

## CASE REPORT

# Rehabilitation of an Adolescent Female by Immediate Loading in the Anterior Esthetic Zone: A Case Report

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## ABSTRACT

Road traffic accidents are common among young adolescents, which leads to dentoalveolar injuries which are the most commonly encountered injuries. Several rehabilitation techniques are available in the literature which includes preparation of a fracture site with composite, splinting with fiber reinforced composites, removable partial dentures, resin bonded bridges, and the most recent-implants. In recent times, immediate implant placement and loading are found to be the permanent rehabilitation solution for an avulsed tooth as compared to reimplantation. Hence, we present a case report of a 16-year-old female patient who met with a road traffic accident resulting in missing right and left central incisors and fractured left lateral incisor, who was managed by rehabilitation with implants with immediate loading as a permanent solution.

**Keywords:** Adolescent female, Immediate loading, Implants in road traffic accident.

**Abbreviation:** CBCT: Cone beam computed tomography.

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## INTRODUCTION

Implants have become prime modality treatment for people who require esthetic rehabilitation of edentulous areas which may be due to either congenital abnormalities or due to trauma.<sup>1</sup> The long-term success of implant treatment in adults has broadened the usage of implants in children. Dental implants in growing children help in conservation of bone with simultaneous

alveolar bone development.<sup>1,2</sup> Missing teeth in young patients are said to have a negative impact on their emotional and social well-being. Hence, rehabilitation with implants as a treatment modality can provide both functional and psychological benefits.<sup>3,4</sup>

## CASE REPORT

A 16-year-old female patient accompanied by her father reported to the Department of Prosthodontics, Army College of Dental Sciences with a history of missing anterior teeth and fractured tooth in the upper left front tooth region. She gave a history of trauma due to a road traffic accident, two days prior to the visit to the hospital. The patient was healthy with no remarkable medical history. Extraoral examination revealed the presence of bruises on her face. Intraoral examination revealed missing upper left and right central incisors with fractured upper left lateral incisors (Ellis class 3) and no soft tissue laceration (Fig. 1). The various available treatment options and the risks involved were discussed with the patient and the parent, following which a more permanent treatment plan to replace the missing dentition was considered. Hence, CBCT was advised to determine the status of the alveolar bone and supporting structures (Fig. 2). Following which, rehabilitation with three implants (Touareg-OS, ADIN Dental Implant System, Israel) of size 4.2 in diameter x 11 mm in length (two each) and 4.2 mm in diameter x 13 mm in length (Figs 3 to 5) under local anesthe-



**Fig. 1:** Intraoral image showing avulsed upper right and left central incisors and fractured upper left lateral incisor

