Delayed eruption - Case study

Anca Maria Răducanu[1], Victor I. Feraru[2]

Bucharest, Romania

Abstract

Objectives. **Specialty literature review on the issue of the chronologically delayed eruption. Examples of the approached subject by the presentation of two clinical cases of different aetiologies.**

Introduction. **The process of teeth eruption lasts for approximately 13-15 years, during which period primary and permanent teeth erupt successively, at moments placed around the medium eruption time.**

Physiological chronological variations of teeth eruption are situated in the interval of +/- twice the standard deviation from the medium eruption age (calculated on large population groups). Delayed/accelerated eruptions are considered pathological teeth eruptions that take place far beyond the limits of this interval.

Material and method. **The cases of two patients, of age 9 and 10, are presented. Both suffer of delayed dental eruption, of different aetiology, mixed in the firs case and local in the second one. Diagnosis was established by the thorough evaluation of the familial and personal history, the general, facial and oral clinical examination; which led to the elaboration of the individualised treatment scheme. Diagnosis sequence and treatment methods adapted on the specific situation were established.**

Results and conclusions. **Large deviations from the medium teeth eruption standards alert the paedodontist, which must thoroughly investigate the patient's oral and general development and thus track down as soon as possible the local dental anomalies as well as the systemic diseases that may disturb the craniofacial complex's functionality.**

Keywords: medium eruption age, chronological delayed eruption.

Introduction

Teeth eruption in a dynamic, genetically dictated process which is a part of odontogenesis and is responsible of the tooth's movement from the bone crypt where it formed until reaching the occlusal plane and starting its function. Together with the teeth' eruption, other processes take place: root development, marginal periodontium formation and the finalizing of the dento-gingival junction [1]. This physiological process is a long and complex one, with great influence on the craniofacial development [1].

Teeth eruption variations – Aethiology

The process of teeth eruption and occlusion development lasts (excluding M3) for approximately 13-15 years, during which period teeth erupt successively, at time moments placed around the medium eruption age, specifically for every dental group, in the primary dentition (PD) as well as in the secondary dentition (SD) [1, 2].

This process suffers a wide individual variability, more pregnant in the permanent teeth, being influenced by physiological and pathological factors.

A. Physiological factors influencing eruption

They are represented by hereditary, hormonal and geographic factors, by sex, race, socio-economic status, nutrition, growth parameters (weight and height at birth), and dental hygiene (as a protection method for

1 Associate Professor, Paedodontics Department, Faculty of Dental Medicine, U.M.F. „Carol Davila", Bucharest
2 Assistant Professor, Paedodontics Department, Faculty of Dental Medicine, U.M.F. „Carol Davila", Bucharest

primary teeth). These factors are considered in determining the normal eruption standards *(Table 1)* [1, 2].

Normal variation of teeth eruption may be defined as the medium eruption age +/- twice of the Standard Deviation (SD). SD in of 4 months for PD and as far as SD is concerned it has values of approximately +/- 6 months for teeth that erupt earlier (incisors, canines and firs molars) and up to +/- 1,5 years for teeth that erupt later (second and third molars, premolars).

B. Pathologic factors influencing eruption *– Table 2* [1, 3].

The aetiological factors of pathologic eruption are: genetic, medium (local and systemic) and idiopathic factors.

Terminology

1) *Chronologically normal eruption* is defined as the situation in which dental eruption takes place at time moments placed around the medium eruption age, inside the interval represented by +/- 2xSD.

2) *Chronologically delayed eruption* (CDE) is defined as the situation in which dental eruption takes place at time moments beyond the interval of +2xSD.

3) *Biologically normal eruption* is defined as the situation in which at the moment of the tooth's emergence it's root is 2/3 formed.

4) *Biologically retarded eruption* (BRE) is defined as the situation in which CDE is associated with a delay of the root's maturation (<2/3) considering the civil age of the child; coordination between dental development and eruption being normal.

5) *Biologically delayed eruption* (BDE) is defined as the situation in which CDE is associated with a normal or greater root maturity (=2/3) considering the child's civil age; coordination between dental development and eruption being abnormal.

