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Management of Midline Diastema with Aligners: Case Series

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Abstract

In adults, the gap between the maxillary central incisors is frequently regarded as an unaesthetic or malocclusion issue. Active treatment is available for patients who feel that a diastema is unacceptable. Not all diastemas, however, can be handled in the same way or at the same time. This article describes the quick, easy, and hygienic device known as aligners, which was used to address a spacing case. For individuals in need of orthodontic treatment, aligners provide a novel solution. Thus, their worries regarding aesthetics, metal allergies, and hygiene are all addressed. Additionally, the duration of therapy is much less as compared to fixed orthodontic appliance, here the management of midline diastema in adult patients with aligners within 12 months. Clear aligner treatment modality is specially helpful for those adult patients who are in public communication profession. The traditional metallic braces which used to impose embarrassment, low self-confidence level during speech delivery in this group of people, can be eradicated by this newer invention – clear aligner. The aesthetic acceptability of this aligner is so demanding that the people who were previously reluctant to have orthodontic treatment, are availing this treatment modality. In this article three adult patients from three different professions (i.e. medical specialty, stage performer and hospitality management) treated with aligner who were previously reluctant to get traditional orthodontic treatment due to their professional need.

Keywords: Aesthetic, Clear Aligner, Diastema, Hygiene, Invisalign, Scanner.

Introduction

The field of orthodontics has advanced significantly during the past 20 years. The development of digital technology has greatly improved treatment mechanics as well as diagnostics and planning. Digital radiography, digital cameras, intraoral and lab scanners, 3D printing, and CAD-CAM metal milling are the main technological developments in orthodontics. When Kesling came up with the idea of gradually moving misaligned teeth using a succession of thermoplastic tooth positioners, the clear overlay orthodontic appliances were first introduced in 1946 (1). When clear aligner was initially introduced in 1999 under the trade name INVISALIGN by Align technology, it has greatly increased in popularity. In recent years, the system has grown significantly because to extensive material science research, enhanced software for virtual tooth movement, and its invisible nature (2, 3). A rapidly expanding area of orthodontics is the treatment of orthodontic patients with clear aligners. Expert dental professionals have discovered that, in many cases, clear aligner therapy does not produce the same level of accuracy as fixed equipment in treating complex malocclusion. Presenting this treatment option to the patients requires careful case selection and counseling.

Diastemas in adult population pose a great embarrassment for social interaction. Causes of diastema are multiple such as high frenal attachment, tongue thrusting habit, microdontia, Bolton tooth material discrepancy etc. treatment modality ranges from removable appliance with finger spring, fixed orthodontic mechano-therapy to most recent clear aligner therapy. The traditional metallic braces which used to impose embarrassment, low self-confidence level in young adult population is completely overcame with the esthetic clear aligner. In this article three adult patients from three different professions (i.e. medical specialty, stage performer and hospitality

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management) treated with aligner who were previously reluctant to get traditional orthodontic treatment due to their professional need. All of them are having midline diastema due to Bolton tooth material discrepancy only and not with high frenal attachment nor with tongue thrusting habit.

Case Report -1

A 26-years-old female patient reported with her primary concern of the presence of gaps in both her upper and lower dental arches, and she desired a more aesthetically pleasing smile (Figure 1A) During the test, it was observed that she had evenly distributed gaps between her teeth in both the upper and lower arches (Figure 1B). Additionally, she had a class I molar and canine relationship on both sides. She did not exhibit any signs of tongue thrusting and her frenal attachment appeared to be within normal range. The individual had a 7 mm gap between teeth in the lower arch and an 8 mm gap between teeth in the upper arch. The patient was presented with two treatment options: conventional braces or ceramic braces, and clear aligners. These options were chosen to address the patient's aesthetic issues and the absence of any complex movements needed to close the gaps. The patient opted for clear aligners in the process of collaborative decision making. The impression was taken with additional silicone and dispatched to the laboratory for scanning.

