Orofacial Findings and Dental Treatment in an 8–year–old Patient With Trisomy 18: A Case Report

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ABSTRACT

Trisomy 18 is characterized by: psychomotor disabilities, dysmorphic features, organ malformations, including mental retardation, growth deficiency, poor motor ability, micrognathia, microcephaly, congenital heart defects, and kidney abnormalities. The oral findings typically observed in these patients are: cleft lip and a high, narrow, and sometimes cleft palate. The degree of severity of the malformations is directly related to life expectancy. Only 5% to 10% of affected infants survive beyond the first year of life. Although trisomy 18 has been widely investigated from a medical standpoint, there is a lack of reports addressing the oral manifestations and dental treatment approach in affected children, presumably due to their shortened life expectancy. The purpose of this article was to present the case of an 8-year-old child diagnosed with trisomy 18 and address the clinical features observed—emphasizing the disease-specific oral, craniofacial, and dental findings. Dental care management of the patient is described. (J Dent Child 2007;74:67-72)

KEYWORDS: TRISOMY 18, EDWARDS SYNDROME, SPECIAL-NEEDS PATIENT

Trisomy 18 was first described in 1960 by Edwards and colleagues[1] and is, therefore, called Edwards syndrome. It is a chromosomal disorder in which all or a critical region of chromosome 18 appears 3 times (trisomy) rather than twice in the cells. In some cases, the chromosomal abnormality may be present in only a percentage of cells, whereas other cells contain the normal chromosomal pair (mosaicism). The disorder is characterized by a constellation of: severe psychomotor disabilities, dysmorphic features, and organ malformations, including mental retardation, growth deficiency, poor motor ability, massive neurological dysfunction, abnormal craniofacial profile with microcephaly and prominent occiput, short neck, micrognathia, ocular hypertelorism, low-set and malformed ears, increased intermammillary distance,distinctively clenched fists with overlapping fingers, and congenital heart disease.[2] Other clinical manifestations may include: spina bifida, renal, pulmonary, and uterine abnormalities, ocular defects, and short sternum. Typical intraoral signs are: cleft lip, and a high, narrow, and sometimes cleft palate.[3]

The incidence of trisomy 18, the most common autosomal abnormality among liveborn infants after trisomy 21, is about 1:8,000 births. A strong female predominance is observed with a 4:1 female-to-male ratio.[4] No racial predominance seems to exist. The severity of the prognosis is indisputable:

a. 95% of trisomy 18 conspectuses are spontaneously aborted;[2]
b. 70% of liveborn infants die within the first 3 months;
c. 90% die before 1 year; and
d. 99% die before the age of 10.[5]

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The high mortality rate is usually due to the presence of: cardiac and renal malformations, feeding difficulties, sepsis, and apnea caused by central nervous system defects. Severe psychomotor deficit and growth retardation are invariably present for those who survive beyond infancy. As in most other syndromes, advanced maternal age is a primary risk factor accounting for trisomy 18.[2]

There are many studies that address the clinical features and conditions involved in trisomy 18 from a medical perspective. The literature is still scarce, however, on reports regarding the oral findings and dental treatment approach in affected children, presumably due to their low life expectancy.

Therefore, the purpose of this paper was to report the case of an 8-year-old child diagnosed with trisomy 18, addressing the major clinical features observed, with emphasis on the craniofacial, oral, and dental findings, and describing the dental care management accomplished.

CASE REPORT

An 8-year-old black female trisomy 18 patient (Figure 1) was seen at the clinic of the Center of Formation of Human Resources Specialized in Dental Care for Special Patients, at the Faculty of Dentistry of Ribeirão Preto, University of São Paulo, São Paulo, Brazil. The child was referred to the authors' service for general dental care by the University Hospital of Ribeirão Preto on the campus of the University of São Paulo, where she was undergoing medical treatment since the age of 5 months (Figure 2).

