



A MULTIDISCIPLINARY APPROACH TOWARDS AESTHETIC MANAGEMENT OF ANTERIOR TOOTH TRAUMA

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ABSTRACT

Dentists have recently realized that function and aesthetics are inextricably linked. Adult patients are currently in high demand for aesthetic solutions. In many cases, there are multiple problems.[1] A single specialty-specific treatment does not produce the desired outcome for the patient. Faced with all of these issues, we require interdisciplinary strategies to help us carry out the complex and imaginative treatments that these cases necessitate.[1] In this case report we are going to talk about a case of trauma to 3 anterior teeth leading to accumulative effort by 4 specialities of dentistry to get desired treatment results.

INTRODUCTION

In modern dental care, an increasing number of patients seek orthodontic treatment with the primary goal of improving their appearance and achieving an aesthetic smile.[2]

This trend toward increased awareness of aesthetics has pushed dentistry to examine dental aesthetics in a more organized and systematic manner, with the health of patients and their teeth remaining the most important underlying goal. However, some existing dentition's cannot be restored to a more pleasing appearance without the assistance of multiple dental disciplines.[3] Children are more likely than adults to sustain facial injuries, which are usually the result of sports, falls, car accidents, fights, or intentional assaults. Blows to the

face frequently affect the teeth, particularly the maxillary incisors, due to their normal labial projection in relation to the mandibular incisors, most of the time resulting in crown damage.[4]

The interdigitation of harmonious tooth proportion and ideal gingival morphology is a successful treatment outcome.[2]

Today, every dental professional must have a comprehensive understanding of the roles of these multiple disciplines in producing an aesthetic makeover with the most conservative and biologically sound multidisciplinary treatment plan possible.[3]

The current case report synchronizes the interactions of various branches of dentistry and orthodontics in order to improve aesthetic outcomes.[2]

CASE REPORT

The patient presented with a chief complaint of fractured upper and lower front tooth. On history taking, patient informed that he slipped on the ground and traumatized his anterior teeth a day before.

On extra oral examination, there was a swelling of upper and lower lip was present. There was no sign or symptoms of maxillary or mandibular fracture was found.

On intra-oral examination, crown fracture was present with respect to 11, 41 & 42 teeth. The patient had poor oral hygiene, disproportionate mesio-distal width of 12 in comparison to 22 and an uneven gingival zenith from 13-23. (Fig. 1)

Based on clinical and radiographic examination it was diagnosed that there was a crown fracture in 11 extending beyond CEJ on palatal aspect, which

according to Hargreaves and Craig classification is a Class 4 fracture.

Similarly there was a fracture in 41 & 42 involving pulp, diagnosed as Class 3 fracture.

A multidisciplinary treatment plan was decided upon consisting of 4 speciality work - Endodontics, Orthodontics, Prosthodontics and Periodontics.

TREATMENT OBJECTIVES

The following treatment objectives were decided upon for this patient: (1) Endodontic treatment for 11, 41, 42, (2) Prosthodontic rehabilitation (Post and Core) of injured teeth, (3) Improvement of smile asymmetry by extrusion of 11 (4) Crown lengthening to attain gingival symmetry.



(a) Extra oral Right Frontal View (b) Extra Oral Frontal View (c) Extra oral left Frontal View



(d) Intraoral Frontal View

Fig. 1 - Pre-Treatment Photographs

TREATMENT PROGRESS

After the diagnosis of the problem was done, a multidisciplinary treatment plan was developed with the help of a team of experts involving an Endodontist,

Orthodontist, Prosthodontist & an Periodontist. The initial treatment plan involved Root Canal Treatment (RCT) for the fractured teeth (11, 41, 42). (Fig. 2)



Fig. 2 - Root canal treatment in 11, 41, 42



(a) (b)



(c)

Fig. 3 - (a) - Occlusal view close up after endodontic treatment of 11, (b) Close up post obturation showing extent of fracture, (c) Intraoral frontal view showing provisional repair of 11

Following the RCT of the above mentioned teeth, Post and Core was done with respect to 11. During this procedure

Gingival height disharmony was observed in upper front tooth region. (Fig. 3 & 4)



