

# Hemisection- A relevant, practical and successful treatment option

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## **Abstract:**

Root resection therapy has been used in the treatment of advanced periodontal disease for nearly 100 years. The preservation of posterior abutment teeth permits oral rehabilitation with fixed bridges instead of removable prosthesis. A case of iatrogenic removable partial denture in relation to 47, causing bone loss till the apex of distal root of 46 came to the department of Periodontics, Sri Siddhartha dental college, Tumkur. The decision was taken to hemisect the distal root, as mesial bone and furcation bone was relatively unaffected. After phase I therapy, periodontal flap was reflected, area debrided and distal root was resected. The case was followed up for 8 months for the survival of the resected molar. A fixed bridge was given to the patient using 45 and the resected molar with 48 as abutments to replace 47.

It has been a year since and hemisected 46 is stable. The keys to long term success appear to be thorough diagnosis, selection of patients with good oral hygiene and careful surgical and restorative management.

**Key words:** Hemisection, oral rehabilitation, case selection.

## **Introduction:**

The removal of a root and the overlaying anatomic crown is referred to as a hemisection.<sup>1</sup> Hemisection of either a maxillary or mandibular molar is often a means of retaining teeth needed for restorative abutments or occlusal support. This treatment can produce predictable results as long as proper case selection is followed by interdisciplinary approach with endodontic, surgical and prosthetic procedures.<sup>1</sup> Hemisection represents a form

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of conservative procedure, which aims at retaining as much of the original tooth structure as possible. The results are durable, and success rates are high if certain basic considerations are taken into account.<sup>2</sup> Periodontal, prosthodontic and endodontic assessment for appropriate selection of cases is important. In periodontics this procedure is indicated in class II furcation involvement and if there is considerable bone available to one root.<sup>2</sup>

In this article a case of hemisection is presented as a relevant treatment option for a tooth where only distal root of a mandibular molar was affected.

**Case report:**

A male patient 63 years, reported with the chief complaint of pain and sensitivity in right lower side since 3 months (Fig 1). The pain occurred on mastication and was relieved once the stimulus was removed. He also complained of removable partial denture sinking in the tissues while chewing. The intensity of pain was such that he could not chew that side. The left side was untreated with edentulous areas which left the patient with no choice but to use right side. Past dental history suggested uneventful extraction of 17,26,27,35, 47 which were carious. Patient had received fixed prosthesis on 14,15,16,17,18 to replace 15, 16, 17, and replacement of 47 was done by removable partial denture, 3 months back. Amalgum fillings were done with respect to 36 and 46. All these treatments were done over the span of one year.

*Medical history:* Patient was a Known hypertensive since 5 years and on medication. Clinically, over all gingival health appeared normal. There was class III gingival recession with respect to 36 (Fig 2). Tooth (46) presented with Bluish red, soft and edematous enlarged gingiva with class- III gingival recession (fig 3). Oral hygiene index- good (0.6), Plaque index- good (0.37)

Over all periodontal status was good except for the 5mm pocket present on distal of 46, grade II furcation involvement in 46 and grade IV in 36. There was grade I mobility in 46 and grade III in 36.26,27,37,47 were missing and were not replaced and 36, 46 had restorations. Examination was made

to assess presence of occlusal trauma on 46. Removable partial denture with respect to 47 was present. It was ill fitting with space on distal aspect of 46 (Fig 4). Arm of the clasp was impinging on marginal tissue of abutment tooth 46. There was a class V composite filling done on 46, which was rough, over hanging and without proper marginal contour (fig 3). Whenever the patient closed the teeth in centric occlusion, denture sank into the tissue giving severe pain in distobuccal aspect of 46. Unreplaced 26, 27 and 37 with non-functional 36 led to increased occlusal load on the teeth present on right side.

*Radiologic investigation:* Intraoral periapical radiograph showed bone loss up to periapical region on the distal root of 46. Little bone loss over furcation area was also appreciated. This case was diagnosed as Localized periodontitis with respect to 36 and 46

Overall prognosis was good considering periodontal health. Tooth (36) had hopeless prognosis and 46 had fair prognosis as distal root had bone loss till the apex. The tooth could be saved as mesial root had good bone and furcation area had reasonably good support.

The treatment consisted of phase I therapy which included extraction of 36 as it had hopeless prognosis. Patient was explained about effects of ill-fitting removable partial denture and the damage it had caused on the 46. Thorough scaling and root planning was done. Gingival and periodontal status was reevaluated after 2 weeks.

Phase II: A decision was taken to save the tooth by hemisection as mesial root of 46 was relatively unaffected with a reasonably good furcation bone and very good interdental bone between 45 and 46. Intentional root canal treatment was done in 46.

Muco periosteal flap was reflected with vertical incisions to expose the area of hemisection. The area was debrided. Hemisection was carried out in 46. Distal root was extracted.



**Fig 1: Fig 1: A 63 year old male patient**



**Fig 3: Bluish red, edematous, soft marginal gingival in relation to 46. The clasp of RPD resting on the marginal gingiva. Faulty class IV composite restoration on 46.**



**Fig 2: Unreplaced missing teeth 26, 27, 35 and hopeless prognosis in 36 with class III recession**

Area was irrigated with antiseptic solution and sutures placed.

Patient was called after one week for suture removal and post-surgical checkup. The surgical area healed uneventfully and was followed up for 8 months for survival of the hemisected molar.



**Fig 4: Ill fitting removable partial denture to replace 47. Plaque retentive area between the denture and 46**

Phase III: The tooth had a good bone support after 8 months and it was decided to give him a fixed

prosthesis involving 45,46,47,48. Occlusally it was contoured as molar on hemisected tooth which provide more surface area for occlusal table, and buccally it was contoured as two premolars to facilitate contouring of sanitary pontic so as to maintain hygiene by patient with interdental brush. The bridge was provided with highly glazed ceramic in the ridge lap area as it is highly recommended in most of the literatures in periodontally compromised posterior teeth.

