

# Odontal and Protetic Reconstruction in Total Coronar Fractures

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*Beyond the acute character, two important aspects confer specificity to the dento-periodontal traumas: the age of the patients and the multidisciplinary attend of the therapeutic approach. The traumas, together with the dento-periodontal infections, are real pedodontic emergencies. Dento-periodontal traumas are lesions requiring careful examination to establish a correct diagnosis and a rapid establishment of appropriate treatment. They require a rapid diagnosis, an optimal therapeutic attitude, to resolve dento-periodontal structures and further harmonious development of the jaws. The coronary traumas that amputate the dental crown result from trauma that develop high intensity forces, with a point of application to the tooth cervical area, accompanied by other types of injuries. Radical status evaluation is performed paraclinically by imaging exploration methods. Information on root length, implantation, absence or presence of periapical diseases, endodontic treatment quality are fully provided by these methods. Clinically, the diameter of the roots of the teeth is evaluated. The analysis and synthesis of these data will allow the determination of the method of substitution and the planning of working methods. Material and Method: The study group comprises 39 children aged 6-16, most of them present for emergency treatment. Results and Discussion: The traumatic agent's force exceeds the resistance and elasticity of tissues, causing discontinuities in the tissue structure, whether soft or rough. Conclusions: The provisional or final treatment of dento-periodontal traumas aims at restoring the morphological, functional and psychological integrity of the traumatized individual.*

**Keywords:** trauma, total coronary fractures, root resorption, aesthetic effect, prosthetic and odontal substitutions

The correlation of clinical and paraclinical examinations provides the most correct therapeutic approach. The periodontal tissue can reveal bleeding in the gingival tract caused by: a subluxation, a corono-radical fracture, or an alveolar fracture [1-3]. Investigating the prevalence of total coronary fractures in populations of different backgrounds, areas and age groups; the argumentation of the therapeutic solutions offered by the odontology and prosthetics applicable to the young ones, in order to restore the loss of the dental noble substance in the most aesthetic way possible [4-6]. The assessment of teeth affected by penetrating coronary traumas by odontous treatments is mandatory at one week, one month, 3 months and one year in order to detect the appearance of pulp necrosis or color changes, as well as the root resorption or the occurrence of periodontal phenomena, recessions [7-9].

The principles and techniques of root channel preparation are described in the literature. To ensure retention and protection, the length of the preparation should be no less than 2/3 with an apical sealing of 5 mm in the case of short roots of 3 mm. The preparation is performed with minimal channel width, and the geometry of the preparation must respect the section of the root. The root of the tooth can be compared to a ring whose resistance is proportional to the difference between the 4th power of the external beam and the 4th power of the internal beam, so the resistance of a prepared root comes not from the inside, but from the sides. Odontal treatment methods are certainly less invasive but with less time-efficient stability and aesthetic effect over time; the choice of the type of treatment involves careful clinical and paraclinical assessment in order to establish the therapy

with the lowest loss of noble dental substance but also to respect the principles of biocompatibility of the child's body [10-12].

Reasonable is to correlate the thickness of the root walls with the diameter of the preparation during action. Thus, the diameters of the prepared channels between 1.3-1.8 mm, the thickness of the root walls between 1-2 mm and the length of 2/3 with an apical sealing of 5 mm will finally produce a uniform distribution of the occlusal stress and a more favourable pronostic in time. Aesthetic restoration remains a current objective of modern dentistry. In this context, to restore the three basic parameters of the chromatics: hue, saturation and brightness, a colour closer to that of the teeth is required. Thus composite materials with a range of varied colours meet these requirements, especially in the case of facial disorders of the front teeth [13-15].

## Experimental part

### Materials and methods

The study group comprises 39 children aged 6-16, most of whom are in emergency for treatment. The group of children includes 26 boys (66.66%) and 13 girls (33.33%). The treatment was performed by classical and modern methods, according to the social and clinical and imagistic possibilities. All patients were required retro-alveolar or panoramic radiographs to complete the diagnosis. The materials used are physiognomic and non-physiognomic; the methods applied have pursued the minimal sacrifice of dental, prosthetic and odontous substitutes as biocompatible as possible for children.