(a)

(b)

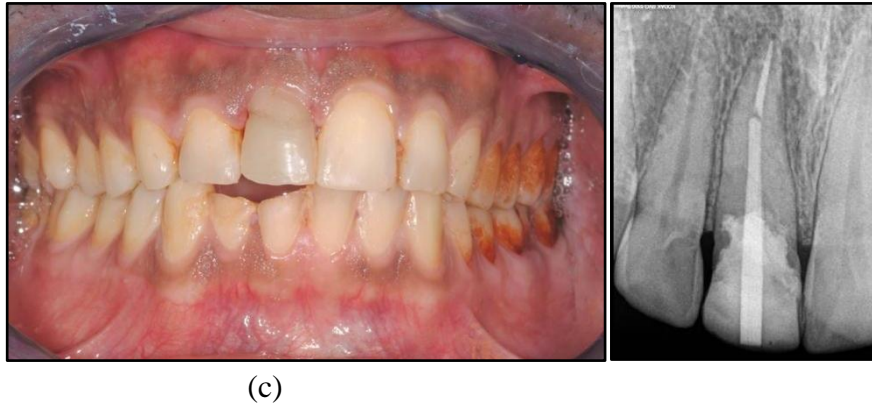


Fig. 4 - (a) Post space preparation (b) Gingival height disharmony in upper anteriors (c) Frontal view after core build-up (d) Post cementation and core build up with Paracore (Coltene)

The next procedure initiated was Orthodontic extrusion of 11. Bonding was done in relation to 13, 12, 21, 22, 23 and a 0.016" NiTi wire was placed. (Fig. 5a) On 1 month Follow up the wire was stepped to 0.016" × 0.022" NiTi. Later the wire was stepped to 0.016" × 0.025" NiTi after 1 month.

Leveling and alignment was achieved in 2 months and 0.019" × 0.025" SS wire was placed. A bracket was bonded to 11 according to the amount of tooth extrusion desired. An 0.014" NiTi auxiliary wire was placed for the extrusion.

Over here incisal edge of 11 was reduced, thus creating space for the extrusion. (Fig. 5b)

Since the archwire used in anteriors for anchorage was in the path of extrusion, the wire was modified and made to bypass 11 to continue further extrusion of tooth. Once the desired position was achieved, the arch wire was replaced and a continuous 0.019" × 0.025" arch wire was placed for a period of 5 months. (Fig. 5d)

Following orthodontic extrusion, incisal edge of 11 was gradually trimmed to maintain crown height (Fig. 5c & 5d) and final finishing was done. (Fig. 5e)

A fixed retention wire was placed palatally in upper anteriors. (Fig. 5f)



(a) (b)