6) *Localised DTE* affects 1 – a few teeth and is usually associated with local causes.

7) *Generalised DTE* affects all teeth and is usually associated with general or genetic diseases.

Diagnosis

Diagnosis is established by the thorough evaluation of the familial and personal history, the general, facial and oral clinical examination; in a logical order thet will facilitate the further correct establishment of the treatment plan [1].

Table 1. Medium teeth eruption ages

	Maxillary	**Mandible**
PRIMARY TEETH		
Central incisors	8-13 months	6-10 months
Lateral incisors	8-13 months	10-16 months
Canines	16-23 months	16-23 months
First molar	13-19 months	13-19 months
Second molar	25-33 months	23-31 months
PERMANENT TEETH		
Central incisors	7-8 years	6-7 years
Lateral incisors	8-9 years	7-8 years
Canines	11-12 years	9-10 years
First premolars	10-11 years	10-12 years
Second premolars	10-12 years	11-12 years
First molars	6-7 years	6-7 years
Second molars	12-13 years	11-13 years
Third molars	17-21 years	17-21 years

Table 2. Ethiologic factor S of delayed eruption [1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]

Local	General	Genetic
Radiological visible:		
• supernumerary	- nutrition deficit	- imperfect amelogenesys
• anodotia	(low weight and height)	- cherubism
• enamel pearls	- vitamin D resistant rachitism	- cleido-cranial dysplasia
• irradiation induced	- A, B, C, D hypovitaminosis	- dentinal dysplasia
anomalies	- chronic hypocalcaemia	- congenital hypertrychosis
• dilacerations	- endocrine diseases:	- mucopolysaccharidosis
• cheilo-gnatho-palatoschisis	• hypothyroidism	- ectodermal dysplasia
• cists	• hypopituitarism	- Gaucher disease
• tumours	• hypoparathyroidism	- gingival fibromatosis
• bone sequesters	• pseudoparathyroidism	- mucolipidosis
• dental ectopy	- prolonged chemotherapy	- Incontinenta pigmenti
• dental inclusions	- dental flourosis	- neurofibromatosis
• periapical infections	- HIV infection	- osteopetrosis
• PD trauma	- cerebral palsy	- osteogenesis imperfecta
• lack of PD root resorbtion	- disosteosclerosis	- progressive hemifacial atrophy
• PD reimpaction	- drugs: fenitoin	- Progeria
• lack of space	- anaemia	- Von Recklinghausen
• regional odontodisplasia	- celiac disease	neurofibromatosis
Radiological not-visible:	- premature birth and very	- Apert syndrome
• scars	low weight at birth	- Carpenter, Down syndrome
• dental ankylosis	- ichthyosis	- Hurler, Hunter, DeLange
• gingival fibromatosis	- severe intoxications with	syndrome (MPZ type I)
• gingival hyperplasia	heavy metals: cobalt, lead	- Gardner, Laband syndrome
• premature loss of PD	- severe renal diseases	- Buckley Cross, Rutherford
	- hypobaric exposure	syndrome
	- genetic disorders	- Gorlin, Ramon syndrome
	- familial, hereditary	- Goldenhar syndrome
	- smoking	(Hemi-facial microsomia)
	- Idiopathic	- Ellis van Creveld syndrome
		(Chondroectodermal dysplasia)
		- Mc Cune-Albright syndrome
		(polyostotic fibrous dysplasia)

Diagnosis sequence

1. Heredo-colateral antecedents (general diseases of the parents, associated with CDE)

2. Personal antecedents (general diseases of the child, associated with CDE)

3. General physical and pshichiatric examination *(Table 2)*, in collaboration with the family doctor and doctors of other specialities (tracing out of unknown general diseases)

4. Facial examination (tracing out the oro-maxilo-facial diseases that may associate with CDE)

5. Intraoral examination: inspection, palpation, percussion and radiological examination. The intraoral examination must be very thorough (up/down and left/right) in order to trace out all local factors *(see Table 2)* that may determine the delayed eruption.