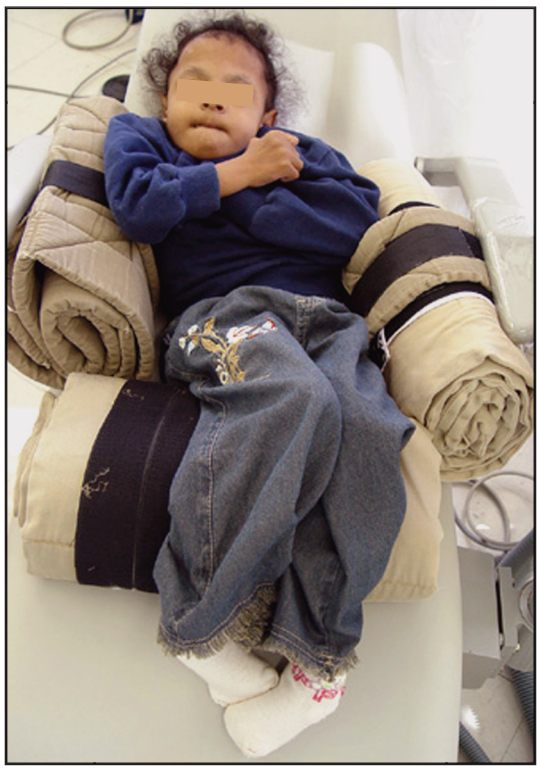

Figure 1. Patient's clinical appearance (frontal view) at 8 years old.

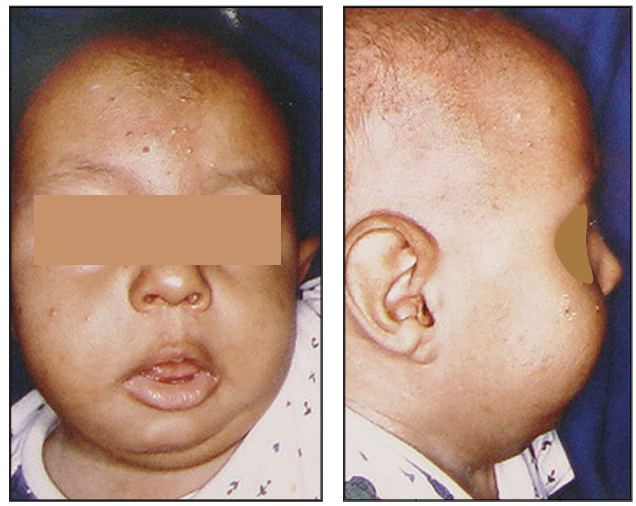

Figure 2. Patient's clinical appearance (frontal and lateral views) at the 5 months old (medical files).

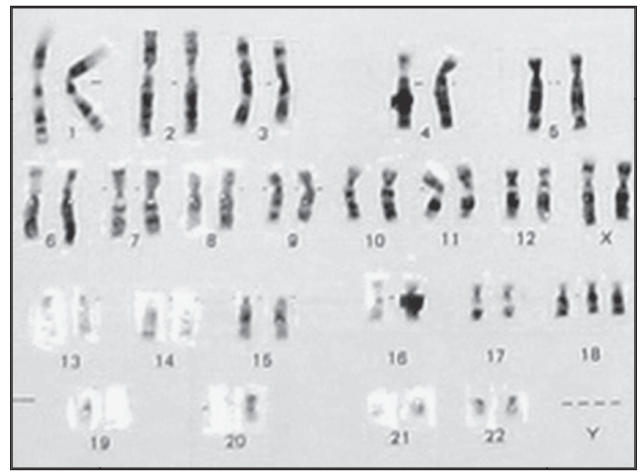

Figure 3. Patient's karyotype for diagnosis of trisomy 18.

At that time, she had been diagnosed as having trisomy 18 by the Medical Genetics Service. Cytogenetic analysis with GTG-banding revealed a 47,XX+18 karyotype (Figure 3).

According to the medical records, a series of exams had been carried out:

1. An echocardiogram evidenced intraventricular communications with mild mitral and aortic insufficiency.
2. The abdominal ultrasonography appeared normal.
3. A thoracic spine X-ray revealed left convex scoliosis with accentuated T9/T10 kyphosis and widened thoracic vertebral channel.
4. The ophthalmic exam showed temporal hypopigmentation of the left iris.

The patient was the first child of nonconsanguineous parents. The mother was 45 years old when she gave birth to the child. She had a family history of and was diagnosed with Treacher-Collins syndrome (Figure 4). Apart from these, other pathologic prenatal or perinatal factors were not detected.