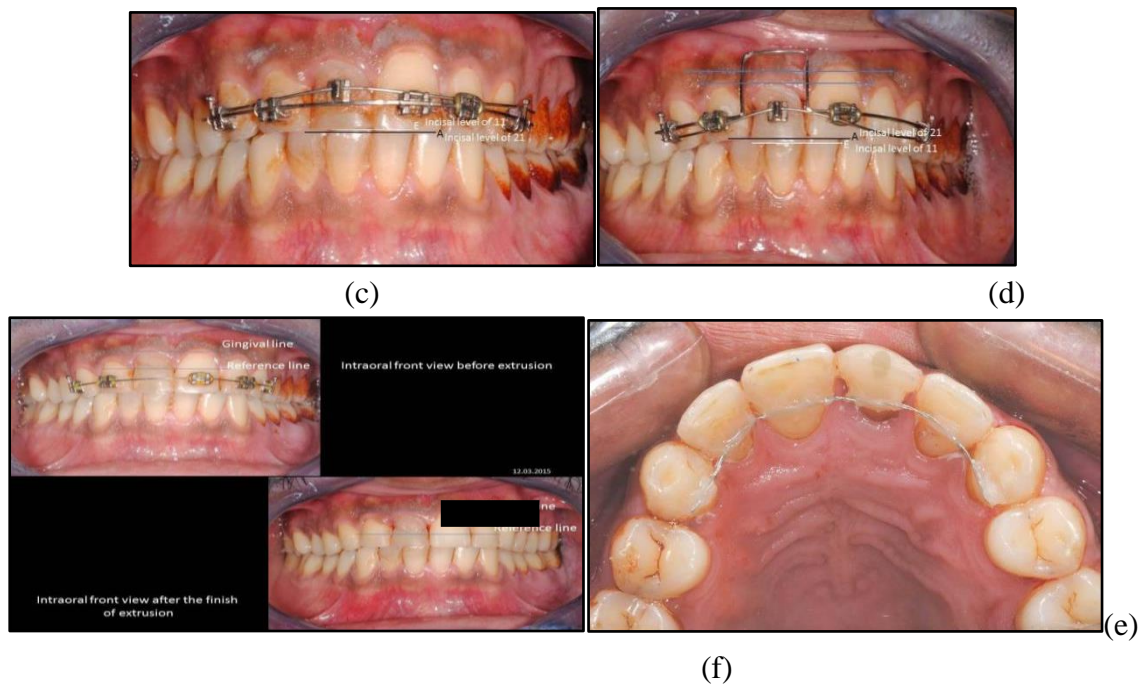


Fig. 5 - (a) Intra-oral frontal view showing bonded teeth and wiring for leveling and alignment (b) Image showing incisal level of the anterior teeth and placement of 0.014 NiTi auxiliary wire on 0.019" × 0.025" SS wire for extrusion of 11 (c) The distance between points c & d have gradually decreased indicating Extrusion of 11 (d) Modification done to allow extrusion (e) Intra-oral view after Finishing of extrusion phase. (f) Fixed Retention of upper anteriors

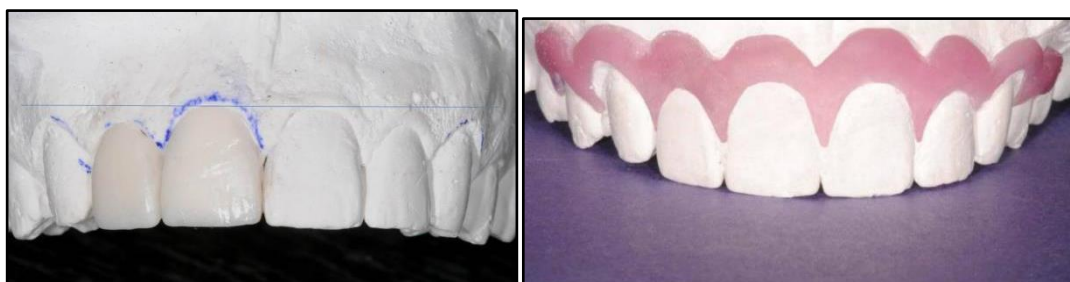
An unavoidable side effect of this procedure was the downward movement of gingiva with respect to 11 in comparison to 21.

So the next step to begin was the Aesthetic Crown lengthening procedure. This was done by creating a wax mockup of 11, 12. This was followed by placement of a periodontal surgical stent. Initial incision and removal of extra tissue was done

followed by full muco periosteal flap reflection for exposure.

Using a Chu's crown lengthening gauge, Marking of bone & gingival level of 21 was done followed by Osteoplasty. Similarly bone level of 11 was assessed and ostectomy was performed. These procedures were repeated on Tooth 22, 23 & 13.

A final ideal bone level of all anteriors was achieved. (Fig. 6)



(a) (b)

