Anterior Incisal Onlay—A Minimally Invasive Non-Surgical Approach to Correct an Esthetic Complication of an Implant Supported Crown in the Anterior Zone

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Abstract: The growing demand for re-treatment of existing implant supported restorations in the anterior area due to esthetic complications poses a clinical challenge. One-piece implant supported restoration adds to the clinical complexity. Single implant crown restorations appear short as a result of expected cranio-facial changes. In the presented clinical case, a minimally invasive approach is offered as a solution for such an esthetic difficulty. The clinical old crown was prepared to receive an anterior incisal onlay (AIO) made from lithium disilicate and felspathic porcelain. The manufactured addition was adhesively cemented, presenting a simple prosthetic solution for an esthetic complaint, with no need for surgical procedure, while not challenging the one-piece implant body. As the variety of materials and methods for predictable adhesion increases, non-surgical and non-invasive treatment options will receive high priority. When correctly diagnosed and meticulously performed, the presented solution will meet the patient expectations and provide a satisfying result.

Keywords: ceramic adhesion; anterior incisal onlay; minimally invasive restoration repair; implant infra incisal occlusion; implant maintenance; one-piece implant

1. Introduction
Throughout growth and development, jaw bones experience remodeling and displacement with a relative change in tooth position. In contrast, dental implants as they integrate directly to bone, behave as ankylosed teeth and remain in position. This may create an esthetic problem when implant submergence leads to infra incisal restoration. Defining the exact timing of growth termination is complex and varies between different schools of thought [1]. Increasing evidence of continuous craniofacial changes in later stages of life appears in the literature and this may explain infra occlusion and severe esthetic impairment in the anterior region [2–4].

As a result, clinicians encounter patients with esthetic complaints following implant supported rehabilitation in the anterior region. The one-piece implant poses a challenge in re-restoring it [5,6]. Since there is no possibility of placing a new abutment, other treatment options should be considered, such as removing the old crown or even extraction of the existing implant. The current paper suggests a prosthetic, minimally invasive, non-surgical solution tailored for a young female patient, presenting a submerged, un-esthetic implant supported crown performed during her growth and development period.

2. Clinical Case
A 19-year-old female patient presented a main complaint on the current esthetic appearance of her implant supported crown which had replaced her congenitally missing right upper lateral incisor. Implant placement was performed some 5 years before, probably during her growth and development period but evidently not far enough from that time.
Examination of the patient revealed, in the position of the upper lateral incisor, a significant clinically short crown relative to the incisal line and the adjacent teeth. The crown was partially covered with soft tissue (Figure 1a,b) leading to uneven gingival margin compared to the homologous tooth. A peri-apical radiograph demonstrated a porcelain fused to metal crown on a one-piece implant with proper supporting bone (Figure 1c). The patient presents a high smile line with excessive gingival display [7] (Figure 1a).

![Figures a-d](image-url)

**Figure 1.** (a) Excessive gingival display and impaired esthetics. (b) Initial situation demonstrating submerged implant supported restoration with uneven gingival line. (c) X-ray presenting the one-piece implant. (d) Gingival pocket.

The crown appearance in her smile significantly bothered the patient affecting her self-esteem, and hence made her seek an esthetic correction of the situation, ruling out any surgical option.

3. Treatment Plan

Taking all aspects into consideration led to a conservative treatment plan without removing the existing implant supported crown [8]. The aim was to fabricate a reinforced ceramic material anterior incisal onlay (AIO) on the existing feldspathic ceramic crown after preparation and conditioning, using an adhesive cementation technique [9]. This treatment option was set to exploit the adhesive and esthetic properties of the reinforced ceramic incisal onlay and the known successful long term bonding ability between reinforced ceramics and feldspathic porcelain.

4. Treatment Sequence

Crown preparation: The crown’s feldspathic ceramic was prepared with a diamond bur, creating a definite, consecutive and smooth circumferential finish line, eliminating possible undercuts and including grooves for precise insertion and seating of the restoration. The preparation was deep enough to facilitate sufficient thickness for the lithium disilicate base (1.4 mm) to be layered by feldspathic porcelain and to allow proper support for the free gingival margin towards achieving a longer apico-coronal clinical crown.

Impression stage: Following the preparation, a conventional impression was taken with an elastomeric material (PVS, Elite, Zhermack, Italy) and the poured master model was scanned (OmniCam, Sirona, Germany) (Figure 2). The base layer was digitally designed,
milled (IPS e.max CAD, Ivoclar Vivadent, Lichtenstein) and layered with feldspathic porcelain (Figure 3) [10].

![Digital planning of the restoration.](image)

**Figure 2.** Digital planning of the restoration.

![Anterior incisal onlay (AIO) Bilayer restoration—lithium disilicate veneered by feldspathic porcelain.](image)

**Figure 3.** Anterior incisal onlay (AIO) Bilayer restoration—lithium disilicate veneered by feldspathic porcelain.

Adhesive cementation: The anterior incisal onlay (AIO) was checked intra orally, presenting a good fit and meeting the patient’s esthetic expectations.

The adhesive cementation followed the lithium disilicate restoration protocol (IPS e.max, Ivoclar Vivadent). A 5% hydrofluoric acid etching was applied for 20 s on the intaglio surface (IPS Ceramic Etching Gel, Ivoclar Vivadent, Schaan, Liechtenstein). After rinsing with copious amounts of water, the intaglio surface was then silanized for 60 s (MonoBond Plus, Ivoclar Vivadent, Schaan) [11].

The prepared crown, protected with a rubber dam, was etched with 9% hydrofluoric acid for 60 s. Suitable protection measures are highly important while using hydroflu-
oric acid, in order to achieve the desired bond strength in a safe manner [12,13]. Copious amounts of water were used for rinsing, and after drying, the surface was silanized (MonoBond Plus, Ivoclar vivadent, Schaan, Liechtenstein). Adhesive bonding was layered on the prepared crown surfaces (G-Premio BOND, GC, Tokyo, Japan) and then light cured for 20 s.

A dual cure resin cement (GCem linkforce GC, Tokyo, Japan) was used to adhesively cement the restoration to the implant crown. The cement excess was removed and the restoration margins were smoothened and polished with porcelain finishing burs and rubber polishing burs and wheels. Absence of occlusal contacts in excursive movements was verified. The adhesive protocol is summarized in Figure 4.

![Diagram of Adhesive Cementation Protocol](image)

Figure 4. Adhesive cementation protocol.

The patient was instructed to maintain the implant, crown and the adhesive restoration by means of newly suggested modalities of care [14,15], as well as professional treatment.

5. Conclusions

The selected treatment plan in this case met the patient’s expectations in full in a simple, easy to execute and minimally invasive conservative manner (Figure 5). In general, adhesive methods, such as anterior incisal onlay (AIO), might introduce simple and easy prosthetic treatment option in cases of infra-occluded restorations due to continued growth. This
treatment modality is a non-invasive short treatment option replacing surgical treatment, while not challenging the one-piece implant body.

![Image of anterior incisal onlay restoration](image-url)

**Figure 5.** Anterior incisal onlay restoration post cementation, demonstrating improved esthetics.

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