Aesthetic and functional management of a patient with Cornelia de Lange syndrome

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Abstract

Cornelia de Lange syndrome is a syndrome of multiple congenital anomalies. The genetic and molecular bases of these lesions are not clear. It is divided into three types based on the severity of the anomaly. Dental findings revealed contracted maxilla, malaligned teeth, multiple impacted and missing teeth. This article describes the successful management of upper central incisor with lateral opening in the apical third on the mesial surface of the root along with aesthetic and functional rehabilitation.

Keywords: Cornelia de Lange syndrome, lateral opening, mineral trioxide aggregate

Introduction

Cornelia de Lange syndrome (CdLS) is a syndrome of multiple congenital anomalies characterized by a distinctive facial appearance, prenatal and postnatal growth deficiency, feeding difficulties, psychomotor delay, behavioral problems, and associated malformations that mainly involve the upper extremities.[1] Classically, it is defined by hypo growth, mental retardation, micromelia, and distinctive facial features.[2]

Cornelia de Lange first introduced the disease as a distinct syndrome in 1933, although Brachmann had described a child with similar features in 1916.[1,3-5] CdLS is also known as Brachmann de Lange syndrome (BDLS) or Brachmann Cornelia de Lange syndrome. Other less frequently used synonyms are Brachman-De Lange Syndrome and typus degenerativus amstelodamensis.[6-8]

Etiology

The genetic and molecular bases of these lesions are not clear. However, it is thought to be due to a dominant mutation. A large part of the cases diagnosed as CdLS seem to be sporadic and 10% of the cases present chromosomal alterations, translocation of the 3q 26:2-q23[2,9] Mutations in a gene named Nipped-B homolog is seen in some patients, but the majority of CdLS cases have normal karyotypes by chromosome banding.[3] Chromosomal analysis of patients with this syndrome revealed duplication of the q 26-27 band region of chromosome 3.[10,11] Complete absence of pregnancy-associated plasma protein A (PAPPA) in pregnancies is associated with CdLS. Hence, PAPPA can be a possible marker in the prenatal diagnosis of Cornelia-de Lange syndrome.[12]

Epidemiology

Incidence of this entity is variable, ranging from 1 : 30 000 to 1 : 50000 in different population groups.[13] There is no racial predilection. It is slightly more common in females (F:M:1.3:1). Jackson *et al*.[14] reported that 33% of these children were delivered prematurely and intrauterine growth retardation was evident. Most children could not live more than 2 years and the main cause of death was pneumonia along with cardiac, respiratory and gastrointestinal abnormalities.

Clinical features

There have been two phenotypes differentiated: A classic and a milder. The genetic bases of CdLS are still not clear. In type I, or classic CDLS, patients have the characteristic facial and skeletal changes of the diagnostic criteria;[12] they have prenatal growth deficiency, moderate-to-profound psychomotor retardation, and major malformations, which result in severe disability or death. Type II, or mild CDLS, patients have similar facial and minor skeletal abnormalities to those seen in type I; however, these changes may develop with time or may be only partially expressed. They have mild-to-borderline psychomotor retardation, less severe pre- and postnatal growth deficiency, and the absence of (or less severe) major malformations. Type III, or phenocopy CDLS, includes patients who have phenotypic manifestations of CDLS that are causally related to chromosomal alterations or teratogenic exposures.

The principal clinical characteristics of this syndrome are the

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Access this article online	
Quick Response Code:	Website: www.contempclindent.org
	DOI: 10.4103/0976-237X.95113

delay in growth and development, hirsute, anomalies in the structure of the limbs, and distinctive facial characteristics.[2,15-17]

The facial features are distinctive, with microcephaly, the eyebrows very close together (sinofria), generalized hirsute (the frontal implantation of the hair is low), the ears are implanted low, small nose, nostrils antiverities (anti spillage), full philtrum, thin lips, micrognathia (the commissural inclined downwards), and perioral cyanosis.[15-17]