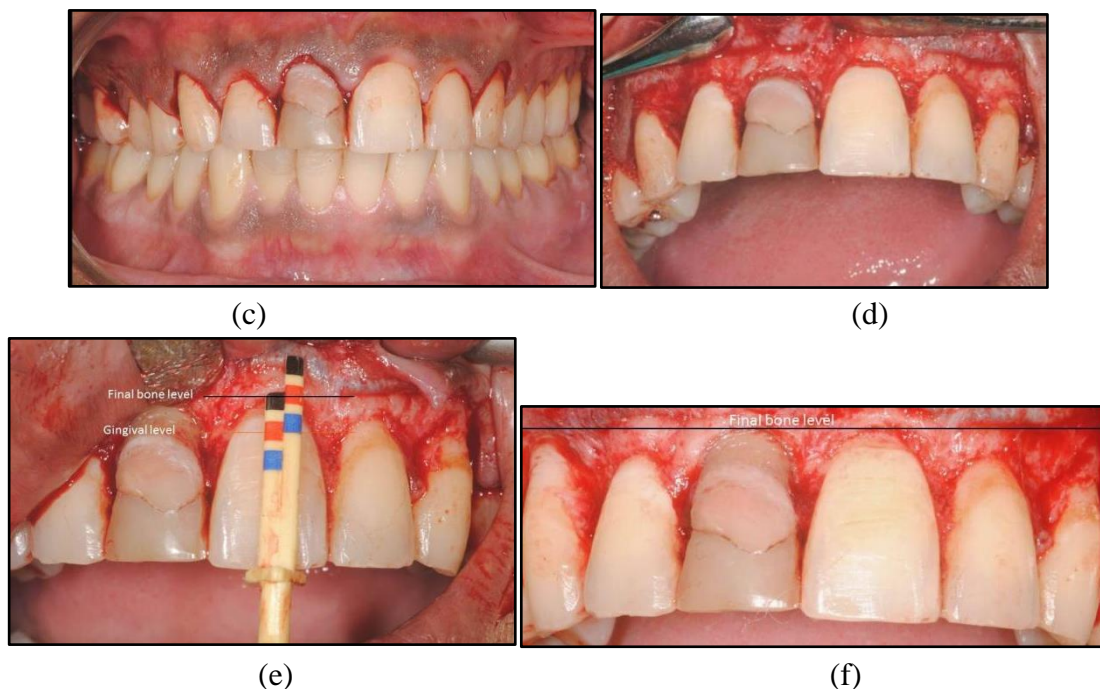


Fig. 6 - (a) Wax Mockup of 11 & 12, (b) Periodontal surgical stent placed, (c) Initial incision and removal of extra tissue, (d) Reflection of full muco periosteal flap, (e) Marking of initial and final bone & gingival level after osteoplasty of 11 using Chu's Crown lengthening gauge (f) Final bone level of anterior teeth

A temporary crown was placed on 11. After 3 weeks the patient was recalled for follow up and there was significant healing occurring. But on close up a small defect at gingival level of 11 was visible. (Fig. 7a) The patient was then recalled after 4 months and complete healing and

adaptation of the gingiva could be seen around the temporary crown. (Fig. 7b)

The final step was the permanent crown buildup for 11. Tooth preparation was done on 11, followed by shade selection for aesthetics. (Fig. 7)

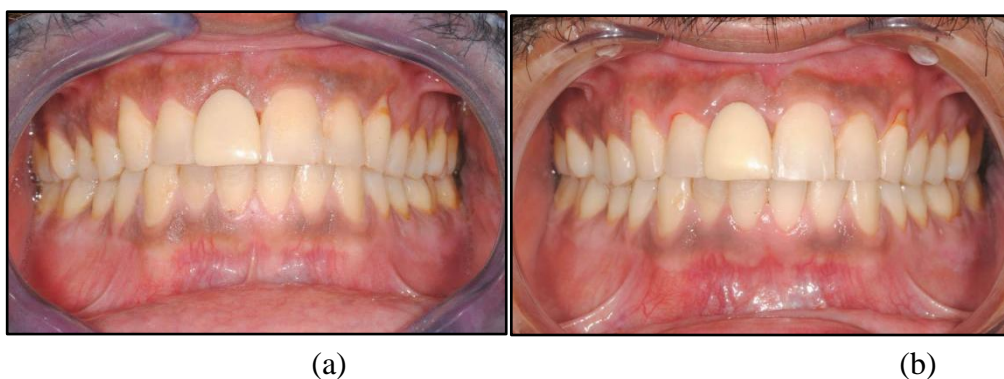




Fig. 7 - (a) Intra oral frontal view photograph showing a temporary crown in 11 and healing of gingiva after 3 weeks, (b) Image showing complete healing after 4 months, (c) Tooth preparation of 11, (d) Shade selection for crown w.r.t 11

Finally the crown was prepared for 11, Enameloplasty was done on 12, Direct composite veneer done w.r.t. 41, 42. Thus

the case was completed in the time period of - 12 months.



