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A Successful Management of Severely Compromised Mandibular Molars with Furcal Involvement using Conventional Bicuspidization: 2 Case Series

Dr. Pallavi Kumari, Dr. Deepakshi Angral, Dr. Vikrant Thakur
PG Endodontics Himachal Dental College Sundernagar

Dr. Vijay Kumar, Dr. Shweta Verma
Professor, Himachal Dental College Sundernagar,

Dr. Neeraj Sharma
Reader, Himachal Dental College Sundernagar

Abstract:- Because mandibularmolars are the first teeth to erupt in the oral cavity, they have a high caries susceptibility index, necessitating careful application of oral hygiene procedures. Anyneglect of maintenance can result in major issu
es such as furcation involvement. Bisection/bicuspidizationis the separation of the mesial and distal roots of mandibularmolars, as well as the crown area, and the retention of these segments separately. These teeth can function as standalone mastication units or as abutments in simple fixed bridges.

Keywords:- *Bicuspidization, Furcation, Mandibular molars and Nabers probe.*

I. INTRODUCTION

The treatment, management and long-term retention of mandibular molar teeth exhibiting furcation invasions have always been a challenge to the discerning general dentist or dental specialist [1]. Modern advances in all phases of dentistry have provided the opportunity for patients to maintain a functional dentition for lifetime. Therapeutic measures performed to ensure retention of teeth vary in complexity. The treatment may involve combining restorative dentistry, endodontics, orthodontics, and periodontics so that the teeth are retained in whole or in part [2-4].

Term furcation involvement refers to the invasion of the bifurcation and trifurcation of the multirooted teeth by the periodontal disease [5]. Though, furcation involvement is the most common phenomenon in mandibular molars it requires immediate attention with respective management [6].

The severity of the furcation defects ranges from a minor loss of attachment in the buccal furcation area, resulting in a shallow pocket, to severe pathology characterised by deep pockets > 10 mm, extensive bone loss, and clinical exposure of the furcation [2,7,8].

Tunneling treatments, hemisection and bicuspidization, as well as open flap debridement, are used to treat Class III abnormalities in mandibular molars [2,9,10].

Bicuspidization is an effective therapeutic option for multirooted teeth with a poor prognosis [6]. The bisection/bicuspidization technique involves separating the mesial and distal roots of mandibular molars, as well as the crown area, and keeping these pieces separately. To remove irritants under the fornix and get two single-rooted teeth, it is usually done in mandibular molars with Class II or III furcation disorders with the purpose of crowning as a premolar [11].

The Nabers probe, which penetrates in and through in the furcation area, is used to diagnose furcation involvement [12].

The following are the indications for bicuspidization [6]:
- Root fracture, which is defined as substantial bone loss involving one or more roots that cannot be treated with regenerative methods.
- Invasion or involvement of a Class II or III furcation.
- Inability to treat and fill a canal successfully.
- Inadequate embrasure space due to close root proximity.
- Root trunk fracture or deterioration with biological width invasion.
- The following are some of the contraindications [6]:
- Poor oral hygiene is number one.
- Roots that have been fused.
- Tissue architecture that is unfavourable.
- Endodontically untreatable retained roots.

A. CASE REPORT 1

A 24-year-old male patient presented to the Himachal Dental College's Department of Conservative Dentistry and Endodontics in Sundernagar with pain in the lower left region of his teeth and a history of root canal therapy a year prior. The tooth was percussion sensitive, had grade I mobility, class II furcation involvement, and a damaged restoration on clinical examination. The PDL had widened, there was modest periapical radiolucency in both the mesial and distal roots, instrument separation in the middle third of the mesial root, and perforation and bone loss at the furcation area, but the skeletal support of both the roots was totally intact (Fig. 1). It was determined that the patient had post-treatment illness with instrument separation in the mesial root w.r.t 36. The patient was informed of the choice to undertake non-surgical retreatment followed by bicuspidation w.r.t 36.

Local anaesthetic is administered (2 percent lignocaine and adrenaline 1:200000; Lox, Neon Laboratories).A non-

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surgical retreatment decision is made, followed by bicuspidation.