The extremities are also usually altered by the presence of simian palm groove, limited mobility of the elbow, micromelia, and syndactyly. Ocularly, they may present palpebral ptosis, conjunctivitis or chronic blepharitis, stenosis of the palpebral canal, severe myopia, nystagmus, and micro-cornea; 30% suffer from cardiopathy and the hypoacousia is either at a low or moderate grade. Finally, the dental problems include ogival palate (20% present associated palatal fissures), underdeveloped mandible, dental malalignment, delayed tooth eruption, microdontic teeth, periodontal disease, and dental erosion produced by frequent gastric reflux (which can also produce esophagitis, esophageal stenosis, and pulmonary problems).[15-17]

Case Report

A male adolescent, 17 years of age, reported to the Department of Conservative Dentistry and Endodontics, Govt. Dental College, Kozhikode, Kerala, with the chief complaint of pus discharge from upper front region. History revealed that he was born a full-term baby and suffered with jaundice at birth. Family history and medical history was not significant.

The patient had synophrys (bushy eyebrows meeting in the midline) with long curly eyelashes [Figure 1], antimongoloid slant, low front and back hairlines, nose with anteverted nares, downturned angles of the mouth and thin lips, long philtrum, and low set ears. Other findings supporting the diagnosis were excessive body hair [Figure 2], small broad hands with simian crease and proximal insertion of the thumbs, clinodactyly of the fifth finger [Figure 3], pigmentations of palm and soles of the feet [Figures 4 and 5], short neck with limited movement, and stiff muscle tone.

Dental findings revealed contracted maxilla, malaligned teeth, multiple impacted and missing teeth [Figure 6]. Patient had cross bite in posterior region and mandibular left premolars were in infraocclusion. Maxillary right central incisor was discolored with localized gingival recession and proximal caries. There was no pain on percussion; cold vitality test and electric pulp test were negative. Intraoral periapical radiographs revealed extensive bone loss in relation to upper central incisor with lateral opening in the apical third on the mesial surface of the root [Figure 7].

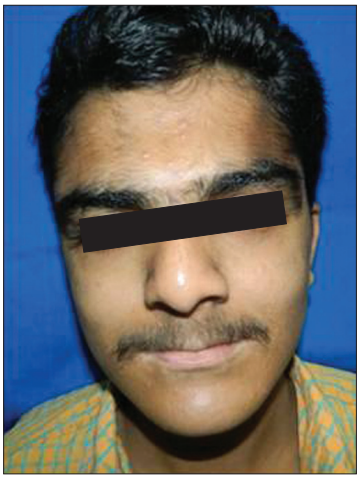

Figure 1: Synophrys and long curly eyelashes

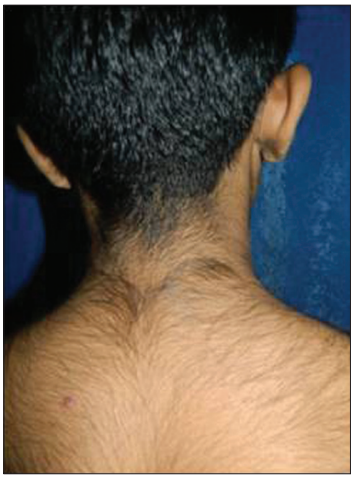

Figure 2: Excessive hair growth

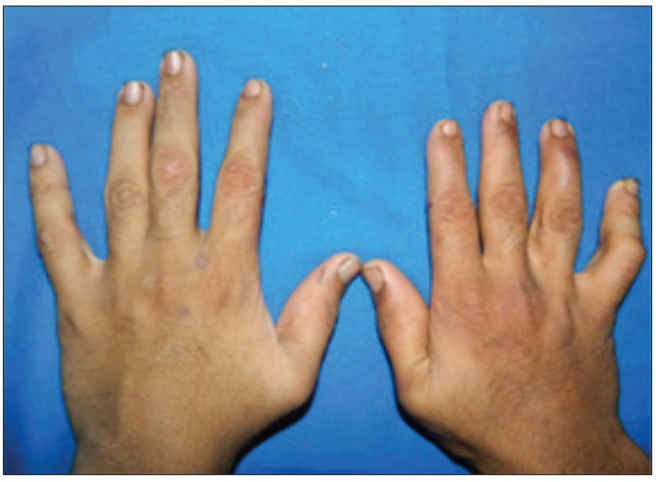

Figure 3: Clinodactyly

A treatment plan was developed that included the removal of maxillary left canine, impacted mandibular left canine and lateral incisor. Following a dental prophylaxis and oral hygiene instructions, the patient was placed on a 0.12% chlorhexidine gluconate (Periogard Oral Rinse; Colgate- Palmolive (India) Ltd.

