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Introduction

The restoration or replacement of teeth can be a challenge where there is loss of interocclusal space. In 1975, Dahl described the use of a removable partial cobalt chrome appliance in order to create space in a case with advanced localised attrition.¹ The appliance was worn continuously for 8 months and allowed indirect palatal restorations to be placed. The increased interocclusal space is known to arise through a combination of intrusion of the anterior contacting teeth and eruption of the posterior separated teeth. The period of time for the occlusion to re-establish has been found to be on average 6 months but can take up to 24 months.² The Dahl concept is regularly applied in cases of tooth surface loss and missing teeth, where there is loss of interocclusal space due to dentoalveolar compensation. Successful tooth movement to create space to place restorations has been reported to be as high as 96%.³ To the authors' knowledge there are no studies presenting outcomes where the Dahl concept has been utilised in order to replace missing teeth with dental implants. This poster illustrates cases where the Dahl concept has been utilised to create sufficient space to replace missing teeth with dental implants.

A common reason for the failure of space creation is poor patient compliance with removable appliances^{3,4}. Gough & Setchell reported the use of a fixed interim cobalt-chromium appliance, which reduced the need for excellent compliance.³ Case 1 demonstrates the use of a fixed cobalt-chrome appliance in order to create interocclusal space to replace missing upper central incisors. Developments in adhesive dentistry have allowed the use of direct composite to be used in the same manner and often serve as the definitive restorations.⁵ Cases 2 and 3 demonstrate the use of direct composite to create sufficient interocclusal space in order to replace the missing dentition with dental implant retained restorations.

Case 1 – Fixed Cobalt-Chrome Appliance



A 23 year old patient presented with concerns about his missing anterior teeth following trauma. He reported a cycling accident 6 months previously and had not had any form of tooth replacement. On examination, the UR1 and UL1 roots were retained. Dentoalveolar compensation had resulted in the loss of interocclusal space to replace the missing upper central incisors. Diagnostic models at an increased occlusal vertical dimension and wax up of the UR1 and UL1 aided planning the minimum space required.



The UR1 and UL1 retained roots were left in situ to maintain alveolar bone as dental implants were planned in the future. A fixed cobalt-chrome appliance was made to reduce the need for patient compliance and provided fixed temporary tooth replacement. The fixed appliance created an increase in occlusal vertical dimension (OVD) with occlusal contact only on the appliance (upper 3-3) and no posterior contact.



10 months following fit of the fixed appliance, occlusal contacts were re-established on the premolars and identified with shimstock bilaterally. The fixed appliance was then sectioned, removing the pontics but leaving the metal retainers on the palatal aspects of the upper 2s and 3s in order to maintain a stable occlusion. The upper central incisor roots were removed atraumatically and a removable partial denture was provided. 8 weeks later, dental implants were placed in the UR1 and UL1 sites with guided bone regeneration.



16 months following fit of the fixed appliance, further occlusal contact was evident and sufficient interocclusal space in order to replace the missing upper central incisors.



The remaining metal retainers of the appliance were removed and the implants restored with 2 screw retained implant crowns. Bilateral occlusal contacts were re-established at the new increased OVD.



Case 2 – Direct Composite



This 25 year old patient was concerned about the appearance of his worn primary teeth. The retained URbc and ULbc displayed significant tooth surface loss, low gingival level and there was lack of interocclusal space. Articulated models and a diagnostic wax up were used to plan an increase in OVD. Direct composite was placed on the premolars and incisors to create interocclusal space.

Over a period of months, posterior contacts had re-established. The URbc and ULbc were then extracted and 3 months later two dental implants placed in the UR3 and UL3 region including guided bone regeneration and alveolar recontouring. The implants were restored with 2 screw retained mesial cantilever implant bridges and the direct composite accepted as the definitive restorations.



Case 3 – Direct Composite



This 42 year old patient was concerned about the general appearance of his teeth. The UR1, UL1, UL2 were extracted following trauma 8 years ago. Generalised tooth surface loss was consistent with erosion and abrasion. There was lack of interocclusal space to replace the missing UR1, UL1, UL2. Following planning stages with articulated models and diagnostic wax up, direct composite was applied to the canines, premolars and lower incisors to achieve sufficient interocclusal space anteriorly. Over a period of months, posterior occlusal contacts were re-established. The UR2 was subsequently extracted and 2 implants were placed in the UR1 and UL1 sites. The implants were restored with 2 individual distal cantilever screw retained implant bridges to replace the missing upper 2-2.



Conclusion

The use of the Dahl concept is a well established conservative technique which can be used to aid the management of limited interocclusal space due to dentoalveolar compensation. The lack of space maintenance in the event of missing teeth can lead to very challenging restorative cases as illustrated by cases 1-3. Careful planning from the outset is essential to ensure sufficient space is created. In addition, space created must be maintained until the implants can be restored which requires good patient compliance, optimal space maintenance and prompt implant restoration following osseointegration. The Dahl concept in these cases allowed the conservative creation of space and re-establishment of the posterior occlusion to predictably restore missing anterior teeth with implant retained restorations.

References

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