An overview of the medical files showed that, shortly before seeking dental treatment, the patient presented with severe cerebral dysfunction and myocarditis. When she was admitted to the authors' service at the age of 8, the child:

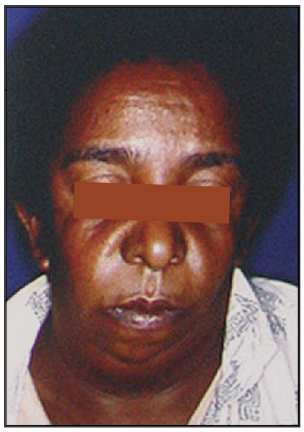

Figure 4. Clinical appearance of the patient's mother frontal view).

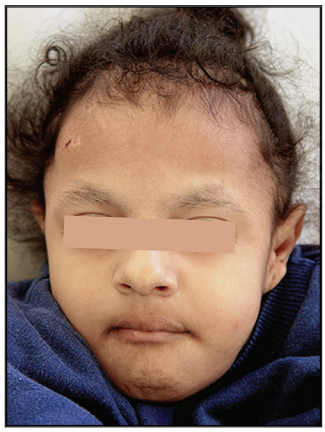

Figure 5. Craniofacial findings of trisomy 18 observed in the patient: microcephaly, micrognathia, low-set and dysplasic ears, underdeveloped nose, and small mouth.

was unable to move or communicate, had remarkable feeding disabilities, and had accentuated failure to thrive. The patient also exhibited other clinical manifestations typically observed in trisomy 18 individuals, such as malformation of superior and inferior limbs, clenched fists with the index finger overlapping the third and fourth digits (Figure 6a), hypoplastic fingernails, rocker-bottom feet with prominent heels and arched soles (Figures 6b), increased intermammillary distance, and joint contractures. The craniofacial findings included: microcephaly, prominent occiput, retroflexion of the head, low-set dysplasic ears, underdeveloped nose, micrognathia, and small mouth with limited mouth opening (Figure 5).

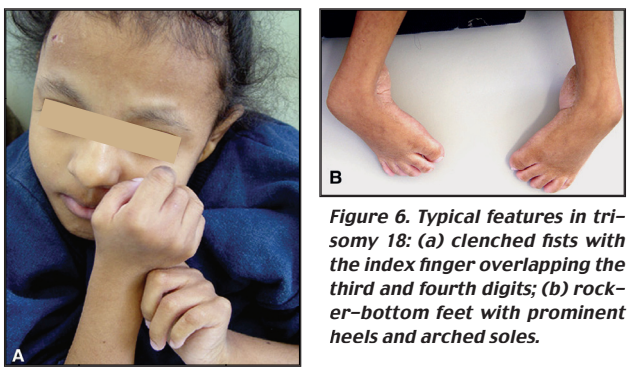

Figure 6. Typical features in trisomy 18: (a) clenched fists with the index finger overlapping the third and fourth digits; (b) rocker-bottom feet with prominent heels and arched soles.

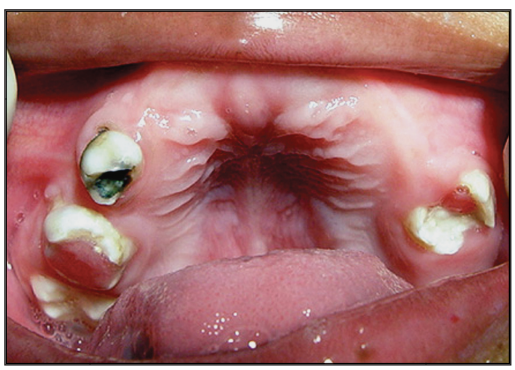

Figure 7. Intraoral view of the patient at 8 years old.

The intraoral examination revealed: a narrow, high-arched palate, multiple caries lesions in the primary teeth, dental plaque, pulp polyps in teeth nos. A and J, and gingival inflammation. The permanent first molars present (teeth nos. 3 and 14) were not decayed. Absence of permanent first molars and maxillary incisors indicated an alteration in the chronology and sequence of dental eruption (Figure 7).

A comprehensive radiographic examination, including periapical and panoramic radiographs, was carried out to outline the treatment plan; it confirmed:

1. the absence of any clinically undetectable enamel lesion overlying caries in dentin in the permanent first molars (teeth nos. 3 and 30);
2. extensive caries lesions in primary teeth nos. C, A, J, L, K, R, and T;
3. the primary second molars and the mandibular permanent first molars were taurodontic in shape;
4. no signs of dental agenesis (Figure 8).

