BILATERAL TWO-ROOTED MANDIBULAR CUSPIDS

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양측성 2치근 하악견치의 증례를 보고한다.

근관치료술식을 합리적으로 시행하기 위해서는 치아 내부구조에 관한 정확한 지식이 필수적으로 요구되고, 근관술식을 하는 동안에는 하악 견치가 2개의 독립적인 치근을 가질 빈도에 대해 고려하여야 한다. 그리고 근관치료가 예기치 않게 실패하였을 경우, 2개의 근관계가 존재할 가능성에 대해 생각해 보아야 한다.

REVIEW OF THE LITERATURE

The importance of a knowledge of the internal anatomy of teeth can not be overemphasized in the practice of endodontics.

The main objective of endodontic therapy is the thorough mechanical and chemical cleansing of the entire pulp cavity and its complete obturation with an inert material[1]. Ingle and Tainter[2] list the most frequent cause of endodontic failure as apical percolation and subsequent diffusion stasis into the canal. The main reasons for this failure are known to be incomplete canal obturation and an untreated canal.

In cases of pulp pathosis, according to Hession[3], successful endodontic therapy depends upon the removal of the cause, the transfer or the site of inflammation to a level at which the body's defense process are competent, and the effective sealing at that level. Endodontic treatment may be unsuccessful when the operator fails to recognize the presence of an additional root canal. Successful endodontic treatment of a tooth demands that the dentist have a thorough knowledge of root canal morphology.

Root canal anatomy and morphology is often complex. The numbers of roots and canals may vary for any tooth. In the human dentition, the roots of some teeth have only one canal, almost without exception. Other roots have two canals that coalesce to form one canal, and occasionally there are roots that have one canal that bifurcates and forms two canals[4].

When reviewing anatomical studies of mandibular cuspid teeth, most studies give the mandibular cuspid as having one root and one canal in most cases[5]. Weine[6] has stated that mandibular cuspids usually have only one root but in rare cases may have two separate roots, and Cohen and Burns[7] have said that the unusual occurrence of two roots can create difficulty, but this is rare. This is true in other studies too. Hession[8] reported that all except one canine of the nine studied possessed one canal ; the exception contained two canals, and two separate roots. And it has been found that the possibility of 2 canal-2 foramen was 3~6% in some studies[1,4,9].

Considering the above mentioned studies, one can realize the rarity of a two-rooted mandibular cuspid. Thus it will not easy to find a two-rooted mandibular cuspid. However, if one fails to notice a two-canaled system, the result also will fail.

The following case report describes an unusual case of bilateral two-rooted mandibular cuspids.

CASE REPORT

A 25-year-old Korean female was presented with mastication difficulty due to rampant caries on general dentition.

Rampant caries seemed to be evoked by negligent oral hygiene. Clinical crowns of both right and left mandibular cuspids were decayed deeply to the pulp and their general morphology seemed to be normal except for the carious tooth structure. The teeth were extremely hypersensitive to thermal change.

A full mouth radiographic survey was taken to examine all teeth in the dental arch. Radiographs of lower cuspids were taken from different horizontal angles. Radiographs from a straight facial view of these cuspids(Fig. 1) gave some but limited information as to tooth morphology. These films did not gave me confidence in the number of roots and canals. However, they revealed two different endodontic systems for each tooth when they were exposed to mesially angulated cones. Other films showing the same tooth(Fig. 2) also demonstrated two different root canals contained in two different roots.

After a rubber dam application, access cavities were prepared. Insertion of endodontic files into the teeth confirmed 1 buccal and 1 lingual canals within each tooth(Fig. 3). The two canals of the

Fig 1. Preoperative radiographs of mandibular cuspids taken from a straight facial view show sharp changes in density(straight arrows). Double root prominences (curved arrows) are seen on mesial surfaces, but they are absent on distal surfaces. A, Right mandibular cuspid. B, Left mandibular cuspid.

right cuspid were cleaned and shaped to size # 35 with K-files under constant irrigation with 2.5% sodium hyposchlorite and 3% hydrogen peroxide solution. The buccal canal of the left cuspid was treated the same as the right one. However, the lingual canal could not be treated as such because

