Endodontic treatment and esthetic management of a primary double tooth with direct composite using silicone buildup guide

Vinaya Kumar Kulkarni, Raju Ragavendra T.[1], Jeevanand Deshmukh[2], Amit Vanka[3], Mahesh Kumar Duddu[4], Anand Kumar G. Patil[5]

Abstract

Gemination and fusion are morphological dental anomalies, characterized by the formation of a clinically wide tooth. Gemination occurs when one tooth bud tries to divide, while fusion occurs if two buds unite. The terms double teeth, double formation, conjoined teeth, geminifusion, vicinifusion and dental twinning are often used to describe fusion and gemination. Double teeth are associated with clinical problems such as poor esthetics, spacing problems and caries susceptibility. Management of such cases requires a comprehensive knowledge of the clinical entity as well as the problems associated with it. This report presents a case of primary double tooth in a 6-year-old boy involving maxillary left central incisor. The anomalous tooth was carious and pulpally involved. This was treated conservatively by endodontic treatment and esthetic rehabilitation was done with direct composite restoration using a silicone buildup guide. The treated tooth was followed up until exfoliation.

Keywords: Composite restoration, double tooth, endodontic treatment, fusion, gemination, primary dentition, silicone stent

Introduction

Double tooth presents as one of the rare anomalies affecting shape of the tooth, which denotes embryological conditions like gemination and fusion.[1] Gemination arises from an attempt at division of a single tooth germ by an invagination, with resultant incomplete formation of two teeth. The structure is usually one with two completely or incompletely separated crowns that have a single root and a root canal. Twinning is the formation of two equivalent teeth by complete gemination/cleavage. The term fusion refers to union of two normally separated tooth germs. Depending on the stage at which the tooth germs join together, the fusion may be complete or incomplete. If the contact occurs early, at least before calcification begins, complete fusion occurs forming a single large tooth. If the contact of the teeth occurs later, when a portion of tooth crown has completed its formation, incomplete fusion results with two pulp chambers and their respective root canals or a single root canal system. The phenomenon of fusion can be between the teeth of normal series or between one of the normal series and a supernumerary tooth.[2]

The etiology of double tooth is unknown, but trauma has been suggested as a possible cause, though a hereditary tendency has also been suggested.[2,3] Gemination and fusion occur both in primary as well as in permanent dentition. Fusion is more common in primary, in comparison to permanent dentition, with a prevalence of 0.5% to 2.5%.[4] The incidence of double tooth ranges from 0.14 to 5.0% in worldwide population, with no sex predilection. Unilateral presentation is more common than the bilateral. In primary dentition, double tooth occur most commonly in mandibular anterior region between lateral incisor and canine.[5]

Double teeth are generally asymptomatic and do not require treatment. However, typical problems associated include poor esthetics, malocclusion, changes in the dental arch length, hyper/hypodontia of the successional tooth, anomalies in the eruption of the permanent successor, periodontal disease or dental caries.[6]

To distinguish between gemination and fusion, it has been suggested that the teeth in the arch be counted with the anomalous crown counted as one. A full complement of teeth indicates gemination, whilst one tooth less than normal indicates fusion.[7] The phenomenon of fusion has been confused with gemination, if it involves a supernumerary tooth. When there is gemination in a dental

Departments of Pedodontics and Preventive Dentistry, Modern Dental College and Research Centre, Indore, [1]Oral Pathology, People's Dental Academy, [2]Periodontics, Rishi Raj College of Dental Sciences and Research Centre, [3]People's Dental Academy, Bhopal, Madhya Pradesh, [4]Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Hyderabad, Andhra Pradesh, [5]Prosthetic Dentistry, Mansarovar Dental College, Bhopal, Madhya Pradesh, India

Correspondence: Dr. Vinaya Kumar Kulkarni, Department of Pedodontics and Preventive Dentistry, Modern Dental College and Research Centre, Gandhi Nagar, Airport Road, Indore – 453 112, Madhya Pradesh, India. E-mail: vinayakumar53@gmail.com

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arch with hypodontia, differentiation from fusion is difficult or impossible.[6]

The purpose of this case report is to describe nonsurgical endodontic treatment and esthetic rehabilitation of a primary anterior double tooth, using silicone buildup guide.

