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CASE REPORTS

The role of dentistry in the diagnosis of cleidocranial dysplasia: report of two cases

Pryscilla Batista Leite [1]*
Caroline Cavaignac Silva Carvalho [2]
Fernanda Vieira Heimlich [1]
Nathalia Almeida Freire [3]
Maria Eliza Barbosa Ramos [3]
Monica Simoes Israel [3]

Abstract:

Cleidocranial Dysplasia presents as a rare condition arising from a change in the RUNX2 gene. This alteration presents both skeletal and dental characteristics that preferentially affect the clavicles, ribs, pelvis and gnathic bones. Supernumerary teeth are one of the dental findings of CCD and hypermobility of the shoulders is a common skeletal find. The aim of this study is to report two clinical cases of CCD in two female patients, in which the dentist's knowledge about the clinical and radiographic aspects characteristic of the disease allowed the correct diagnosis of the condition.

Keywords: Cleidocranial Dysplasia. Tooth, Supernumerary. Tooth Abnormalities.

[1] UERJ, Faculdade de Odontologia - Rio de Janeiro - Rio de Janeiro - Brazil.
[2] São Leopoldo Mandic, Estomatologia - Rio de Janeiro - Rio de Janeiro - Brazil.
[3] UERJ, Estomatologia - Rio de Janeiro - Rio de Janeiro - Brazil.

Correspondence to:
Pryscilla Batista Leite.
E-mail: pryscilla_leite@hotmail.com

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INTRODUCTION

Cleidocranial dysplasia (CCD) is a generalized bone disease best known as triggering dental and clavicular abnormalities and is caused by mutations in the RUNX2 gene on chromosome 6p21. The prevalence of this change is 1:100,000 births and there is no predilection for gender[1,2].

The RUNX2 gene guides osteoblastic differentiation, chondrocytes maturation, and appropriate bone formation. This gene is responsible for the induction of CBFA1 in the bone formation process. Some studies suggest that the RUNX2 gene plays an important role in odontogenesis, acting in the differentiation pathway of odontoblasts in the formation of the enamel organ and the proliferation of the dental lamina[3].

Defects in the bone skeleton primarily affect the clavicle and skull. However, other abnormalities may be reported, such as spina bifida and delayed pelvic closure[4].

One of the common findings related to clavicular abnormalities is the hypermobility of the shoulders, due to clavicle hypoplasia, and a pathognomonic sign an act of approaching the shoulders near the midline [1.

Patients with CCD may present with short stature, macrocephaly, brachycephaly, frontal and parietal prominence, and wormian bones. In addition to these findings, hypertelorism and the broad nasal base with nasal bridge depression may be present[4,5].

On extraoral examination, it is important to evaluate the manifestations in the gnathic bones, however, some characteristic findings are common in other syndromic manifestations. Because of this, diagnostic differentiation should be performed when one of the characteristics of CCD is not present in the patient with the condition[6].

The intraoral examination makes it possible to evaluate the existence of an ogival and narrow palate, allows, through the inspection and palpation maneuver, to observe and verify whether the patient has class III malocclusion and if he has cleft palate[17].

In addition to these examinations, radiographic examination, especially panoramic radiography, is essential to evaluate deciduous tooth retention, delay or complete failure in permanent teeth eruption and prevalence of supernumerary teeth [7,8].

Supernumerary teeth are common in mandibular premolars and maxillary incisors, being an indispensable feature in the evaluation and formation of diagnosis[9].

Therefore, this study reports two cases of cleidocranal dysplasia in two female patients, in which the diagnosis was found by the dentist.

CASE REPORT

Case 1

A 17-year-old female patient presented to the Stomatology Clinic of the School of Dentistry of UERJ, accompanied by the responsible woman. The responsible person reported that the patient had dental problems and deciduous dentition was still prevalent in both dental arches. The guardian also reported that the patient had been adopted by her when she was four years old.

On extraoral examination, a prominent frontal and parietal bone and enlarged nasal prominence were observed (Figure 1). In addition to these findings, the patient presented hypermobility of the shoulders, managing to bring them closer to the midline, a common finding in cleidocranial dysplasia (Figure 2).

