

# Hemisection as an Interim Treatment Prior to Implant Therapy: Case Report

## İmplant Tedavisi Öncesinde Bir Geçiş Tedavisi Olarak Hemiseksiyon

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**ABSTRACT** In children and adolescents, the treatment of multi-rooted teeth with extensive loss of tooth structure is often limited to extraction. However, extraction is frequently followed by prosthetic, orthodontic and aesthetic treatments, which increase treatment cost. Alternatively, hemisection can be done if there is indication as an interim treatment. The purpose of thereport was to describe the hemisection of a mandibular first molars with extensive tooth structure loss in an adolescent, for functional, orthodontic, and aesthetic reasons. The fifth year results of this treatment showed that a successful transition period could be ensured for implant therapy with true endication.

**Key Words:** Tooth; space maintenance

**ÖZET** Çocuk ve genç bireylerde, aşırı madde kayıplı çok köklü dişlerin tedavisi çoğu kez çekim ile sınırlı olmaktadır. Çekim tedavisini ise, tedavi masraflarını arttıran, protetik, ortodontik ve estetik tedaviler takip etmektedir. Alternatif olarak, endikasyonu varsa bir geçiş tedavisi olarak hemiseksiyon yapılabilir. Çalışmanın amacı, genç bir bireyde, fonksiyonel, ortodontik ve estetik nedenlerle, aşırı madde kayıplı alt çene daimi birinci büyük aza dişlerinin hemiseksiyonunun tanımlanmasıdır. Bu tedavinin beşinci yıl sonuçları, doğru endikasyonla implant tedavisi için başarılı bir geçiş dönemi sağlanabileceğini göstermiştir.

**Anahtar Kelimeler:** Diş; yer koruma

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In adults, the loss of permanent teeth due to various reasons such as caries, periodontitis, trauma result in dental complications. However, in juveniles, tooth loss is often followed by alveolar bone resorption, which subsequently makes it difficult to place implants or render other similar treatments.<sup>1,2</sup> Therefore, in cases where growth and cranial development are still occurring and the teeth have not erupted completely, retention of natural teeth is important in order to prevent future treatment complications.

The advances in dental materials and treatment modalities have enabled retention of teeth with extensive apical lesions, which otherwise would have been indicated for extraction. Hemisection is a surgical procedure used for treating multi-rooted teeth with extensive apical lesions. This

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procedure involves amputation of one or more roots of a multi-rooted tooth with apical lesion, and allows the retention and continued functioning of a portion of the affected tooth.<sup>3,4</sup>

Hemisection can be applied on serious periodontal defects, endodontics problems not having been treated, vertical fractures including a single root and acute furcation cases. When hemisection indication is decided, before the application of surgical operations, the part of the teeth to remain in mouth should be observed diligently and sufficient bone support for the remaining segment should be provided.<sup>4</sup>

This case report describes the hemisection of the mandibular first molars (36, 46) in a 16-year-old patient with a follow-up period of five years. The procedure helped in preventing the extraction of teeth.

## CASE REPORT

A 16-year-old boy with a noncontributory medical history was referred to our pediatric dentistry clinic for extraction of teeth no. 36 and 46. Intra-oral examination revealed: presence of poor oral hygiene; hyperaemic gingiva; and carious lesions in teeth no. 21, 22, 26, 34, 36, and 46. Teeth no. 36 and 46 were tender on palpation and percussion and were mesially tipped and exhibited extensive loss of tooth structure (Figure 1). Space loss was observed due to caries. Vitality tests were conducted. Tooth no. 46 was found to be vital whereas 36 was nonvital. Radiographic examination revealed that the presence of a large radiolucent area associated with the furcation of the teeth (Figure 2a-b).



FIGURE 1: The appearance of the stone model of the patient before the treatment.

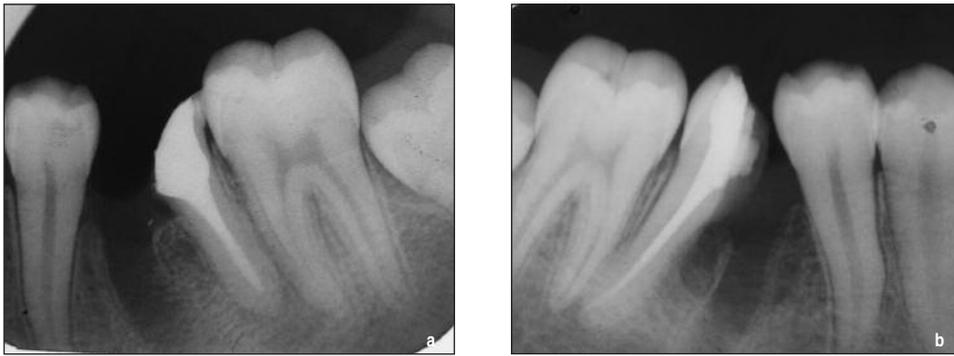
After analysing the study models and clinic occlusion, hemisection was decided as the treatment of choice. We planned to amputate the mesial roots of teeth no. 36 and 46 and retain their distal roots. The retained teeth would aid in regulating the occlusion and prevent problems relating to spacing, thus, eliminating the need for a space maintainer. The treatment plan and risks were explained to the patient and his parents. Their written approval was obtained.

The teeth were isolated with a rubber dam. An access cavity was prepared and the pulp was extirpated. The pulp chamber and root canals were irrigated with sodium hypochlorite (2%). Oral antibiotic therapy was initiated, and oral hygiene instructions were given.