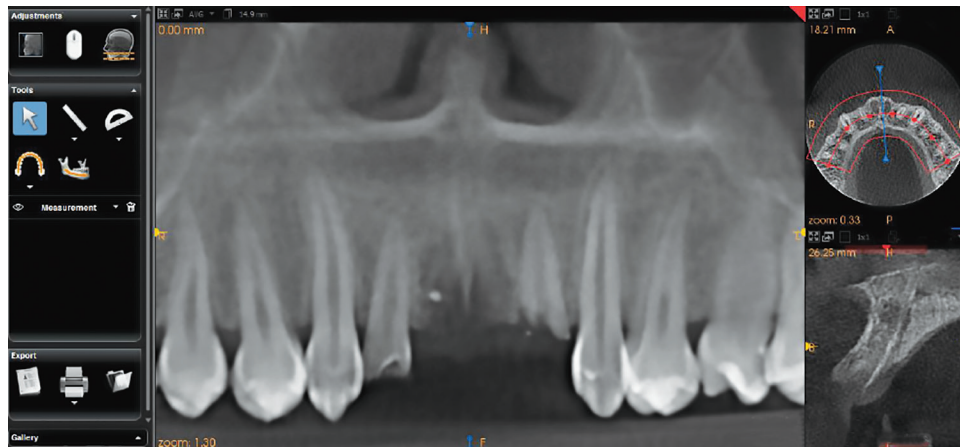
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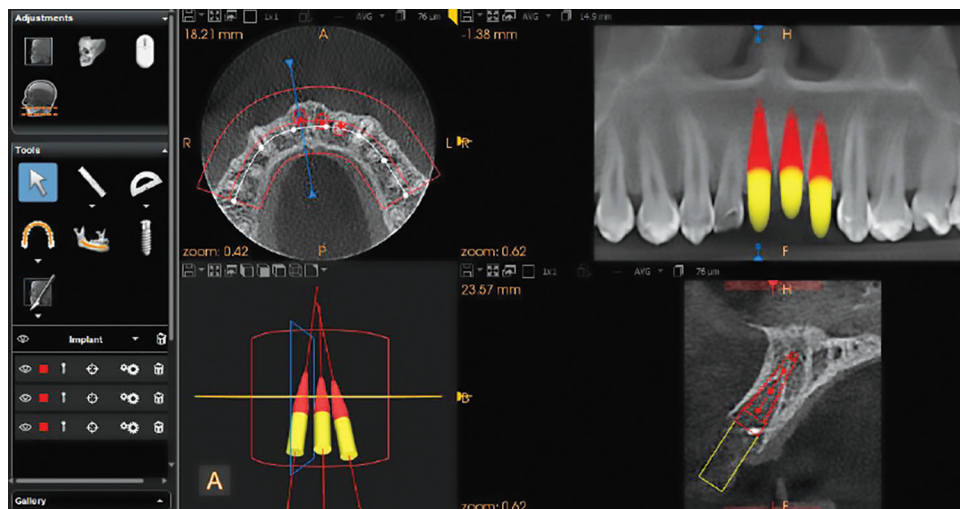
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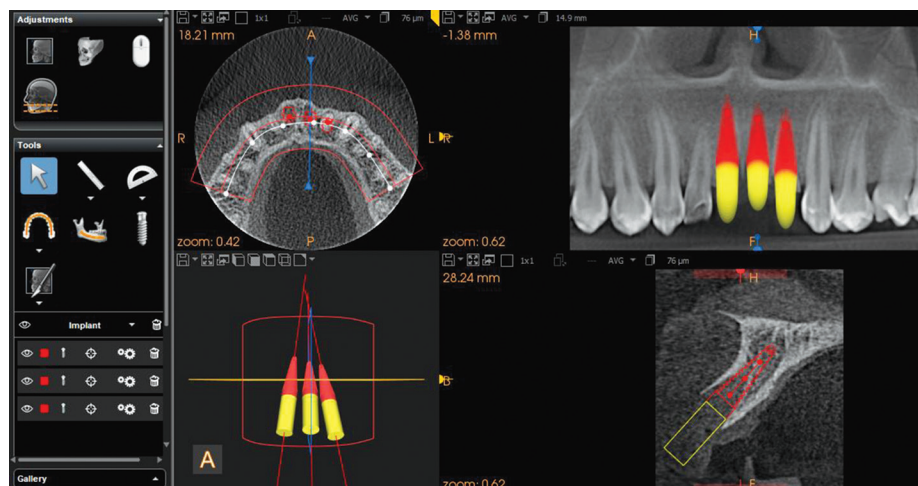
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**Fig. 2:** CBCT image showing avulsed upper right and left central incisors and fractured upper left lateral incisor with intact cortical plates



**Fig. 3:** Implant planning in CBCT software CS 3D Imaging v.3.5.73 with respect to upper right central incisor

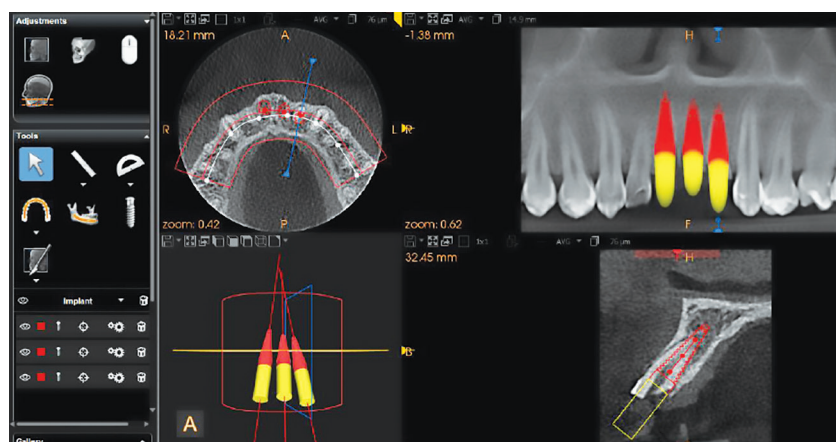


**Fig. 4:** Implant planning in CBCT software CS 3D Imaging v.3.5.73 with respect to upper left central incisor

sia was the decided treatment plan. Antibiotic prophylaxis of Amoxicillin 1 gm and Ketorol DT 10 mg was given before the surgery which was continued post-surgery also. The course of the treatment focused on improvement in patients' anterior dental esthetics, and provision of the stable and predictable restoration of the traumatized dentition site using a confirmed approach. Three implants measuring  $4.2 \times 11$