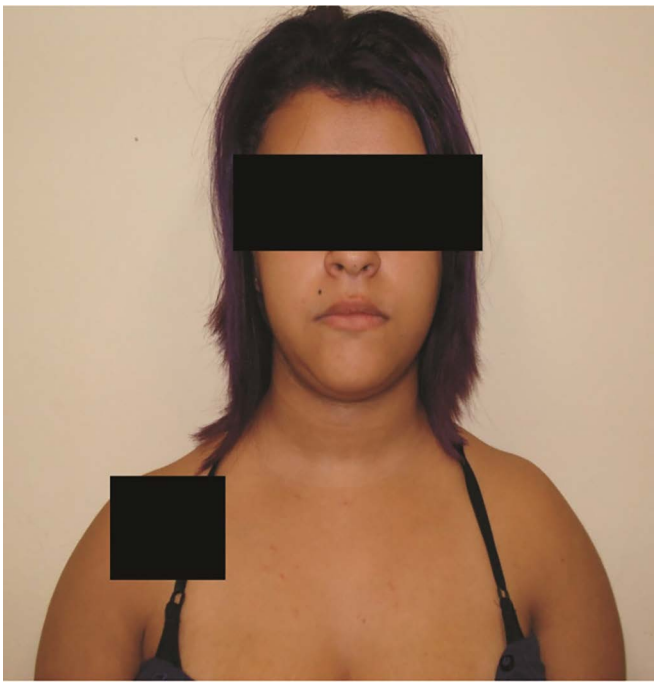

Figure 1. Clinical aspect of the patient with CCD presenting a wide nasal base with nasal bridge depression.

Intraoral examination was observed the retention of several deciduous teeth, ogival palate, open bite and presence of permanent dental germs on palpation in the vestibular of deciduous teeth (Figure 3).

Radiographic examinations were requested, including panoramic radiography, in the previous consultation with another professional. Through this imaging examination, it was possible to verify the presence of retained permanent dental germs and the eruption of permanent teeth incompatible with the chronological age of the patient (Figure 4). In addition to these findings,

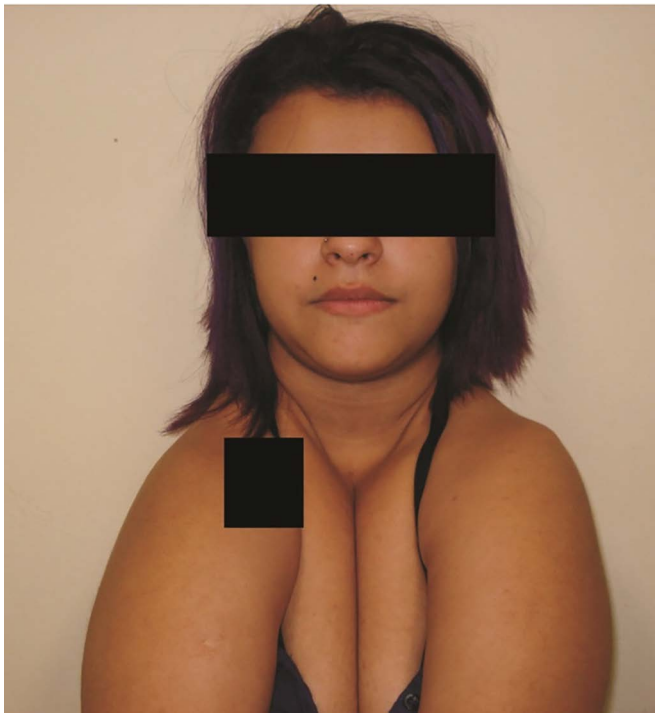

Figure 2. Shoulder hypermobility is a common feature of cleidocranial dysplasia.