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## Results and discussions

The acute nature and the psychological stress generated by a trauma must not destabilize the practitioner who counsels the patient. The purpose of the treatment is to preserve vitality by preserving a pulp uninfamed by a barrier of hard tissue formed by application of a biocompatible material on the pulp exposure area. The radiological pattern in the coronal fractures recommends periapical, occlusal, lateral or lateral distal incidence. It is possible to visualize the fracture line path at the root level but it is not possible to visualize the apical extension of the fracture, the occlusal exposure at variable angles in the horizontal plane. The extent of the fracture can be visualized.

The group of 39 studied children comprises:

- 6-10 years- 3 children (3 boys)
- 10-14 years old-22 children (12 boys and 10 girls)
- 14-16 years 11 children (9 boys and 2 girls).

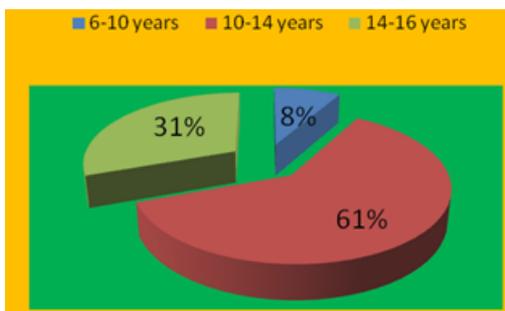


Fig. 1 Percentage distribution of patients with total coronary lesions by age group

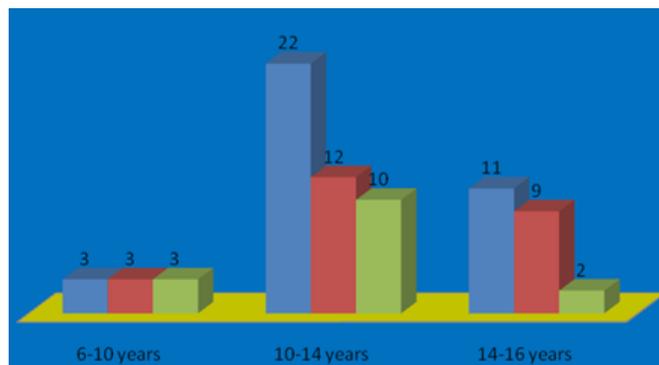


Fig. 2. Distribution of patients by age group and gender

Boys in the category of those with total coronary fractures are explained by their participation in risky activities. The algorithm for clinical examination is guided by the following criteria: anamnesis, general history, general consultation, trauma history, intra and extraoral examination, paraclinical examinations. The dentist confronted with situations where dental treatment has been postponed.

In the cases we have studied, we had the following situations:

- accidents on temporary fractured teeth,
- accidents on permanent live young teeth with the apex in construction,
- accidents on permanent vital young teeth with an unidentified apex ;
- accidents on vital young teeth with a closed apex
- accidents on permanent non vital teeth

Radiographic paraclinical examination was mandatory and indispensable to assess apexian status, traumatic lesions, periapical phenomena. Panoramic radiographs have been recommended in the presence of articular bone traumatic injuries, alveolar rebord or bone-base. Retroalveolar radiography was used to measure the

incidence of stresses between the underlined points, since the radiograph of this type is isometric. Endodontic treatments, surgical interventions, coronary reconstruction and substitution therapy were used as working methods. In the studied group 39% was the total coronary fracture rate: penetrating coronary fractures, non-penetrating coronary fractures and complete coronary fractures. From interviews with traumatized patients, we have detached the frequency of accidents that may cause such mutilations of the dental arches: scooter accidents, strokes, road accidents, play accidents, sports accidents and other casualties. Total fractured shocks require assistance as quickly as possible both for the pain caused by pulp exposure and the restoration of the lack of substance. Early counselling is indispensable for the application of appropriate endodontic therapy. Fracture has a reddish tinge, and pulp exposure can lead to pulp necrosis by bacterial infection, if not being treated on time. The pulp is traversed by very sensitive nerve endings, not only highly vascularized, and when traumatic injuries expose these terminations, touching, water, air, or cold foods will cause burning pains; the signs of hemorrhage will be searched for in fractured teeth. Time becomes a critical factor in the treatment of exposed pulp, channel treatment being the treatment of choice. In the case of young people - children with developing apex, maintaining apical vitality is of major importance. The treatment differs according to the state of the apex; most of the trauma concerns young permanent teeth with incomplete roots, the treatment being directed to maintaining the tooth's vitality. The apical area has a special dynamic with respect to the apex, it is closed at the age of 4 years after the eruption of the tooth. The apex of the frontal teeth, with the formation of the root, is divergent, followed by the mineralization of the crown and the root, but also due to the deposition of the secondary dentine, will take a form with the parallel walls, then converge until the diaphragm closes. The moment of the apical closure will have the following shape:

