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# Dens invaginatus in a geminated central incisor: case report

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## Abstract

*Simultaneous occurrence of gemination and dens invaginatus in the same tooth is reported. Combined surgical and non surgical endodontic therapy was completed, with satisfactory results.*

## Literature Review

Gemination has been defined as a partially successful attempt by the tooth bud to divide (Levitas 1965). The result is usually a wide bifid crown, a single root canal, and a common root (Tannenbaum 1963). The incidence of gemination has been placed at 0.47% (Clayton 1956).

Dens invaginatus is an abnormality of permanent tooth development that results in an enamel-lined cavity intruding into the crown and/or root (Townend 1974).

The occurrence of gemination and dens invaginatus as separate entities is well documented in the dental literature. The concomitant development of these two anomalies, however, is extremely rare. One such case has been described without elaboration on treatment or etiology (Burzynski 1980). The objective of this paper is to report such a rare occurrence and its clinical management.

## Case Report

A 10-year-old white male was referred to the pediatric dental service at Children's Hospital of Pittsburgh for evaluation of an abscessed maxillary left permanent central incisor. The patient's medical history was unremarkable especially for trauma. For the preceding four weeks, the patient had been taking penicillin prescribed by the referring dentist.

Clinical examination of oral structures appeared to be within normal range, with the exception of the maxillary left permanent central incisor which exhibited increased mesiodistal width and a slight bifid appearance (Fig 1). Radiographic examination revealed a multicanal, single rooted tooth with two distinct invaginations extending beyond the crown into the root. Definite periapical radiolucency was observed, which correlated with the previous pain and swelling reported by the patient (Fig 2, see next page).

In view of the anomalous anatomy of the pulp canals and the overt anxiety of the patient, surgical endodontic treatment under general anesthesia was planned. Two weeks later, the patient was taken to the operating room. Lingual access was obtained into the pulp chamber and invaginations. Three canals were localized and filed. The invaginations were debrided, irrigated and dried. Obturation of the invaginations and canals was completed with gutta-percha using lateral condensation. A full-thickness labial flap was reflected and access to the root end was gained through the labial plate. The apical area was debrided and curetted. Retrograde amalgam was placed to help obtain an apical seal. An intraoperative culture of the apical area grew occasional colonies of alpha-hemolytic streptococci. The patient received 1 million units of penicillin G prior to surgery, which was followed by 1500 mg of penicillin V daily in three

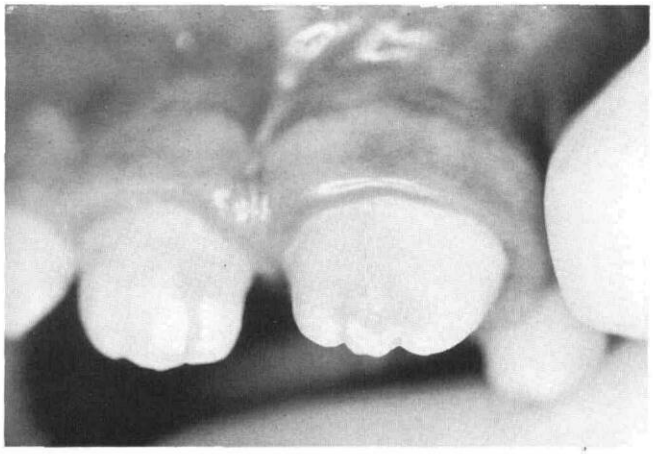

**Fig 1.** Anterior view showing increased mesiodistal width compared to normal antimere.

**Fig 2.** Pretreatment radiograph showing multiple dilacerated canals and invaginations.

divided doses, for a period of 10 days. The postoperative course was unremarkable.

Three months after surgery a final restoration was planned for the lingual access. Upon reentering the tooth, slight hemorrhage was noted. An additional canal was located and instrumented after exhaustive exploration. Four weeks later the canal was filled with guttapercha.

The patient has been followed for three years and has had no complications (Figs 3 & 4).

## Discussion

The clinical and radiographic evidence of a widened, multicanal, bifid central incisor with invaginations occurring in a dentition with normal tooth count suggests simultaneous gemination and dens invaginatus.

