Case Series

Inter-Disciplinary Dental Care and Management of Cleft Lip And Palate: A Case Series

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ABSTRACT

The dental rehabilitation treatment of cleft lip and palate patients requires a multi-pronged interdisciplinary involvement of orthodontics, restorative dentistry, prosthodontics and oral surgery to provide them with optimal esthetics, function, and stability. These teams provide a multi-faceted evaluation which includes input from a variety of professional disciplines making it possible for coordinated care and reduces the fragmentation of several independent specialists. Teams also have a special opportunity to address the complex social and psychological issues prevalent in treating persons with birth defects This clinical case series describes an interdisciplinary (oral surgery, orthodontics, restorative and prosthodontics) approach for the coordinated treatment of cleft lip and palate patients.

Keywords: Cleft lip and palate

INTRODUCTION

Cleft lip and palate is known to be one of the most prevalent congenital deformity affecting the face and the jaws with incidence varying between 1:500 to 1:2500 live births.[1,2] The incidence of clefting in India is considered to be one in 600 new born babies, standing to be around 30000 new cases annually.[3]

Multiple problems such as facial disfigurement, malocclusion due to missing and malformed teeth, improper mastication and speech, and nasal regurgitation are usually seen.[4] The nature and the extent of medical and dental problems among cleft patients, dictate the need toward inter-disciplinary approach where different medical and dental specialists are involved in the treatment. A inter-disciplinary team setting involve specialties from the following disciplines: pediatrics, plastic and reconstructive surgery, maxillofacial surgery, otolaryngology, orthodontics, genetics, social work, nursing, speech therapy, pediatric dentistry, prosthetic dentistry, and psychology. The orthodontist's role in timing and sequence of treatment is imperative in terms of overall team management.[5-8]

Orthodontic treatment represents a key factor for the success of the overall treatment of cleft patients, which usually includes pre-surgical naso-alveolar molding (PNAM), expansion, face mask therapy, comprehensive fixed orthodontic treatment, and possible pre-surgical orthodontics in cases requiring orthognathic surgery[9].

The following case series describes comprehensive dental treatment and management of cleft lip/palate patients highlighting the importance of inter-disciplinary orthodontics. In order to maintain brevity,

the number of illustrations for the subsequent cases i.e. case number 2 and 3 has been reduced to pre and post treatment pictures.

CASE NUMBER 1

A 15 year old post-pubertal male reported with a chief complaint of irregular placed front teeth. He was diagnosed as a case of operated bilateral cleft lip and palate with Skeletal Class II malocclusion and Angle's Class I molar relation with half-class II canine relation bilaterally. The pre-maxillary segment was not mobile. He also presented with a midline diastema, bilateral crossbite in the canine-premolar region due to constricted upper arch, an overjet of 1mm and complete overbite, congenitally missing 22 and hypoplastic 11, spacing of 4 mm in upper arch and upper incisor retroclination (Figure 1, 2).

The treatment objectives were to obtain optimal soft and hard tissue aesthetics; to obtain and maintain periodontal and interdental bone health for stability; and to obtain and maintain optimal occlusal contacts.

The inter-disciplinary treatment plan was to expand and prepare the maxillary arch for bone grafting using a slow NiTi palatal expander (Figure 3). This was followed by an autogeneous cancellous bone graft harvested from the ileac crest and placed bilaterally in the maxillary canine region (Figure 4). Orthodontic alignment and leveling was carried out using a 0.22 X 0.28 inch slot MBT prescription appliance (3M Unitek Gemini) and a protraction utility arch was used to intrude and procline the upper incisors (Figure 5). The final occlusion obtain was a Class I canine and Class I Molar. Since there was no grossly severe sagittal and transverse deformity, orthognathic surgery was not deemed necessary. A pre-prosthetic assessment was done to determine what restoration and prosthesis would best suit the patient (Figure 6). The upper left central incisor were built-up and recontoured with composite veneering and a fiber-reinforced resin bridge spanning 12 to 22 was given till the patient attained sufficient dental maturity to receive a final prosthesis to improve the aesthetics (Figure 7, 8, 9). Upper and lower bonded retainers were planned to maintain the treatment changes- i.e. permanent retention protocol was followed. Total treatment time taken was 15 months. The treatment progress schematic has been summarized in Flowchart 1.

CASE NUMBER 2

A 13 year old female reported with a complaint of irregularly placed teeth. The patient was diagnosed as a operated case of bilateral cleft lip and palate with anterior crossbite with respect to 21; which was also hypoplastic and unilateral posterior dental crossbite with respect to the left side, along with a narrow maxillary arch and mild crowding present in the mandibular arch (Figure 10). Both upper lateral incisors were missing and both upper canines were impacted, there was no transverse and sagittal skeletal discrepancy noted.

Similar to the case number 1, the Interdisciplinary treatment objectives in this case were to obtain optimal soft and hard tissue aesthetics, proper localization and disimpaction of impacted canines with minimum tissue and patient morbidity, subsequent substitution of the canines in place of the upper lateral incisors, to obtain and maintain periodontal and interdental bone health for stability and to obtain and maintain optimal occlusal contacts.

