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*The methods of treating deciduous dentition  
after mechanical traumas*

The more frequent cases of deciduous tooth mechanical traumas in children pose a serious problem in paediatric dentistry. There are various causes of deciduous dentition traumas. In the youngest children they are connected with the period of learning to walk between the first and the second year of life. A trauma results mostly from the hitting of a sharp object in the face. Later, between the fourth and the fifth year of life, traumas often occur at play. Children of school age often report traumas of the permanent dentition, which result from games, sporting events or even fights. Dental traumas can be accompanied by the injuries of periodontium and soft tissues of the oral cavity and face. Out of many factors favourable to dental traumas, the types of malocclusion should be mentioned, in particular, the protrusion of the upper incisors of a class II / 1 according to Angle's classification. Physically disabled children are also exposed to the increased risk of traumas, especially those with the impaired coordination of movements, suffering from cerebral paralysis and epilepsy. The traumas of dentition and soft tissues in the oral cavity can also occur during the general anaesthesia procedure and some diagnostic examinations, which involve the insertion of instruments through the oral cavity. Such cases are, however, very rare. The damage to dentition can happen as a result of a direct trauma, e.g. hitting of a hard object directly on (to) a tooth or indirectly on (to) the chin, or the cheek, where the soft tissues cushion partly the intensity of the stroke. The corollaries of a trauma depend on many factors such as: the force causing the injury, the direction of hitting, the shape of a hitting object, its flexibility, child's age and the type of dentition (deciduous or permanent). The softer and more flexible the hitting object is, the lower probability of a dental crown fracture but the greater risk of a tooth dislocation. Deciduous teeth display a greater tendency to be dislocated or avulsed due to the structure of their crown (the crown being shorter in relation to that of the permanent dentition) and also due to the structure of anatomical roots which with age undergo a root resorption and thereby being less firmly seated in the alveolus. This tendency also results from the structure of parodontium, the fibres of which are thinner, as well as the alveolar process, which is less mineralised than the one in case of the secondary dentition. Permanent teeth are more vulnerable to the fracture of their crown or root. The frequency of dental traumas is difficult to establish as very few children with minor injuries report themselves to medical treatment. Hence, epidemiologic data is generally understated. Andreasen and Rown's research reveals that dentition traumas occur in 30% of the children with deciduous teeth and in 22% of those with secondary dentition. Needless to say, the number of boys with the dentition traumas is twice as big as the number of girls. With the primary dentition these observations cannot be confirmed. The difference is on the whole insignificant. In most cases the effects of traumas concern central jaw incisors. Mostly a single tooth becomes traumatised, although a few injuries in a child may occur (1, 2, 3, 4, 6, 14).

The post-traumatic treatment of the primary dentition has been changing for some time now as the surgical and conservative methods of treating the effects of injuries are becoming modernised and newly improved dental materials are being introduced. The rules of conduct are hard-and-fast and the aim is to introduce a biotherapy which holds teeth vital after an injury and restores the regular functions of the masticatory system and occlusion. The choice of post-traumatic treatment of the primary dentition depends on their developmental stage, type of trauma and first of all on a child's capability to cooperate. There are three stages in the development of the primary dentition which can be distinguished: 1) the first period – denitification phase; 2) the second period – stabilisation phase; 3) the third period – tooth resorption phase. According to Naulin the division for the medial incisors is the following: period I: from 6 months to 18 months; period II: from 18 months to 4 years; period III: from 4 years to 7 years (7).

The choice of treatment depends on the type of trauma and child's cooperation. Small injuries of the dentine are polished and protected by means of fluorine preparations. In case of a greater loss of hard tissues in the deciduous teeth a reconstruction of the dental crown may be necessary. The reconstruction is performed by the application of light cured composite material after the previous protection of the fracture area with a calcium hydrate base. It is recommended to conduct pulp vitality tests and pay attention to the occurrence of possible dental crown discolorations at intervals of 15 days, one month, 3 months, then every 6 months till the physiological loss of a deciduous tooth.

In case of a dental crown fracture of a deciduous tooth together with denuded pulp the choice of treatment depends on the developmental stage of the deciduous tooth root, the area of an exposed pulp as well as the time that has elapsed since a trauma. In case of a newly exposed pulp (the time being shorter than 48 hours) with a minimal surface of denudation in a premature deciduous tooth (first period), a pulp amputation is performed together with the use of calcium hydrate-based preparation or the N2 paste. According to Sargenti's formula the N2 amputative paste consists of 47% trioxymethylene, zinc oxide, eugenol, oil of rose, barium sulphate. It is recommended to use the N2 paste exclusively for deciduous teeth with a vital pulp destined for the amputation. The very same type of trauma of a deciduous tooth in its 2<sup>nd</sup> or 3<sup>rd</sup> phase of development requires a pulp amputation as well as pulp mummification by the application of formocresol. After administering anaesthesia pulp extirpation is performed. Then having achieved haemostasis, a cotton pellet medicated with formocresol or 2% glutaraldehyde is left in the pulp chamber close to the pulp for 5 min. Next, a base of zinc oxide eugenol and formocresol is gently inserted in equal proportions. A tooth is reconstructed by the application of composite material.

Formocresol has been long chosen in the endodontic treatment of vital and dead deciduous teeth. It is applied in a 1:5 diluted formula, and there is no justification for the use of more condensed solutions as they are more toxic. Buckley's formocresol was introduced in 1905 and recommended as a non-toxic agent for the devitalisation in times when no local anaesthesia was administered. Since 1950 it has been used for the endodontic treatment of primary dentition. In practice, one part of the concentrate (formaldehyde 19 ml, tricresol 35 ml, glycerol 15 ml, water 31 ml) is mixed with four parts of solvent (3 parts glycerol, 1 part water) (13).