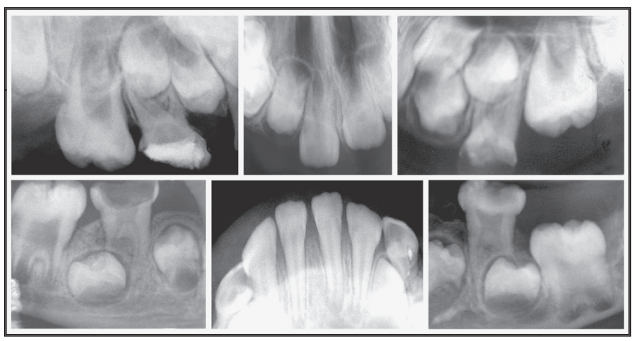

Figure 8. Comprehensive periapical radiographic examination.

Clinical and radiographic findings along with information gathered from the past medical/dental history provided undisputable evidence that the child was at high risk for caries and caries activity.

The patient was following a therapeutic regimen that included oral administration of phenobarbital (30 drops of Gardenal 2x/day) and sodium valproate (1.5 mL 3x/day) and was regularly treated by a physiotherapist and a phonoaudiologist. Before each dental treatment appointment, as a routine procedure, she was given a prophylactic antibiotictherapy prescribed by her attending physician. Clindamycin 600 mg (20 mg/Kg mL 1 hour before the procedure) was the antibiotic of choice because the child was reportedly allergic to penicillin.

Dental care for trisomy 18 patients is further complicated by their: severe intellectual deficit, limited communication skills, and reduced ability to cooperate with even simple procedures. Therefore, the emphasis on the oral health management of these special needs children must be on prevention. In the case reported, a comprehensive individual-targeted program was settled based on the patient's high caries risk and activity status. The initial phase of the treatment plan was directed at providing the parents with elementary instruction on oral health care. This included: general information on caries disease, training on mechanical removal of dental plaque, and counseling on a low-sucrose diet.

The patient's high-risk condition and adopted treatment strategies were thoroughly explained to the parents, and both were required to be willing and compliant with treatment. Furthermore, it was stressed that oral home care should be supportive of the professional care provided at the clinics and that family commitment was primordial for achieving and maintaining an adequate oral health status. It was strongly emphasized that, unless the parents completely understood the relevance of a partnership approach, positive and lasting outcomes could not be reached.

The treatment strategies included professional prophylaxis, and topical applications of:

a. 0.12% chlorhexidine gluconate (Periogard, Colgate-Palmolive, Kolynos do Brazil Ltda, São Bernardo do Campo, São Paulo, Brazil); and
b. 1.23% acidulated phosphate-fluoride gel (Sultan Topex, DFL Ind. Com. Ltda, Rio de Janeiro, Brazil).

The surgical/restorative procedures were performed under local anesthesia at sequentially scheduled appointments in the dental office, with the patient sitting on her mother's lap. Neither conscious sedation nor physical restraint was carried out. Extensively damaged, hopeless teeth nos. A, J, M, K, R, and T were extracted (Figures 9a and 9b). Tooth

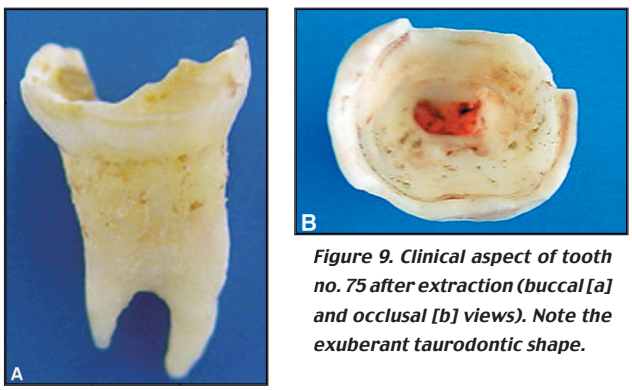

Figure 9. Clinical aspect of tooth no. 75 after extraction (buccal [a] and occlusal [b] views). Note the exuberant taurodontic shape.

no. C was restored with resin composite after indirect pulp capping with calcium hydroxide cement and a glass ionomer base were provided. Teeth nos. 16 and 46 were sealed with a resin-based sealant. In spite of the patient's micrognathia, small mouth, and limited mouth opening, it was possible to carry out caries removal, cavity preparation, and restorative procedures under absolute isolation using a rubber dam and saliva ejector. At the last session, dental prophylaxis was performed and topical fluoride was applied.

