

The challenge of central incisors solved by CAD-CAM

Accreditation Case Type 2

(One or two indirect upper anterior restorations with natural teeth beside)

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Introduction

Dr Julian Caplan, an experienced Cerec user takes us through his approach to restoring anterior teeth using CAD CAM.

History and clinical examination

The patient was unhappy with her two central incisors. Her dentist had recently repaired the upper right central incisor veneer but she was also unhappy with the shape and fit of the upper left central incisor veneer. The patient only wished for the upper central incisors to be treated.

The medical history was unremarkable and the dental history revealed the patient had had her current veneers fitted approximately 5 years previously. The teeth were symptom free. On examination the TMJ and occlusion were stable. The patient had a Class 1 relationship

with a normal overjet and overbite. Vitality tests proved positive.

The periodontal health was reasonable, with no pockets of more than 2mm present. Some gingivitis was present, especially interdental, and a hygienist visit was scheduled to treat the gingivitis present. The gingival symmetry was good.

It was decided to use the one visit Cerec technique to enable accurate colour matching and shaping of the incisal edge. The veneer is made in the surgery allowing good patient input into the final result from a colour and morphological point of view.

Diagnosis and treatment plan

The definitive diagnosis consisted of:

- Localised gingivitis

- Fractured veneer 11
- Defective veneer 21 with poor shape.

The clinical treatment goals were to develop symmetry of the two central incisors in length and colour. Following stabilisation of the gingival health, informed consent was given in writing by the patient and the required appointments scheduled.

Clinical Stages

The patient's tissues were anaesthetised using 2ml 4% articaine with 1:100,000 adrenaline. The existing veneers were removed and a standard veneer preparation was completed on 11 and 21.

After the patient's details were entered into the Cerec acquisition unit the dental database mode was chosen.

This enabled the Cerec computer to be utilised to the full. All design



Figure 1: a-d – Full face. upper occlusal: Before (above) and after (below) images of the case

Figure 2: a-f – Retracted: *Before (above) and after (below) images of the case*



tools are available in this mode allowing accurate design of the required veneers with minimal adjustment of the veneers prior to fit.

Cerec liquid was painted on 12,11,21,22 and dried. The tooth surface was powdered and four optical impression images of the

preparations were taken using the infrared camera on the Cerec acquisition unit.

The materials available to mill porcelain restorations in-surgery are feldspathic, leucite reinforced or lithium disilicate ceramics. Composite based millable blocks are also available but research shows

that even over a relatively short term these are inferior in aesthetics, wear and survival rate.¹

The feldspathic flexural strength is in the region of 60MPa compared to leucite reinforced, which is about 140MPa and lithium disilicate, which is up to 400MPa.



Figure 3: a-f – Smile: *Before (above) and after (below) images of the case*

Interestingly, the flexural strength of enamel is only 50MPa. This underlines the importance of having a uniform thickness of veneering material that is well bonded to the underlying tooth structure and unsupported material is kept to a minimum. In this case care was taken to ensure an even anterior guidance and, as aesthetics was the key element, feldspathic porcelain was chosen.

In general the higher the filler content of the ceramic the less translucent is the material and, in cases where disguise of the underlying tooth colour is not required, the more aesthetic result is achieved using a feldspathic porcelain such as Vita Mk2. Polychromatic blocks are also available where the chroma varies throughout the block enabling a warming neck developing into a translucent tip. In the case presented a 'natural' change in chroma was developed using a monochromatic

feldspathic block and a veneer of 0.5mm thickness. This allowed for some warmth in the neck from the underlying dentine. Incisally no obvious incisal halo was present on the adjacent right lateral incisor and minimal incisal staining was required to allow the veneers to blend with the natural dentition characteristics.

The Cerec computer program was used to create a suitable design for a veneer on 21. A 1M1 Vita Mark2 block size I12 was placed in the milling machine and the milling process begun. Whilst this first veneer was milling the second veneer was designed ready to be milled. Twelve minutes later the first veneer was ready to be tried in. The fit, form and aesthetics of the veneer were examined. After the second veneer had been milled they were both tried-in and minor adjustments made to their morphology. Minimal staining procedures were carried out and the veneers were fired in the

porcelain oven. Following confirmation with the patient that the colour was acceptable the veneer was replaced into the furnace for a final glaze.

The veneers were cemented with translucent Variolink cement and Prime and Bond NT. Glycerine was placed at the margins to allow complete curing of the oxygen inhibition layer with the light-curing unit. Finally the occlusion was checked for interferences in centric, lateral and excursive movements and the adjustments polished with shofu points and diamond polishing paste on felt cylinders.

Armamentarium

- Nikon D70 digital camera
- Surgical loops (Orascoptic 2.6L)
- Gloves (Aloecare Unodent)
- Articaine 1:100,000 adrenaline (Henry Schein)
- Brushes (Unodent)
- Diode laser (zap)
- Burs (Komet)



Figure 4: a-f – Anterior: Before (above) and after (below) images of the case

- Vita 3-D shade guide (Vitapan 3D Master)
- Prime and Bond NT (Kerr)
- Expasyl (Kerr)
- Soflex discs (3M)
- Komet Set 4399 recontouring rubbers
- Superoxyl (Sultan; Englewood, NJ, USA)
- Rubber dam heavy blue (Optident)
- Varolink cement (Ivoclar Vivadent)
- Bend-a-brush (Centrix)
- Brasseler polishing strips (Komet)
- Diamond polishing paste, Luminescence (Abrasive Technology)
- Vita Mark2 porcelain blocks (1M1)
- Vita accent stains
- Vita Atmomat porcelain furnace
- Cerec 3D acquisition unit and milling unit
- Cerec liquid
- Titanium Oxide powder in Powdermiester applicator

Further reading

- Christensen GJ. Alternatives for Class 2 restorations. *CRA Newsletter* 1994 **18**: 1-2.
- Gurel G. *The Science and Art of Porcelain Veneers*.
- Jedynakiewitz NM. Interface dimensions of CEREC 2 MOD inlays. *Dent Mater* 2000 **16**: 68-74.
- Rufenacht C. Biological integration. In *Principles of Esthetic Integration* (1st ed. pp. 53-61) Carol Stream, IL: Quintessence Publishing, 2000.

Reference

- 1 Vanoorbeek S, Vandamme K, Lijnen, Naert I. Computer-aided design/computer-assisted manufactured composite resin versus ceramic single-tooth restorations: a 3-year clinical study. *Int J Prosthodont* 2010 **23**: 223-230.