- Higher central incisors around the age of 10
- Upper lateral incisors at about 11 years
- Higher canines around 13-15 years
- Lower incisors at about 10 years
- Lower lateral incisors at 11 years old;
- lower canines at 13 years old.

At the pulpary organ level, the dental trauma determines degenerative phenomena dominated by the reduction of the number of cellular elements as well as their dimensions, interested in odontoblasts, fibroblasts and undifferentiated mesenchymal cells.

It produces the growth of collagen, being in the process of calcification. Vascular changes occur due to the fact that the vascular network is diminished by capillary obliteration, the pulp organ having a diminished supply. It produces a large amount of secondary dentin, manufactured by odontoblasts and undifferentiated mesenchymal cells. Nerve terminations in dentinal canals are affected by their degenerative modification, which causes numerical reduction of the nerve branches in the Weill's layer with a small number of cells.

The pulp changes result in a reduction in the volume of the pulp cavity with the storage of mineral substances; the fitting of these disorders is the result of vascularized dynamics due to compressions and tractions exerted on the vasculo-nervous pack during trauma, or inflammatory and degenerative lesions in the tooth supporting elements that obstruct normal circulation in parodonto-pulp joint vessels.

By reducing pulp defenses, eventual contamination would cause pulp necrosis. Regressive changes mostly do not concern the apical territory, so rooting growth and apexification remain possible.

Dental radicular remnants are root fragments of different dimensions remaining in the alveolar bone as a result of carious traumas or processes that have resulted in complete destruction of the crown of the tooth, or due to unsuccessful dental extractions (incomplete extractions by breaking the crown or root of the tooth during surgery, with the keeping of a root fragment in the alveolus); resulting from an aggression, presents sharp surfaces, cracks adjacent to the opening of the pulp chamber that presents either the bleeding and extremely painful dental pulp or the traces of a possible endodontic treatment. The therapeutic attitude towards these radical scars varies and is governed by many factors. The discovering roots or root fragments is possible by conducting and examining by the dentist of a radiograph or volumetric tomography. There is the situation of an empty dental channel with fermented food remnants, fetid smell, accompanied by periapical phenomena, osteitis, acute or chronic apical periodontitis, granulomas, cysts. The pulp is contaminated, even superficially, with germs from the oral cavity or from the substances who entered the oral cavity through trauma.

The therapeutic attitude in these cases consists of monitoring the patient and intervening only when the complications occur. In most cases, removing these root fragments through minimal invasive surgery is indicated to prevent complications that may occur later: affecting adjacent structures, infections, pains and irritations. The dentist is able to assess the benefits and risks associated with each case, based on the clinical and paraclinical examination of the patient, and determine the therapeutic approach to be followed. The treatment applied in our cases concerned with several tooth categories: temporary teeth; permanent teeth, which have several clinical stages of development; young permanent teeth with open apex; permanent young teeth with an incomplete apex; permanent young teeth with closed apex, devital teeth.

Coronary fractures in temporary teeth are uncommon, because in young children the resilience and suppleness of the alveolar bone totally or partially favours intrusions and dislocations; when the root of the temporary tooth is resorbed, its small length will allow for a movement rather than a fracture. Coronary fractures are neglected; but when there are irritation injuries, a specialist counselling is required.