Inspection

- Soft tissues: scars, tumefaction, dense or fibrous fraena

- Left – right evaluation, given that significant dental eruption deviations are fre-

quently unilateral (tumours, hemifacial micro/macrosomia)

- Primary tooth's persistence (may induce the successors' deviation)

- Infraocclusion of a tooth – may associate with its ankylosis

Palpation

- May reveal prominences on the alveolar ridge, characteristic to erupting teeth

- May induce: pain, cracks or other symptoms

- Examination of tooth's' support structures → decrease of physiologic mobility = ankylosis

Radiographs

- Orthopantomogram may reveal:
  - Dental number anomalies: agenesis / supernumerary teeth,
  - Dental shape, size, structure and position anomalies of the unerupted teeth
  - Tooth support structures status
  - Presence of tumours, cysts
  - Root development evaluation
- Clark incidence and computerized tomography are useful methods in establishing the location of tumours, supernumerary teeth, misplaced teeth that need surgical corrections.
- Radiographs to evaluate bone density and skeletal maturity, in collaboration with a paediatrician or endocrinologist.

Treatment

Recommended treatment methods are:

- Surgical (extraction, obstacles removal, uncovering of affected teeth)

- Orthodontic (traction, creation and maintenance of necessary eruption space)

- Replacement of extracted teeth with: fixed/mobile prosthesis, auto transplant/ implant

- Treatment of the systemic diseases that determined the CDE.

Suitable treatment methods are selected among these, depending on the given clinical situation:

1. CDE of teeth with abnormal development (malformed)

Primary teeth

- Determining if the dental malformation is localised / generalised

- Expectative or extraction – recommended at unerupted primary teeth with severe anomalies; the extraction's moment must take in account the successor's development degree and the space necessary for their eruption.

Permanent teeth (Rx)

- Determining if dental malformation is localised/generalised

- Expectative until skeletal growth is finalised

- Surgical uncovering without harming the dental support apparatus

- The severely malformed teeth will be extracted if they present no prosthetic value

2. Delayed eruption of teeth with normal development (Rx)

- *Biologically normal eruption, with no physical obstacles or ectopy:* root development supervision is recommended, by periodical radiographic examinations
- *Biologically delayed eruption, with ectopic position of the tooth:* therapeutic attitude varies from expectative, surgical uncovering of the tooth and orthodontic traction (if auto-correction does not appear) or autotransplant in case of deviations greater than 90 from the normal position, to extraction.
- *Biologically delayed eruption with presence of radiological visible / not visible obstacle:*
  - ***PD:*** therapeutic attitude varies from expectative, removal of the physical obstacle without affected tooth exposure, to orthodontic treatment in rare situations and even the extraction of the affected tooth
  - ***SD:*** surgical removal of the obstacle and exposure [14] of the included teeth or creation of the necessary eruption space [1]. When alveolar ridge length deficiencies create a physical obstacle, arcades' expan-

sion as well as the extraction of the affected tooth or neighbouring teeth may be necessary to obtain the necessary space.

3. Generalised delayed eruption associated with systemic diseases

The proposed methods for the treatment of these eruption disturbances are: expectative, obstacles' elimination, surgical uncovering of the tooth with or without orthodontic traction, auto-transplant and systemic diseases' treatment.

Clinical cases

We present two clinical cases with CDE (2xSD) of different aetiologies. Anamnesis, examination, diagnosis and treatment sequence are presented comparatively in *table 3 a, b, c, d.*

Table 3 a

Case 1 NM, male, rural environment 9 years 4 months	**Case 2 CD, female, urban environment 10 years 2 months**
PRESENTATION MOTIVE	
- lack of frontal teeth eruption	- delayed, incomplete and abnormal eruption of 1.1
PERSONAL HISTORY	
- lack of appetite - preferres snacks and sweets - rarely consumes meat, milk and derivates, raw fruits and vegetables, eggs - multivitamins treatment did not improve the situation	- trauma suffered in the frontal upper area at an uncertain small age, with no consecutive treatment
HEREDOCOLATERAL ANTECEDENTS	
- mother: stature hypotrophy and ponderal hypertrophy - father: staturo-ponderal hypotrophy, DDE - sister: normal general and dental development	Of no importance
PERSONAL PATHOLOGIC ANTECEDNTS	
Rickets after-effects	No