(two each) and  $4.2 \times 13$  were placed at missing sites (upper left and right central incisors and following extraction of upper left lateral incisor), under local anesthesia. The drilling protocol was performed according to the manufacturer's specifications (Fig. 6). Primary stability of 45 N/cm was achieved and immediate loading was carried out (Fig. 7). Postoperative panoramic radiograph (Fig. 8) was taken to





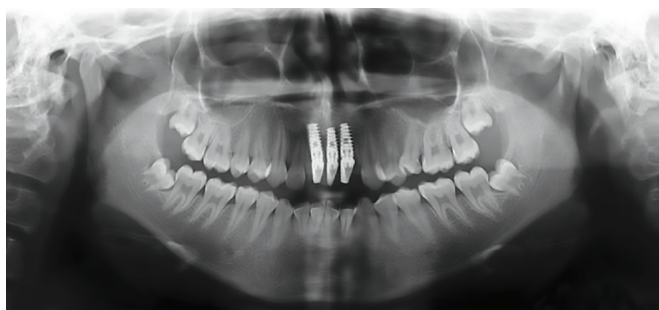
**Fig. 5:** Implant planning in CBCT software CS 3D Imaging v.3.5.73 with respect to fractured upper left lateral incisors



**Fig. 6:** Implant placement in progress



**Fig. 7:** Implant placement with abutments in place



**Fig. 8:** Panoramic radiograph showing postoperative implant placement with abutments in place



**Fig. 9:** Provisional restoration in flowable composite in place

check the accuracy of the implant placement. The impressions for provisional restoration were made in irreversible hydrocolloid (Zelgan 2002, Dentsply). Flowable composite (Tetric N Flow, Ivoclar Vivadent) was used for fabrication of the same, which was corrected for premature occlusal contacts and relieved out of occlusion before cementation (Figs 9 to 11). On subsequent visits, the provisional restorations were assessed for esthetics, soft tissue, and hard tissue health and replaced when required. After follow-up for a year, an abutment level impression of the maxillary arch was made in one stage polyvinyl siloxane (Aquasil, Dentsply, Surrey, UK) impression technique for fabrication

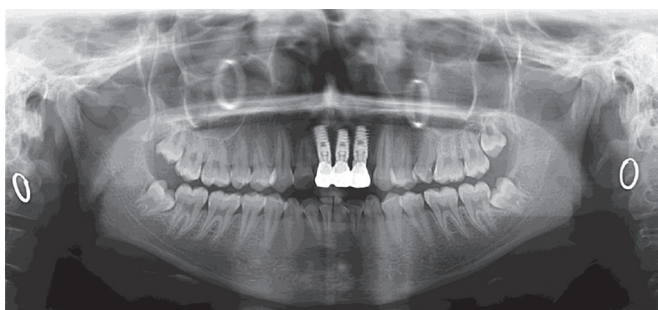
of permanent prosthesis (Zirconia). Before its cementation, a panoramic radiograph (Fig. 12) was taken which showed healthy bone and implant integration with little or no changes in the relation of adjacent teeth and implant. The prosthesis was then cemented using provisional cement (Figs 13 and 14) and the maintenance phase instituted for one week, 3 months and 6 months following which the restoration was assessed for esthetics, wear, discoloration, occlusal contacts, soft and hard tissue health. A lateral



**Fig. 10:** Provisional restoration in flowable composite in place



**Fig. 11:** Provisional restoration in flowable composite in place



**Fig. 12:** Panoramic radiographic of the implant placement, after one year follow-up and final prosthesis in place



**Fig. 13:** Intraoral image with final prosthesis (zirconia) in place



**Fig. 14:** Extraoral image with final prosthesis (zirconia) in place

cephalogram was taken to ascertain growth completion (Fig. 15). Oral prophylaxis was provided at each visit and oral hygiene instructions reinforced.