When there is a pulp touch, the clinical and radiological examination will establish the most appropriate therapeutic action, depending on the pulp pathology and on the stage of the root resorption. As with any other extraction, neither the removal of the remaining root do not involve patient exposure to pain. Pre-operator is anesthetized, to ensure that he will feel nothing, at most a feeling of pressure during extraction. After removing the root residue, the wound under the flap is properly cleaned. Then, the gingival flap is replaced, sewed with some surgical sutures and a sterile swab is used that slows bleeding.

Post-operative care is the same as for a normal dental extraction, and a new visit is scheduled in the surgery to remove sutures.

By using conventional means, these teeth will be reconstructed, avoiding the use of special pulp anchor or parapulp. The method of choice remains the restoration with composite materials after the acid attack of the dental surfaces. The treatment of total coronary dental fractures in vital teeth with open apex, after radiological evaluation,

open apex in contraindications, endocanal instrumentation or pulp extirpation. It is necessary to keep an apical bony viable to ensure apexian closure; thus the substances of filling will disseminate in the periapical space, complicating the situation. Exposed Pulp Intervention Possibilities: Partial pulpotomy performs a partial amputation of pulp tissue because Cvek considers that only part of the pulp tissue is affected; has the advantage of being conservative with cell-rich pulp tissue with a better healing capacity. Cervical pulp (pulp amputation) removes all of the coronary pulp, leaving only the fibrous pulp that is more fibrous, with fewer cells and, therefore, with less reaction capacity; a part of the coronary pulp is removed with its regenerative capacities. Partial partial pulpotomy shown in cases where we consider that the inflammation is extended to the root area or in cases of amputation failure; removal of inflamed tissue, followed by protection and stimulation of the apical body forming organ. The treatment of permanent teeth with an uncomplete apex, with the walls of the parallel apical delta, presents two treatment options: partial pulpotomy, with apexian expectant, which can be closed by fibrous, cementoid or bone; pulpotomy to the radiographic apex with subsequent coronary reconstruction.

The treatment of young permanent teeth with a complete apex consists of pulpectomy and coronary reconstruction. When the trauma involved more than 1/3 of the coronary volume, the coronary reconstruction also involves root attachment. There are situations where temporary or definitive teeth can be odontally reconstructed.

The intrication of odontal and prosthetic methods determines treatment combinations that depend on the physician's choice. Prosthetic time consists in preparing the root canal to receive an endodontic anchoring device with the reconstruction of a tuft on which plastic reconstitution materials or prosthetic parts are applied.

The reconstitution variants are: self-tapping dentatus prefabricated devices; prefabricated zirconium biopost devices; molded (metallic) substitution inlay type; zirconium or ceramic devices; mixed devices, prefabricated devices of different materials.

The treatment of devital teeth with fractured dental crown is resolved in the first phase of the periapical pathology and in the radiological and clinical investigation of the correctness of endodontic treatment: 5 cases (12.82%) were resolved by endodontic treatment; two patients (5.12%) underwent apical resection surgery; 4 patients (10.24%) were treated endodontically with stimulants of local metabolism; six patients (15.38%) were operated and apical resected. The variant of coverings created: temporary coating with precast, acrylic microprotection or Scutan method; combining methods of endodontic reconstitution; final coverage with physiological or semifisionic microprotection. The increased frequency of dental trauma in children and youngsters and the variety of clinical forms do not allow a global approach to them, but an individualised therapy based on age and stage of evolution of the tooth affected, by the structures concerned, their severity and associated injuries.

## Conclusions

The treatment of hard tissue teeth trauma aims to protect affected tissues as well as pulp protection when exposed to trauma.

Possibilities of odont or multiple treatment, from the restoration of the loss of substance with aesthetic materials, to partial or total depilation and obturation as

well as the latest materials of the patient-adapted dental protection.

Radiography is a paraclinical examination that allows the assessment of pulp-dentinal organ damage due to the accuracy of detecting acute or chronic tissue changes.

Variants of prosthetic treatment presented offer a wide range of approach to traumatic pathology, adaptable to the type of lesion the patient presents.

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