After the tooth was observed to be asymptomatic, the distal roots were obturated with gutta percha and a calcium hydroxide-containing sealer (Sealapex, Kerr, Langenau, Germany), using the lateral condensation technique. Hemisection was performed under local anaesthesia after reflecting a



FIGURE 2: a) Periapical radiography of tooth no. 36. b) Periapical radiography of tooth no. 46.



**FIGURE 3:** a) Periapical radiography of tooth no. 36 after resection. b) Periapical radiography of tooth no. 46 after resection.

full-thickness flap. The coronal teeth portions was filled temporarily with glass ionomer cement (Ketac-Cem, 3M ESPE, St Paul, Minn) until the final coronal restorations (Figure 3a-b).

Approximately two thirds of the root canal filling of tooth no. 36 was removed and a thin layer of glass ionomer cement (Ketac- Cem, 3M ESPE) was placed. The required 2-mm-wide length of Ribbond (Ribbond Inc, Seattle, Wash) was cut with the special scissor supplied by the manufacturer to prevent unraveling and then saturated with a few drops of bonding agent (Scotchbond Multi-Purpose, 3M ESPE Dental AG, Seefeld, Germany). The Ribbond post was prepared and applied by following the manufacturer's instructions. Chemically cured translucent composite resin (Alfcomp, Voco, Germany) was used to fix the Ribbond post into the root canal (Figure 4). The coronal part of Ribbond was covered with a light-cured condensable hybrid composite resin (Surefil, Dentsply-De-Trey, Germany), and a core was built up. Finally, the coronal restorations of teeth 36 and 46 were restored with composite by using strip crowns (Figure 5a-d). The patient was called after 1 month, and subsequently, at regular 6-month intervals for the next three years. Throughout this period, the treated teeth mouth and were clinically and radiographically confirmed to be free of symptoms.

Patient who didn't come his controls regularly due to living in another city, could be examined at the end of the fifth year, it was seen that tooth no. 46 was in mouth, whereas tooth no. 36 was extracted. According to the information got from the patient, tooth no. 36 had been extracted by another



**FIGURE 4:** Clinical appearance of tooth no. 36 after fiber post placement.

dentist due to felling of its restoration four months ago, and implant therapy was advised (Figure 6). It was seen that the tooth no. 46 was retained in the mouth, not sensitivity to palpation and percussion with normal gingiva (Figure 7).

## DISCUSSION

In adolescents, extraction is usually the treatment of choice for multi-rooted teeth, where extensive apical lesion and bone loss are limited to a single root, the remaining roots being unaffected. Following tooth extraction, alveolar bone resorption occurs frequently, resulting in decrease in the alveolar bone dimensions.<sup>1,5</sup> This phenomenon complicates future restoration of the lost tooth i.e. implant and traditional prosthesis placement.<sup>6</sup> Therefore, maintenance of the alveolar bone dimension is important for achieving good aesthetics and function.

Literature in the form of case reports describe successful hemisection aimed at maintaining the health of multi-rooted teeth.<sup>7-9</sup> Hemisection aids in the retention of the healthier portion of a multi-



**FIGURE 5:** a) Clinical appearance of tooth no. 36 after resection. b) Clinical appearance of tooth no. 46 after restoration. c) Periapical radiography of tooth no. 36 after restoration. d) Periapical radiography of tooth no. 46 after restoration.

rooted tooth affected by advanced endodontic and periodontal diseases. It facilitates both periodontal health restoration and bone regeneration. The retained half of the tooth positively influences on-going bone development and decreases the difficulties that could be encountered during orthodontic, prosthodontic, and implant therapy. It also supports the surrounding gingival and periodontal tissues.<sup>7</sup>

In the present case, by choosing hemisection over extraction of the affected teeth, the following disadvantages were prevented: The need for orthodontic and possibly prosthodontic treatment, deterioration of periodontal health of opposing and adjacent teeth, tipping of adjacent teeth, extrusion of opposing teeth, and alveolar bone loss that could complicate future implant therapy. The added advantage of hemisection is that the retained root permits physiological tooth movement.

In their review that compared implants and root resection therapies, Kinsel et al. reported a failure rate of 3.6% for implant therapy as opposed to a failure rate of 15.9% for root resection ther-



**FIGURE 6:** A 5-year follow-up periapical radiography of extraction site of tooth no. 36.



**FIGURE 7:** A 5-year follow-up periapical radiography of tooth no. 46.

apy.<sup>10</sup> In contrast, another study with a follow-up period of 15 years reported equal success rates for both the treatment modalities.<sup>11</sup> Park et al. reported a success rate of 60.1% for root resection therapy at the end of a 10-year follow-up period.<sup>12</sup> The authors were also suggested that periodontal reasons were the most common causes for failure.

Hemisection can be successful if the case selection is appropriate, endodontic therapy is adequate, and the restoration is in harmony with the patient's occlusion and periodontium.<sup>8</sup>

Although retention of the mesial portion of a mandibular molar is recommended, another school of thought advocates retention of the distal root as it is wider and stronger than the mesial root.<sup>13,14</sup> In the present case, the prognosis of teeth no. 36 and 46 was determined as good at the end of the follow-up period.

Five years after the hemisection, bone development in both the quadrants was observed. Hemisection allowed retention of a portion of the natural tooth structure and provided scope for further alveolar bone development. The retention of the treated teeth in the arch and the fact that they were still functional for a period of 5 years despite the presence of poor oral hygiene, indicated that the procedure was successful.

The results of this case report emphasise that alternative treatment options should be preferred over extraction, especially in children and adolescents, where maxillofacial growth and development are still occurring. Hemisection, a conservative therapeutic approach, should be considered as an interim treatment option in such cases to ensure success of therapies such as implant placement that may be required in the future.

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