CASE REPORT Open Access

# Aesthetic rehabilitation of upper central incisors using combined direct and indirect technique: A Case report

Mohd Haikal Muhamad Halil[1]*, Muhammmad Hazwan Mustafa[2], Syahirah Aisyah Kamaruzaman[3]

[1] *Department of Restorative Dentistry, Kulliyyah of Dentistry, International Islamic University, Kuantan, 25200 Pahang*
[2] *Astana Dental Clinic, Dataran Wangsa, Wangsa Maju, 53300 Kuala Lumpur*
[3] *Kal Dental Clinic, Jalan Wangsa Delima 13, Wangsa Maju, 53300 Kuala Lumpur*

## Abstract

Improving dental appearances generally leads to an increase in confidence, social interactions and ultimately quality of life. This case aimed to perform aesthetic rehabilitation on the upper central incisors. The patient was a 25-year-old female who was concerned with the gap in her front teeth and discolouration of her crown. The treatment started with shade matching and preliminary measurements prior to cementation of temporary crown. Later, an all ceramic e.max Lithium Disilicate crown was cemented on tooth 11 followed by direct composite restoration on tooth 21 for diastema closure. In conclusion, both the indirect and direct restorative technique when applied appropriately proved to be effective and satisfactory to the patient.

***Keywords:*** *aesthetic, composite, crown, e.max*

**Received:**
10 March 2022
**Revised:**
26 June 2022
**Accepted:**
18 July 2022
**Published Online:**
30 July 2022
**How to cite this article:**
Muhamad Halil, M. H., Muhammad Hazwan Mustafa, & Syahirah Aisyah Kamaruzaman. Aesthetic rehabilitation of upper central incisors using combined direct and indirect technique: A Case report. *IIUM Journal of Orofacial and Health Sciences*, 3(2), 235-240. https://doi.org/10.31436/ijohs.v3i2.136
**Article DOI:**
https://doi.org/10.31436/ijohs.v3i2.136
***Corresponding author**
**Address:**
Department of Restorative Dentistry, Kulliyyah of Dentistry, International Islamic University Malaysia, Kuantan Campus, 25250 Kuantan, Pahang, Malaysia
**Telephone:** +60192816007
**Email address:**
drhaikal@iium.edu.my

## Introduction

Any problems in areas of high aesthetic concern such as the anterior teeth especially in the maxilla where the teeth can be seen during smiling and speaking can lead to confidence and self esteem issues (Nugroho & Aco, 2020). One study showed that dental aesthetic is the third most common chief complaint after pain and check up and there were significant difference between the genders where females (23.48%) were more than males (11.50%) (Abdullah & Al-Tuhafi, 2006). There are a number of treatment modalities for an aesthetic rehabilitation among which are microabrasion, direct composite restorations or a combination of both, indirect composite restorations, veneers and crowns. Each treatment modality caries its own subset of pros and cons and is selected inn propriety to an individual case (Sowmya *et al.,* 2017). This paper outlines the treatment protocol for a young female who presented with dental aesthetic concerns in which a combination of a direct composite restoration and indirect crown was performed.

There are two types of crown available for anterior teeth which are metal ceramic crown and an all ceramic crown (NurulaqmarIwani, 2020). The minimum thickness of porcelain and metal required for metal-ceramic crowns is 0.7 and 0.5 mm, respectively, it is accepted that a labial reduction of 1.5 mm is required (Jr *et al.,* 2020). Therefore, to maximise the conservation of tooth structure, it is common to place a full metal coverage on the palatal surface which is a less aesthetically critical area and a porcelain coverage on the labial side. On the other side, an all ceramic crown would require more reduction. However, a Lithium Disilicate crown the overall reduction is 1.0mm and 0.7 to 0.8mm for a zirconia crown. The advantages of an e.max crown over a zirconia crown is its enduring aesthetic quality, translucent and lifelike appearance and less risk of chipping (Dolidze & Bitarova, 2016). Based on the systematic review, all-ceramic crowns, for anterior teeth, showed survival rates at 5 years compared to those seen for metal-ceramic crowns (Pjetursson *et al.,* 2007).