The interdisciplinary plan was maxillary arch preparation and expansion for alveolar bone grafting and canine disimpaction using slow NiTi palatal expander, autogeneous bilateral alveolar bone grafting harvested from the ileac crest region in the upper canine region and placement of attachments to disimpact the upper canines, orthodontic alignment which included bringing the impacted canines into proper alignment and leveling using a 0.22 X 0.28 inch slot MBT prescription appliance (3M Unitek Gemini). The canines were substituted for the missing lateral incisors and the premolars for the canines; the upper left central incisor was recontoured and built-up using composite veneering. The case was finished in a Class II molar relationship (Figure 11). As with case 1, there was no gross sagittal and transverse correction required surgically. A permanent retention protocol was implemented i.e. fixed upper and lower bonded retainers. . Total treatment time taken was 19 months. The treatment outline has been summarized in flowchart 2.

CASE NUMBER 3

A 14 year old reported with a chief complaint of irregularly placed upper front teeth. He was diagnosed

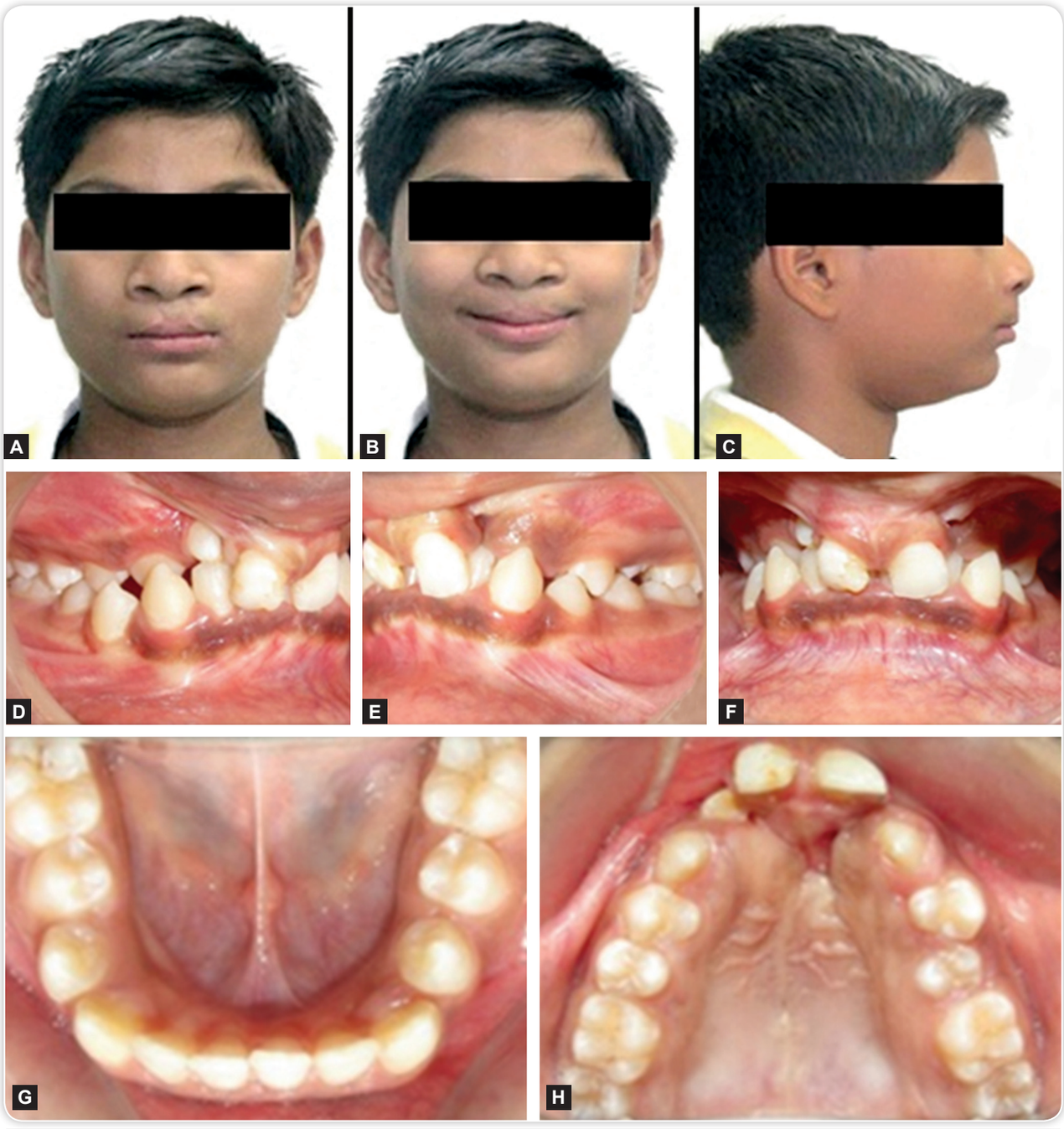


Figure 1 Pre-treatment photographs of case 1- (A)- Frontal rest; (B) Frontal Smile; (C) Profile; (D) Right lateral; (E) Intra-oral frontal; (F) Left lateral; (G) Maxillary occlusal; (H) Mandibular occlusal

as a case of operated bilateral cleft lip and palate having a convex profile with narrow maxillary arch, rotated upper central incisors with midline diastema of 3 mm and missing upper right lateral and peg left upper lateral which was impacted (Figure 12). No sagittal and transverse discrepancy was noted.

