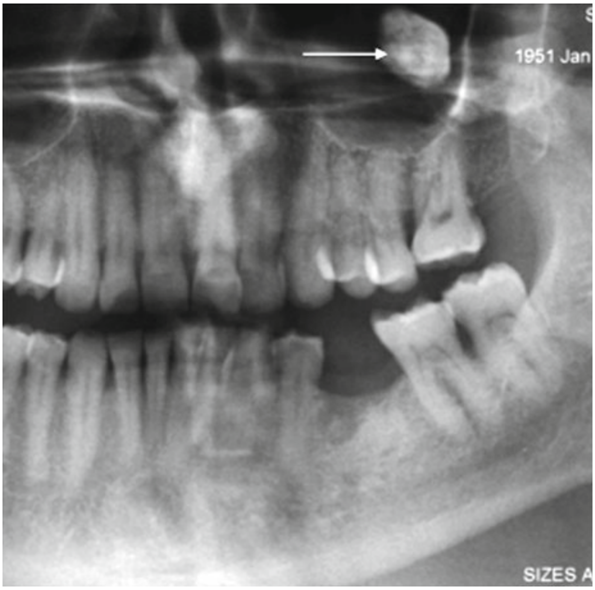



**Fig. 2.27** The image shows palatoschisis. The *arrows* indicate the schisis margin affecting the hard palate

**Fig. 2.28** Dysmorphic and rudimental dental element (indicated by *arrow*) which is inclusive in the left maxillary sinus



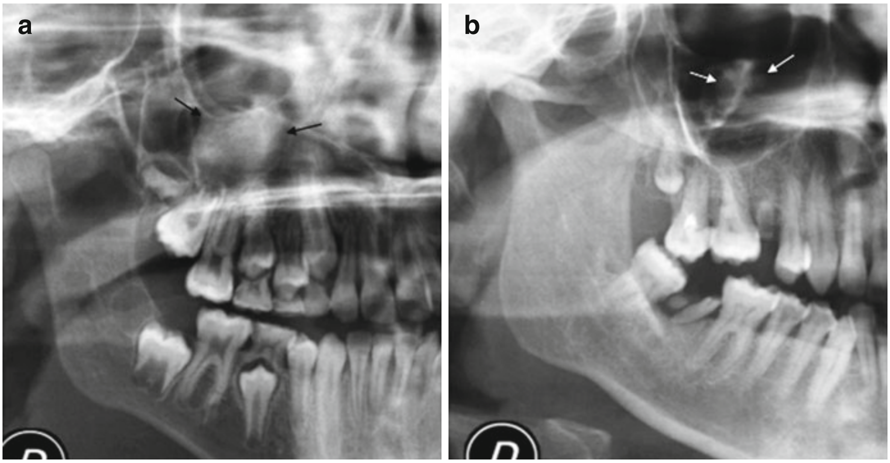



**Fig. 2.29** (**a**, **b**) The image shows two cases of osteoma in the maxillary sinus (indicated by *arrows*)

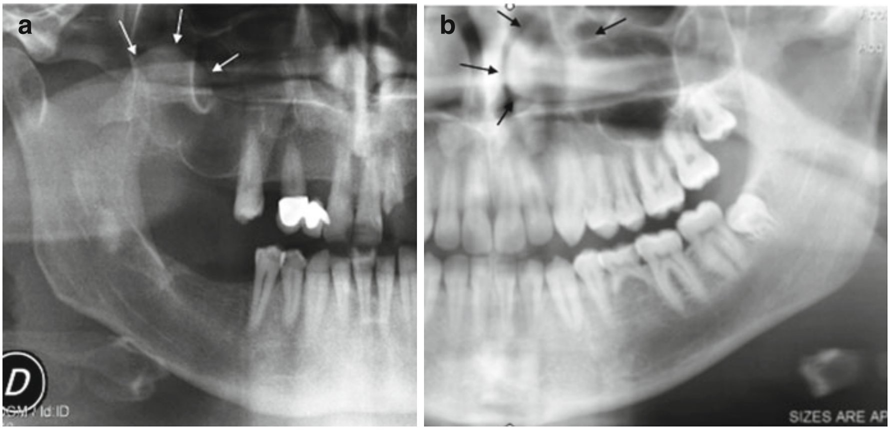



**Fig. 2.30** (**a**) Mucous retentive cyst (indicated by *arrows*) of the right maxillary sinus. (**b**) Opacity, projecting itself into the maxillary sinus, due to the transport shadow of the inferior turbinate bone (indicated by *arrows*), which must not be confused with an endosinusal cystic lesion