Treatment options for diastema closure is chosen according to case to case basis and the etiology of diastema. They can be treated by orthodontic closure, restorative therapy, prosthodontic therapy, surgical correction or multidisciplinary approach (Andarabi *et al.,* 2015; Hwang *et al.,* 2012). The upper left permanent central incisor which was sound was used as a collateral in the process to achieve a symmetrical diastema closure. Hence, the most conservative option possible was ideal in order to preserve the tooth. A conservative and aesthetic treatment of misaligned anterior teeth by direct composite additions are considered both a valuable and effective procedure (Peumans *et al.,* 1997). Specifically, a direct composite resin restoration would allow better operator control and allow for a complete assessment of the final morphology and shade matching in a single visit compared to an indirect restoration (Andarabi *et al.,* 2015).

## Case report

A 25-year-old Malay female was concerned of the gap in her front teeth and discolouration of her crown. She had her metal ceramic crown as treatment for her previously deeply carious tooth back in high school. She also had fixed orthodontic appliances which was completed back in 2014 but she was non-compliant to the retainers. Intraoral examination revealed a metal ceramic crown on tooth 11 which was non tender to percussion, no bleeding on probing and no tooth sensitivity. A diastema was noted between tooth 11 and 21. The patient also presented with good oral hygiene and a high frenal attachment on the maxillary arch. Generalised fluorosis was noted on all the teeth in the upper arch.

Full mouth scaling and polishing was done as initial treatment followed by replacement of metal ceramic crown on 11 with an all ceramic e.max Lithium Disilicate crown. Shade selection for tooth 11 was done and the patient and operator decided on shade A2 (Chu *et al.,* 2010). The colour was recorded using VITA Classical shade guide. The prosthesis was removed from tooth 11 and the tooth preparation was refined in addition to the 1mm subgingival margin placement. Impression taking was done using the putty wash technique with 3M™ Express VPS Impression Material Light body and Regular Body (3M ESPE, USA). To achieve maximal aesthetics and overcome the diastema presented, prefabrication measurements were taken using callipers (Figure 1) for the ideal size, shape and proportion of tooth 11 and 21. The lab was also informed to mimic the surface detail of mild fluorosis on the incisal third of tooth 11 and to perform wax up on tooth 21 which shall provide space for future composite build up. Thereafter, a temporary crown was constructed for tooth 11 using the 3M ™ Protemp 4 Temporization Material (3M ESPE, USA) in the shade A2 (Figure 2c).

Figure 1. Illustration of measurement method using callipers. The space between the upper lateral incisors measured and divided in half to achieve symmetry.

Tooth isolation was done on tooth 13 until 23 using silk blue rubber dam (Sanctuary Health, MALAYSIA) and a brinker B5 clamp was used on tooth 11 as the main retraction to expose the margin of prepared tooth (Figure 2a, 2b).

The e.max Lithium Disilicate crown surface was treated using hydrofluoric acid for 60 seconds. Then rinse and dried followed by application of rubber phosphoric acid using a microbrush for 60 seconds which was again rinse and dried. The e.max Lithium Disilicate crown was then placed in an ultrasonic cleaner bath for 5 minutes and finally a fine drop of silane was applied on the crown fitting surface and heat dried. The prepared tooth 11 surface was cleaned with pumice. Later it was sandblasted with 50 microns aluminium oxide followed by a total etch 2 step technique using 37% phosphoric acid for 20 seconds which was rinse and dried and lastly, OptiBond FL (Kerr Company, USA) adhesive was placed uncured. The same adhesive was also applied on the fitting surface of the prosthesis to improve wettability. The A2 injectable composite GC gaenial (GC, EUROPE) was used and the e.max Lithium Disilicate crown was seated. Excess luting cement was removed before light curing for 20 seconds from the labial, incisal and palatal angles. Then, glycerin gel was applied, and a final cure for 40 seconds was done from all angles (labial, incisal, palatal, mesiolabial, distolabial, mesiopalatal, distopalatal, mesioincisal and distoincisal). The margins were trimmed, finished and polished after the rubber dam was removed. Final check of occlusion was done and was proved satisfactory to the patient.