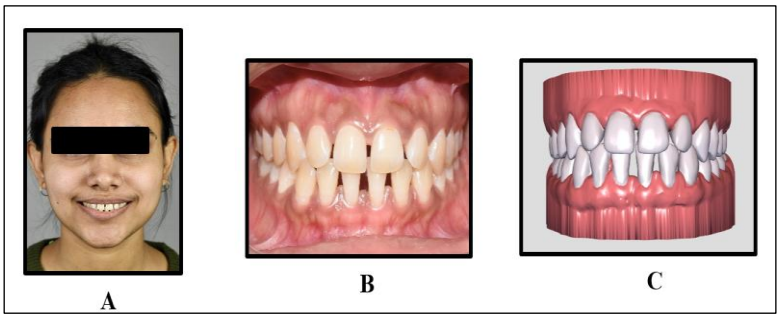

Figure 1: Pre-Operative Photographs (A: Extra-Oral, B: Intra-Oral, C: Virtual View)

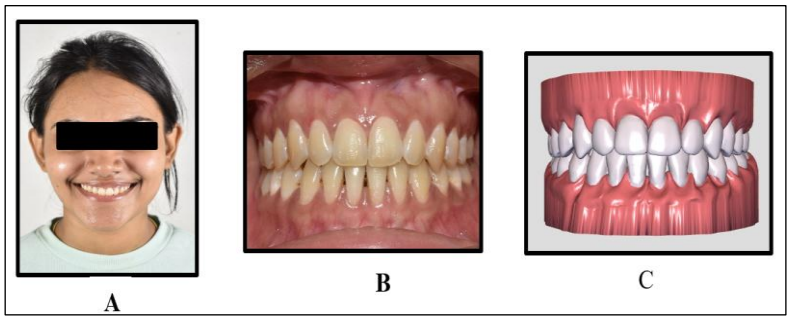

Figure 2: Post-Operative Photographs (A: Extra-Oral, B: Intra-Oral, C: Virtual View)

Treatment Objectives: Treatment goals in these case series include achieving dentoalveolar structure alignment and levelling, closing the generalized space, enhancing aesthetics, and preventing the lower anterior teeth's periodontal health from getting worse.

Treatment Progress: Upon approval of the virtual treatment plan (Figure 1C), upper 12 and lower 16 sets of aligners were planned, Zero aligners were delivered on the 5th day to check the fit. Then attachments were bonded on all first molars and 11,21,13,23, 31,41,34,44 and First set of aligners were delivered on the 7th day. The patient was advised to wear each aligners for near about 22 hrs a day for three weeks except during eating. The patient was seen once in every 2 months to check for the fit of the appliance and the treatment progress. The total treatment duration was 1 year. Fixed bonded retainers were placed from canine to canine in upper and lower arch to maintain the corrected position. All the diastemas are corrected resulting a satisfied patient outcome (Figures 2A, 2B, 2C).

Case Report -2

A 32 year old male patient came to the department with forwardly placed upper front teeth along with gaps (Figures 3A, 3B). He had a class I molar and canine relationship on both sides. Due to his occupational demand, he only opted for clear aligner treatment method. After evaluation of the

scanned impression, the virtual treatment plan decided to go for upper 15 and lower 17 sets of aligners. Attachments were placed on all the first molar and 24, 34, 14, 44, 13, 42. Inter proximal reduction done distal side of 32, 42 (0.3 mm each) and mesial and distal side of 33, 43 (0.3 mm each side). Instructions were given to wear each aligner for near about 22 hrs a day for three weeks except during eating. The patient was seen once in every 2 months to follow up (Figure 4). The total treatment duration was 1 year. Fixed bonded retainers were placed from canine to canine in upper and lower arch to maintain the corrected position (Figures 5A, 5B).

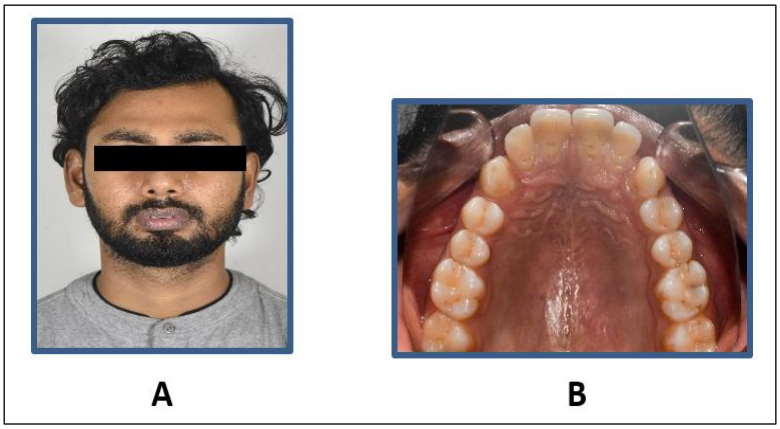

Figure 3: Pre-Operative Photographs (A: Extra-Oral, B: Intra-Oral Maxillary Occlusal View)

Figure 4: Per-Operative Photograph (Aligner with Attachments)