Previous reports have indicated the occurrence of dental invaginations concurrently with other dental anomalies such as taurodontism, short roots and microdontia (Ireland et al. 1987; Casamassimo et al. 1978). One case of dens invaginatus and gemination has been reported previously (Burzynski 1980).

**Fig 3.** Three year post-treatment radiograph. Note the extent of dilacerated canals into the incisal edge.

Most authors agree that dens invaginatus is caused by a distortion of the enamel organ causing protrusion into the dental papilla and subsequent development of an enamel-lined cavity which communicates with the oral environment (Oehlers 1957). A recent microradiographic study suggested that excessive and prolonged activity of the cells which form the lingual pit could provide the mechanism for dental invagination (Benyon 1982). The bizarre occurrence of these anomalies in one tooth is most likely due to chance, although genetic predominance toward both anomalies is quite possible.

**Fig 4.** Anterior view three years postoperatively, prior to orthodontics therapy. Note the lingually locked left lateral incisor.

It is interesting to speculate on the embryologic timing of the two anomalies. Most likely, gemination occurred during the initiation stage of development and dens invaginatus followed somewhat later during morphodifferentiation.

Clinical management of such anomalies should emphasize preservation of function and esthetics. It has been shown that pulpal necrosis commonly seen in invaginated teeth can be treated nonsurgically (DeSmit 1981). However, in this case, given the pre-existing pain and swelling, patient anxiety and multiple dilacerated canals, the decision was made to proceed surgically. The difficulty in obtaining complete obturation of both the canals and invaginations necessitated the retrograde amalgam seal. Further, we suspected that the orifices into the two most lateral canals originated well within the incisal edge. Obtaining access into those canals would have required extensive elimination of tooth structure which we did not consider an acceptable option. Three year post-treatment radiographs suggest that the amalgam has sealed the canals at the apex.

Prevention of pulpal necrosis in such a tooth would have been the treatment of choice. Sealing the entrance to the invagination immediately after eruption would be a preventive measure. Surgical exposure and sealing prior to eruption could have been considered if an early radiographic diagnosis had been made.

Esthetic management of gemination could involve recontouring, veneering, or treatment of the affected tooth or the adjacent teeth to create an illusion of symmetry.

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## Curing light damage linked to disinfectant

Glutaraldehyde solutions used to disinfect curing light guides may damage the guides' fiber-optic rods and compromise the performance of light curing units, according to a study recently published in General Dentistry.

Researchers at Oregon Health Sciences University School of Dentistry undertook the study after they noticed that some composite resin restorations placed in their clinic were chalky and soft after curing, while others required extremely long curing times to achieve an acceptable hardness. The researchers, Drs. William T. Dugan and John H. Hartleb, examined the light guides and observed what appeared to be a coating on the curing tips. At first they though the coating was cured resin picked up from contact with restorations, but a polishing procedure to clear the tips did not improve their performance. The researchers then observed that the insertion ends of the removable light guides also were coated, and that polishing of both ends of the guides restored them to normal curing function.

Writing in the January/February 1989 issue of General Dentistry, journal of the Academy of General Dentistry, Drs. Dugan and Hartleb explain that the finding of deposit on both ends of the light guides led them to suspect an environmental factor as the cause. They conducted an experiment to examine one such factor: the 10-minute immersion in a buffered gluteraldehyde solution that light guides in the clinic underwent after each use.

In the experiment, fresh light guides were immersed in the buffered solution for four days. Depth of cure subsequently achieved by these guides decreased significantly, as did curing depths effected by light guides that had been in clincal use with intermittent immersion in gluteraldehyde for 10 months. Fresh light guides and some that had been resurfaced cured composite resin to a depth of 4.5 mm; the clinically used guides and those stored in disinfectant for four days cured to depths of 2.0 and 2.5 mm.

Scanning electron microscopy photographs of the light guides demonstrated significant damage to thge structure of their glass rods after immersion in glutaraldehyde; it was this damage that had created the appearance of a coating on the unmagnified rod ends.

Drs. Dugan and Hartleb recommend that other disinfecting solutions and other brands of lamps (they tested the Visilux 2) be examined for similar problems.