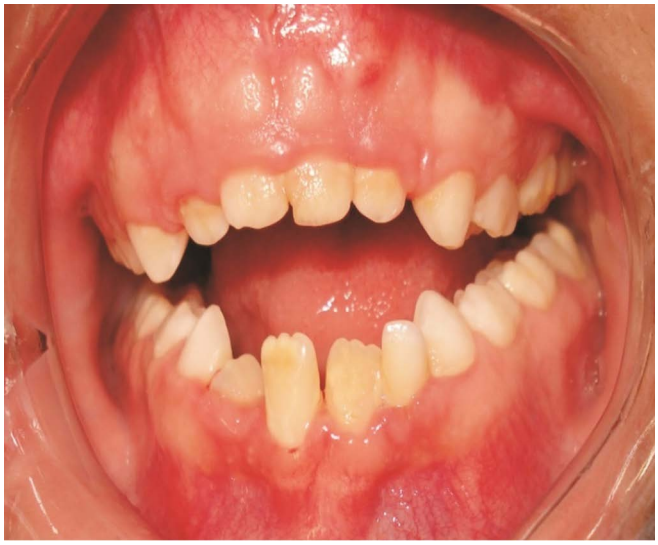

Figure 3. Intraoral examination revealing ogival palate and anterior open bite.

the presence of supernumerary teeth was detected in the region of the first upper and lower premolars.

Given the anamnesis and the extra and intraoral clinical findings associated with imaging, cleidocranial dysplasia was diagnosed.

The patient was referred to the integrated dental clinic of the School of Dentistry of the State University of Rio de Janeiro (UERJ) for a multidisciplinary approach to her treatment.

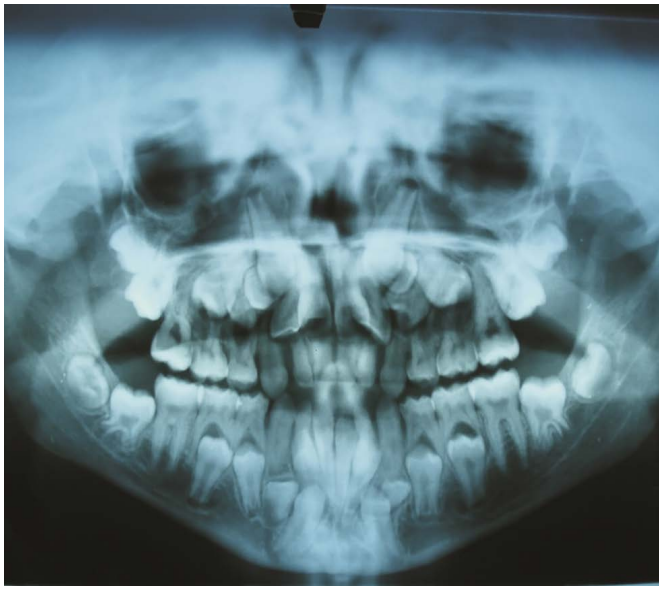

Figure 4. Panoramic radiography showing the presence of supernumerary teeth and permanent teeth impacted both in the maxilla and mandible.

Case 2

A 24-year-old female patient attended the Stomatology Clinic of the School of Dentistry of UERJ in search of a diagnostic evaluation of cleidocranial dysplasia after being referred for dental evaluation by another institution.

The patient could not inform, when questioned in the anamnesis, about the family history, making it impossible to identify the pattern of heredity of the condition.

According to dental history, the patient followed up the deciduous dentition and presented deciduous teeth in large quantities in the oral cavity.

On extraoral physical examination, there was a prominent forehead, wide nasal base with nasal base depression and shoulder hypermobility (Figure 5). In the intraoral examination, prolonged retention of several deciduous teeth and ogival and narrow palate and the open bite was observed (Figure 6). A panoramic radiograph was requested and through radiographic analysis it was possible to see supernumerary teeth and permanent teeth impacted on both the maxilla and the mandible.The panoramic radiograph in addition to the anamnesis and intra and extraoral examinations allowed the diagnostic confirmation of cleidocranial dysplasia. (Figure 7).

The patient was instructed about the diagnosis and had been referred to the orthodontics service for adequate treatment for dental alterations.

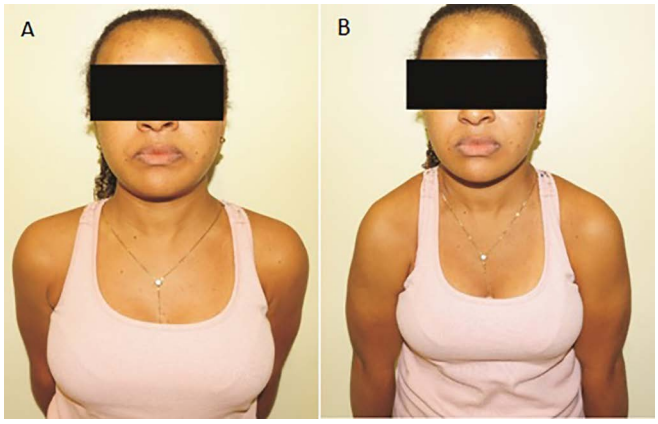

Figure 5. (A) The patient presented clinical characteristics of CCD as a broad nasal base with nasal bridge depression and shoulder hypermobility **(B)**.