The Interdisciplinary treatment objectives in this case were to obtain optimal soft and hard tissue aesthetics especially with respect to the pre-maxillary segment; hypoplastic upper central incisors, impacted right upper peg lateral incisor which required proper disimpaction with minimal morbidity and the missing

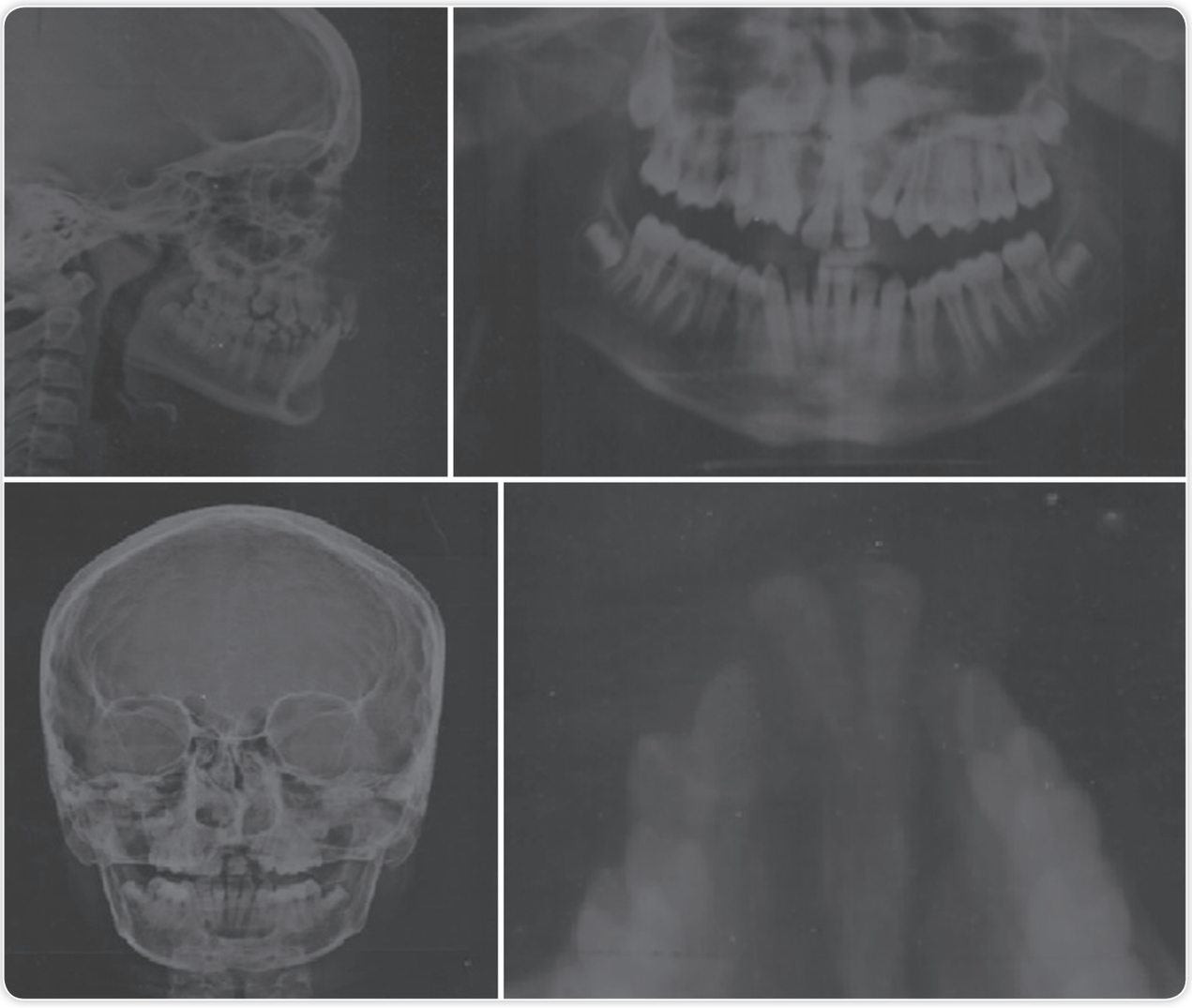


Figure 2 Pre-treatment radiographs of case 1