Table 3 b

Case 1 NM, male, rural environment 9 years 4 months	**Case 2 CD, female, urban environment 10 years 2 months**
GENERAL CLINICAL EXAMINATION	
W = 21,5 kg (N = 20-50kg) *(Fig. 1)* H = 112cm (N = 117-147cm)	Weight and height concordant with age
ORAL CLINICAL EXAMINATION	
- mixed dentition - all M1p present - all Ip not erupted - all It persistent - 5.4, 6.4, 7.1,8.1 mobility I-II	- mixed dentition -1.1 structure anomaly in ↑ V - dystrophic tooth, in ↑ in the III-rd position of quadrant 1 - 1.2 not erupted, 42 in ↑ - 2.1, 2.2 reached occlusal plane ~ 1 year ago *(Fig. 6, 7)*

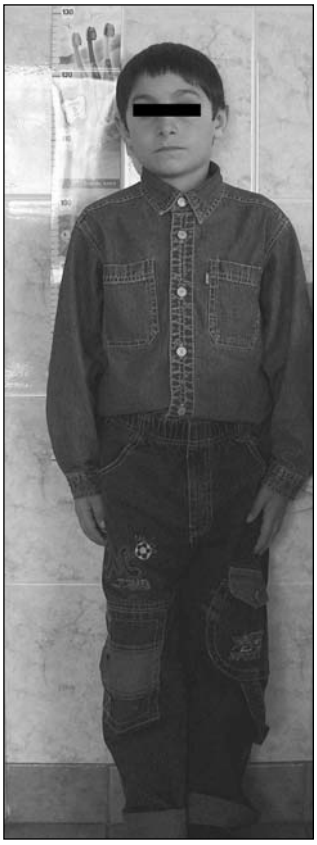

Fig. 1 Case 1: Stature hipotrophy

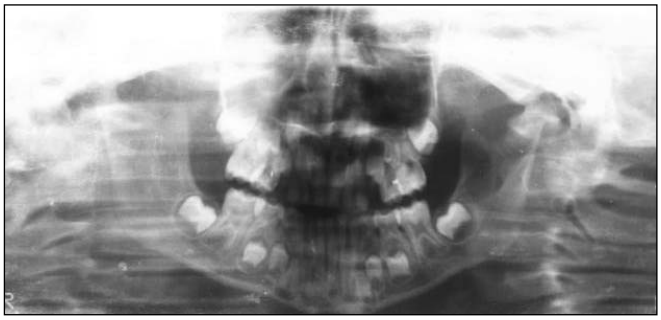

Fig. 2. Case 1: Orthopantomogram, 9 years 4 months

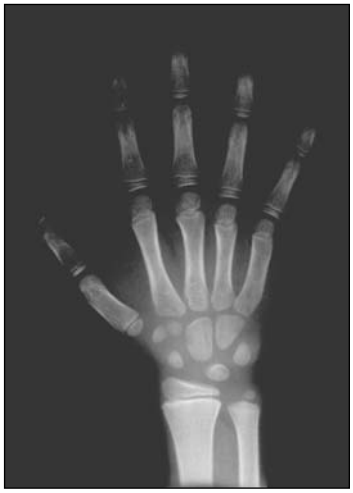

Fig. 3 Case 1: Palm radiography - concordance between osseous and biologic age

Table 3 c

Case 1 NM, male, rural environment 9 years 4 months	**Case 2 CD, female, urban environment 10 years 2 months**
RADIOLOGYCAL EXAMINATION	
Orthopantomogram *(Fig.2):* - presence of all not erupted permanent teeth, with normal development - probable eruption sequence modification (PN before I) Palm radiography *(Fig.3):* - concordance between osseous and biologic age	Periapical radiographs: - Presence of 1.2, intraosseous - S in ↑ in III-rd position *(Fig. 8)* - Normal situation on the other side *(Fig. 9)*
GENERAL DIAGNOSIS	
- familial stature hypotrophy - weight at the lower normal limit - unbalanced, cariogenic nutrition - C, D vitamins deficiency - rickets	Not necessary
DENTAL DIAGNOSIS	