Instructions about tooth-brushing and dietary habits were emphasized at each treatment appointment. The importance of maintaining a good oral health status for a patient with such a complex medical history, severe cardiac problems, and systemic fragility was discussed with the family. The patient returned for monthly follow-up visits to monitor dental plaque control, possible onset of new lesions, and periodontal conditions. In addition, due to the difficulty of tooth-brushing clearly evidenced during the treatment, professional prophylaxis and topical applications of chlorhexidine gluconate and fluoride were performed at each visit.

Nevertheless, despite the reinforced counseling and the supportive treatment rendered at the clinic, defective oral home care was still evident. Indeed, the parents seemed not to understand at all either the severity of the child's conditions or the relevance of family compliance with both medical and dental treatments.

Regrettably, 7 months after the dental treatment began, the patient died from cardiac/respiratory arrest as a complication of the syndrome.

DISCUSSION

Trisomy 18 is the second most common human chromosomal abnormality (only trisomy 21 occurs more frequently)[6] and it is caused by the existence of an extra chromosome 18 in every cell. In most cases—nearly 80%, according to Goldstein and Nielsen[7] the syndrome manifests as a pure trisomy without mosaicism but double aneuploidies and translocations have been reported which, although rare, has a markedly more favorable prognosis.[8] The patient described in this case report had a complete trisomy 18. Thus, considering the reportedly average life expectancy of affected children, it would be safe to say that she actually was a long-term survivor.

The most remarkable features in trisomy 18 are: mental retardation, growth deficiency, and congenital cardiac malformations.[2] Other possible manifestations include: prominent occiput, retroflexion of the head, microcephaly, low-set and malformed ears, micrognathia, and high-arched or ogival palate.[3] These characteristics were clearly evident in the patient documented in this article. According to Nussbaum (2001),[2] other clinical signs typically observed in trisomy 18 individuals are: the second and fifth digits overlapping the third and fourth, hypoplastic nails, short neck, and arched soles and rocker-bottom feet with prominent heels. All these malformations were observed in the child presented in this report.

An abnormal chromosomal distribution is more often observed in pregnant women of advanced age. The average age of mothers giving birth to children with trisomy 18 is estimated to be 35 years.[2] Accordingly, the mother described in this case report was 45 years old when she gave birth. In addition, the mother had been diagnosed with Treacher-Collins syndrome. Although there are no scientifically based data to support any direct correlation between the mother's syndrome and child's trisomy, is an interesting finding.

The dental care of these patients primarily must emphasize prevention. The settlement of a comprehensive treatment plan relies on:

1. assessing the child's caries risk and activity;
2. identifying the factors and conditions that most influence this status; and, above all
3. motivating the family to realize that positive attitudes towards oral health may reduce the likelihood and/or severity of caries disease.

For ultimate benefit:

1. information transmitted to parents or caregivers should take into account their background knowledge on dental

care, socioeconomic status, and educational level; and
2. the directions must always be simple and easy to follow.

Coping with the problems of parenting a child with such a debilitating and life-threatening disorder is definitely a challenging, lifelong experience. The physical disabilities, limitations, and medical problems of these children are so demanding that sometimes oral health care is not regarded as a priority. Nevertheless, parents must be instructed and made conscious that inappropriate oral hygiene habits can lead to dental problems that will inherently bring their children additional (and avoidable) pain, discomfort, and complications.

The literature does not support any evidence of high-caries risk in trisomy 18 patients, however it is common knowledge that individuals with special needs can present a high caries incidence probably due to frequent intake of fermentable carbohydrates (sucrose-rich, soft-consistency foods offered several times a day) coupled with deficient physiological oral self-cleaning processes and inappropriate oral hygiene habits.

Patients with trisomy 18 have a low life expectancy and, therefore, are not often submitted to professional dental care. Moreover, dental treatment of these individuals is further complicated by their: severe intellectual deficit, motor disabilities, limited mouth opening, and frequently associated cardiac disorders. In this case report, however, these difficulties did not hinder the treatment to be rendered in an ambulatory environment. This differs from a previous report of dental treatment in a trisomy patient that was carried out under general anesthesia.[9] The benefits of the ambulatory treatment include the: possibility of exposing the patient to less invasive dental procedures, lower cost, absence of hospitalization, thus eliminating the risks inherent to general anesthesia procedures and hospital infection.