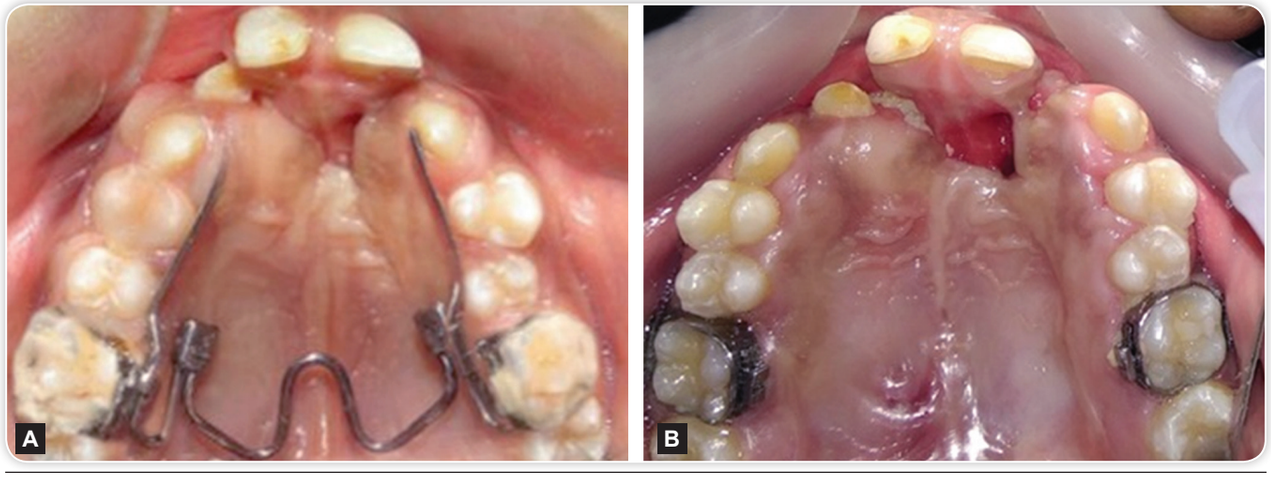


Figure 3 (A)- NiTi expander in place; (B) Post-expansion

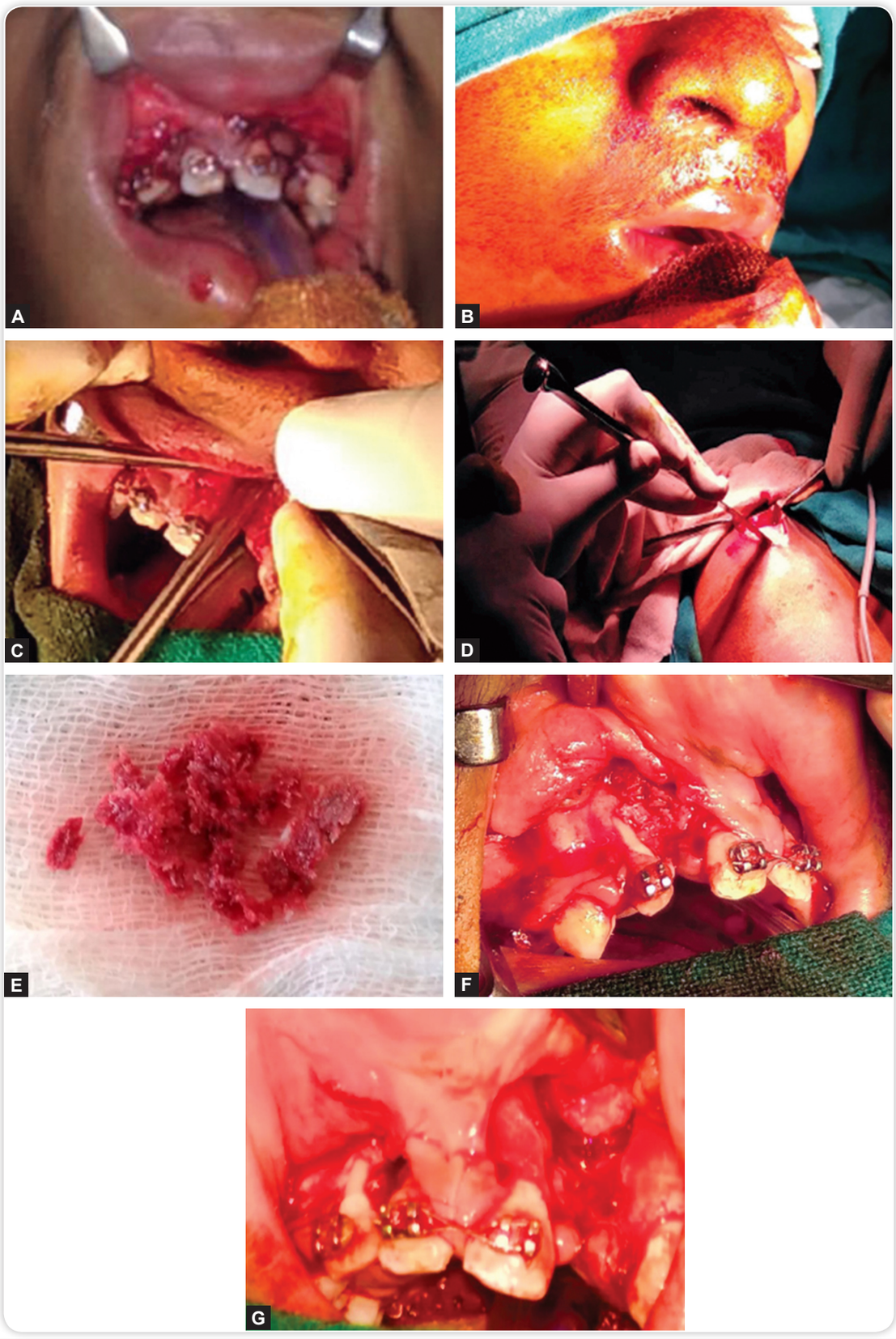


Figure 4 (A) Examination of defect area; (B) Patient preparation; (C) Exposure of surgical area; (D) Harvesting of ileac crest bone; (E) Bone graft collected from site area; (F and G) packing of graft in defect on right side and left side respectively