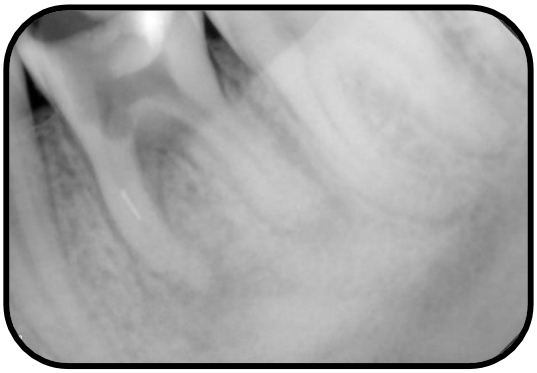

Fig. 1: Mandibular left first molar

A spherical bur was used to remove the coronal repair (Mani Inc., Japan). The #15 K-file was used to locate canals (Mani Inc., Japan). There was some obstruction at the middle third of the mesiolingual canal while inserting the file, thus a radiograph was taken right away to confirm instrument separation in the canal. With #10 K-file (Mani Inc. Japan), an attempt was made to bypass the separated instrument, and once successful, the radiograph confirmation was performed. (Fig. 2).

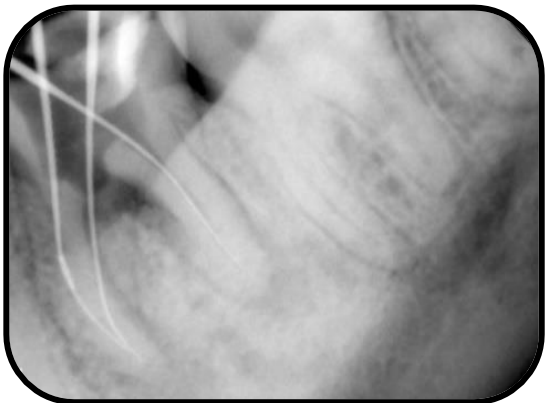

Fig. 2: Bypassing the separated instrument

It was then followed by a gradual rise in file size until #25 K-file was reached (Mani Inc., Japan). The #25 H-file (Mani Inc., Japan) was then inserted to engage and successfully retrieve the separated instrument, which was confirmed radiographically shortly after (Fig 3).

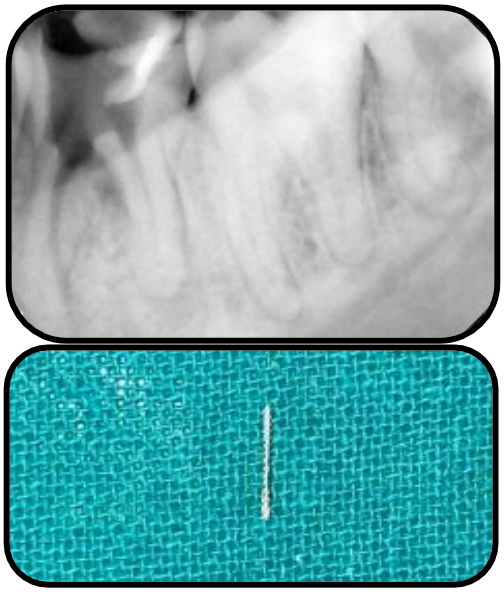

Fig. 3: Retrieval of the separated instrument

Following retrieval, a thorough irrigation with 3 percent NaOCl (Prime Dental, India) was performed, followed by a final treatment with saline. Protaper Gold (Dentsply Maillefer, Switzerland) was used for biomechanical preparation up to F2 in the mesiobuccal and mesiolingual canals, and F3 in the distal canal. In between instrumentation, 5ml of 3 percent NaOCl (Prime Dental, India) was utilised, followed by final irrigation with 2ml 17 percent EDTA (PrevestDenpro, India) and a final rinse with 5ml of distilled water. For two weeks, a calcium hydroxide dressing was used (Fig. 4).

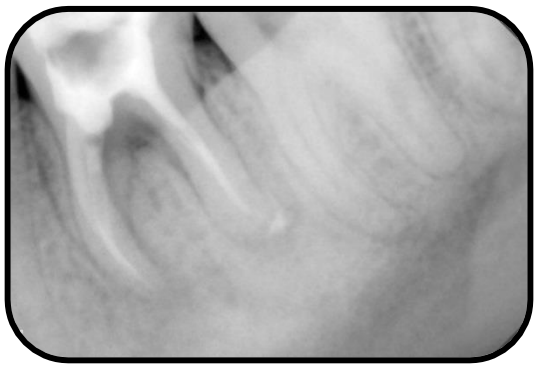

Fig 4: Calcium hydroxide dressing

On the following visit, master Gutta Percha was confirmed (Fig. 5), and Sealapexobturation was performed using the lateral condensation technique, followed by post obturation repair with Nano hybrid flowable composite Tetric N Flow (Ivoclar Vivadent) to provide a good coronal seal (Fig. 6).

