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CASE REPORT

Maxillary Midline diastema closure after replacement of primary teeth with implant prosthesis

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Key Clinical Message

This case shows an excellent esthetic treatment outcome using implant-retained crowns replacing maxillary laterals and canines in hypodontia patient with unusual incidence of spontaneous diastema closure after the placement of implants. To our knowledge, this is the first case report showing maxillary midline diastema closure after implant placement.

Keywords

Hypodontia, Missing maxillary lateral incisors and canines, Implant, implant-retained crowns, Midline diasetma closure, diasetmas, esthetics, fixed dental prosthesis, metal-ceramic crowns.

Introduction

Restoring the anterior segment generally with restorations is considered to be difficult and in hypodontia patient this is even more challenging. Careful planning of the management of space for missing teeth in younger individuals is crucially important. This case report describes an interesting incidental finding of a hypodontia case treated with implants.

In this case the patient presented with concerns about appearance when the retained deciduous teeth failed. This case was esthetically challenging with a high smile line and anterior segment spacing. The patient was treated with implant-retained crowns replacing missing maxillary lateral incisors and canines on both sides. Unexpectedly, the maxillary midline diastema had closed after the placement of implants, prior to the provisional stage.

Hypodontia, the developmental absence of number of teeth is associated with characteristic morphological changes in teeth, alveolar volume deficiencies, and skeletal jaw mal-relationships (1). Hypodontia in the permanent dentition occurs in 3.5–6.5% of the normal population (2). Dhanrajani (1) classified hypodontia into:

1 Mild-to-moderate hypodontia: Absence of usually two or more teeth but fewer than six teeth, excluding third molars.
2 Severe hypodontia: Absence of six teeth or more, excluding third molars.

The missing teeth are usually associated with dental anomalies characterized by microdontia, conical teeth, delayed exfoliation of primary teeth and generalized diasetmas, which causes hypodontia patients concern about appearance rather than function. There are multiple features that make treatment of the hypodontic patient complex:

- The presentation of a patient who is too young for implant treatment.
- Decisions on the extraction of primary teeth as opposed to retaining them.
- Permanent teeth may be in the wrong position.
- A lack of interocclusal space may require an increase in occlusal vertical dimension.

The lack of alveolar tissue, in particular bone. Treatment options might vary from no treatment in mild hypodenotia where the appearance and function are acceptable to severe hypodontia where the implant modality will be the best option.

Implant placement with a two-stage surgical approach in the anterior area of the mouth may be imperative and may require an esthetic provisional replacement for the missing tooth during the healing phase. This provisional restoration should help optimize the health of hard and soft tissues around the implant without exerting pressure on the residual ridge and maintain the position of the adjacent and opposing teeth (3). Implant placement and restoration is a preferred solution for the replacement of missing teeth in any age group, but is particularly beneficial for younger patients (Fig. 1).

Case Report

A healthy British Caucasian female was referred to me for restorative opinion from joint Orthodontic/Restorative hypodontia clinic at Guy's Hospital as it was noticed that at the age of 18 her maxillary deciduous lateral incisors and canines were mobile. She was concerned about the loss of the deciduous mobile teeth and the effect of this will have on her appearance. She was keen to have a natural appearance when her teeth were replaced. The patient was a regular dental attender with no relevant medical history.

On examination no extraoral abnormalities were detected. She had competent lips with a high smile line in forced smiling. On examination, she had healthy mucosa and her oral hygiene was fair with mild marginal inflammation. Basic Periodontal Examination (BPE) showed no periodontal pockets >3.5 mm, no calculus/overhangs, but had bleeding after probing in the posterior areas only. The permanent teeth present in the maxillary arch were central incisors, premolars and first molar, while the mandibular arch was fully dentate until the second molar.

The patient presented with an Angles class I incisor relationship on a Class I skeletal base with a Class III molar relationship in the buccal segments. A maxillary midline diastema and spacing in the anterior segment of maxilla were noted. The estimated width of the maxillary midline diastema was 2 mm. Maxillary first premolars were disto-buccally rotated. Maxillary deciduous laterals and canines were slightly mobile. The estimated space for the existing deciduous upper laterals and canines on the left side was 17 mm and on the right side was 15 mm.