Maintenance phase: Patient has been followed up since with regular recall visits and oral prophylaxis. He has good masticatory efficiency with the prosthesis is very happy with the treatment outcome.

### Discussion

The terms "root amputation" and "hemi-section" are known collectively as "root resection."<sup>3</sup> Root resections or hemisections have been used rather aggressively by many clinicians to treat all types and gradations of bone loss and furcation involvements.<sup>[4]</sup>

Hemisection allows for physiologic tooth mobility of the remaining root, which is thus a more suitable abutment for fixed partial dentures. The less occlusal forces, under-contouring of the embrasure spaces and proper crown margins are all factors in the high success rates observed with hemisection<sup>2</sup>

This particular case presented with complex treatment planning, as patient had an iatrogenic removable partial denture with 47, which had caused bone loss till periapical region in the distal root of 46. Since there was good bone support on the mesial side of 46 along with fair inter radicular bone, extraction was not considered. Hemisection as a treatment option perfectly suited the case. There were other missing teeth which needed prosthetic replacement. Patient wanted to conserve as much tooth structure as possible. The hemisected 46 could be used as an abutment for replacement of 47 with fixed prosthesis.

The decision of hemisecting the tooth should be based on the extent and pattern of bone loss, root

trunk and root length, ability to eliminate the osseous defects and endodontic- restorative consideration.<sup>5</sup> which were all considered. When choosing to perform a hemisection procedure, consideration should be given to the morphology, clinical length and shape of the roots of a multirouted tooth.<sup>1</sup> It is important to take into account the divergence of the roots while making a case selection. Affected teeth with roots spread apart facilitate the clinician's ability to carry out root resection. Teeth with closely approximated or fused roots are not good choices to receive hemisection therapy.<sup>1</sup>

In the present case the above mentioned indication for case selection in performing hemisection was optimum as the roots were not closely approximated or fused. The tooth had to be endodontically treated before hemisection. In situations when resection periodontal therapy is decided, initiation of conventional endodontic treatment before therapy simplifies the surgical procedure. This is because tooth preparation can invade the pulp chamber and jeopardize control of the coronal seal of the endodontic access opening complicating the completion of endodontic therapy.<sup>1</sup>

On the left side, 36 had hopeless prognosis and 26, 27, 37 were not replaced. Untreated left side forced the patient to use only the right side for mastication. This created occlusal overload on the abutment tooth on the right side.

According to Buhler et al, hemisection should be considered before every molar extraction, because this procedure can provide a good absolute biological cost savings with good long-term success. In addition, he reported that the failure rates of single-tooth alloplastic (titanium) implants and hemisections are not substantially different.<sup>[6]</sup>

In this particular case the hemisected tooth was observed for 8 months for bone support and fixed prosthesis involving 45,46,47,48 was given only after that.

Clinical prediction of the long term prognosis is important for avoiding additional treatment. This can help to prevent unnecessary costs and build better rapport between the patients and clinicians.<sup>6</sup> A method for determining the precise prognosis of periodontally diseased teeth was reported in various studies. The tooth related factors such as molar location, resected roots, type of prosthetic abutment, opposing dentition, and post-operative prosthesis did not affect survival rates.<sup>6</sup>

According to Shin-Young Park,<sup>7</sup> resected molars used as intermediate abutments of a fixed bridge, had a higher survival rate. This might be because the occlusal loads on the intermediate abutment are smaller than on terminal abutments and single abutments. Amount of occlusal forces is significant for the long term success of the fixed bridge, and root fractures were frequently reported in resected molars with higher occlusal loads.<sup>7</sup>

The keys to long term success appear to be thorough diagnosis, selection of patients with good oral hygiene and careful surgical and restorative management.<sup>8</sup>

The present case was treated with sanitary pontic, buccally contoured like premolars for better hygiene maintenance.

The prognosis of root resected molars may not be as poor as previously believed.<sup>9</sup> Multirooted, periodontally involved molars can be maintained for long periods of time with hemisection. The large variation in success and failure reported by different authors is a reflection that roots resection and hemisection is a technique sensitive procedure<sup>9</sup>. One must be careful throughout the processes of case selection, and endodontic, periodontal, restorative and maintenance therapies. Critical analysis before reconstruction and regular reevaluation during maintenance period are crucial.<sup>9</sup>

Langer et al reviewed records of 100 patients who had undergone root resection over a 10 years

period. They reported a failure rate of 38%, of which 15.8% occurred within the first 5 years after surgery. Most failures involved mandibular teeth and occurred for reasons other than inflammatory periodontal disease.<sup>10</sup>

There are only few longterm studies on the survival of teeth after hemisection and root amputation published. These investigations often lack information about case selection and subsequent restoration. Furthermore there are conflicting data about the survival of the remaining fragment (3% - 38% for ten years.) and a wide range of reasons for failure of hemisection.<sup>11</sup>

Carnevale in his study on long term effects of root resective therapy suggested that it can be considered an effective measure to resolve periodontal problems of furcation defects.<sup>11</sup>

#### **Conclusion:**

Hemisection as a treatment option to conserve the tooth structure and use it as an abutment is still very relevant. The prognosis of root resected molars may not be as grim as previously believed. The decision of hemisecting the tooth should be based on the extent and pattern of bone loss, root trunk and root length, ability to eliminate the osseous defects and endodontic- restorative consideration.<sup>5</sup> The data indicate that recurrent periodontal disease is not a major cause of the failure of these teeth. It was shown that such teeth can function successfully for long periods.

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