

## **Management of Complicated Crown Fracture: Tooth Fragment Re-Attachment as A Single Visit Procedure with Crown Lengthening by Diode Laser: An Interdisciplinary Case Series.**

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### **I. Introduction**

Coronal fracture of anterior teeth is most common traumatic injury of permanent dentition<sup>1,2</sup>. The upper central incisors are the teeth most frequently affected by this type of dental injury<sup>3</sup>. The traumatic incident related to central incisor is because of buccal positioning of teeth<sup>4</sup>.

Dental injuries usually affect only a single tooth. However, certain trauma types such as sports injuries & automobile accidents involving multiple tooth injuries<sup>5</sup>. Treatment of crown fractures depends on many factors involving extent of fracture whether it involves part of root, amount of biologic width, involvement of alveolar bone fracture, fracture pattern, occlusion, aesthetics, presence or absence of fractured tooth fragment and its condition, prognosis of the condition<sup>6-8</sup>.

Re-attachment of tooth fragment is one of the best options for managing coronal tooth fracture when there is no or minimum violation of biologic width<sup>9</sup>. When there is invasion of biologic width or substantial associated periodontal injury, restorative management of coronal fragment should follow proper management of these associated issues.

The main advantages related to fractured tooth re-attachment are conservative, Aesthetics, cost-effective and it is an acceptable alternative to restoration of fractured tooth with resin based composite or full coverage crown<sup>10-12</sup>. However in such cases, esthetics may become an important issue as pulpless teeth lost part of their translucency and brightness.

There are few experimental models have proved that, the limit of fractured strength remains same when 90% of the original tooth structure is maintained. According to Rais&pusnam, the minimum strength of fractured teeth is not known, even many authors claims 50% strength seems to be sufficient.

This article reports two clinical case reports of fractured tooth re-attachment treated successfully with crown lengthening by Diode laser.

### **II. Case 1**

An 35 year old male patient reported to the outpatient Department of Conservative Dentistry & Endodontics, Adhiparasakthi Dental College and Hospital, Tamilnadu, India with chief complaint of broken upper front tooth region due to trauma which occurred two days back.

On intra oral examination, 21 had fractured completely with the fracture line present subgingivally. However, the fractured segment was still attached, but mobile, the mobility was evident on labio-palatal direction. On radiographic examination, the fracture line was 1-2 mm below CEJ. Pulpal status, periodontal conditions of adjacent tooth was checked. In 21 the tooth was found non-vital and root canal treatment completed in single visit.

There was no evidence of periodontal and pulpal trauma in adjacent teeth. They were vital. The patient expressed the desire of maintaining the tooth. So, considering the various treatment options available, we are decided to carry out endodontic treatment followed by cementation of fiber post and re-attachment of fractured tooth using self-adhesive resins. The treatment plan was explained to patient, and the patient was accepted for the treatment.

Local anaesthesia was administered and the mobile fractured segment was separated and removed. It was then placed on 0.9% normal saline to prevent dehydration. The tooth was isolated and single visit root canal treatment was done by standard step back technique for biomechanical preparation and the canal was obturated with No.70 GP as an sectional obturation method in 4mm apical part of canal to maintain the apical seal.

After the endodontic treatment over, post space was prepared using the drill( ) and the patient is sent to the department of periodontics for crown lengthening on the lingual aspect. Fiber post was selected corresponding to the size of the drill used, and fit of the fiber post was

examined radiographically. Crown lengthening was done on the lingual aspect of incisors by lasers. Accurate fit of the crown was checked after crown lengthening.

The fractured segment was re-attached, ensuring the tooth was well positioned and in good contact. A flowable composite was used to adhere with the post of the fragment of canal for 30 seconds using light cure unit 3M ESPE. Occlusion was checked using articulating paper. No interferences were noted, excess material was removed and restoration margins were finished with series of polishing burs and the tooth was polished to high luster using aluminium disks.

The patient was instructed to avoid loading the anterior teeth. Immediate postoperative clinical assessment presented good esthetics and good occlusion while radiographic examination showed stable re-attachments and good periodontal health. Follow up appointment of 1 week, 1 month and 3 months clinical examination revealed which showed normal aspects of tooth and supporting structures.

### **III. Case Report 2**

A 42 year old male patient reported to the Department of Conservative Dentistry and Endodontics, APDCH, Melmaruvathur, Tamilnadu, with chief complaints of fractured upper anterior teeth due to impact force of sugarcane bite.

On intraoral examination, 22 was fractured completely with fractured line present Subgingivally with labially and palatally. But, the fractured segments were still attached, but mobile, the mobility was evident on labiopalatal direction. Various treatment procedures were explained to the patient. Among all the various treatment options, patient desired reattachment of own fractured teeth.

Patient referred to Department of Periodontics for elevation of flap using laser. Flap was elevated and fit of fractured segment checked. Fractured segment re-attached using fiber post. Post-operative radiograph taken and fit of the fractured segments confirmed.

Patient evaluated after a week, 1 month, 3 months which showed normal aspects of tooth and supporting structures.

### **IV. Discussion**

With advancement in dental bonding technology, it is now possible to achieve excellent results with reattachment of dislocated tooth fragments provided that the biologic factors, materials and techniques are logically assessed and managed. The use of natural tooth substance clearly eliminates the problems of differential wear of restorative material, unmatched shades and difficulty of contour and texture reproduction associated with other techniques. Treatment plan can be made after evaluation of the periodontal, endodontic, coronal and occlusal status [13]. Other factors that might influence the choice of technique include the need for endodontic therapy, extension of fracture, quality of fit between fragments and the fracture pattern.

