

Aesthetic Reconstruction of Hypodonty Using Kevlar Fibres

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Summary

Aesthetic inadequacy due to hypodonty of the upper left first premolar of a 20 yearold patient was detected by clinical and radiological examination. After a certain period of time space reduction had occurred because of shifting of a permanent upper canine tooth in the distal direction to the place of the second upper premolar, and the gap created corresponded to the width of the upper canine tooth. By a minimal traumatic therapy procedure we substituted the canine tooth by using fibres, adhesive procedure and composite materials.

Key words: hypodonty, kevlar fibres, composite material.

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Introduction

Hypodonty is regarded as one of the abnormalities in the number of teeth, and occurs due to disorder in the initial stage of the tooth origin. It can refer to the shortage of one or more teeth, and the most common teeth missing are genetically unstable. In accordance with Butler-Dalberg's field theory, these are the last teeth in a group except for the lower incisors of which the middle incisors, are genetically most unstable. It frequently occurs in permanent dentition, within the range 2.3-9.6% (1).

Hypodonty can be symmetrical as well as asymmetrical. Symmetrically the most common teeth missing are the third upper molars, lateral incisors and other fore molars, whereas asymmetrically the first molar is most commonly missing. It can occur in some syndromes, although this was not the case with our patient (2-4).

Diagnosis is mostly based on a clinical and radiographic examination, which indicates shortage of

one or more teeth. The therapy procedure chosen to remedy these defects is orthodontic shifting of the teeth. Another solution would be a prosthesis bridge (5). This procedure, however, requires the removal of great quantities of healthy tooth tissue, and is therefore often unacceptable to patients. Due to the development of dental materials and improvement of operative techniques, there is a possibility of improving these and similar defects by applying fibres strengthened with composite materials. This, however, is only a temporary solution which requires repetition of the procedure, and also depends on some factors such as occlusion, patient's habits, etc. A permanent solution would be the making of an inlay bridge by Targis Vectris material, which doesn't require grinding of the whole tooth; instead, cavities are prepared as for inlay. After considering all the possibilities (as well as his own financial means) the patient decided to go ahead with the therapy with the composite materials, strengthened with kevlar fibres.

Case presentation

Hypodoncy of the upper left first premolars was detected by clinical and radiological examination (Figure 1). In agreement with the patient we decided to use fibres strengthened with the composite materials.

The initial step was choosing and adapting the celluloid cap which had to fill the space between the adjoining teeth (Figure 2). The cervical half of the cap's vestibular wall was cut off in order to put it later together with the composite material on the bridge of the fibres and composite. The next step was measuring and cutting the kevlar fibre in order to strengthen the composite material (Figure 3). The fabrication of the preparation followed. On the proximal surface of the lateral incisor and canine tooth, the preparation had the shape of a classical preparation of the third class (Figure 4) with the difference of yet being extended to the palatal surface because of increasing of the contact surface between the material and the tooth. Cavities were etched with a 37% orthophosphoric acid by total etching for 20 seconds. After washing out and drying the adhesive was prepared. We used Syntac Single Component* dentine adhesive. We then set a thin layer of Tetric Flow* into which the kevlar fibre sheaf was inserted and finally everything was polymerised (Figure 5). The rest of the cavity was filled with Tetric Ceram* microhybride composite material. Kevlar fibres, which bridge the empty space, were strengthened with Tetric Flow composite material (Figure 6). On the bridge thus created previously prepared celluloid cap filled with Tetric Ceram composite material, was set (Figure 7). After polymerisation, the rest of the cervical part of the vestibular surface was filled with the plastic instrument (Figure 8). Figures 9 and 10 show the result of the therapy after removal of the surplus composite material and final polishing.

Discussion

The best criterion for detecting hypodoncy of a specific tooth is its clinical and radiographic short-

age at the age when it would be logical for the tooth to be there. If, as a consequence of hypodoncy, there is an enlarged space between two adjoining teeth, a therapeutic approach, depending on the empty space span and the condition of the adjoining teeth, can be in making a fixed prosthesis substitution, orthodontic tooth shifting or aesthetic reconstructive technique, by using modern ceramically optimised polymer composite materials.

Today there is a great number of composite materials on the market with different amounts of inorganic filling, responsible for the physical - mechanical characteristics and dispersion of light during polymerisation, which influences both the quality and durability of the composite filling.

Since the amount of the inorganic filling impacts the elasticity module of the composite materials, the use of these materials with lower elasticity module of enamel, that is of dentine, causes breaking of the material on the filling edge, because such materials do not possess sufficient firmness and are significantly deformed under the impact of mastication forces. Moreover, if there is disproportion with the elasticity module of dentine, due to the lower elasticity module of the composite materials, bending of the filling occurs, which consequently creates hydrostatic pressure on the pulp liquid and provokes pain (6-8).

Kevlar fibres were used initially as a basis for strengthening and laying of the composite materials. On the other hand, by strengthening the composite materials with these fibres the value of the elasticity module increases by about 20-30% (9, 10).

After fixation of kevlar fibres into the prepared cavities of the adjacent teeth, etching and adhesive application, the composite material was set into the celluloid cap and everything together was put on the kevlar fibres. The material layering technique should in part compensate for the contraction of the material. Since the majority of direct procedures for making the fillings recommends laying the composite materials in layers, the best material is the one that retains its position after usage (11). Moreover, this material is expected to have the ability of shaping the morphological anatomy of the occlusion tooth surface. Consequently the use of liquid composite materials, such as Tetric Flow, is recommended in

*Vivadent, Schaan, Liechtenstein

the deepest and the most inaccessible cavity area, whereas it is advisable to set a dense material on the surface itself.

The layering technique has several advantages. Besides enabling attainment of the aesthetically more natural filling, occlusion adjustment, it also facilitates the final procedure of modelling and treatment of the fillings. Furthermore, the free surface of each layer increases which helps the movement of the composites during polymerisation and reduces stress (tension) of the linking surface. Another important factor is that we also reduce the creation of microgaps, or in the tooth - composite material junc-

tion (regarding the material itself or the enamel) (12, 13).

A modified celluloid cap on the vestibular side was used in order to strengthen the cellular fibres. Whereas for compensation of the polymerised contraction into the proximal cavities of the adjoining teeth layering technique was used for the... the composite material is applied and illuminated in the cap in one piece. This made realisation easier and faster, and application in one layer is justified because the entire is made of the composite material so that the gap which would probably be created due to polymerisation contraction will not endanger the work.