## DISCUSSION

Dental trauma is defined as an injury to the oral structures including both hard and soft tissues.<sup>5</sup> They comprise three-quarters of all traumatic injuries occurring in childhood and adolescence.<sup>6</sup> A study by Stockwell, reported the incidence of anterior tooth trauma in the permanent teeth



**Fig.15:** Lateral cephalogram showing cervical vertebrae maturity indicator stage 5 (maturation stage) with stable incisal inclination

to be 1.7 patients/100 children/year.<sup>7</sup> The affected teeth are said to have a poor prognosis with many of them, often requiring extraction.<sup>8</sup> Loss of teeth not only leads to loss of function but also affects the growth of alveolar bone.<sup>9</sup>

Concerning the growth of jaw bones, its completion is first seen in a transverse plane, then in sagittal



and lastly in the vertical plane. Hence it is important that the displacement of the entire bony complex via the sutural growth be followed by the oral implants to ease in prosthetic rehabilitation in later stages if it crosses the suture. Whereas the bone remodeling also termed as drift, is not followed by the implants. This is important in the maxillary arch where the two-thirds of remodeling occurs after the age of 7 years. In the maxilla, transverse growth in the anterior portion is completed before the adolescent growth spurt at the mid-palatal suture which is three times larger in the first molar region<sup>10</sup> with little changes in inter canine distance at the age of 10. Hence implant placement shortly after the eruption of permanent leads to midline diastema. Also, enlargement between the molars is said to be smaller than the sutural widening in the same area.<sup>11</sup> In previous studies, implant placement in the anterior maxilla as early as 9 years showed no transverse problems.<sup>12,13</sup> However the sagittal growth of the maxilla is associated with the growth in skeletal body height with the anterior part of the maxilla to be stable, except when it is displaced downward and forward during growth, where 25% of displacement is lost via resorption as per previous case reports. Also, fenestration of the labial bone was reported at 11 and 19 months after the implant placement.<sup>14</sup>

An implant does not take part in spontaneous tooth migration, unlike teeth which show spontaneous mesial drift with the lateral segment, canine to the first molar moving 5 mm mesially and maxillary incisors moving 2.5 mm buccally. The vertical growth unlike the sagittal and transverse continues and is said to cease at 17 or 18 years for girls and much later for boys. Between the age of 9 and 25 years the maxilla is said to move about 6 mm downwards and 2.5 mm buccally with an average eruption velocity at 1.2 mm to 1.5 mm/year during the active growth stage and thereafter 0.1 mm to 0.2 mm/year.

In the present case, removable partial denture was not a recommended plan of treatment as it depends on the patient's compliance. Further, it can cause unwanted bone resorption and gingival diseases. Conventional fixed partial denture in a healthy dentition is also not indicated unless the adjacent teeth are heavily restored. Adhesive/resin bonded bridge is an alternative and conservative treatment option but only for the single edentulous region due to the high percentage of debonding. So, implants were chosen over other treatment options. In the present case report, implants were placed at an age of 16 years, which is an optimal age for implant placement as the growth spurt in the maxillary segment is said to cease by the age of 15 years.<sup>15</sup> It also has the added advantage of maintaining the alveolar bone and faster healing potential at this age.<sup>2,11</sup> Though infra occlusion and position relative

to the adjacent teeth was observed and modification of the restoration was needed as per the studies were done by Thilander et al., but such discrepancies were more severe in patients who had unstable incisal relationships.<sup>16</sup> Many studies have also proposed that delaying dental implants until the skeletal maturity has given favorable treatment outcomes, but in a retrospective study done by Bernard et al., showed mature adults exhibiting vertical discrepancy after anterior restorations with osseointegrated implants to the same extent as an adolescent with remaining growth potential.<sup>17</sup>

## CONCLUSION

Dental implant placement is considered the best treatment modality for rehabilitation in adolescents if proper treatment planning with patient's growth pattern, the status of the existing dentition, functional status of mastication, phonetics, esthetics, emotional and psychological well being, is taken into consideration. The treatment is said to be justified if the positive effects are greater than the drawbacks of the procedure. Hence it is the responsibility of clinician to propose a regular follow up and further monitoring of the treatment outcome.

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