A noteworthy recommendation is that dental treatment of trisomy 18 children presenting with cardiac disorders as complications must invariably be carried out under a prophylactic antibiotic coverage as a routine procedure. It has been shown[6] that 90% of trisomy 18 patients present associated congenital cardiopathies. Hence, the dentist should be aware of the condition and its potential complications when treating affected individuals.

Regarding the dental characteristics of the patient at issue, an interesting finding was that 6 of her teeth—nos. A, J, K, T, 19, and 30—were taurodontic in shape. Although it is a dental anomaly highly prevalent in other autosomal trisomies, such as Down syndrome, taurodontism has not been previously referred to as a typical dental feature in trisomy 18.[10-12] In a recent case report, Tatakis and Milledge[9] described taurodontism in all permanent first molars of a trisomy 18 patient. Nevertheless, as far as the authors could ascertain, this paper is the first to describe taurodontism in the primary dentition of a child diagnosed with trisomy 18.

Follow-up of trisomy 18 long-term survivors should provide more consistent information to support or confront this presumed association. Meanwhile, one can only speculate that dental taurodontism may be added to the orodental features typically found in trisomy 18 patients.

Late eruption of teeth is a clinical feature usually observed in syndromic patients in which there is an overall developmental delay at several levels. Although Tatakis and Milledge9 do not refer to late-emerging teeth as a common oral finding in trisomy 18, a delay in dental eruption was observed in the patient described in this paper.

The review of dental literature published up to 2004 shows one report on the orodental findings in trisomy 18 patients.[9] Thus, to the best of the authors' knowledge, this paper appears to be only the second report in the dental literature that specifically addresses the orodental findings and dental care management in a trisomy 18 patient.

A recent article[4] indicated that the prognosis regarding an extended lifespan for pure trisomy 18 patients can be relatively good when untreatable life-threatening congenital anomalies are not present at birth or during the first year. Consequently, the outstanding current advances in science coupled with the early institution of aggressive medical therapies should lead to an increase in the number of trisomy 18 long-term survivors. These children and adolescents will demand dental care along with lifelong medical assistance. Therefore, dental professionals should become familiar with the clinical features and potential implications of this disease to yield high-quality oral health management of trisomy 18 patients. Moreover, it is extremely important that dentists and dental hygienists are included within the set of health professionals assisting trisomy 18 patients that survived infancy in order to enroll these children in individual-targeted, noninvasive preventive programs.

REFERENCES

1. Edwards JH, Harnden DG, Cameron AH, Cross BM, Wolff OH. A new trisomic syndrome. Lancet 1960;1:787.
2. Nussbaum RL. Thompson & Thompson Genetics in Medicine. 6th ed. Philadelphia, Pa: WB Sauders; 2001.
3. Carey JC. Trisomy 18 facts. Available at: "http://www.trisomy.org/info." Accessed November 12, 2004.
4. Petek BE, Pertl B, Tschernigg M, Bauer M, Mayr J, Wagner K, Kroisel PM. Characterization of a 19-year-old long-term survivor with Edwards syndrome. Genet Couns 2003;14:239-44.
5. Hecht F, Hecht BK. Chromosome 18 trisomy. In: Buyse ML. Birth Defects Encyclopedia. Cambridge, Mass: Blackwell Scientific Publications; 1990:385-6.
6. McKusick VA. Catalogs of autosomal dominant, autosomal recessive, and X-linked phenotypes. Mendelian Inheritance in Man. 8th ed. Baltimore, Md: The Johns Hopkins University Press; 1988.
7. Goldstein H, Nielsen KG. Rates and survival of individuals with trisomy 13 and 18. Clin Genet 1988;34:366-72.
8. Silva EO, Araújo MCP, Maia VV, Leal GF. Trisomy 18 in a 12-year-old boy [Portuguese]. J Pedod 1992;68:11-2.

9. Tatakis DN, Milledge JT. Severe gingival recession in trisomy 18 primary dentition. A clinicopathologic case report of self-inflicted injury associated with mental retardation. J Periodontol 2000;71:1181-6.
10. Stewart RE. Taurodontism in X-chromosome aneuploid syndromes. Clin Genet 1974;6:341-4.
11. Witkop CJ, Keenan KM, Cervenka J, Jaspers MT. Taurodontism: An anomaly of teeth reflecting disruptive development homeostasis. Am J Med Genet Suppl 1988;4:85-97.
12. Bell J, Civil CR, Townsend GC, Brown RH. The prevalence of taurodontism in Down's syndrome. J Ment Defic Res 1989;33:467-76.