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Fig. 5: Master gutta-purcha confirmation w.r.t 36.

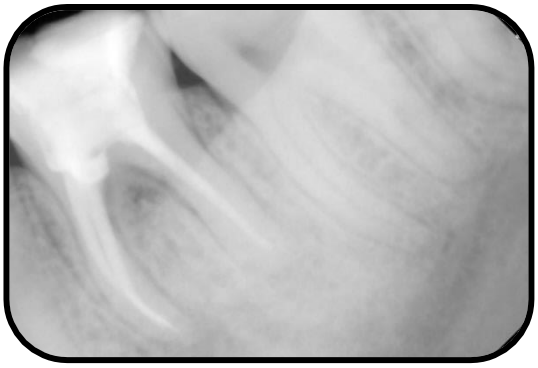

Fig. 6: Obturation w.r.t 36.

The occlusal table was reduced to the bare minimum in order to redirect forces along each root's long axis. The crown was separated using the vertical cut procedure. To produce a vertical cut towards the bifurcation area, a long shank tapered fissure bur TF 12 (Mani inc. Japan) was utilized. The area around the furcation was trimmed to ensure that there was no undercut or residual material that could cause future periodontal inflammation. To ensure separation, a fine periodontal probe (GDC) was put through the cut. The work area was sufficiently irrigated with sterile saline. To corroborate the surgery, a postoperative radiograph was taken (Fig 7).

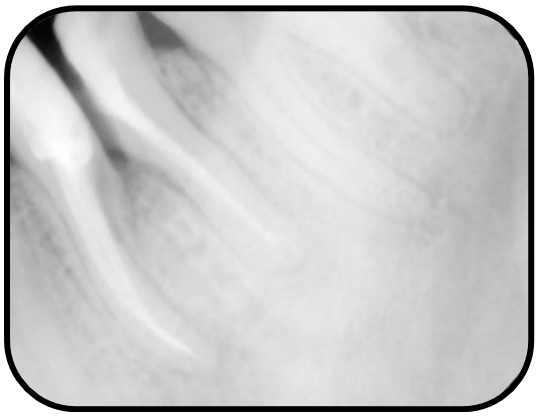

Fig. 7: Crown separation w.r.t 36.

To avoid food lodgment, each separate part of the tooth was crowned separately (Fig. 8 and 9).

Fig .8: Crown prepation w.r.t 36

Fig. 9: Crown cementation done

At 1, 3, and 6 months after surgery, the patient was contacted for a follow-up visit. After 6 months, there was no pain, movement, or discomfort w.r.t. 36 on clinical assessment. The periapical lesion had healed and there was significant bone fill in the defect at the bifurcation area on radiographic evaluation, and healing was deemed to be sufficient w.r.t 36 (Fig. 10, 11 and 12).

Fig. 10: (1 Month Follow Up)

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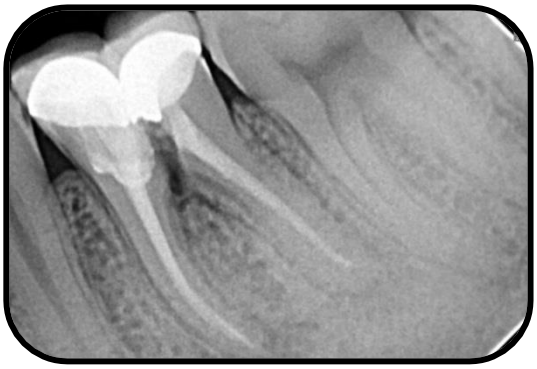

Fig. 11: (3 Month Follow Up)

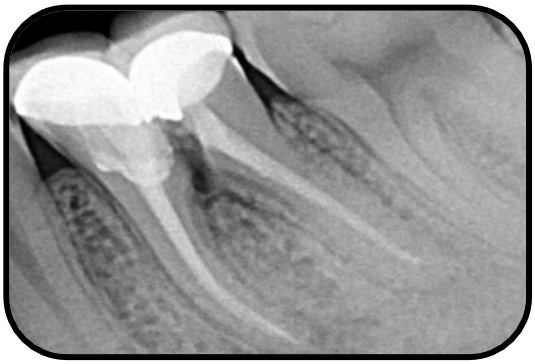

Fig. 12 (6 Month Follow Up)

