

# Digital indirect planning of a Class IV direct composite restoration: A clinical report.

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## Introduction

Maxillary anterior teeth are the most common teeth to undergo trauma due to various reasons. These traumas mainly occur in children and adolescents. The fracture of a front tooth has an apparent impact on a person's appearance and speech. If left untreated or if inadequately treated, it may have a severe impact on the social and psychological well-being of the patient. It is generally thought that great artistic skills are necessary to achieve optimal aesthetic results in Class IV restorations, but what is actually needed is a good planning of the future restoration and to understand the colour properties of the materials that are being used.

In the following case report, a predictable method was used to build up morphologically accurate composite restorations. The most effective approach to planning restoration nowadays involves digital methods, enabling the analysis of space for the future composite material used in restoration. By implementing a well-defined protocol for layering, Class IV restorations can be built quicker and more straightforward, saving time and effort.

## Clinical report

An 11-year-old girl was brought to the clinic after she slipped and fell at the swimming pool. The fall had broken her left maxillary central incisor (Fig. 1). The tooth fragment was lost. During clinical examination, it was determined that it was a Class IV fracture without pulp exposure. The tooth was still vital, without increased mobility and not tender to touch at the moment of examination. The periapical X-ray showed no signs of root fracture and confirmed the apex of the tooth was closed (Fig. 2).

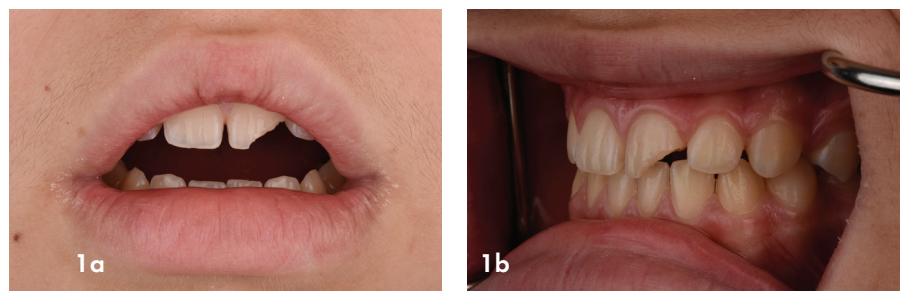


Fig. 1: Preoperative situation; a) Extraoral frontal view; b) Intraoral oblique view.

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Fig. 2: The radiograph shows an uncomplicated crown fracture of tooth 21. No root fracture could be seen.

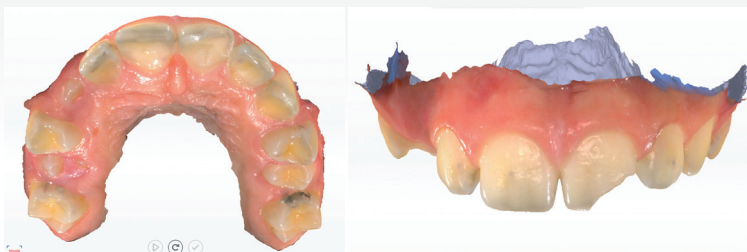


Fig. 3: Intraoral scan.

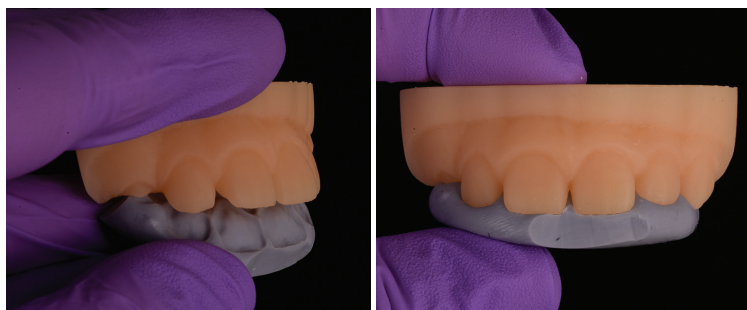


Fig. 4: 3D printed model of the future design and the silicone palatal index

Due to the patient's young age, the vitality of the tooth, and the presence of healthy remaining tooth structure, an adhesive direct restoration is a preferred initial option. Such a direct restoration of a large anterior tooth fracture can be quite challenging. Therefore, an indirect planning approach for the restoration was chosen, allowing us to achieve a restoration with optimal length, shape, and inclination. This method ensures meticulous articulation of the restoration during every movement, including maximal intercuspitation, protrusion, and left and right laterotrusion. By planning meticulously beforehand, any necessary adjustments after the restoration process are minimal or even unnecessary.