Badami and associates [14] have shown neither the bevel nor the material used could obtain the original fracture resistance of the tooth. Specimens prepared with chamfer and bonded had a fracture resistance of 40-60%, with internal dentin groove and over contour it reached around 90%. A simple reattachment procedure as in the first case is indicated, since bevel with flowable composite improves fracture strength recovery. The resistance of the fracture segment can be directly proportional to the surface area of adhesion.

Most of the 5th generation bonding agents increased the fracture resistance of reattached coronal fragments when used with conjunction with unfilled resin. Extensively fractured fragments have to be restored with conjunction with a resin. The highest fracture resistance was obtained by chemically cured composite followed by light cured and resin cement and least by only dentin bonding agent [15]. The pulp chamber was used for increasing the surface area for composite bonding and without the use of post. Amir et al in 1986 [16] showed when endodontic therapy is required, the space provided by pulp chamber may be used as an inner reinforcement, thus avoiding any excess preparation of teeth.

### **V. Conclusion**

According to our clinical evaluation, the restoration of a fractured crown using the adhesive reattachment is the optimal treatment for an enamel-dentin fracture when the tooth fragment is available, intact and well preserved. The clinical results appear to be positive and they show that this technique is easy to perform and standardize, inexpensive, and that it allows both functional and aesthetic recovery. In fact, the reattachment technique helps avoid the silicon matrix that is required to model the palatal surface properly to create a base for the subsequent composite layering. When compared to more aggressive prosthetic techniques like crowns and veneers, the reattachment technique is both conservative and aesthetic.

Using this treatment procedure it is possible to achieve long-term retention and good mechanical resistance of the tooth-fragment complex. Our clinical experiences, in accordance with literature data, prove that when the fragment is quickly reattached it is possible to preserve pulp vitality. The quality of the adhesion turned out to be suitable although an ultraconservative technique was preferred without any type of preparation

and only with the use of the bonding method. In any case, it was possible to perform the reattachment again with positive outcomes.

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**TABLE-1**

DEMOGRAPHIC DATAS <sup>3</sup>	TOTAL PARTICIPANTS- 480	
<b>GENDER</b>	Male	261 (54%)
	Female	219 (46%)
<b>AGE (IN YEARS)</b>	20 and < 20 years	65 (14%)
	21 to 40	207 (43%)
	41 to 60	146 (30%)
	61 to 80	62 (13%)
<b>EDUCATION</b>	Upto high school level	136 (28%)
	Upto college	190 (40%)
	Upto university and above	109 (23%)
	Uneducated	45 (9%)
<b>QUALIFICATION</b>	Student	66 (14%)
	Unemployed	56 (12%)
	Housewife	67 (14%)
	Unskilled	62 (13%)
	Professional	113 (23%)
	Business	116 (24%)

<b>3</b>	<b>Would you be Content with removable placement /denture as relacement for missing tooth?</b>	
a)	Yes	262
b)	No	248
<b>4</b>	<b>Have you Heard of implant treatment?</b>	
a)	Yes	357
b)	No	153
<b>5</b>	<b>Do you know that implants can be used for replacement of missing teeth?</b>	
a)	Yes	304
b)	No	206
<b>6</b>	<b>How well informed do you feel about about implant?</b>	
a)	Very well	41
b)	Well	114
c)	Moderately well	142
d)	Poorly	203
e)	Not at all	10
<b>7</b>	<b>Would you like to get implant treatment if needed?</b>	
a)	Yes	356
b)	Not at all	154
<b>8</b>	<b>What do you Personally think of dental implant treatment?</b>	
a)	Opted if needed	371
b)	Opted for other alternatives	139
<b>9</b>	<b>Do you think Implant needs special care and hygiene?</b>	
a)	No	192
b)	No less than natural teeth	91
c)	Yes need more care	227
<b>10</b>	<b>Like to know more about dental implants?</b>	
a)	Yes	407
b)	No	103
<b>11</b>	<b>Where do you think dental implants are placed ?</b>	
a)	Jaw bone	332
b)	Gums	63
c)	Neighboring teeth	48
d)	Don't know	67

<b>12</b>	<b>How long do you think a Dental implant lasts ?</b>	
a)	<5 yr	208
b)	<10	166
c)	Upto 20	51
d)	Life time	85
<b>13</b>	<b>Biggest advantage of implant</b>	
a)	Fixed replacement	141
b)	Looks better	242
c)	Good in function	91
d)	Avoids grinding of natural teeth	36
<b>14</b>	<b>Biggest disadvantage</b>	
a)	High cost	284
b)	Need of surgery	142
c)	Long treatment time	84
<b>15</b>	<b>Reason for failure of dental implants?</b>	
a)	Dentist	130
b)	Patient	82
c)	Poor oral hygiene	165
d)	Allergic/Incompatibility	133
<b>16</b>	<b>How do you think the treatment charges which are involved in this procedure?</b>	
a)	Affordable	176
b)	Non affordable	334
<b>17</b>	<b>What in your opinion majority contributes to the cost of Dental implants?</b>	
a)	Cost of dental implants	277
b)	Cost of surgery	127
c)	Company supplying implant	53
d)	Dentist	53
<b>18</b>	<b>Who in your Opinion should opt for Dental implant ?</b>	
a)	Implants are good for every one	239
b)	Expensive only for rich	271