Case Report

A 6-year-old boy reported seeking treatment for his abnormally appearing upper front tooth. Patient had previous episodes of spontaneous pain associated with the anomalous tooth, which was relieved by medications. His medical and family histories were non-contributory. Intraoral examination revealed that the patient was in early mixed dentition stage. Mandibular primary central incisors were replaced by the permanent successors. Mandibular primary right lateral incisor was exfoliated; all four permanent first molars were erupted and rest of the primary dentition was intact. Primary maxillary left central incisor had a double crown; the two halves of the crown were like mirror images. They were separated by a deep developmental groove on labial and lingual surfaces running from incisal edge to the sub-gingival region of the crown [Figure 1]. The lingual groove had a carious lesion and the tooth was tender to vertical percussion. Dental midline was shifted to the right side due to the presence of the large anomalous tooth. Intraoral periapical radiograph exhibited primary maxillary left central incisor like a double tooth. A radiolucent line was present between the two halves of anomalous tooth crown from incisal edge to the cervical area of the crown. There were two separate pulp chambers and root canals. Periapical radiolucency and root resorption in the apical region was present with the affected tooth [Figure 2]. Depending on history, clinical and radiographic examinations, a diagnosis of double tooth affecting primary maxillary left central incisor with chronic periapical abscess was made. Treatment was planned after discussion with the parents, which included endodontic treatment of the affected tooth followed by esthetic rehabilitation using direct composite restoration.

Endodontic procedure

After administration of local anesthetic, direct access was gained to the root apices under rubber-dam. Shaping and cleaning of the canals was performed using endodontic K-files and H-files (*MANI,* INC. Utsunomiya, Tochigi, Japan). Irrigation of the root canals at every step was done with 2.5% sodium hypochlorite and normal saline. The root canals were filled using a combination of calcium hydroxide, iodoform and silicon oil (Metapex, Meta Biomed Co., Ltd. Cheongju Factory, Korea) [Figure 2]. Access cavity was sealed primarily with cavit (3M ESPE AG, Seefeld, Germany) and followed by glass ionomer cement (Ketac™ Molar Easymix, 3M ESPE AG, Seefeld, Germany).

Figure 1: Intraoral view showing double tooth affecting primary maxillary left central incisor

Esthetic rehabilitation

Mesiodistal dimension of the affected tooth was considerably more in comparison with the right central incisor. It was decided to reduce the size of primary maxillary left central incisor and increase the size of right central incisor. Shade selection for the composite material was done. For primary left central incisor, incisal and proximal reduction of 1 mm and 0.5 mm of facial and palatal reduction was carried out. Maxillary right central incisor required no tooth reduction, only smoothening of the enamel margins was done. Preliminary impression was made in alginate and master model was prepared using dental stone. Laboratory wax-up was done using inlay wax, to mimic the final tooth counters [Figure 3]. A composite buildup guide (stent) was fabricated using addition-type silicone elastomer (Affinis putty supersoft, polyvinylsiloxane, Coltene/Whaledent AG, Feldwiesenstrasse, Switzerland) to register the palatal surfaces, proximal contours and the incisal edges against which the composite would be built [Figure 3]. The teeth were etched for 15 seconds with 36% phosphoric acid and rinsed for 10 seconds with water. After removal of the excess water, dentin bonding agent (Adper ™ Single bond 2, adhesive; 3M ESPE AG, Seefeld, Germany) was applied for 15 seconds with a brush and then air thinned. The bonding agent was light cured for 20 seconds. The stent was then positioned in the mouth and the palatal, proximal and incisal aspects

Figure 2: (a) Pre and (b) postoperative intraoral periapical (IOPA) radiographs, showing primary double tooth with two pulp-chambers and respective root canals filled with root canal filling material

were built with the composite resin material (Filtek Z250; 3M ESPE AG, Seefeld, Germany) in an incremental manner followed by facial surfaces. Final finishing and polishing of the composite was done using finishing burs and composite finishing kit (SHOFU, SHANK CA, PN 0306, Shofu Dental Corporation, USA). Even though dental midline was not coinciding, reasonably good esthetics was delivered to the patient [Figure 4].

Patient was followed up for 1 year at monthly intervals, the patient was asymptomatic throughout the period and root of the primary double tooth was resorbed at a normal rate. After 1 year, the permanent maxillary left central incisor erupted in the oral cavity from the palatal aspect of the affected tooth [Figure 5], displacing it facially. The primary double tooth showed grade-3 mobility. However, permanent right central incisor was not yet erupted, the primary predecessor exhibited grade-2 mobility. The radiographic examination revealed almost complete root resorption of the primary central incisors. Simultaneously, root canal filling material was also resorbed and the permanent successors were in the path of eruption [Figure 6]. The amount of root formation and the eruption of permanent maxillary left central incisor were ahead of the permanent maxillary right central incisor. Within 2 weeks period after the first year follow-up appointment, the patient reported with physiologically exfoliated primary double tooth.