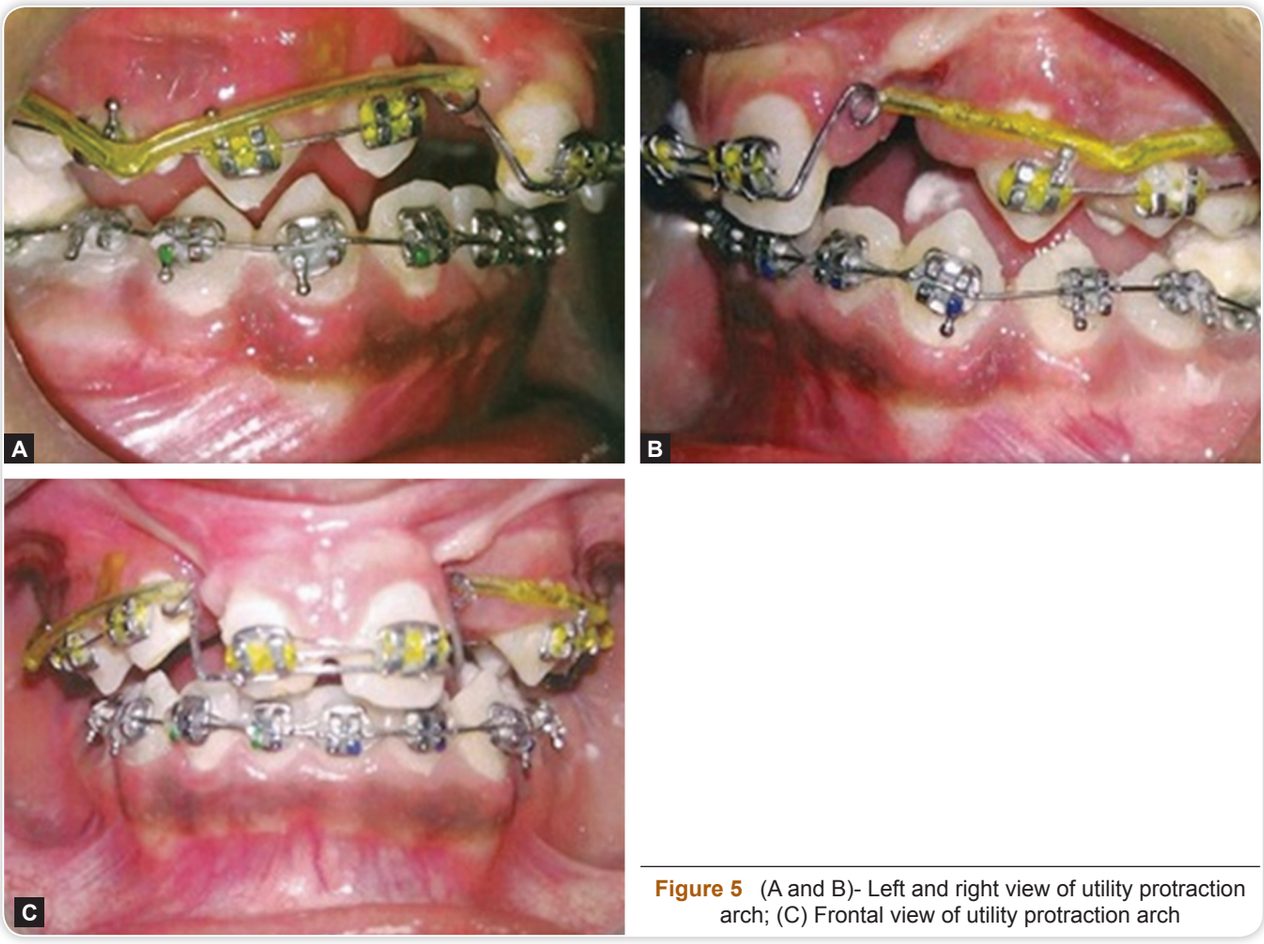


Figure 5 (A and B)- Left and right view of utility protraction arch; (C) Frontal view of utility protraction arch

lateral upper left lateral incisor, to obtain and maintain periodontal and interdental bone health for stability and to obtain and maintain optimal occlusal contacts.

The interdisciplinary treatment plan was preparation and expansion of the maxillary arch using a slow NiTi palatal expander, proper localization and disimpaction of the upper right peg lateral incisor, harvesting and placement of autogeneous bone graft harvested from the ileac crest bilaterally in the canine region and the cleft region, orthodontic alignment and leveling using a 0.22 X 0.28 inch slot MBT prescription appliance (3M Unitek Gemini) where the left upper canine was substituted in place of the missing lateral to finish in Class I canine and class II molar relationship (Figure 13). This was followed by a pre-restorative assessment leading to the build-up and cosmetic contouring of the peg lateral and upper central incisors (Figure 14). No orthognathic surgical intervention was deemed necessary Upper and lower bonded retainers were planned to maintain the treatment changes- i.e. permanent retention protocol was prescribed. In addition, there was a resin wing connecting the upper left reshaped canine and central incisor to prevent rotational relapse. Total treatment time taken was 18 and half months. The treatment outline has been summarized in flowchart 3.