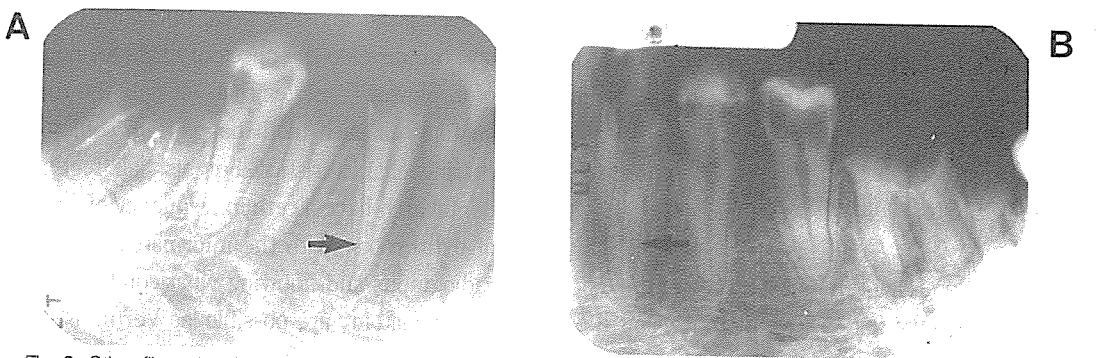
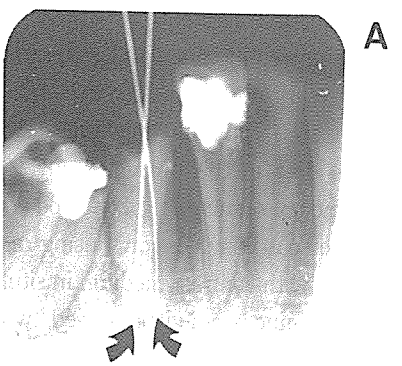


Fig 2. Other films showing same cuspids show double root prominences on both mesial and distal surfaces(arrows). A, Right mandibular cuspid. B, Left mandibular cuspid.



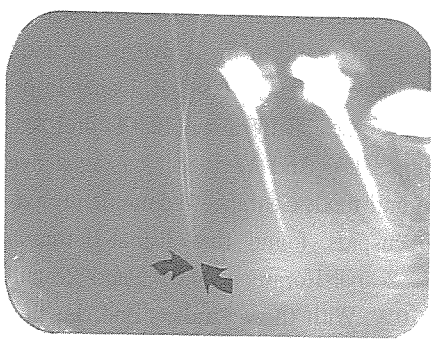


Fig 3. A, Radiograph of right mandibular cuspid taken from a mesial angle with instruments in place shows two different root canals contained in two different roots (arrows). B, Left mandibular cuspid shows two different root apexes(arrows).

Fig 4. Radiographs taken from a mesial angle after root canal filling. A, Right mandibular cuspid. B, Filled canals of the left mandibular cuspid show two canals of different paths and roots.

the apical portion of it was not patent when negotiated with a file # 8.

At the 4th visit, there was not any exudate in the canals at all, and root canal obturations were achived using a lateral condensation of guttapercha and sealer(Fig. 4). The lingual canal of the left cuspid was filled to the deepest point accessible.

DISCUSSION

An understanding of the morphology of the pulp cavity is necessary for successful root canal therapy.

What is generally seen on intraoral radiographs is a very poor image of the canals. Because root canals have three dimensions, this image is deficient, since it is impossible to see the buccolingual aspect, although it is on this plane that root canals exhibit the largest number of variants. Thus, in performing endodontic therapy, before a dentist begins instrumentation of the access, it is necessary for him to study radiographs from several different angles[10,11]. Frequently, several films showing the same tooth will be available for study[12] for example, if a full mouth survey has been taken. If other films are at hand, each will give a slightly different view of the same tooth. Examine that tooth on each film in which it appears.