The patient was fully assessed clinically and radiographically. Study casts were constructed and a diagnostic wax-up was performed and analyzed. All retained deciduous teeth had a moderate degree of root resorption and are due to exfoliate thus it was decided to extract all the retained deciduous teeth. Additionally, the age of the patient was suitable to have implant therapy to achieve maximum alveolar bone preservation.

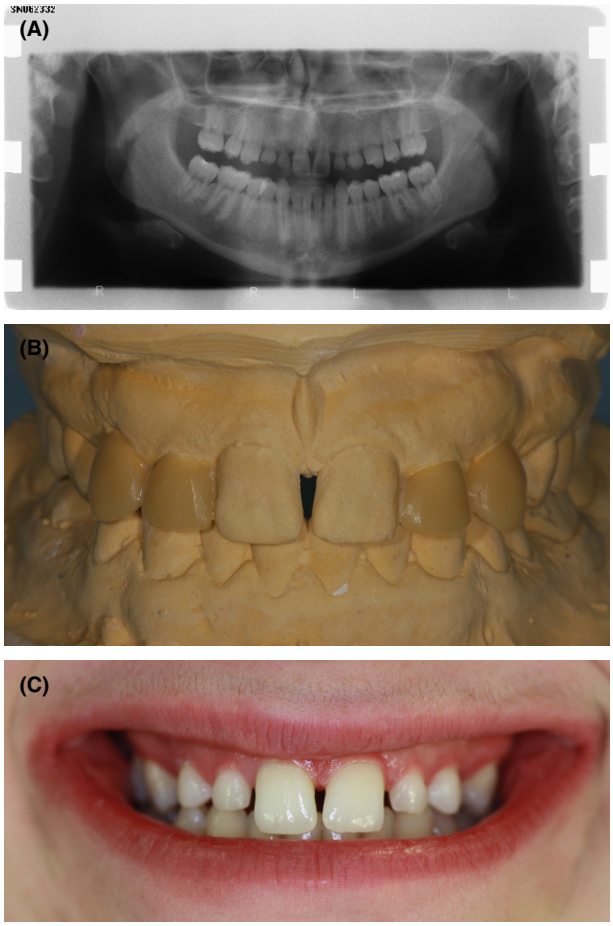

Figure 1. (A) Orthopantomogram showing the retained deciduous teeth with missing permanent successors. Note also the extent of the deciduous root resorption. (B) Anterior view of the diagnostic wax-up, (C) Pretreatment intraoral anterior view photograph.

The aim of the treatment was to improve esthetics of the maxillary labial segments. To finalize the treatment strategy a period of information gathering and careful discussion with patient and a phased treatment plan approach was agreed.

Primary impressions were taken and study casts were duplicated and then mounted on a Denar® articulator using a face-bow transfer and interocclusal record taken at intercuspal contact position. Diagnostic wax-up was performed at the existing vertical dimension, which enabled the achievement of esthetically reasonable morphology of teeth.

Options for management of missing teeth based on clinical, radiographic examinations, and diagnostic wax-up are:

1 Implant-retained prostheses to replace missing maxillary teeth with single implant-retained crowns were considered the best option because it is the most conservative method of replacement.

2 Removable acrylic partial denture was considered to replace missing maxillary teeth. However, this was not an ideal option due to potential compromise to the remaining dentition by increasing plaque accumulation.
3 Fixed restorations to replace maxillary lateral incisors and canines on both sides with resin retained fixed–fixed bridges were not considered to be viable due to the long span. In addition, the first premolars would not be the ideal abutment teeth as they were rotated and to replace missing teeth with conventional fixed–fixed bridges would be a destructive option, as the abutments were sound teeth. An acrylic immediate partial denture was fabricated to replace the existing maxillary deciduous teeth. Extractions were done prior to implant surgery to promote primary closure at the sites of implant-fixtures placement.

Implant Surgery

A decision was made on the number and size of implants to be placed. The surgical procedure was carried out under local anesthesia. Mid crestal and vertical relieving incisions to preserve gingival papilla around the teeth were made and full thickness flaps were elevated. The patient was scheduled for Stage II surgery 3 months after implant placement. During Stage II surgery, cover screws were removed and replaced with healing abutments. The immediate partial denture was adjusted to fit the healing abutments areas. The patient was reviewed 3 weeks after Stage II to proceed with the restorative phase. Fixture head impressions of the maxillary implants were taken using an open tray technique for the construction of provisional restorations. At this impression making visit it was noted that the median diastema had completely closed.