First, an intraoral scan of the upper teeth was made (Fig. 3). A digital design of the missing part could be made this way, making a mirrored copy of the intact incisor. The design was 3D printed and utilised to reference and create the palatal index from silicone putty. (Fig. 4). Prior to the build-up, the teeth were isolated with rubber dam. Prior to treatment, the fractured tooth was decontaminated with a 2% chlorhexidine solution. A long bevel was made on the vestibular surface in order to mask the fracture line (Fig. 5). After selective enamel etching and bonding with a universal adhesive (G-Premio BOND, GC), a palatal composite shell was created (G-ænial A'CHORD, GC; Shade: JE –



Fig. 5: A long bevel was created on the vestibular surface.



Fig. 6: Marking the fracture line on the index

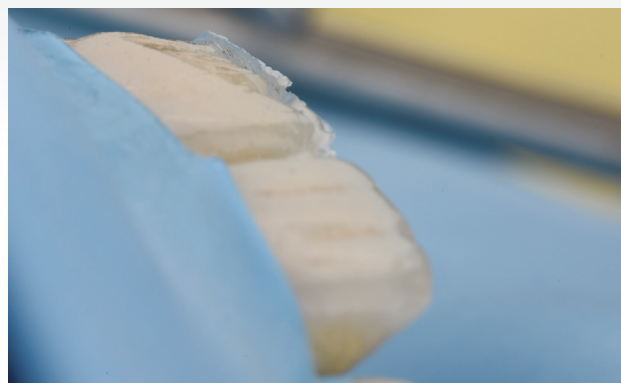


Fig. 7: The mamelons were created in dentine shades (G-aenial A'CHORD; AO2 – Opaque A2 and A2 – Body A2; ). a) frontal view; b) oblique view.



Fig. 8: Contouring of the final layer in enamel shade (G-aenial A'CHORD; JE – Junior Enamel)

Junior Enamel). The fracture line was marked on the silicone index with a probe; this helps to determine the amount and location of the composite that needs to be placed (Fig. 6). On this shell, the mamelon structure was carefully shaped using dentine shades (Shade AO2 – Opaque AO2 and A2 – Core A2; Fig. 7). While working free-hand, it's important to evaluate the restoration from different angles to make a good estimation of how much volume should be added and how much space should be left for the final layers (Fig. 7b). The mamelons were then enveloped with Opalescent Modifier (Essentia, GC), placing a thin layer in between and around them. The opalescence of a tooth is predominantly noticeable within the halo around the incisal edge, where a transition occurs from the translucent enamel of the incisal portion to the dentine mamelons, which block transillumination. Then, a thin layer of G-aenial A'CHORD Junior Enamel was placed as the final layer of the restoration. A smooth surface with the appropriate topography can easily be obtained with a

brush (Fig. 8). The finishing and polishing was done with fine polishing strips and rubber spirals. A high gloss, comparable to the other teeth, could easily be obtained (Fig. 9).

The patient was instructed to continue as usual, but to avoid parafunctions, such as nail biting. Follow-up appointments were planned after two weeks, three months and six months. In case of pain, colour change, swelling or any other concern, she would have to consult sooner.

Three months later, at the follow-up appointment, no functional or aesthetic changes had occurred (Fig. 10).

### Discussion

A single, large anterior tooth restoration requires much attention to detail in terms of shape, colour and symmetry. In young patients where the broken tooth fragment is not available, a composite restoration is the obvious choice; it's cost-effective, aesthetic, can be done in one session and is easy to repair. However, some artistic skills are



*Fig. 9: Final result.*

required to obtain high-quality results. The morphology in these young teeth is often more pronounced due to the absence of excessive wear. Making use of a palatal index can considerably reduce the treatment time, because less time is necessary to determine the line angles, shape and to finish the palatal surface. Making use of composites with good aesthetic and handling properties is also important for a good outcome. G-ænial A'CHORD exhibits natural fluorescence and excellent blending properties, which are necessary to achieve a realistic outcome in all circumstances. What is more, its non-sticky formula facilitates the shaping and sculpting. Besides, because of the proprietary filler technology, it's easy to polish and the high gloss level is maintained for a long time.



*Fig. 10: Result after 3 months.*

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