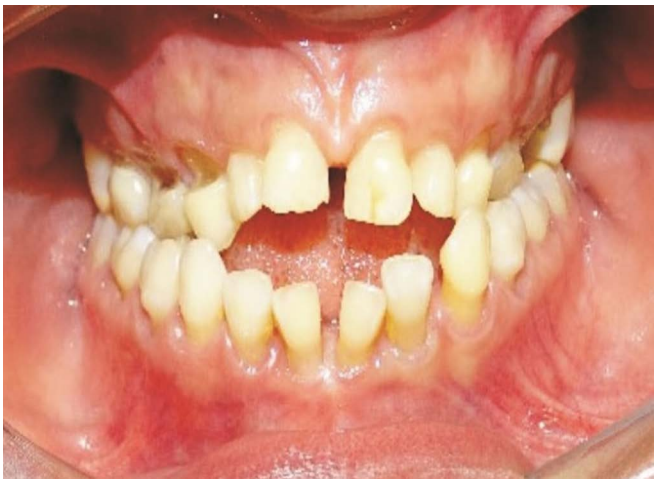

Figure 6. Ogival and narrow palate and anterior open bite.

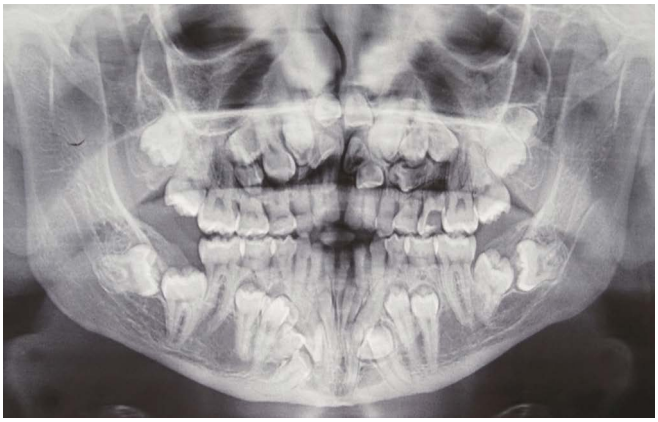

Figure 7. Multiple supernumerary teeth and tooth impaction - a common finding in the condition.

DISCUSSION

CCD is an autosomal dominant disease consisting of skeletal disorder and characterized by clavicle aplasia or hypoplasia, a large skull with prominent frontal bossa, wormian bones, delay in tooth eruption, supernumerary teeth, pelvic hypoplasia and numerous other changes such as short stature and others[4,10].

In both cases reported in this article, the characteristic clinical findings of the disease were seen. The final diagnosis of CCD was made from careful anamnesis, intraoral and extraoral examination and complementary tests. CCD has a differential diagnosis with other conditions such as hydrocephalus, osteogenesis imperfecta, osteopetrosis and other pathologies similar to this condition, therefore, its diagnostic differentiation is an essential step in the path of final diagnosis[6].

In case 1 and case 2, the patients presented hypermobility of the shoulders. According to Paul et al.[1], shoulder hypermobility is a common finding in CCD, being characterized as a pathognomonic sign in which patients are usually able to approach the shoulders to the midline. Although in case 2 the patient did not approach the shoulder to the midline, she presented mild hypermobility, in addition to other signs that helped in the diagnosis.

The craniofacial and dental alterations visualized on extraoral and intraoral examination, respectively, from both the first and second cases were fundamental for the diagnosis of cleidocranial dysplasia. Both patients presented common findings such as maxillary hypoplasia, nasal bridge depression, narrow arched palate, and malocclusion.

Other common findings have also been observed in reported cases, such as supernumerary teeth and delay in permanent teeth eruption. Such dental manifestations were better evaluated on panoramic radiography, which allowed the evaluation of the proportion of supernumerary teeth of patients and the condition of a dental eruption. In the diagnosis of CCD, panoramic radiography is a fundamental complementary examination since it composes one of the stages of the diagnosis of the condition[7,9].