- DTE of all Ip md. and Icp mx. (>2SD) - BDE at 3.1, 4.1 (= 2/3) *(Fig.2)* - general and local cause	- DTE at 1.2, 1.1 (>2SD) - BRE at 1.2, 1.1 (<2/3) *(Fig. 8)* - local cause (supernumerary tooth)

Table 3 d

Case 1 NM, male, rural environment 9 years 4 months	**Case 2 CD, female, urban environment 10 years 2 months**
GENERAL TREATMENT	
- open air exercises - treatment of anorexia in collaboration with the family doctor - diet control and correction	No
DENTAL TREATMENT	
- prophylactic treatment of dental caries - extraction of 3.1 ,4.1, 5.4, 6.4 - expectative	- prophylactic treatment of dental caries - extraction of 5.2 - expectative - extraction of dilacerated S/1.2
EVOLUTION	
- after the extraction of mobile primary teeth the permanent successors soon erupt *(Fig. 4, 5)* - caries treatment - diet, oral hygiene and eruption of the rest of the permanent teeth supervision	- abandoned treatment

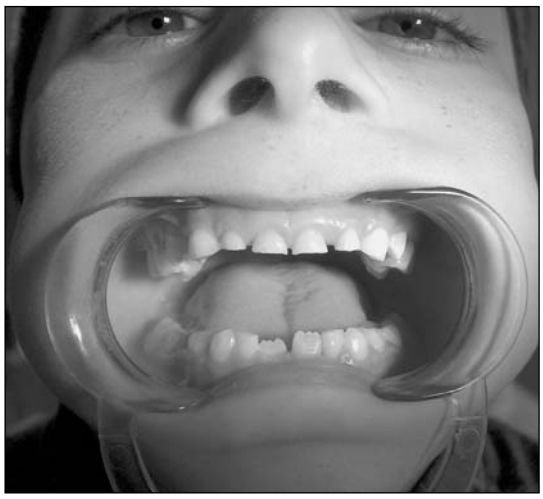

Fig. 4 Case 1: Permanent teeths' eruption following the extraction of mobile primary teeth

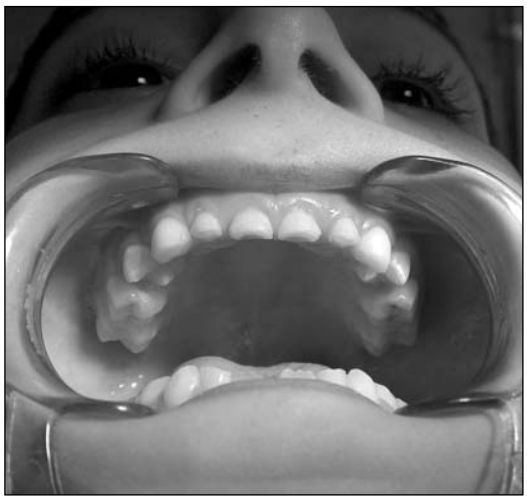

Fig. 5 Case 1: Eruption sequence modification (PM before I)

Conclusions

Normal teeth eruption variations are a feature frequently encountered in clinical practice. Large deviations from established standards should alert the physician who must thoroughly investigate the patient's health and development.

Delayed dental eruption may appear as an expression of a systemic disease or may announce one's appearance, indicating a perturbation of the craniofacial complex.

Complete patient's evaluation leads to diagnosis specifying and elaboration of the complex treatment plan (paedodontic, surgical, orthodontic, general).