Calcium-hydrate-based preparations are not recommended by many authors to treat the pulpitis of the primary dentition as they may be the cause of chronic pulpitis and the internal tooth resorption. The mechanism of the resorption process is to irritate the deciduous tooth pulp by calcium hydrate and activate dentinoclasts, which lead to the central resorption of a deciduous tooth. It is an immunological sort of phenomenon, the essence of which is production of megacells in the pulp. This phenomenon has not been observed in the pulp of the secondary dentition (7).

In case of considerable pulp denudation and the time longer than 48 hours that passed after trauma, the treatment of mature teeth (in their 2<sup>nd</sup> phase of development) is pulpectomy. H o l a n claims that the endodontic treatment of deciduous incisors which have undergone necrosis resulting from a prior

injury is an alternative to tooth extraction, which consequently may lead to speech problems, premature eruption of permanent dentition as well as to their abnormal position. According to Ram, the dental crown fracture together with denuded pulp results mostly in a tooth extraction due to lack of child's cooperation (5, 8, 9, 10). Resorbed deciduous teeth with denuded pulp in their 3<sup>rd</sup> phase of development, which have been traumatised, are subject to extraction. Extraction is also this method of treatment which has been chosen in all cases of traumatised deciduous teeth together with a denuded pulp when a child is incapable of collaborating. Primary tooth fractures including simultaneously the dental crown and root require extraction as well (11, 12).

In case of a deciduous tooth agitation or its subluxation, it is advisable to keep observation as the procedure. Regular clinical examinations are recommended every month, next every two months and then every 6 months as well as radiological examinations till the physiological depletion of a deciduous tooth. A deciduous tooth which has been first traumatised and then extracted should be gently inserted into the alveolus and then fixed by means of a splint. If a tooth is highly mobile and causes occlusal disturbances it should be extracted. In case of an impacted and laterally dislocated deciduous tooth the choice of treatment depends on the developmental stage of a deciduous tooth root, the degree of tooth sinking and its position with reference to the permanent tooth bud. An x-ray examination is the most significant and determines the choice of procedure. If the apex of a deciduous tooth is dislocated towards the permanent tooth bud, the deciduous tooth should be extracted and stitches inserted. If the apex of a deciduous tooth is dislocated towards the vestibule and the deciduous tooth is immature (1<sup>st</sup> period) there can occur a second tooth eruption in the period of 1 to 6 months and further clinical observation should take place.

Avulsed primary teeth do not undergo replantation as this procedure can be more detrimental to the regular development of a permanent tooth bud than the trauma itself, e.g. pulp necrosis, inflammatory resorption or deciduous tooth ankylosis. The premature depletion of deciduous teeth, in particular incisors, leads to the considerable shortening of the anterior segment of superior dental arch, providing it takes place before the eruption of deciduous canine teeth. Therefore, retaining the space after the extracted teeth is the only way to prevent subsequent orthodontic disorders. It is possible to retain this space by means of prosthetic and orthodontic appliances.

Retaining the space for permanent dentition, the above-mentioned appliances are also of aesthetic value, and prevent possible phonetic problems in children and thereby guarantee proper psychological development. It is necessary to consider raising the pro-healthcare awareness of the necessity for parents to report their child to the immediate medical treatment of post-traumatic states of deciduous dentition. This would reduce the number of subsequent complications occurring in secondary dentition after the injuries experienced in childhood. The main objective of the therapeutic management is to retain the physiological function of a traumatised tooth as well as to protect the regular development of a permanent tooth bud.

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## SUMMARY

For the sake of very young patients and the processes of growth and development of the masticatory system they undergo, mechanical traumas of deciduous teeth require immediate treatment. The choice of treatment method of the deciduous dentition traumas depends on a type of sustained injury, the developmental stage of deciduous teeth and first of all on a child's ability to cooperate. The primary objective of the therapeutic management is to retain the physiological function of an injured tooth and to protect the regular development of a permanent tooth bud. Considering the impact of a suffered injury on the developing stomatognathic system, children should be given medical check-ups and be under the observation, even after the completed treatment of deciduous tooth post-traumatic state. It is also necessary to raise among parents pro-healthcare awareness of the necessity to report a child to immediate medical treatment. This would reduce the number of subsequent complications occurring in the secondary dentition after the injuries suffered in childhood.

## Metody leczenia zębów mlecznych po urazach mechanicznych

Ze względu na bardzo młody wiek pacjentów i zachodzące u nich procesy wzrostu i rozwoju narządu żucia urazowe uszkodzenia zębów mlecznych wymagają odpowiednio szybkiego leczenia. Wybór metody leczenia urazów zębów mlecznych uzależniony jest od rodzaju doznanego urazu, etapu rozwojowego zębów mlecznych oraz przede wszystkim od zdolności dziecka do współpracy. Głównym celem postępowania leczniczego jest zachowanie funkcji fizjologicznej uszkodzonego zęba oraz ochrona prawidłowego rozwoju zawiązka zęba stałego. Mając na uwadze wpływ doznanego urazu na rozwój narządu żucia, dzieci powinny być poddawane kontroli lekarskiej i obserwacji nawet już po zakończonym leczeniu stanów pourazowych zębów mlecznych. Konieczne jest również zwiększenie świadomości prozdrowotnej rodziców co do konieczności jak najszybszego zgłaszania się z dzieckiem do leczenia. Zmniejszyłoby to liczbę późnych powikłań występujących w uzębieniu stałym po urazach doznanych w dzieciństwie.