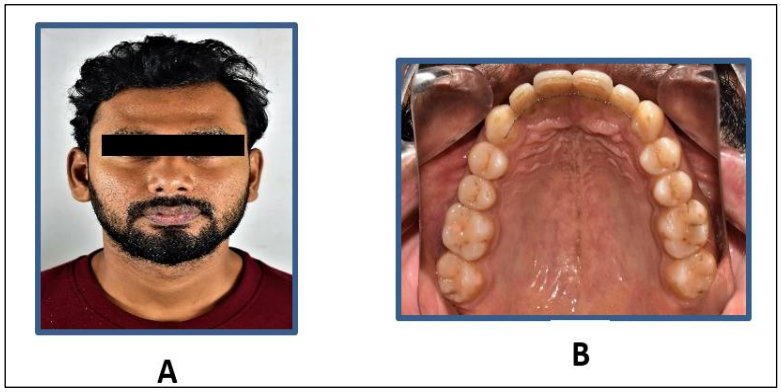

Figure 5: Postoperative Photographs (A: Extra-Oral, B: Intra-Oral Maxillary Occlusal View)

Case Report -3

A 23 years old female patient presented with gaps in the upper front teeth (Figures 6A, 6B). She had a class I molar and canine relationship on both sides. Upon the other treatment choices, she opted for clear aligner for its esthetic approach. The virtual treatment plan decided to go for upper 10 and lower 15 sets of aligners. Inter proximal reduction done distal side of 31, 32, 41, 42 (0.2 mm each) and mesial and distal side of 33, 43 (0.3 mm each side). The overall treatment duration was 10 months with a visible result (Figures 7A, 7B).

Figure 6: Pre-Operative Photographs (A: Extra-Oral, B: Intra-Oral)

Figure 7: Post-Operative Photographs (A: Extra-Oral, B: Intra-Oral)

Discussion

Adults who wish to forego orthodontic tooth correction due to aesthetic concerns now have the option of treating with Clear Aligners (4). The advantages are many folds:

- Removable appliance –
  - Easy to maintain oral hygiene
  - Easy to keep clean the appliance
- Comfortable and less likely to irritate soft tissues
- Prevent tooth wear from bruxism – acts as night guard
- Less restriction on foods, less debonding of brackets
- Overall less chair side time
- The clinician can predict and expect how the treatment results would be at the end.

Predictable results can be obtained for mild to moderate correction of tooth such as space closure, retraction, decrowding etc. However, patient selection is extremely important for clear aligner therapy (5).

Ensuring patient compliance is main factor for achieving success in clear aligner treatment. The success of the treatment relies heavily on the patient's adherence to wearing aligners for around twenty hours per day, seven days per week. The duration and success of treatment can vary significantly according on the level of patient adherence (6).

After every four to five sets of aligners, it's critical to check the clinical locations of the teeth with the virtual setup photographs. It's not always possible to get the result as it is predicted in virtual treatment planning (7). If any aberration occurs, the orthodontist should halt treatment at this point and request that the laboratory send a fresh set of aligners with all corrections required. In this case series, proclined and spaced anterior teeth have been addressed, demonstrating the effectiveness of the clear aligner. Complex tooth movements can now a days are also possible with clear aligners (8). Though, there are certain limitations and drawbacks in clear aligner therapy such as significant rotation correction, root torqueing, detailing and finishing of occlusion (9).

Conclusion

The hygienic detachable, and easy appliance known as Aligners is described in this article as it was used to treat a spacing case. For adults seeking orthodontic treatment, aligners provide a fresh

approach (10). That takes care of their concerns about cleanliness (11, 12), metal allergies, and aesthetics (13). Also, therapy can be completed in the same amount of time, if not less, as with fixed appliances.

The virtual environment has multiple purposes: it aids in diagnosis, but it can also educate and motivate the patient. More importantly, the effectiveness of the treatment depends on the patient's active participation (14, 15). The procedure was successful, and the patient felt relieved with the final product. . The patient had good periodontal health at the time of reporting, and this condition persisted both during and after therapy. Indeed, the patient's smile was esthetically improved with fewer appointment and less chair side time (16).

Abbreviations

None.

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Author Contributions

Diptangshu Garai: Writing initial draft, Kallol Pramanik: Record Collection, Sankhya Ghosh: Record Collection, Pintso Tshering Lepcha: Grammatical Mistake Correction, Scrutiny, Mukesh Kumar: Redesigned the reference of article, Ali Asger: Scrutiny.

Conflict of Interest

No conflict of interest among the authors.

Ethics Approval

Ethical approval and written informed consent of the patients have been taken.

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