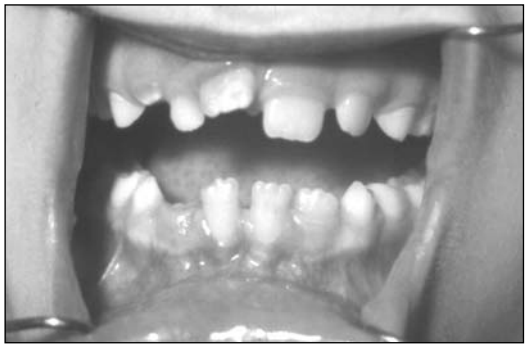

Fig. 6 Case 2: Oral aspect - frontal view

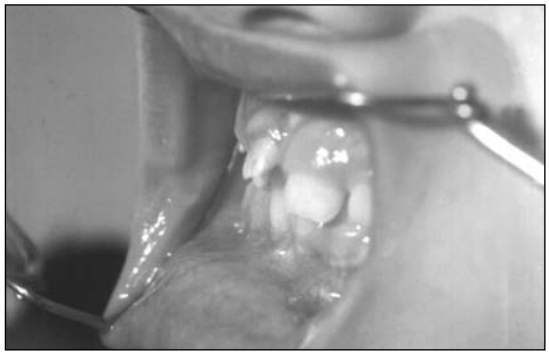

Fig. 7 Case 2: Oral aspect - lateral view

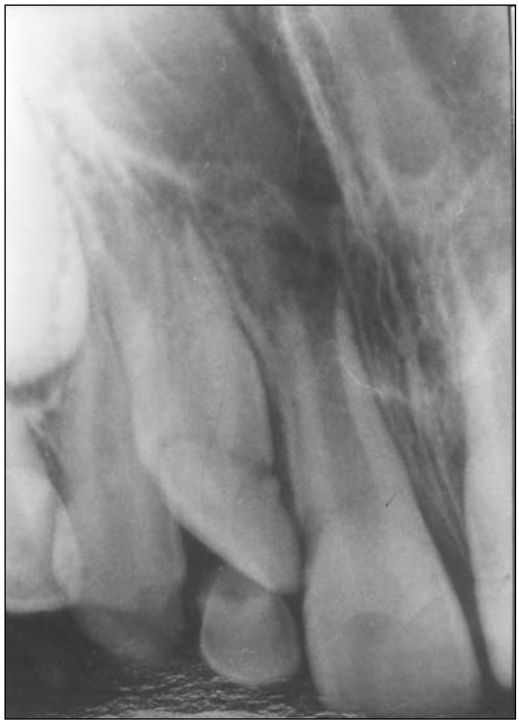

Fig. 8 Case 2: Periapical radiograph, first quadrant

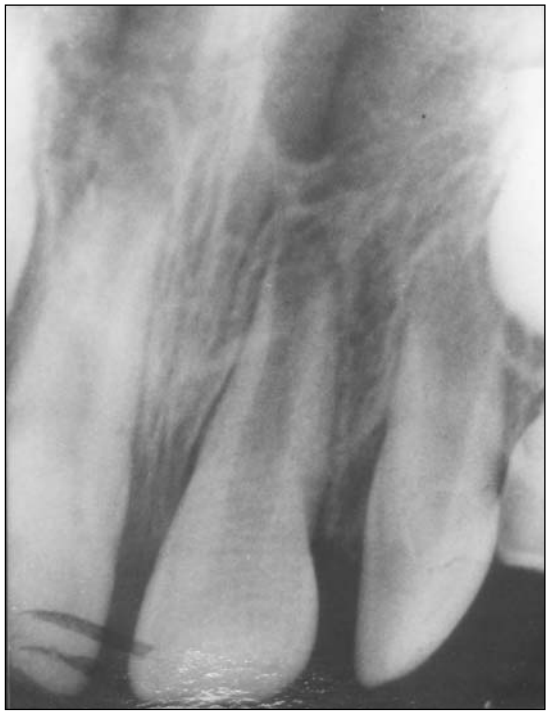

Fig. 9 Case 2: Periapical radiograph, second quadrant

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Corespondence to: Dr. Feraru Ion – Victor, Faculty of Dental Medicine, U.M.F. „Carol Davila", Bucharest, e-mail: victor.feraru@gmail.com