The B5 clamp on tooth 11 was removed and a B4 clamp was used on tooth 21 as the main retraction (Figure 3a). The ceramic crown on tooth 11 was covered with a polytetrafluoroethylene (PTFE) tape to protect the surface (Figure 3b). A silicone putty impression of the wax up on the study cast was used as a guide for the diastema closure. Composite build up of tooth 21 was done using 3M Filtek Z350™ (3M ESPE, USA) in shade A2 (Figure 3c). Finishing of the restoration was done using a fine (red coded) diamond bur, followed by Shofu™ Supersnap.

Finishing and Polishing Disk (Shofu Dental, GERMANY) at the interproximal surface. Finally, polishing was done using finer discs and Eve™ Diacomp Twist (EVE Dental, GERMANY) (Sowmya et al., 2017). New Essix retainer were constructed for the upper and lower arch for post orthodontic retention.

## Discussions

The rehabilitation of anterior teeth can never disclude aesthetics. Apart from the spacing and discolouration, the patient also had concerns on her appearance in photographs that can most likely be attributed to the lost of natural dental features. A dramatic change in appearance from correction of these problems often results in improved confidence, personality and social life (Ritter *et al.,* 2019). Fortunately, there are various aesthetic treatment options including direct and indirect techniques of restoration, both of which were used in this case.

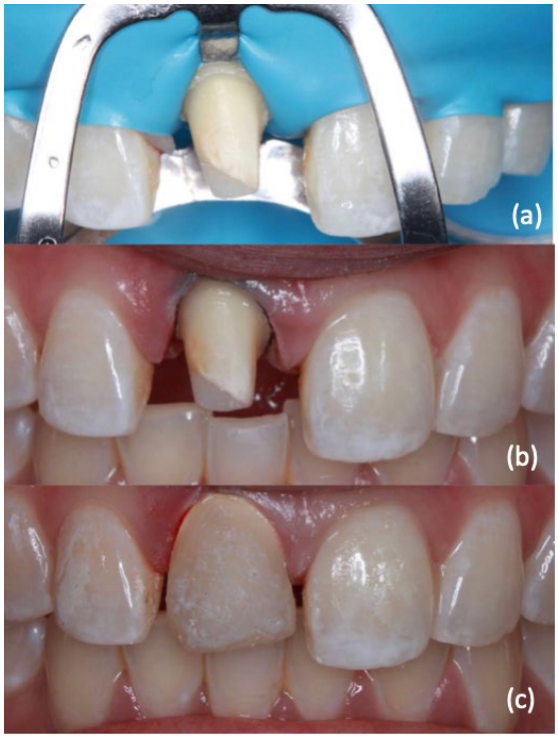


Figure 2. Rubberdam isolation of tooth 11 during the second appointment (a) Retraction of soft tissue before impression taking (b) Temporary restoration on tooth 11 (c)

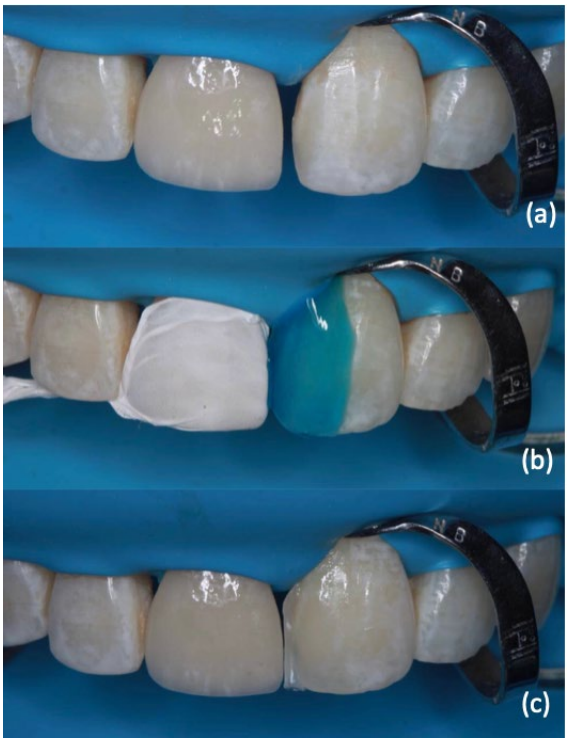


Figure 3. Rubberdam isolation of tooth 21 during the second appointment (a) Etching mesial half of tooth 21 for 30 seconds