Abutment selection was carried out using the fixture head cast and putty matrix of diagnostic wax-up. An alginate impression of the provisional restorations in situ, a face-bow transfer and interocclusal records were also taken. Definitive working impressions for maxillary anterior fixture heads were made. Maxillary anterior metal-ceramic crowns were fitted, checked for fit at margins, esthetics, and occlusion.

The patient was reviewed after 1 month and she was very happy with the treatment outcome and felt more confident with her smile. The importance of regular follow up appointments and good oral hygiene was reinforced.

Discussion

Restoring the missing permanent teeth was considered to be a challenge with the elements of anterior segment spacing and high smile line (4). The condition requires careful treatment planning and consideration of the options and outcomes following either space closure or prosthetic replacement. Therefore, single implant-retained restorations were considered to be the most suitable option in this case rather than one implant-retained cantilever bridge as many studies showed that cantilevers increase forces on supporting implant. Nevertheless, since the patient have a high smile line single implants will provide an esthetically pleasing outcome. Palmer et al. (5) stated that the position of implants needs to be restoratively rather than surgically guided, leading to a better esthetic outcome.

The only reason for midline diastema closure could be the pressure caused by the immediate denture, which was worn for 4 weeks, however, a simple Hawley retainer can close small diastemas in 3–6 months. Also before and during the provisional restoration stage care was taken not to load the residual ridge and to maintain the position of the adjacent and opposing teeth. The implants were well aligned, parallel to the natural teeth and there was adequate supporting bone around them as shown in periapical radiographs (Fig. 2A). We were not able to find a logical explanation for the closure of the midline diastema. The midline diastema may constitute an esthetic concern in many patients

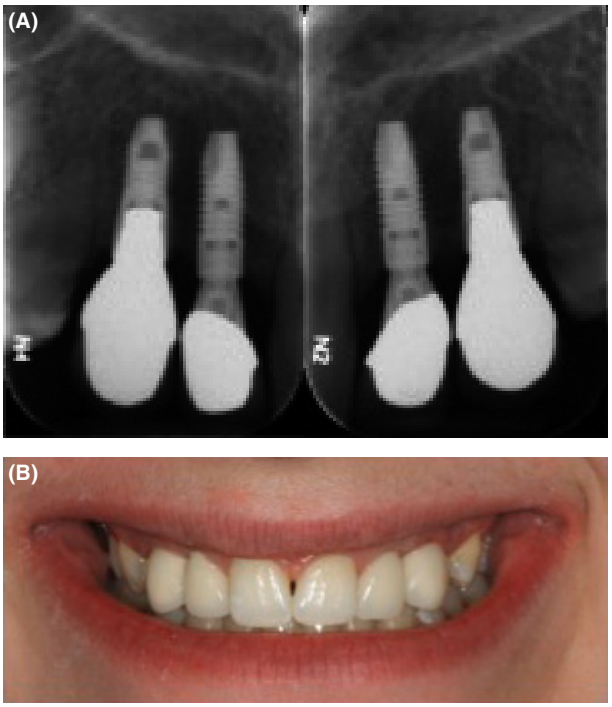

Figure 2. (A) Postoperative periapical radiographs were taken to assess marginal bone levels around the implants. (B) An extraoral photograph of treatment outcome.

who might seek treatment for it. In this case the patient did seem to be concerned about this issue and the main concern was having natural tooth morphology. The closure of the midline diastema before the provisional stage actually added a great deal to the overall esthetic outcome and the patient was happy with the appearance, even though it was not considered in the treatment because it was not one of the patient priorities.

Conclusion

This case showed an excellent esthetic treatment outcome using implant-retained crowns replacing maxillary laterals and canines with unusual incidence of diastema closure after the placement of implants and the patient was very happy and felt more confident with her smile. Restoring the severely hypodontic dentition with implant and fixed restorations requires meticulous planning, realistic treatment goals and a highly motivated and compliant patient (4).

Acknowledgments

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Conflict of Interest

None declared.

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