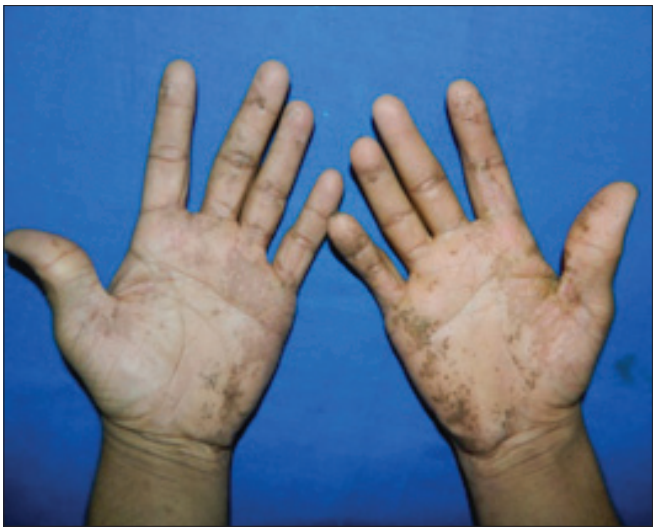

Figure 4: Excessive pigmentation of palms

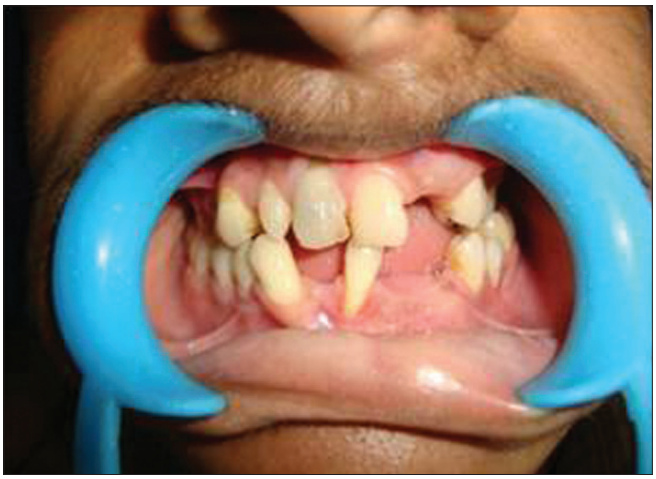

Figure 6: Preoperative

Powai, Mumbai.) oral rinse, with a recommended use of twice daily.

Although a plan of orthodontic therapy to correct the posterior cross bite was presented to the patient as part of the primary treatment option, the patient declined these treatment modalities due to the financial burden. After extraction of teeth # 11, 22, and 23, a metal-ceramic-fixed partial denture was planned to replace the missing teeth.

Endodontic treatment

Endodontic treatment along with lateral apical closure was planned for maxillary right central incisor. After the placement of rubber dam, the pulp chamber was cleaned and irrigated with 5% sodium hypochlorite (Sodium Hypochlorite, Prime Dental products, India) and final flush was done using 2% chlorhexidine (Calypso, Septodont, India). The width of the canal was gauged, and it was found to be equal to an ISO 140 no. K-file (Mani, INC, Japan). The walls of the canal were cleaned using a circumferential filing motion followed

