

# Esthetic restoration of a single tooth following

**SUMMARY**

**PATIENT:** An 18-year-old male patient missing tooth 11 due to a snowboard accident at the age of 14. He had worn a temporary restoration since the accident and was presented on the initiative of the attending orthodontist.

**CHALLENGE:** Restoration in the esthetic upper anterior region following tooth loss and a bone defect at the age of 14. Bone loss in adolescents leads to impaired growth and increased resorption during augmentation.

**TREATMENT:** Restoration of the bone defect using a bone augmentation plug and a single implant with customized Atlantis abutment and all-ceramic crown.

CASE STUDY BY:



FRED BERGMANN

**REPLACEMENT OF UPPER ANTERIOR** teeth is an immense challenge for the attending dentist – especially in young patients. Loss of the buccal bone lamellae due to resorption or trauma leads to a lack of support for the soft tissue and esthetically compromised contouring of the marginal gingiva. If treatment is to result in impeccable esthetics in these cases, augmentation

procedures are essential. In addition, the prosthetic restoration must be designed to ensure that the hard and soft tissues are conserved long term.

**IN THE CASE DESCRIBED HERE,** the 18-year-old male patient had suffered massive anterior tooth trauma at the age of 14 due to a snowboard accident. The clinical/radiological diagnosis indicated complete loss of the incisal edge from tooth 21 and in region 11 complete loss of the tooth and buccal bone lamellae (Figs. 1 and 2). Prior to the accident the patient had a small diastema which pressured him psychologically. His wish was that the treatment should include closure of the diastema yet he rejected provision of tooth 21 with a veneer. We commenced the treatment by closing the bone defect in region 11 by means of augmentation using an autologous monoblock graft from region 48 together with augmentation material and a PRGF autologous blood membrane for covering the defect. While harvesting the bone block, tooth 48 was also extracted (Fig. 3). The incisal edge of tooth 21 was built up with composite and a Maryland bridge was placed temporarily. Following a healing period

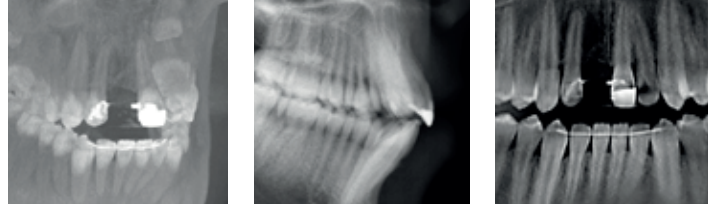


FIG. 1 X-ray showing the pre-surgical condition.

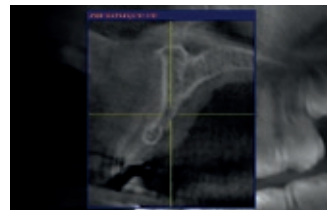


FIG. 2 This close-up clearly shows the loss of buccal bone lamellae.



FIG. 3 X-ray showing the status following augmentation with a bone block.

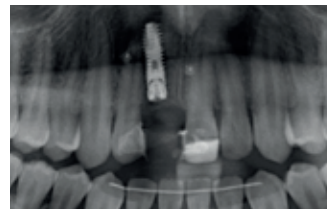


FIG. 4 X-ray showing the Xive S implant in place.



FIG. 5 Preparing to take a closed impression. The pronounced papilla resulting from the diastema is clearly visible.

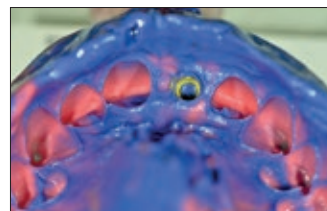


FIG. 6 The palatal positioning of the implant and the adequate distance between implant and adjacent teeth can be seen in the impression.

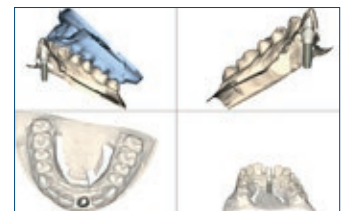


FIG. 7A Planning the abutment with Atlantis VAD software.