Fig. 8 - Completed Case



Fig. 9 - Upper and lower anteriors with contrastor



Fig. 10 - Extra-oral smiling photographs



Fig. 11 - Extra-oral facial photographs



Fig. 12 - Pre-treatment & Post-treatment intra-oral photograph



Fig. 13 - Pre-treatment & Post-treatment smiling Photographs



Fig. 14 - Pre-treatment & Post-treatment facial Photographs

TREATMENT RESULT

The final result was a permanent crown on 11, Enameloplasty on 12, Composite veneer on 41, 42 and esthetic crown lengthening from 13 to 23. On protrusion and opening of mandible there was no interference between the anterior teeth and displayed incisal edges and embrasures evidently. The gingiva showed good healing and esthetic goals of the specialists and patient were achieved. The patient was very pleased with the end result of the treatment.

DISCUSSION

In the field of oral health, there is a growing demand for orthodontic treatment, which creates attractive smiles using the individual's own natural teeth.[5]

The increased frequency of traumatic injuries to anterior teeth is a result of modern leisure activities, with crown fractures being the most common injury. Depending on the location of the fracture, different treatment approaches have been suggested for fractured teeth. An artificial

crown or an acid-etch composite system can be used to repair a crown fracture.[4]

Composite resin restoration using the acid etch technique is regarded as a highly aesthetic treatment for repairing fractured anterior teeth.[6]

However, no synthetic restorative material can match the aesthetic characterization or colour stability of natural tooth structure.[6] Several authors have advocated for additional preparation of the fractured fragment and the remaining tooth structure to improve bonding of the fractured fragment to the remaining tooth structure.[6]

Clinicians face a challenge in their daily practice when it comes to the functional and aesthetic restoration of severely compromised anterior teeth with fixed partial dentures. The use of metal infrastructures in teeth in general makes it difficult to mimic the physical features of an intact tooth, such as its shade, translucency, and fluorescence. As a result of the advancement of reinforced ceramics and non-metallic post systems, metal-free ceramic restorations can now be used in

severely compromised anterior and posterior teeth.[4]

Although orthodontic extrusion requires more visits and takes longer than surgical extrusion, it was the preferred treatment for lateral incisor extrusion because the orthodontic forces allow a biological way of extruding the tooth without removing the alveolar bone as a crown lengthening, which could compromise the aesthetics.[4] The gingival levels are established to determine the aesthetic relationship of the maxillary anterior teeth. The gingival levels should be evaluated in relation to the projected incisal edge position. The key to determining proper gingival levels is determining the desired tooth size in relation to the projected incisal edge position.[3]

Gingiva can move as a result of eruption or recession. So, the ideal gingival levels are determined by determining the correct width-to-length ratio of the maxillary anterior teeth, the desired amount of gingival display, and symmetry between the right and left sides of the maxillary dental arch.[3]

In this case, orthodontic extrusion and incisal edge restoration was the better treatment option.[3]

A group of dental specialists can provide a more detailed diagnosis and effectively and fruitfully resolve difficult dental issues.[2]

For some time, the need for a multidisciplinary approach in the treatment of routine dental problems has been recognized, particularly for dental traumas that necessitate comprehensive treatment and an accurate diagnosis and treatment plan while respecting biological, functional, and aesthetic aspects, as well as the patient's will.[4]

CONCLUSION

Multidisciplinary approaches involving surgeries, endodontics, orthodontics, periodontics, and prosthodontics are critical factors in the successful functional and aesthetic rehabilitation of complicated crown fracture and crown-root fracture.[4] To diagnose and resolve aesthetic problems predictably, it is necessary to synchronize various specialties with orthodontics in an organized and systematic manner. [2]

The patient was pleased with the overall treatment results and the pleasant and aesthetic smile achieved at the conclusion of the treatment. This article discusses the various principles that must be followed when creating an aesthetic smile that is satisfactory.[2]

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