B. CASE REPORT 2

A 29-year-old male patient presented to the Himachal Dental College's Department of Conservative Dentistry and Endodontics in Sundernagar with pain in the lower left region of his teeth and a history of root canal therapy three years before. On clinical examination, the tooth was percussion sensitive, had grade I mobility, had class II furcation involvement, and had a permanent restoration. Radiolucency and bone loss were seen on radiographs in the location of the furcation. With respect to both the mesial and distal roots, there was a broadening of the PDL and a modest periapical radiolucency. There was a permanent restoration that had been installed incorrectly (Fig. 13).

It was determined that the patient had previously treated chronic apical periodontitis w.r.t. 37. With reference to 37, a treatment plan of re-restoration followed by bicuspidization was devised and explained to the patient.

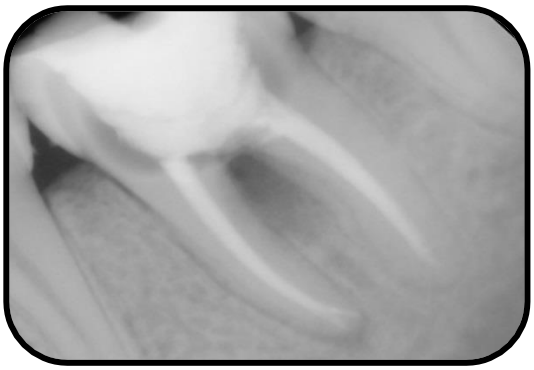

Fig. 13: Mandibular left second molar.

Using a high-speed air-rotor (API Super torque) and a round bur BR-45, the previous restoration was removed (Mani Inc. Japan). Tetric N Flow, a nanohybrid flowable composite, was used to restore the area (Ivoclar Vivadent) (Fig. 14).

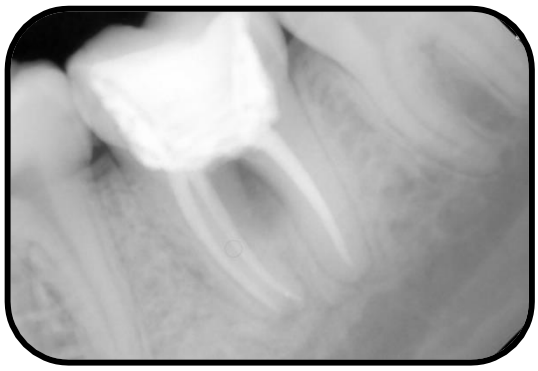

Fig. 14: Re-restoration done w.r.t 37

The occlusal table was decreased, and a vertical incision was created towards the bifurcation area with a tapered fissure bur TF 12 (Mani Inc. Japan). A periodontal probe (GDC) was used to guarantee that the furcation area was separated. A saline irrigation was applied to the divided area, and an instant radiograph was performed to confirm the treatment (Fig 15).

Fig. 15: Crown separation w.r.t 37

Then each separated part was crowned individually to avoid food lodgement (Fig 16 and 17).

Fig. 16: Crown preparation w.r.t 37.

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Fig. 17: Crown cementation done

At 1, 3, and 6 months after surgery, the patient was followed up on. Following a 6-month clinical assessment, there was no pain, movement, or discomfort w.r.t. 37. The periapical lesion had healed and there was significant bone fill in the deficiency at the bifurcation location on radiographic evaluation, and healing was deemed to be sufficient w.r.t 37 (Fig. 17, 18 and 19).

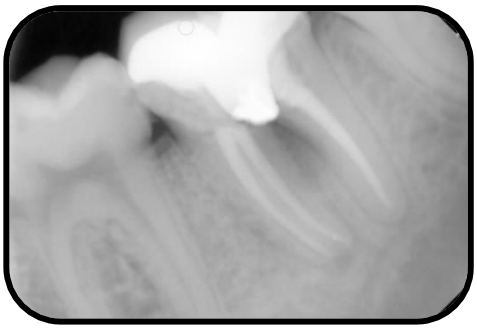
Fig. 17 (1 Month Follow Up)