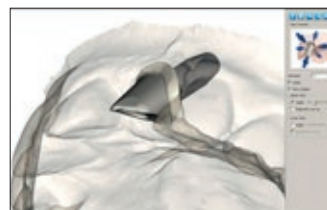


FIG. 7B

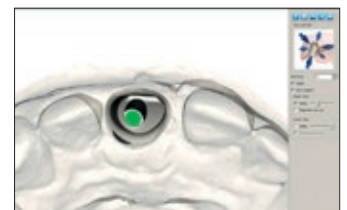


FIG. 7C

# anterior tooth trauma during adolescence

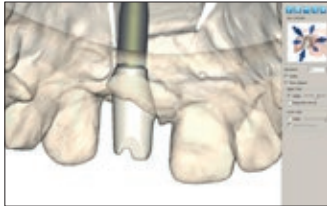


FIG. 8 Designing the abutment to provide optimum support for the soft tissue covering the crestal bone.



FIG. 9 The customized zirconia abutment on the model.



FIG. 10 The customized abutment and all-ceramic crown.



FIG. 11 The triangular-shaped emergence profile and convex buccal bone.



FIG. 12A The locating guide for placing the abutment.



FIG. 12B



FIG. 13 Screw-retaining the abutment using a contra-angle with torque limiter to prevent abutment loosening.



FIG. 14 The abutment in place - frontal view.



FIG. 15 The abutment in place - lateral view.



FIG. 16 The all-ceramic crown after placement.

of four months, the bone graft defect in region 11 exhibited considerable resorption. This was the result of bone loss during adolescence, which regularly leads to increased resorption during augmentation procedures. The gap was closed by placing a 3.8 mm diameter, 15 mm long Xive S implant (Fig. 4) positioning it slightly towards the palatal aspect to ensure that the buccal bone lamellae were retained long term. During implant placement the resorption defect was filled with augmentation material. The operating site was covered with BioGuide where the membrane was secured with Frios titanium tacks with a further fibrin autologous blood membrane being placed. The implant was fitted with a custom Atlantis temporary, which remained in situ for three months to create a triangular emergence profile. Subsequently, an open impression was taken using a special tray and Impregum (Figs. 5 and 6). The master model was fabricated in the laboratory and shipped to the Atlantis fabrication center in Sweden where a custom all-ceramic abutment was fabricated. The abutment was planned and designed using the Atlantis VAD (Virtual Abutment Design) software. The design was intended to provide optimum support for the soft tissue contours covering the crestal bone (Figs. 7 and 8). After fabrication of the abutment, this was sent to the laboratory together with the model (Fig. 9).

**IN THE LAB AN ALL-CERAMIC** crown was fabricated on the custom abutment (Fig. 10). The crown was designed with an approximate 0.5 mm subgingival margin in the visible vestibular region only. Proximally and buccally the crown margin was placed equigingivally or even slightly supragingivally. This design enabled excess cement to be removed completely after placement which effectively prevents peri-implantitis. At the time when the definitive crown was placed, the soft tissue was healthy and the emergence profile was anatomically formed (Fig. 11). The Atlantis Abutment was placed and screw-retained using the locating guide fabricated in the laboratory to ensure correct positioning (Figs. 12 to 15). Following this, the crown was cemented into place. The crown was slightly oversized in order to close the diastema as requested by the patient (Figs. 16 to 18). The X-ray clearly showed the epicrestal positioning of the implant and the supporting design of the custom abutment (Figs. 19 and 20). The clinical outcome of the prosthetic restoration in region 11 and conservative restoration of the incisal edge on tooth 21 was outstandingly esthetic. Even though crown 11 was not quite perfectly contoured as it was slightly oversized, the diastema was closed as requested by the patient and he was highly delighted »

## CASE STUDY

### ESTHETIC RESTORATION OF A SINGLE TOOTH FOLLOWING ANTERIOR TOOTH TRAUMA DURING ADOLESCENCE

- » with the result. The follow-up session two years later also demonstrated excellent red/white esthetics (Fig. 21).

**THIS CASE DEMONSTRATES** how excellent results can be achieved, even in the esthetically demanding upper anterior region, with a combination of augmentation procedures, palatal positioning of the implant and placement of a patient-specific abutment. ■

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FIG. 17 The patient was highly delighted with the esthetics.



FIG. 18 Clinical examination two months after placing the definitive restoration.

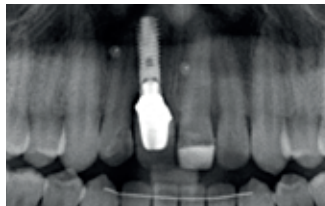


FIG. 19 X-ray taken two months after placing the crown.



FIG. 20 X-ray taken two years after placing the definitive restoration.



FIG. 21 Perfect esthetics two years after placing the crown.