Restoration of single tooth with an indirect restorative technique, although appears simple is actually more challenging in terms of shade matching. An all ceramic crown would offer superior aesthetics compared to a metal ceramic crown (Rathi & Verma, 2019). Especially nowadays, all-ceramic restorations are considered as the most aesthetically pleasing restorations available in dentistry, giving the tooth almost a life-like appearance, and a high degree of aesthetic satisfaction to the patient in addition to having good colour stability (Nobert *et al.,* 2019). The replacement of metal ceramic crown with an all ceramic e.max Lithium Disilicate crown would not raise concerns in terms of conservation of tooth structure since the tooth preparation requirements are almost similar. Additional tooth preparation was done only to move the preparation margin 1mm subgingival which was minimal and necessary to meet the patient's aesthetic demands.

The upper right permanent central incisor which presented with the former was replaced with the latter. The concern for that particular tooth was not symptomatic but rather an issue of un-satisfactory shade matching. There are more conservative options to an indirect crown restoration such as a direct composite restoration or an indirect veneer restoration. However, both are an objectionable choice since too much tooth structure has been loss to support the them. In addition, an all ceramic crown has a more superior colour stability compared to composite res-in (Sowmya *et al.,* 2017) and

it is an ideal substitute for porcelain-fused-to-metal crowns to overcome their aesthetic limitations (Anissa *et al.,*2016).

Diastema closure of the upper central incisors were done immediately after cementation of all ceramic crown on tooth 11 (Baia *et al,* 2018; Prakash *et al,* 2018). However, the success of this procedure was meticulously planned through various preliminary procedures. This included shade selection and measurements of the width of diastema using a calliper. The space between the upper permanent lateral incisors were measured and the space divided in half to achieve symmetry. Preliminary procedures are crucial in this case since it involves achieving equilibrium between an indirect and direct restoration. It only made sense then that the compo-site restoration only begins after we ensure that the e.max Lithium Disilicate crown was of ideal size, since the composite can be shaped to match the crown rather than the other way around. Normally, diastema closure restoration should emerge slightly below the crest to appear natural and confluent (Garg & Garg, 2015). Hence, adequate retraction should be given attention to when using rubber dam isolation.

In this patient, a combination of direct and indirect restoration was the best treatment option to solve the chief complaint. Restoring the upper right permanent central incisors with and indirect restoration allowed for a minimal reduction of the upper left permanent central incisors for the diastema closure (Oteo, 2012). The minimally invasive strategy is used to replace a failed restoration is highly beneficial in this case (Kusumasari *et al.,* 2021). Besides, despite the different long term outcomes in terms of colour stability exists for the different treatment approach for each tooth, the direct composite resin restoration could easily be repaired or replaced to match the crown in the future (Azzaldeen & Muhamad, 2015).

Reasonable aesthetics in terms of shape, colour and symmetry were achieved using both direct and indirect restorative techniques which successfully addressed the main concerns regarding natural looking restoration and closure of diastema.


Figure 4. Pre-operative photo showing metal ceramic crown on tooth 11 with gap between the upper central incisors (a) Post-operative photo showing all ceramic crown on tooth 11 and composite build up on tooth 21 (b).

## Conclusions

Both all ceramic crown and the direct composite acid etch technique when applied appropriately proved to be effective and satisfactory to the patient.

## References


Abdullah, B., & Al-Tuhafi, A. (2006). Chief complaints of patients attending College of Dentistry at Mosul University. *Al-Rafidain Dental Journal*, *7*(2), 201-205. Retrieved from https://rden.mosuljournals.com/article_39756_f4812e09229419c9830413659c9085c6.pdf

Andarabi, S., Zia, A., Kumar, A., & Alam, S. (2015). Closure of midline diastema by direct composite resin build-up using a customized matrix technique - a case report. *International Journal of Oral Health Dentistry*, 1(1), 46-49.