DISCUSSION

The prime role of the interdisciplinary cleft team is to provide integrated quality and continued care for cleft patients with longitudinal follow-up. But why do we need interdisciplinary teams instead of multidisciplinary teams[10]?

Day had stated that: 'A multidisciplinary approach can occur as a series of isolated evaluations by several

Figure 6 Pre-prosthetic intra-oral views of case 1- (A) Left lateral; (B) Right lateral; (C) Frontal; (D) Maxillary occlusal; (E) Mandibular occlusal

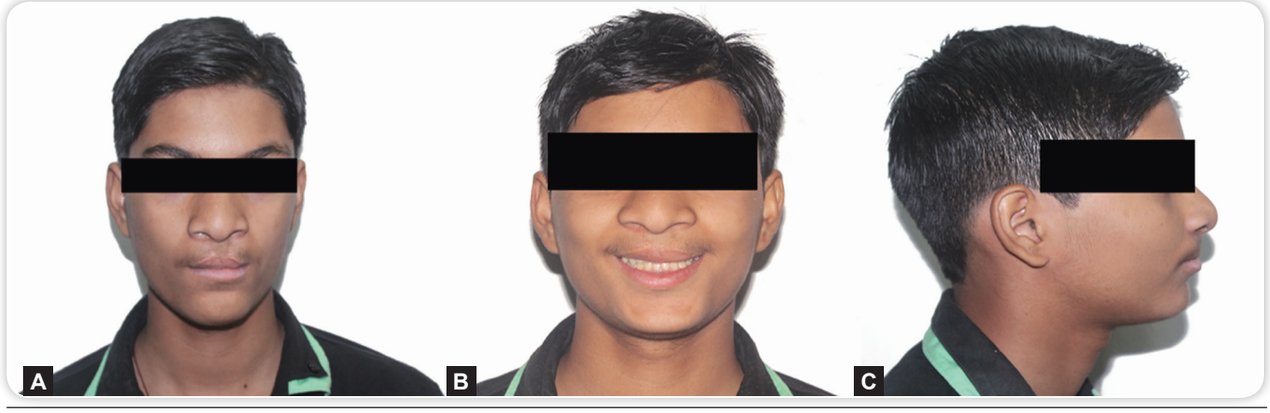


Figure 7 Post-treatment extra-oral views of case 1- (A)- Frontal rest; (B) Frontal smiling; (C)- Profile

Figure 8 Post-treatment intra-oral views of case 1 following prosthetic and restorative rehabilitation- (A)- Left lateral; (B) Right lateral; (C) Frontal

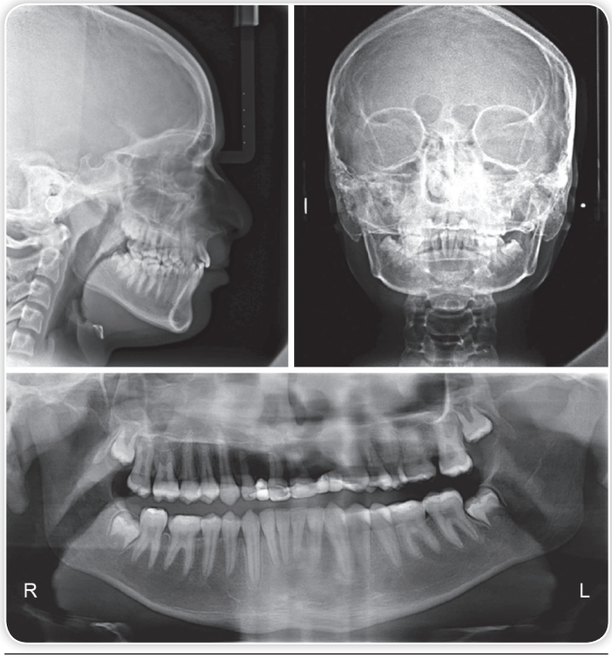
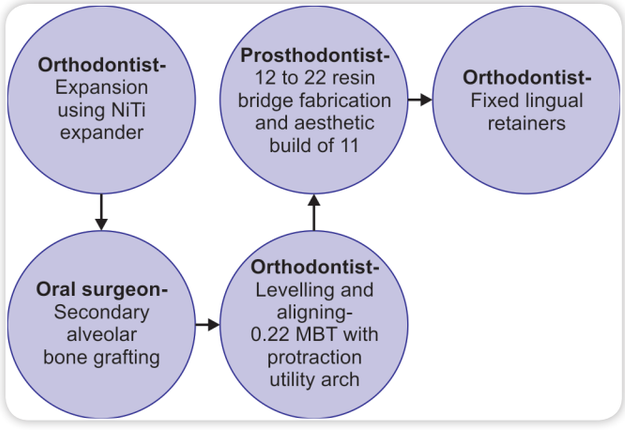