Both in case 1 and case 2, the late eruption of permanent teeth was a characteristic finding. Manjunath et al.[14] considered that the absence of cellular cementum is not the probable influence on the eruption process, According to the author, the standard abnormal resorption in the bone and the increase in the percentage of the type of gap of cemento-enamel junctions can explain this delay in the eruption.

According to the literature, CCD has no predilection for gender[2]. However, in both cases reported, the patients were female.

Regarding the age of involvement, according to a study conducted by Golan et al. [7] in which 283 patients were reviewed, among which 146 were men and 137 were women, the mean age of CCD is around 18 years[7]. In the first case report, the patient was in the 1st decade of life, and in the 2nd case the patient was in the 2nd decade of life, which indicates the proximity of the mean age of involvement and the obtaining of diagnosis of the cases.

In case 1, the patient sought dental help due to dental complaints and was unaware of the condition obtaining the diagnosis from the consultation with the stomatologist. As in the study by Santos et al.[6], there was a complete absence of an initial diagnosis before the dental consultation. This case highlights the importance of the dentist in the diagnosis and referral for appropriate treatment in a multidisciplinary manner[1,8].

Unlike case 1, in case 2 the patient sought diagnostic confirmation of the condition since another professional had referred her for this purpose.

Young patients typically exhibit a relatively normal maxillo-mandibular relationship, a factor that often renders the diagnosis unnoticed by dentists. As the individual ages develop short lower facial height, acute gonial angle, an anterior inclination of the mandible and mandibular prognathism, making the condition more easily identifiable[18].

In cases where the pattern of inheritance cannot be detected, the probability of occurrence of mutations can also be considered since CCD may occur from hereditary correlation or new mutations. The RUNX2 gene is a member of the family of transcription factors and has expression restricted to the development of osteoblasts, as well as a subset of chondrocytes. The existence of chromosomal translocations, exclusions, insertions, meaningless mutations, and splicing sites, as well as missense mutations of the RUNX2 gene in patients with cleidocranial dysplasia, has been described by Otto[15].

Hereditary patterns were unknown in both reported cases. In case 1, the patient had been adopted at 4 years of age and there was no way to inform about family involvement. In case 2, the patient did not know if there was a family involvement. Therefore, it was not possible to identify whether the disease originated from heredity or spontaneous mutations. According to Mundlos[18], more than 40% of cases represent spontaneous mutations and may occur without heredity.

According to Machol et al. [13], prenatal diagnosis during pregnancy may increase the chance of detection of the pathological variant in the family (heredity pattern). Since the proportion of cases originating from the RUNX2 gene mutation is high, every child who has an individuality with the CCD spectrum has a 50% chance of developing/possessing the pathological variant.

After the diagnosis of the condition, patients were referred for immediate multidisciplinary treatment, since, according to the authors Jensen[10] and Kreiborg[3], the treatment of patients with CCD should be performed as early as possible to promote both the eruption of the erupted teeth and the extraction of the supernumerary teeth.

Among the possible treatments of the dental conditions of the patients of the reported cases, orthodontic treatment was included to improve the condition. One of the protocols for the treatment of dental abnormalities of CCD in the literature, the one proposed by Becker et al. [11] suggests the use of surgical techniques for the extraction of supernumerary teeth jointly to orthodontic traction for permanent teeth employing light orthodontic forces.

For the treatment of skeletal deformities adjunct to the correction of dental problems, orthognathic surgery appears as an option and should be performed as early as possible by a maxillofacial surgeon when indicated[8].

Some authors propose bone reconstruction with dental implants after further studies to evaluate the possibility of osseointegration involvement since there are changes in the bones of patients with this condition[12].

CONCLUSION

Therefore, in the case reports, is presented the occurrence in female patients as well as the presence of supernumerary teeth, ogival and narrow palate and nasal bridge depression in both patients is demonstrated. The patients were referred for multidisciplinary treatment after the final diagnosis.

It can be concluded that the dentist's knowledge about clinical and radiographic finds is essential in the diagnosis of maxillofacial alterations like in the process of diagnosis of DCC.

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