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Unerupted teeth

Cutting of a tooth is its axial movement from non-functional position in the bone towards the functional position in the occlusion (6). It is a dynamic process that includes finishing the development of the root, stabilization of the parodontium, and preservation of the occlusion function. Cutting is a word frequently used to indicate the moment when a tooth appears in the stoma. Appearing of a tooth in the stoma – cutting of the dental tuberculum is a synonym of the moment of cutting, used as the clinical indicator of dentition. Normally, the cutting of milk and permanent teeth into the oral cavity occurs in the appropriate period of time, which is influenced by various factors: racial, ethnic, sexual, and individual.

In clinical practice significant time deviations are observed. They manifest themselves by premature or delayed dentition. Quite frequently, delayed teeth cutting may be the only symptom of a focal or systemic pathology and directly contributes to establishing the appropriate diagnosis and implementing the suitable therapy. In delayed dentition the following parameters have to be taken into consideration: the patient's chronological age in a given population, and biological dentition determined by root development progression. The biological time of tooth cutting occurs when the root reaches ca. 2/3 of its total expected length. Delayed tooth cutting is the state when, despite the fact that 2/3 or more of the root length is already formed, the tooth does not erupt. The consequence of delayed cutting of a tooth is its lack in the oral cavity. Pseudoanodontia is the clinical lack of a tooth, which normally should be present in the stoma, due to the patient's chronological and dental age. In such cases a radiological examination reveals the presence of teeth in jawbones (6).

Teeth retention (*retentio dentes*) is one of the most frequent anomalies of teeth position and accompanies many faciomaxillary defects. Retention of a tooth is one of the reasons why it does not erupt in the dental arch in the expected term. The expression "an unerupted tooth" concerns both retained teeth and those being in progress of cutting. The terms "embedded tooth" and "impacted tooth" are used interchangeably. A retained tooth (*dens retens*) is a fully developed tooth that after the period of physiological eruption stall remains in the bone of upper or lower jaw (mandible). The retention may be complete, when the tooth is surrounded by bone from all its sides (*retentio dentis completa*), or partial (*retentio dentis partiale*), when the dental crown remains in the soft tissues, after it has partially cut through the bone, and stops in this position. Such a tooth usually reveals no tendency to grow (8). Retention of teeth may concern single teeth or a larger number of them. Deciduous teeth are retained relatively seldom, and then it concerns molar teeth (6, 8). In the permanent dentition most often retained teeth are upper and lower wisdom teeth, upper canines, premolar teeth, lower canines, upper and lower incisors (1, 15). In clinical practice, retention of any tooth can be encountered.

Retention of the first and second permanent molar tooth occurs rarely, but is quite significant clinically, because these teeth play an important role in the act of chewing, coordination of

mimic movement and occlusion support (10). Three main causes of teeth eruption disorders may be distinguished from the etiological point of view. These are: ectopic position of the tooth bud, obstacles on the way of tooth eruption, disturbances in dentition mechanics (such as defects of the bud or periodontal ligament), depending on the eruption stage. The first two causes lead to tooth impaction in the bone, the third – to primary and secondary retention (partial eruption, half retention). The most frequent obstacle to tooth eruption is the lack of space in the bone, causing collisions of the buds (1, 6, 10, 13). Other typical obstacles are: additional teeth, odontoma, a cyst, crowding of teeth buds, lack of room due to previously erupted teeth in the dental arch, premature loss of milk teeth, rotation and other position deviations causing changes in the direction of teeth cutting, which leads to impaction (1, 6, 10, 12, 13). If the impaction occurs before the tooth appears in the stoma, the radiogram indicates that the long axis of the impacted tooth is not parallel to the correct way of tooth cutting. Primary retention is the interrupted cutting of a correctly developed and situated bud before it emerges in the oral cavity, with exclusion of physical obstacles on the way of its eruption and ectopic position of the bud (6,10). Secondary retention is the inhibition of eruption process after the tooth appears in the stoma. Primary tooth retention is caused by inhibition of metabolic transformations responsible for bone resorption in eruption trajectory.