Figure 9 Post- treatment radiographs of case 1

Flowchart 1 Schematic representation of inter-disciplinary care in case 1



disciplines and does not imply the merger of evaluative insights or the shared development of a treatment plan, which are the hallmarks of an interdisciplinary team'.[11] An interdisciplinary team, on the other hand,

Figure 10 Pre-treatment photographs of case 2- (A) Frontal rest; (B) Profile; (C) Intra-oral frontal; (D) Right lateral; (E) Left lateral; (F) Maxillary occlusal; (G) Mandibular occlusal

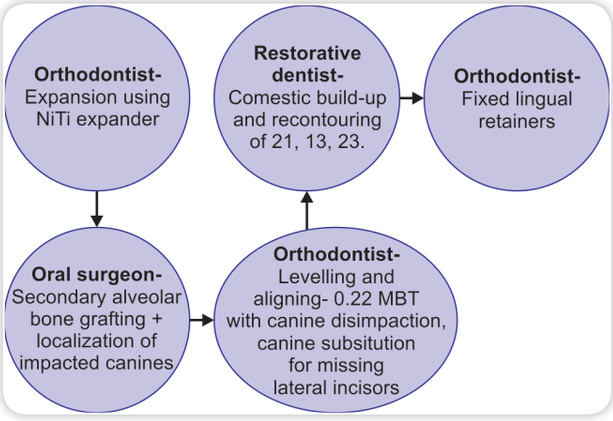
is one in which professionals from different disciplines are involved in conducting a joint evaluation and developing a treatment plan in which expertise is pooled and decision making is collective.[12] From these definitions it becomes clear that we should aim for the latter team format when treating cleft patients as joint team consultations, where patients examination and discussion is held concurrently by all team members. This leads to the formation of well-oiled functioning team.

Figure 11 Post-treatment photos of case 2- (A) Frontal rest; (B) Profile; (C) Intra-oral frontal; (D) Right lateral; (E) Left lateral; (F) Maxillary occlusal; (G) Mandibular occlusal

The central theme of this paper is to emphasize a comprehensive inter-disciplinary approach towards the management of cleft lip/palate patients. All the three cases mentioned have active participation from the orthodontic, oral surgical, conservative and prosthodontic team.

The treatment plan had specific goals, that are achievement and maintenance of prime oral health,

Flowchart 2 Schematic representation of inter-disciplinary care in case 2



achieving occlusal stability in rest and in function and acceptable aesthetics with respect to the relationship of the jaws and teeth and the relationship to the cranial base and skeletal facial profile. The treatment goal was to maintain what is correctly aligned and change what is not.

When a complete cleft of the alveolus is present, unilateral or bilateral, an early secondary bone graft is recommended between the age of 8 and 11 years, and prior to emergence of the canine at the cleft-affected side. The timing is based on the developmental stage of the unerupted canine adjacent to the cleft, whereby its root length should be half to three-quarters of its full length.[13,14] The bone is usually harvested from the iliac crest, sometimes from other bones such as the tibia, mandibular symphysis etc. Orthodontic preparation for the bone graft is usually needed which involves expanding the maxillary arch to align the maxillary segments in the correct position and relation to each other. However, care must be taken not to over-expand the arch, as it will be difficult to close the soft tissues over the bone-grafted area.[10] A successful outcome of this procedure requires a sufficient amount of healthy attached gingiva.[15] Therefore, an oral surgeon consultant and involvement is indicated during the expansion phase.

Cleft patients have more dental abnormalities than those seen in the general population. Hence, they are likely to require fixed, removable, or combined prosthodontic rehabilitation to replace missing teeth/edentuluous cleft area, thereby improving hard and soft tissue esthetics.[16] Regarding the management of a missing lateral incisor which is commonly observed in cleft patients, there are two acceptable options.[17-19]

Maintenance of the space for a dental implant/bridge (seen in case 1), Movement of the canine into the lateral incisor space following necessary aesthetic reshaping and shade matching (as seen in case 2), to resemble a lateral incisor.

If a dental implant/bridge is to be placed, space needs to be created for the prosthesis which is to replace the missing lateral incisor. Sometimes due to the young age of the patient, a resin pontic/bridge may have to be given as intermediate restoration, till there is sufficient dental maturity to receive a final restoration. A cosmetic removable prosthesis may also be fabricated to maintain the space.[8]

Increased attention is given to retention appliance design and long-term stability. In view of the potential for relapse in the transverse and sagittal dimensions, lifetime retention is highly recommended.[20]

CONCLUSION

Treatment of the patients with CLP represents both esthetic and functional problems. To improve the quality of life of these patients an inter-disciplinary approach is required to treat both of these problems. Orthodontic treatment should be performed in discreet and planned phases with specific objectives in conjunction with other specialities. Proper orthodontic care enhances soft tissue repair, speech production, oral function, and self-image.