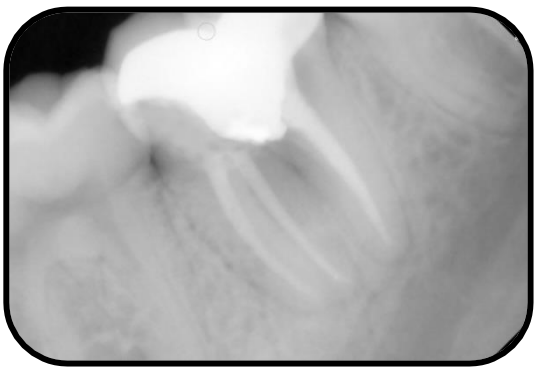
Fig. 18 (3 Month Follow Up)

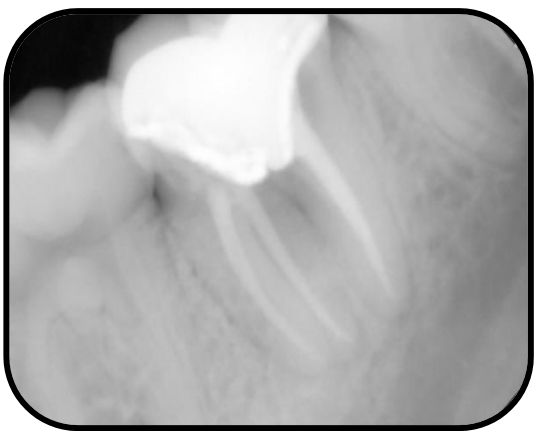
Fig. 19 (6 Month Follow Up)

II. DISCUSSION

Subgingival inflammation produced by bacterial infection is referred to as periodontitis. It affects the periodontal ligament, cementum, and alveolar bone, as well as the periodontal supporting tissues. Periodontitis damages the junction of multi-rooted teeth, causing tissue degradation at first, followed by bone loss and, finally, furcation involvement [13].

According to **Farshchian and Kaiser (1988)**, the odds of success are higher when adequate bony support is present around the furcation of implicated molars, and there should be sufficient separation between the embrasure space of the mesial and distal roots, which aids in proper hygiene maintenance. They claim that the success of bicuspidization is determined by three factors: the stability and adequacy of bone support for individual tooth sections, the absence of severe root fluting of the distal aspect of the mesial root or the distal aspect of the distal root, and adequate separation of the mesial and distal roots to allow for the creation of an acceptable embrasure for effective oral hygiene [14].

According to **Newell (1991),** the benefit of the bicuspidization process is that some or all of the tooth structure is preserved, but the downside is that the tooth required root canal therapy prior to the bicuspidization surgery [15].

According to Saad et al. (2009), bicuspidization necessitates surgical exposure, which might result in postoperative pain and discomfort for the patient. Root canal therapy is also required before to the operation because root canal failure can result in the entire procedure failing [16].**Basten et al (1996)**determined that maintaining proper oral hygiene and surgical care can improve the prognosis of furcation-affected molars for a longer period of time [17].

Bicuspidization, on the other hand, has a number of drawbacks. It might induce discomfort and worry, just like any other medical operation. This technique can also fail due of an endodontic therapy failure. The restoration may lead to periodontal deterioration if the tooth is not alleviated from lateral excursive stresses or if appropriate marginal adaptation is not present [18].

The prognosis for bicuspidization is the same as for normal endodontic treatments, assuming that case selection is right and that the restoration, as in this case, is of appropriate design in relation to the patient's occlusal and periodontal needs. Following that, a good bone healing response was observed. This indicated that the operation itself, as well as the occlusal changes made and the angulation of the root, were all ideal for aiding in the tooth's recovery [19].

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III. CONCLUSION

One of the most difficult aspects of periodontal therapy is dealing with furcation involvement. Several factors influence the decision to treat a periodontitis-affected furcation with a specific treatment. The majority of therapists consider tooth type and degree of furcation involvement to be the most essential variables in determining which treatment technique to use.

The clinical challenge of long-term retention of mandibular teeth with Grade III furcation is a difficult one. Bicuspidization is a method that allows us to restore masticatory function of mandibular molars without sacrificing the entire tooth or a portion of it. The procedure's long-term success is contingent on proper case selection, diagnosis, and treatment planning through a collaborative interdisciplinary approach.

The prognosis of a bicuspidized tooth is determined by the supporting bone, the restorative treatment method, and the patient's oral hygiene. Improvements in periodontics and endodontics processes andmaterials have led to more advanced therapy and teeth with marginal prognosis, allowing patients to maintain a functional dentition for the rest of their lives.

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