Probably the main factor of teeth eruption disorders is ankylosis. In the histological examination of extracted unerupted teeth focal ankylosis was found. It was usually limited to the bifurcation area and the periapical part of the root. Secondary retention is suspected when a tooth stands below occlusion at the age when it should be found in the occlusion line. Radiologically, secondarily retained teeth reveal focal obliteration of periodontal ligament spacer resorption of root surface. Sometimes a tooth with secondary retention may be covered with gingival mucous membrane and suggest primary retention. It is thought that primary tooth retention may be caused by genetic factors, past injury, infections and local metabolic disorders. Eruption disorder depends on systemic or local factors (6, 10). The influence of systemic factors concerns patients with congenital syndromes, and then the disorders relate to retention of many teeth, e.g. in cleidocranial dysostosis, in fibrous dysplasia of bones (1). Delayed teeth eruption may be caused by nutritional factors, vitamin D-resistant rickets, endocrinological disorders (cretinism), hypopituitarism, hypoparathyroidism, pseudohypothyroidism, cerebral palsy, drugs (Fenytoinum), long-term chemotherapy, anemia, premature birth, low birth body mass, renal failure, poisoning with Co, Pb and other heavy metals, genetic disorders, nicotinism (2). The cause of local factors delaying eruption or causing tooth retention may be an obstacle within the gingival mucous membrane (a scar after an injury or surgery), gingival elephantiasis or hyperplasia of the gums, additional teeth, dentigenous and non-dentigenous tumors, milk teeth injuries, ankylosis of milk teeth, milk teeth periodontitis, premature loss or lack of milk teeth resorption, enamel pearls, ectopic eruption, shortening of dental arch, damage with X-rays, jawbone fracture (1, 6, 13, 14). In about 18% teeth developing in the place that corresponds to fissure of the broken mandible in children and young people reveal delayed eruption, lack of eruption or dental root resorption, abnormally large crowns, and idiopathic migration (2, 5).

Placing and situation of the unerupted teeth may be very different. In the mandible they are most often found in the area of alveolar process, less often in the body, ramus, or condyloid process of the mandible, or on its inferior margin. In the jaw there were unerupted teeth in suborbital area, in close vicinity of the maxillary sinus, in the jugular recess of the maxillary sinus, as well as near the incisor foramen and piriform aperture (7). Unerupted teeth may remain in the bone for many years, and their presence is found accidentally, on X-ray photographs. Sometimes they reveal themselves under the influence of denture base pressure. Retained teeth may cause inflammatory complications, cysts, symptomatic neuralgia, face- and headaches, in certain cases irradiating towards the neck or

temples, without accompanying inflammatory symptoms (11). Unerupted teeth, remaining in the bone, may cause a range of problems. Severe pains or worrying inflammatory symptoms make the patient seek medical help. The presence of an unerupted lower wisdom tooth enhances bone resorption in the region of the distal surface of the root of the second molar tooth, and the formation of deep gingival pockets on its posterior surface. The presence of an unerupted upper wisdom tooth may cause premature, serious disorders of the parodontium in the maxillary region. The gingival pocket, deepening towards the peak of the root, relatively quickly reaches the region of the second molar's root arborization, which intensifies the parodontopathy and makes the treatment much more difficult. Partially retained third lower molars usually cause pericoronal inflammations, induced by biting the tissues with the third upper molar tooth. The recurring injury of the tooth cap, covering the masticatory surface of the partially erupted lower wisdom tooth leads to its damage, edema, and occasionally to stormy inflammatory symptoms. The inflammatory states of gingival pocket over the erupting lower wisdom tooth is enhanced by the accumulation of food residuals related to the patient's inability to clean the surface. Pericoronal inflammation of unerupted lower wisdom teeth may lead to severe infections and dangerous inflammatory complications. Unerupted teeth, exerting pressure on the root of the neighbouring tooth, may cause its resorption, similar to the process of milk teeth roots sorption process during the eruption of permanent teeth. In such a situation, extraction of the unerupted tooth may save the neighbouring tooth through cement renewal. In elderly persons, due to loss of teeth, there occurs the alveolar bone atrophy, making the teeth, which are deeply retained in the bone, come close to its surface, causing visible projection of the dental process in the stoma. The denture, pressing the soft tissues over the unerupted tooth, not covered with the bone, leads to ulceration of soft tissues and inflammatory states. The dental follicle, connected to the retained teeth, sometimes gets degenerated and transforms into a dentigenous cyst. A dentigenous tumor may also develop from an epithelium that lines the dental follicle around the unerupted tooth. The mandible may contain a large sized adamantoma, caused by retention of a wisdom tooth. Cysts and tumors around unerupted teeth do not occur frequently. However, retained lower wisdom teeth may cause many pathological states in this region.