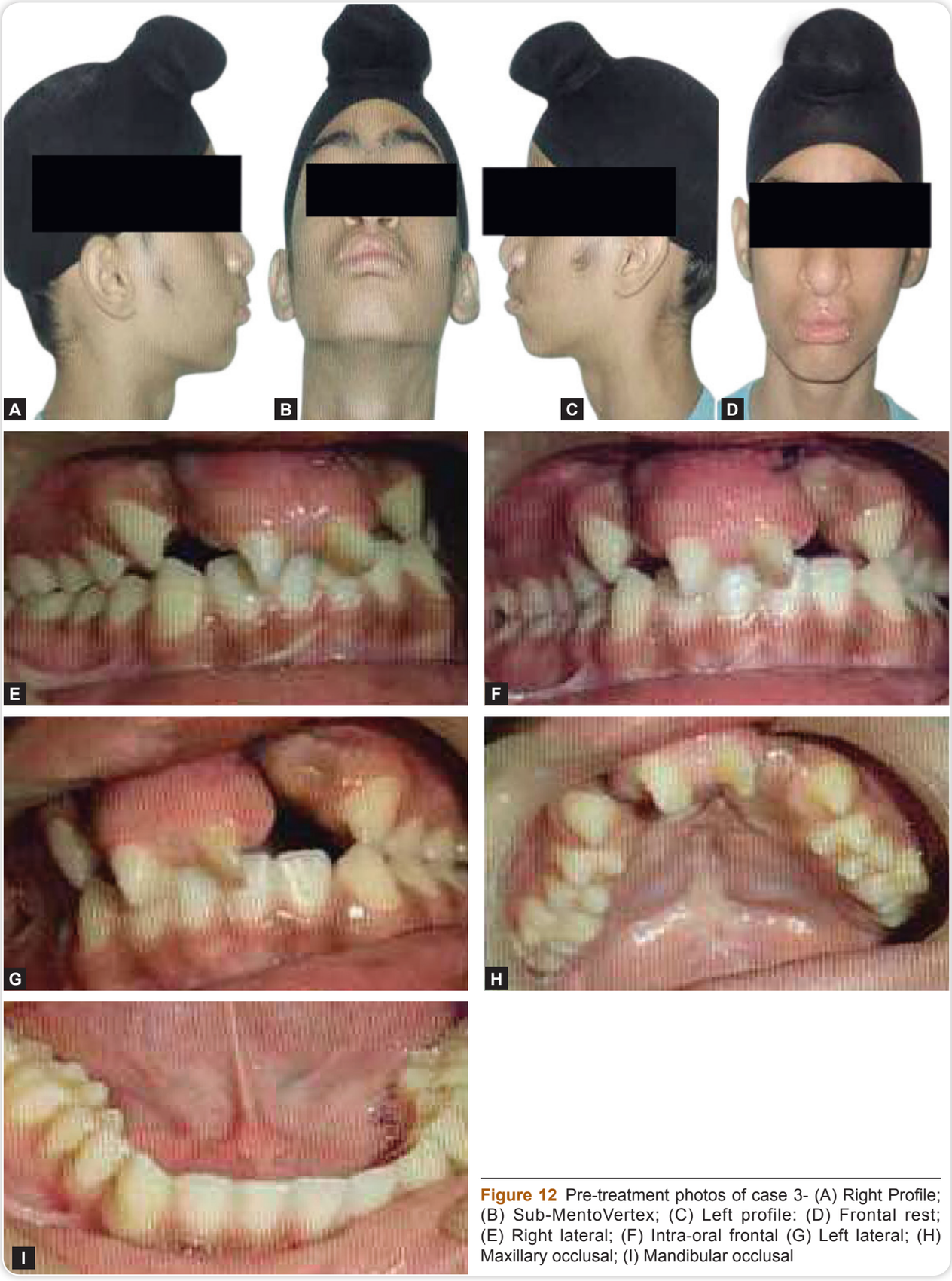
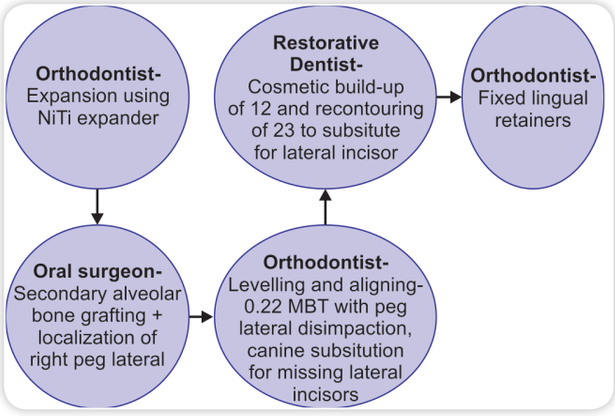


Figure 12 Pre-treatment photos of case 3- (A) Right Profile; (B) Sub-MentoVertex; (C) Left profile: (D) Frontal rest; (E) Right lateral; (F) Intra-oral frontal (G) Left lateral; (H) Maxillary occlusal; (I) Mandibular occlusal

Figure 13 Pre-restorative views of case 3 (A)- Frontal rest; (B) Frontal smiling; (C)- Profile; (D) Left lateral ; (E) Right lateral; (F) Intra-oral frontal; (G) Maxillary occlusal; (H)- Mandibular occlusal

Figure 14 Post-restorative intra-oral photo of case 3

Flowchart 3 Schematic representation of inter-disciplinary care in case 3



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