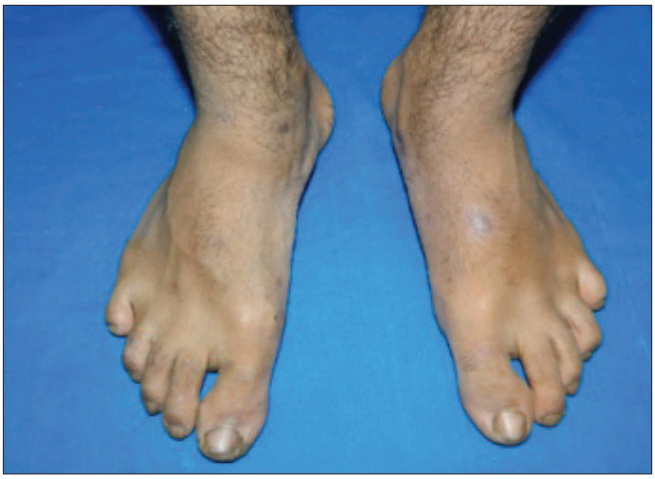

Figure 5: Excessive pigmentation of soles

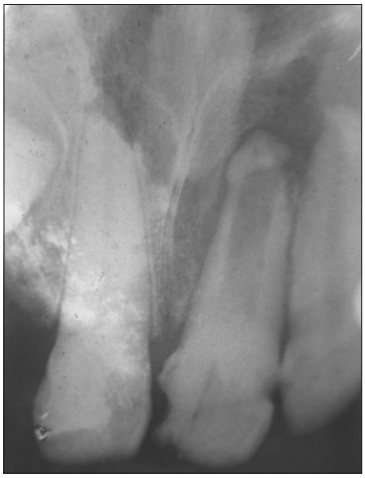

Figure 7: Preoperative intraoral periapical

by an intracanal dressing with Ca(OH)2 paste (RC Cal, Prime Dental products, India) and sealing of the access cavity with Cavit-G (ESPE, Seefeld, Germany).

One week later, the tooth was again isolated under rubber dam and the canals thoroughly irrigated with saline to wash out any remnants of the Ca(OH)2 dressing and 17% liquid Ethylene Diamine Tetracetic Acid (EDTA) Smear Clear (SybronEndo, CA, USA) for removal of the smear layer. A combination of calcium sulfate hemihydrate and de-mineralized bone particles (Type-I collagen) in powdered form, Osseomold (Advanced Biotech Products, India), was used in the formation of the artificial barrier. The powder was mixed with saline placed and packed using a delivery system comprised of two large bore needles. The material was packed against the bone and was allowed to be pushed beyond the apex into the bony space formed due to the periapical lesion in order to achieve a matrix for the placement of Mineral Trioxide Aggregate(MTA). Any excess material left in the canal was removed using the ISO 140 no. K-File. A radiograph was taken to confirm the placement of the barrier followed by mixing the White MTA Angelus (Angelus, Londrina, PR, Brazil) and using the same system of

needles for delivery of the material. Following the placement of MTA over the barrier, butt-end of a paper point was used to compact the material and clear out any excess from the walls. Moistened gauze was placed in the remainder of the canal and the access cavity sealed using glass ionomer cement (Fuji, *GC* Corporation, Tokyo, Japan). Since the MTA takes around 6 to 8 hours for complete setting, the patient was called on the next day and the moist gauze was removed and a plugger was used to check if the material was thoroughly set. Subsequently, backfill was performed using ObturaII (Obtura/Spartan, Fenton, MO, USA), and the access cavity was sealed using composite resin. A radiograph confirmed the completion of the endodontic therapy [Figure 8]. Two weeks' recall radiograph revealed the complete resorption of the calcium sulfate barrier. Intentional endodontic treatment was done for abutment tooth nos.- 20, 21, 24, 27, so that parallelism could be maintained.

The coronal portion of the root canal obturation was removed on # 27 with a heat carrier instrument for the placement post-system. The root canal was then temporized (Cavit G, 3M-ESPE, Germany). The day after completion of the endodontic treatment, the root was prepared for the post placement by removing the sealing material with Gates Glidden burs and manual files. The post space was prepared with the Cytec Fiber Glass Post drill. The parallel-sided glass-fiber post system (Cytec Blanco, Hahnenkraat, Germany) was placed into the root canal and was cemented within root canal with dual adhesive cement (Variolink II, Ivoclar Vivadent, Schaan, Liechtenstein). Then, for the core, composite resin (Valux Plus, 3M-ESPE, USA) was placed incrementally and cured for 40 seconds using soft-start technique (Elipar Freelight II, 3M-ESPE, USA). The residual excess at the restorative margin was finished with a series of finishing burs. Then, it was polished to a high luster using aluminum oxide discs (Sof-Lex, 3M-ESPE, USA).