Discussion

In the presented case, full complement of primary maxillary teeth were present and at the same time the two halves of the anomalous crown were like mirror images, indicating clinically a case of gemination. However, radiographically, there were separate pulp chambers and root canals. This indicates incomplete fusion between primary maxillary left central incisor and a supernumerary tooth. Fusion between a normal tooth and a supernumerary one is quite rare in primary dentition, with a prevalence of 0.06% in Japanese children and 0.2% to 0.6% in the children of western countries.[8] Concerning the treatment, an exact differentiation between gemination and fusion is not critically important,[9] rather important are their associated problems. Traditional terminologies such as gemination and fusion should be used to indicate the potential embryologic cause and not as an exact diagnosis.[10] Clinically, a more appropriate terminology such as double tooth can be preferred.

In the present case, primary double tooth was pulpally involved with periapical radiolucency and root resorption in the apical region. The treatment options were surgical removal of the anomalous tooth followed by a space maintainer, to facilitate easy eruption of successional tooth. Because, presence of primary double tooth may cause delayed resorption of root due to greater root mass and increased area of root surface relative to the size of the permanent successor crown. This may lead to delayed or ectopic eruption of the permanent successor.[5] Another option was to treat the double tooth endodontically and esthetically rehabilitate using direct composite restoration. This option was less invasive, but required a careful observation of the patient with repeated recall visits, to assess the root resorption

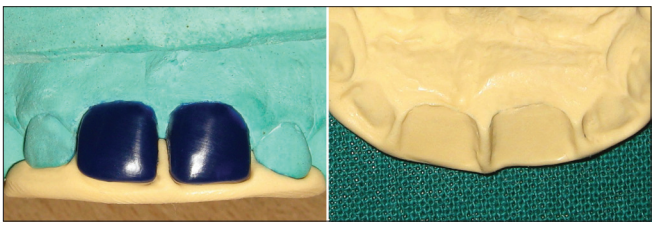

Figure 3: Wax-up done using inlay-wax and silicone putty stent was fabricated

Figure 4: Direct composite restoration done on primary maxillary central incisors

Figure 5: Intraoral view after 1 year follow-up, showing erupting permanent maxillary left central incisor. (Black circle)

Figure 6: Follow-up IOPA radiograph after 1 year, showing almost complete root resorption of primary double tooth and erupting permanent successor

pattern of anomalous tooth. Patient's parents insisted for preservation of the natural tooth and agreed for repeated recall visits. They were made aware of the condition and were ready for extraction of the double tooth at any time if it interferes with the eruption of permanent successor. Hence, the second treatment option was opted.

After the treatment, patient was followed up for 1 year and the period was uneventful. The root of primary double tooth resorbed at a normal pace and exfoliated physiologically. The permanent maxillary left central incisor erupted before the permanent maxillary right central incisor and this can be attributed to the amount of root development.

Several cases of primary double teeth have been reported in the literature, many of which emphasized on preservation of the primary double teeth.[1,11-13] No definitive treatment for the primary double teeth to improve the esthetics was performed. At the same time, there was an association between presence of primary double teeth and congenital absence of one of the permanent successors,[1,11-13] such association was not seen in the presented case.

A case of primary double tooth involving primary maxillary right lateral incisor and a supernumerary tooth in a patient with cleft lip was reported by Meadors and Jones.[14] There was supernumerary permanent successor to the supernumerary primary tooth. The primary double tooth along with supernumerary successor was removed surgically.

Kamakura *et al*.[15] have reported a case similar to the presented one. The primary maxillary left central incisor was fused with a supernumerary tooth and was involved pulpally, which was treated endodontically and restored with composite restoration.

The uniqueness of the present case was use of silicone buildup guide (stent) for composite restoration. It was a useful custom made tool for easy and accurate composite build up of the palatal, proximal and the incisal aspects. It reduced the amount of trimming required and also the chair-side time.

Conclusion

Successful endodontic and esthetic treatment of primary double tooth has been presented. Owing to the abnormal morphology of crown and the complexity of the root canal system in double tooth, pulp therapy would present difficulties. Hence, careful clinical and radiographic examination is essential to successful endodontic treatment of such anomalous tooth. Clinicians should never assume that canal systems are simple and should be aware of anatomical variations in the tooth they are treating. Composite restoration on palatal surfaces of the anterior teeth using free-hand technique is difficult. The time spent to restore a single tooth is prolonged and each restored tooth needs more trimming and polishing. Thus, the use of stents acts as an adjunct to allow quick and easy restoration of teeth.

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