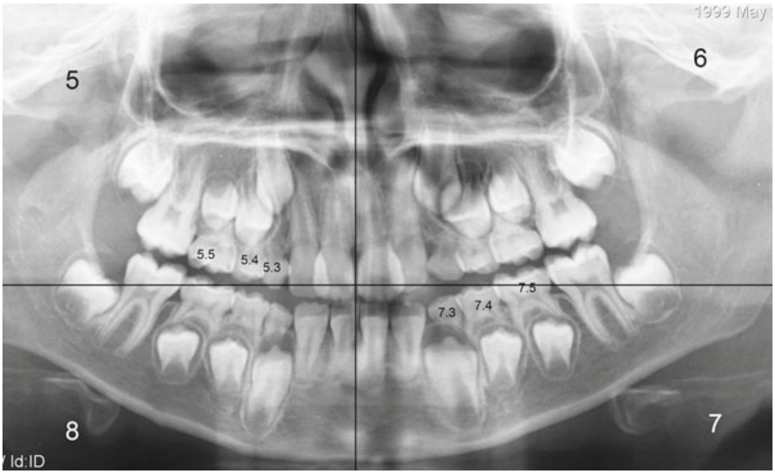



**Fig. 2.31** Scheme showing the detection and the denomination of the deciduous elements

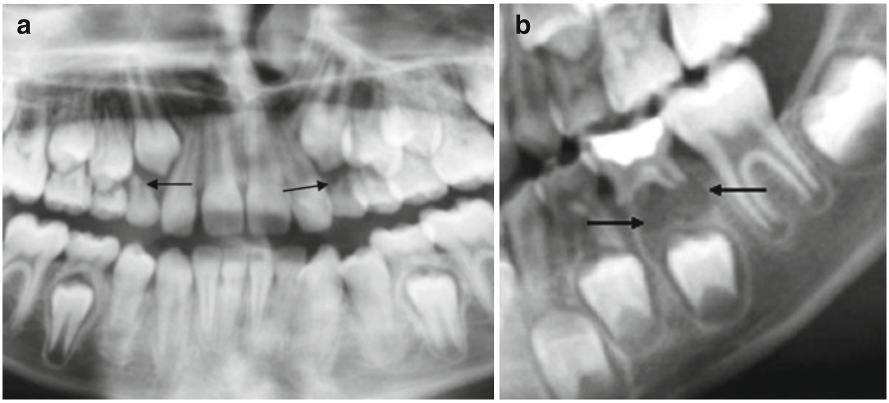



**Fig. 2.32** (**a**) Physiological apicolysis (indicated by *arrows*) of the deciduous superior canines. (**b**) Pathological apicolysis in paediatric age due to flogistic periapical area of bone resorption (indicated by *arrows*) of a deciduous element

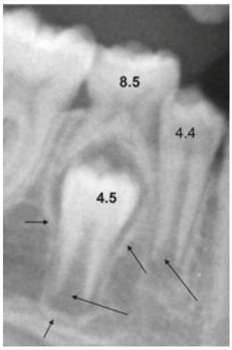



**Fig. 2.33** Characteristic deciduous aspect of the inferior right deciduous second premolar (8.5). The correspondent permanent element (4.5) is in phase of dehiscence and it is possible to detect the alveolar or dental sac (indicated by *short arrows*). Both 4.4 and 4.5 typically present incomplete radicular axis with a wide apical foramen (indicated by *long arrow*)

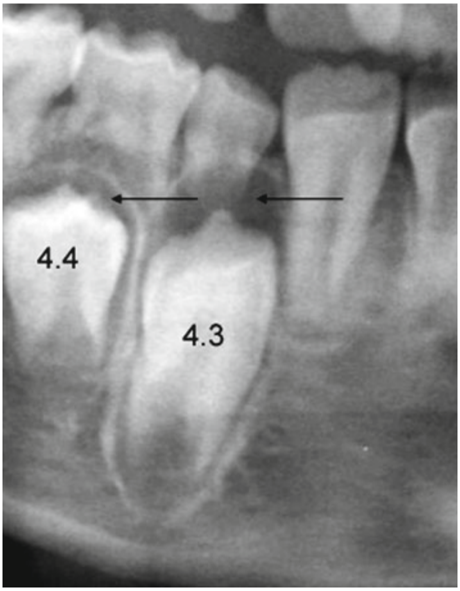



**Fig. 2.34** The image shows 4.3 and 4.4 in phase of dehiscence. The *long arrows* indicate the radiolucency which identifies the remains of the enamel organ

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