In this case, the radiographs from a straight facial view of these cuspids gave some but limited information as to pulp/root morphology. a sharp change in density almost always indicated that a broad pulp chamber has split into two distinct finer canals[13]. A double root prominence on the mesial surface indicates two bulges and a concavity, and the absence on the distal surface indicates a flat or convex root surface[12]. Through the radiographs from mesial and distal projections and other films showing the same cuspids among full mouth radiographs, two definitive canals, each in its own root bulge were confirmed. This case pointed out the importance of a preoperative radiographic examination to avoid errors.

Working clinically, it is obvious that the canal proper is an invisible area, but, with experience, one can develop the necessary skill for negotiation of it. Slowey[13,14] states that not only the root canal anatomy of each tooth has certain commonly occurring characteristics, but also all teeth in the dental arch have a certain frequency of occurrence of extra roots. With the information given by the radiographs and knowing what combination of internal anatomy are possible, as Vertucci[15] has stated, the operator will be able to determine the type of canal configuration. This information gained before the initiation of preparation, will greatly facilitate subsequent treatment.

Dentists have been treating mandibular cuspids endodontically for years under the general assumption that these teeth possess only one root canal. There is no data in the present study to suggest the frequency of occurrence of two-rooted or two-canaled lower cuspids. Hession[8], using radiographic technique with contrast medium in situ, reported that one of nine studied possessed two canals and two separate roots. Pineda & Kuttler[9], using radiographic examination on 187 extracted human teeth, demonstrated that 1canal-1foramen was 81.5%, 2canal-1foramen 13.5%, and 2canal-2foramen 5.0%. Green[4], using a dye penetration method on 100 cuspids, noted that 1canal-1foramen was 87.0%, 2canal-1foraman 10.0%, and 2canal-2foramen 3.0%. And Vertucci[15], using a dye penetration and tooth clearance technique on extracted 100 cuspids, found that 1canal-1foramen was 80.0%, 2canal-1foramen 14.0%, and 2canal-2foramen 6.0%. With these studies, one can find that the frequency of two-rooted or two-canaled lower cuspid will be 3~9%.

From the low percentage of two-rooted cuspids in other stduies, it seems unlikely that many cus-

pids have two roots. However, a thorough clinical and radiological examination of the teeth will enable those with a possibility to have two roots to be identified as in this presented case.

To gain successful treatment result, all canals must be located during the course of root canal therapy. Care and attention should be directed in access preparation and exploration of these canal systems, avoiding the possibility of oversight[16]. The expected root canal anatomy dictates the location of the initial entry of access. It dictates the size of the first files used, and it contributes to a rational approach to solving the problems that arise during therapy[14]. For a more adequate examination of the floor of the pulp chamber, the conventional access opening should be modified into one that is more oval in shape and wider labiolingually than is customarily thought necessary[15]. This permits better visualization of a second canal, as well as proper instrumentation of the lingual aspect of a single canal. Moreover, Cohen and Burns[7] described that if there are two roots, precurving of instruments at initial access will enable the clinician to trace down the buccal or lingual root wall until the tip engages the orifices.

Even if the mandibular cuspid has only one root, it may have Type I, I or III configuration, as do the mandibular incisors[6]. Because the root canal is thin mesiodistally but wide labiolingually, in cross-section, the lingual portion of the canal is almost slit-like in comparison to the larger buccal portion. Thus fine files often are necessary to clean the lingual wall thoroughly.

The presented case here showed that two roots can exist bilaterally in some of these cuspids ; therefore, the operator must always be aware of the possibility of double roots and canals when treating mandibulr cuspids. Furthermore, not only in conventional endodontic therapy but also in surgical endodontic treatment, knowlege concerning the number of roots and canals become indispensable to achieve success.

SUMMARY

The case of bilateral two-rooted mandibular cuspids has been presented.

An accurate knowledge of the morphology of the pulp cavity is essential before an endontic procedure can be approached rationally. The frequecy with which a mandibular cuspid has 2 separate roots should be considered during root canal preparation procedures. The dentist should also be aware of the possibile existance of two canal systems if root canal therapy should unexpectedly fail.

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