Deep, intraosteal situation of a retained molar tooth, or changes related to it (cysts, tumors), significantly decrease the mechanical resistance of the mandible and make it susceptible to fracturing. Occlusion disorders, caused by wisdom teeth, may lead to the dysfunction of temporomandibular joint. Due to many pathologies caused by unerupted teeth, these teeth usually have to be extracted, unless there are special contraindications justifying saving them. A contraindication for tooth extraction is, first of all, the patient's general health state. The decision on extracting an unerupted tooth that does not reveal pathological symptoms and is covered by a thick layer of bone is determined by the patient's age and the vicinity, as well as the possibility of damaging other teeth's nerves passing nearby, as well as the nerves of maxillary sinus, etc. The therapeutic management of retained teeth should be conducted in a team, with the participation of an orthodontist and a surgeon. The selection of treatment method depends on the patient's age and the local conditions in the oral cavity. In the case of retention of incisors and cuspid teeth in the jaw, we consider the possibility of introducing them into the dental arch because of their functional and esthetic value. Surgical treatment depends on orthodontic treatment plan and includes prophylactic or compensatory extractions (first premolar teeth are extracted to introduce the cuspid teeth), the procedure of uncovering the crown of an unerupted tooth, tooth autotransplantation, involving relocation of a tooth bud or a fully developed tooth into another place, surgical removal of a retained tooth.

Before making an attempt at tooth extraction, it is necessary to localize the retained tooth carefully in an X-ray photograph. Pantomogram is a most often selected photograph (13). In certain

cases a panoramic photograph should be complemented with photos taken with the use of some other technique (9). Occlusion photos are useful as a selected or complementary examination in the diagnostics and treatment planning of unerupted teeth (15). Orthodontic and surgical procedures that make it possible to bring the retained teeth into the dental arch and remove them by means of an operation, may be accompanied by a range of complications, such as gingival recession, substantial reduction of the width and height of alveolar process, postoperative recession of soft tissues, caused by the loss of surrounding soft tissues. Extraction of unerupted teeth, and especially of the lower wisdom teeth, is often accompanied by inflammatory complications, such as post-extraction ache, edema, lockjaw, reaction of the neighboring lymphatic nodes, sometimes raised body temperature (3). It was found that perioperative application of an antibiotic makes the symptoms milder and decreases the risk of inflammatory complications. However, a question under discussion is prophylactic application of antibiotics in connection with surgical removal of an unerupted tooth in generally healthy persons. On the basis of the current literature, we cannot explicitly state whether prophylactic application of antibiotics is advisable and appropriate (4). Definitely, every patient and every case require an individual approach.

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SUMMARY

The paper is a compendium of hitherto knowledge about unerupted teeth. This frequently occurring dental disorder may lead to various kinds of local and general complications. The correct diagnostics and selection of the treatment method is an always current issue in everyday dental praxis.

Zęby zatrzymane

Praca stanowi kompendium dotychczasowej wiedzy na temat zębów zatrzymanych. To nie-rzadko występujące zaburzenie zębowe może prowadzić do różnego rodzaju powikłań miejscowych i ogólnych. Prawidłowa diagnostyka oraz wybór metody leczenia zębów zatrzymanych jest zagadnieniem aktualnym w codziennej praktyce stomatologicznej.