Anissa, BM., Chakroun, M., Hadyaoui, D., Nouira, Z., & Cherif, M. (2016). Zirconia based crowns for esthetic rehabilitation of severely discolored teeth:a case report. *Journal of Oral Health and Dental Science*, 1(1), 1-3.

Azzaldeen, A., & Muhamad, A. (2015). Diastema closure with direct composite: architectural gingival contouring. *Journal Of Advanced Medical and Dental Sciences Research*, 3(1), 134-139.

Baia, J., Ortiz, M., Brandao, G., Pereiro Neto, A., Araujo, J., & SIlva, C. (2018). Multidisciplinary aesthetic rehabilitation: case report. *Rio De Janeiro Dental Journal*, *3*(2), 37-41.

Chu, S., Devigus, A., Paravina, R., & Mieleszko, A. (2010). *Fundamentals of Color* (2nd ed.). Illinois: Quintessence Publishing Co.

Dolidze, T., & Bitarova, I. (2016). Advantages and disadvantages of e-max and zirconia crowns. *European Scientific Journal*, 12, 465-468.

Garg, N., & Garg, A. (2015). *Textbook of Operative Dentistry* (3rd ed.). Philadelphia: Jaypee Medical Inc.

Hwang, S., Ha, J., Jin, M., Kim, S., & Kim, Y. (2012). Diastema closure using dircet bonding restorations combined with orthodontic treatment:a case report. *Restorative Dentistry & Amp; Endodontics*, 37(3), 165.

Jr, H., Sather, D., Jr, E., Cain, J., Mitchell, D., Blanco, L., & Kessler, J. (2020). *Fundamentals of Fixed Prosthodontics* (3rd ed.). Batavia: Quintessence Publishing Co.

Kusumasari, C., Hatayama, T., & Shimada, Y. (2021). Replacement of two failed indirect restorations with direct bonded restorations using minimally invasive strategy. *Journal Of Dentistry Indonesia*, 28(3).

Norbert, A., Farina, A., Linden, M., Colussi, P., Paranhos, L., & Carli, J. (2019). Aesthetic and functional rehabilitation of anterior teeth using the in-ceram zirconia system: a case report. *Journal of Clinical and Diagnostic Research*.

Nugroho, J., & Aco, A. (2020). Porcelain veneer for a simple and esthetic treatment on anterior teeth with enamel hypoplasia: a case report. *Conservative Dentistry Journal*, *9*(2), 74-76.

Oteo, J. (2012). Additive solution to diastema closure by a combination of direct and indirect techniques. *Dentistry*, 02(03).

Peumans, M., Meerbeek, B., Lambrechts, P., & Vanherle, G. (1997). The 5-year clinical performance of direct composite additions to correct tooth form and position. *Clinical Oral Investigations*, 1(1), 12-18.

Pjetursson, B., Sailer, I., Zwahlen, M., & Hammerle, C. (2007). A systematic review of the survival and complication rates of all-ceramic and metal-ceramic reconstructions after an observation period of at least 3 years. Part I: single crowns. *Clinical Oral Implants Research*, 18, 73-85.

Prakash, L., Singh, M., Sarkar, M., & Kumar R, L. (2018). Application of CAD/CAM in esthetic rehabilitation using high translucent zirconia: a case series. *International Journal of Contemporary Medical Research*, *5*(11), 4-7.

Rathi, S., & Verma, A. (2019). Material selection for single-tooth crown restorations. *Applications Of Nanocomposite Materials in Dentistry*, 225-235.

Ritter, A., Boushell, L., Walter, R., & Sturdevant, C. (2019). *Sturdevant's Art and Science of Operative Dentistry* (7th ed.). Missouri: Elsevier.

Nurulaqmar-Iwani, S. (2020). Review article: different types of coronal restoration for endodontically treated anterior teeth: treatment recommendation. *International Journal Of Research Studies In Medical And Health Sciences*, 5(8), 26-35.

Sowmya, K., Dwijendra, K., Pranitha, V., & Roy, K. (2017). Esthetic rehabilitation with direct composite veneering: a report of 2 cases. *Case Reports in Dentistry*, *2017*, 1-3.