Functional and esthetic rehabilitation

Maxillary and mandibular complete-arch impressions were made using irreversible hydrocolloid (Jeltrate, Alginate, Fast Set; Dentsply Intl, York, Pa) impression material. Diagnostic casts were fabricated from Type III dental stone (Kalstone, Kalabhai-Parsons, Mumbai, India) and mounted on a semi-adjustable articulator (Articulator #3140; Whip Mix Corp) using a face-bow transfer (#8645 Quick Mount Face-Bow; Whip Mix Corp) and a centric relation record (Take 1 Bite; Kerr Corp, Orange, Calif). The articulator was programmed using protrusive and lateral records (Coprwax Bite Wafers; Heraeus Kulzer, South Bend, Ind). A diagnostic waxing in the anteriors was done to determine the final treatment outcome. Maxillary and mandibular anterior and posterior teeth were prepared for metal-ceramic restorations. Laboratory-processed provisional restorations (BioTemps; Glidewell Laboratories Inc, Newport Beach, Calif) were fabricated and cemented with zinc-oxide eugenol (RelyX™ Temporary NE Cement, 3M, India). The patient wore the provisional restorations for 4 weeks without any complications. Definitive impressions of the prepared maxillary and mandibular anterior teeth were obtained using vinyl polysiloxane impression material (Affinis Putty Soft, Affinis Precious LB Silver; Coltene Whaledent). Working casts were generated from Type IV die stone (Ultrarock, Kalabhai-Parsons, Mumbai, India) and mounted onto the articulator using interocclusal records (Take 1 Bite; Kerr Corp). Ten unit anterior and posterior FPDs in the

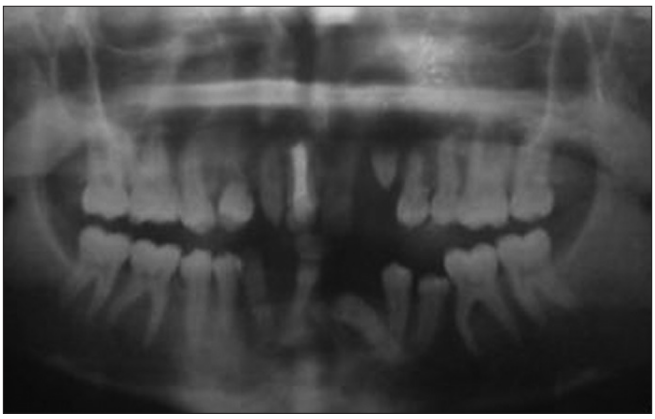

Figure 8: Post-obturation OPG

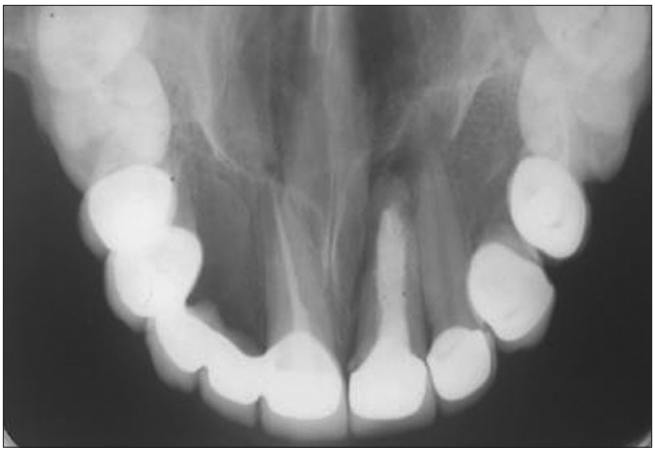

Figure 9: Postoperative occlusal view

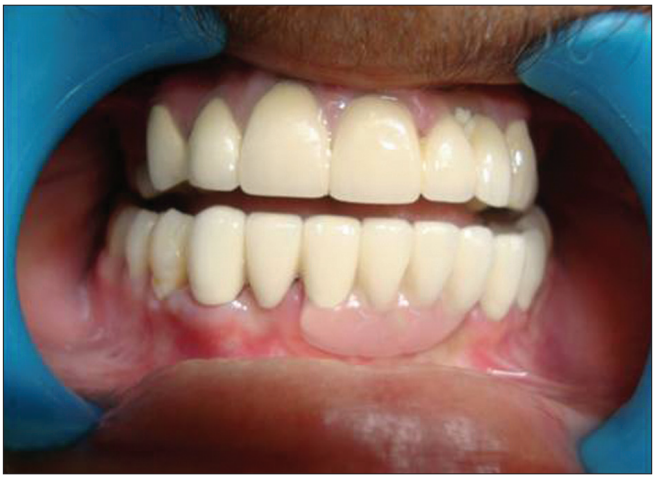

Figure 10: Postoperative

maxillary arch and eight unit FPDs in the mandibular arch were fabricated (Heraeus Kulzer, Chandler, Ariz/Ceramco II; Dentsply Ceramco, Burlington, NJ), evaluated intraorally, adjusted, and cemented (Ketac-Cem Maxicap; 3M ESPE, India) [Figures 9 and 10]. The patient had no medical complications. He was recalled every 6 months for a period of 2 years.

Discussion

Cornelia de Lange or BDLS is a rare congenital disorder of unknown etiology. Diagnosis and counseling for the CDLS is complicated by the phenotypic variability and lack of a definitive diagnostic marker. Management of such patients can perfectly be done by a team approach including cardiologist, gastroenterologist, endocrinologist, urologist, ENT specialist, and dental surgeon. Preventative revisions starting in infancy and in coordination with the pediatrician are necessary. Routine revisions every six months facilitate the changes in orofacial growth, detection of pathologies, and strengthen the care of teeth at home. Before planning any treatment, the dentist must carefully evaluate the dental needs of such patients and his/her ability and willingness to corporate during treatment. Usually, CDLS patients have some degrees of mental retardation and hence needs to be treated as a special child. The presence of lateral opening in the root was an incidental finding which needs to be sought. Supernumerary teeth and impacted teeth are also encountered in these patients. Patients could also require the expertise of orthodontists for the correction of cross bites.

MTA has an excellent sealing ability in the presence of moisture in a root canal.[18] Although the surgical intervention of perforation and repair with MTA were reported to be successful,[19,20] there are several disadvantages to the surgical procedure. Formation of a physiological gingival crevice, function regeneration, and maturation of the gingival connective tissue require 3 to 5 weeks,[21] and surgical intervention would be more difficult if the defect was located on the lingual aspect of the root.[22] A patient's anxiety about the surgery and additional healing time for soft tissue may be a limiting factor. The technique utilizing calcium sulfate or a combination of calcium sulfate and collagen in a powdered form is relatively simple as the placement is similar to that done for MTA through the use of a carrier device. Calcium sulfate was found to induce tissue repair when it was used for filling large surgical cavities because invagination of the epithelium, which prevents bone formation, is avoided. Calcium sulfate is resorbed after about 4 weeks, thereby assisting in the formation of new bone tissue and more favorable repair.[23-25]

The treatment strategy for patient with multiple missing teeth should be targeted toward protecting the remaining hard tissues and restoration of stomatognathic system. As in all extensive prosthetic and restorative therapy, the treatment goal is focused on preservation of function and esthetics. Endodontic treatment, when needed to assist with restorative treatment, should be considered. The fixed prosthodontic treatment was selected which is more conservative than other considered alternatives like surgical correction for the malocclusion. Other treatment methods involving extractions of remaining teeth and placement of removable prostheses or extractions of remaining teeth combined with implant-supported fixed or removable prosthodontics are considerably more radical and have greater incidence of clinical complications than conventional fixed and removable prosthodontics.[26,27] This patient wished to retain as much of his natural dentition as possible. However, this option requires the patient to maintain meticulous oral hygiene since caries of abutments is the leading complication of FPDs supported by the natural dentition.[28]

Conclusion

Proper treatment plan should be established before clinical procedures. With the aim of it, a thorough examination including clinical examination, radiographic assessment, and diagnostic wax up are essential. Psychological health is also an important issue in patients affected with CdLS. The patient was relieved of his symptoms and was very happy with the treatment outcome; esthetics and function were satisfactory. Besides achieving the objectives set out at the beginning of the treatment, psychologically he became a happier and more confident person.

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How to cite this article: Johns DA, Bhonsale DL, Shivashanker VY, Johns M. Aesthetic and functional management of a patient with Cornelia de Lange syndrome. Contemp Clin Dent 2012;3:S86-91.

Source of Support: Nil. **Conflict of Interest:** None declared.