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## **USAGE OF CAD/CAM Ti-BASE LITHIUM DISILICATE IMPLANT ABUTMENTS IN ESTHETIC REGION**

*Three parameters are used to describe the aesthetics and health of implant restorations: residual alveolar bone, peri-implant soft tissue and material of crown. These factors must be considered for function and aesthetics. Lithium disilicate abutments offer aesthetic advantages when ceramic materials are also used for laminate veneers. This aesthetic solution uses nothing more than thin ceramic fragments but presents excellent optical properties. This clinical report describes the use of lithium disilicate restorations with laminate veneers.*

**Keywords:** oral implantology, lithium disilicate abutments, laminate veneers, provisional implant restoration, emergence profile, light-curing composite resin, aesthetic area, recontoured gingival architecture

### **Introduction.**

Single-tooth implants have become a standard in dentistry and are considered state of the art. As implant survival and success rates are high <sup>1,2,3</sup>, the aesthetic outcome has become the main focus of interest in aesthetically sensitive areas. To achieve an optimal aesthetic outcome, implants must be placed in an optimal position and inclination<sup>4,5</sup>. Ideally, successful implant-supported restorations should imitate the appearance of natural teeth. The implant-supported restoration should be in symmetry with the reference tooth.

Restorations in the anterior aesthetic zone present challenges in both the surgical and prosthetic phases of implant dentistry. Full ceramic crowns may be the ideal choice to replace natural teeth in aesthetic areas<sup>6</sup>. The use of ceramics both the abutment and crown would provide better translucency for the implant restoration than is obtainable with metal abutments and metal-ceramic crowns<sup>6,7</sup>. Ceramic abutment would also be preferable to metal components because of the gray colour that can be transmitted through the peri-implant tissues. Recently, lithium disilicate material had been widely marketed, because of the adhesive properties of this material and its preservation of tooth structure. The computer-aided design/computer-aided manufacturing (CAD/CAM) of lithium disilicate abutments has resulted in improved soft tissue responses<sup>9,12,14</sup>.

Although lithium disilicate abutments may benefit both colour and contour management of soft tissue aesthetics using patient-specific abutments, the mechanical risks of such clinical decisions require further exploration <sup>9,10</sup>.

Lithium disilicate abutments offer aesthetic advantages when ceramic materials are also used for laminate veneers. This aesthetic solution uses nothing more than thin ceramic fragments but presents excellent optical properties<sup>10,11</sup>. This clinical report describes the use of lithium disilicate restorations with laminate veneers.

### **Materials and methods.**

A 34-years-old female patient was admitted to the clinic of the Oral Implantology department of Istanbul University complaining of the lost upper-left central incisor and there was a bridge with the tooth on the right. The patient did not report any systemic diseases. During clinical examination, the good oral hygiene and low smile line were observed ( Figure 1 and 2).

Initial intraoral radiograph ( Figure 3 ) and cone-beam computed tomography scan ( CBCT ) ( Figure 4 ) were taken.



Figure 1 and 2 - Clinical view

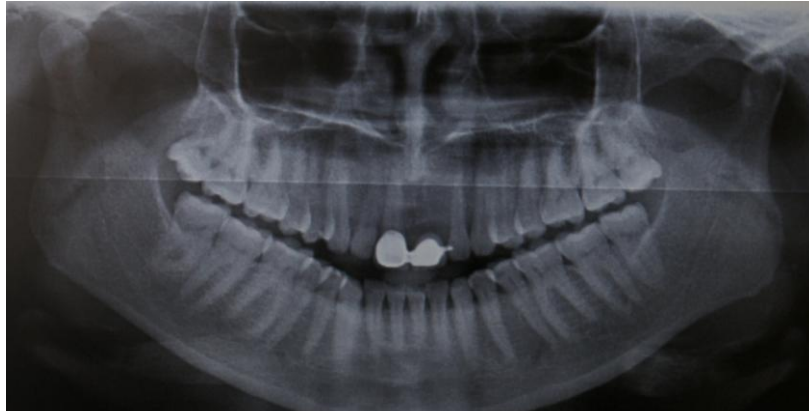


Figure 3 - Initial panoramic radiograph

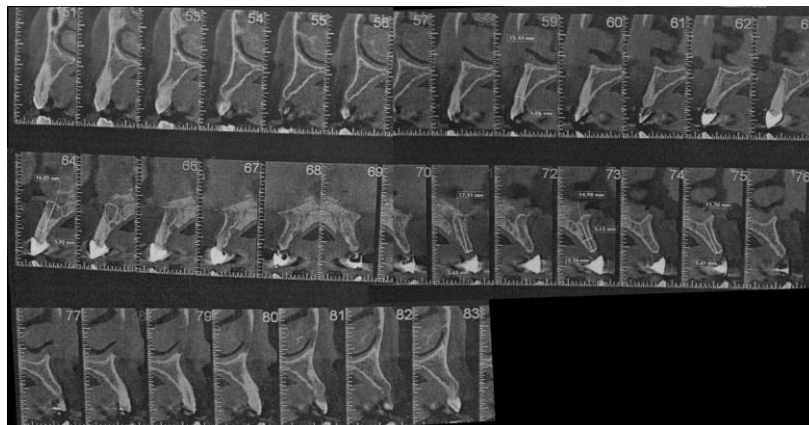


Figure 4 - Cone-Beam Computed Tomography Scan (CBCT)

Infiltrated anesthesia was applied, followed by enveloped flap elevation. Tooth in 11 position was extracted ( Figure 5 ). Following surgical stage, bone-level dental implants (Camlog Screw-Line Implants, Wimsheim, Germany) were placed according to the manufacture instructions. Immediate implantation was achieved for implant position 11 and delayed implantation for the one in position 21. The implants were uncovered after 3 months of healing. Panoramic X-ray was taken 3 months after implant placement (Figure 6). All implants were clinically determined to be stable, with no mobility and healing abutments were placed (Figure 7).

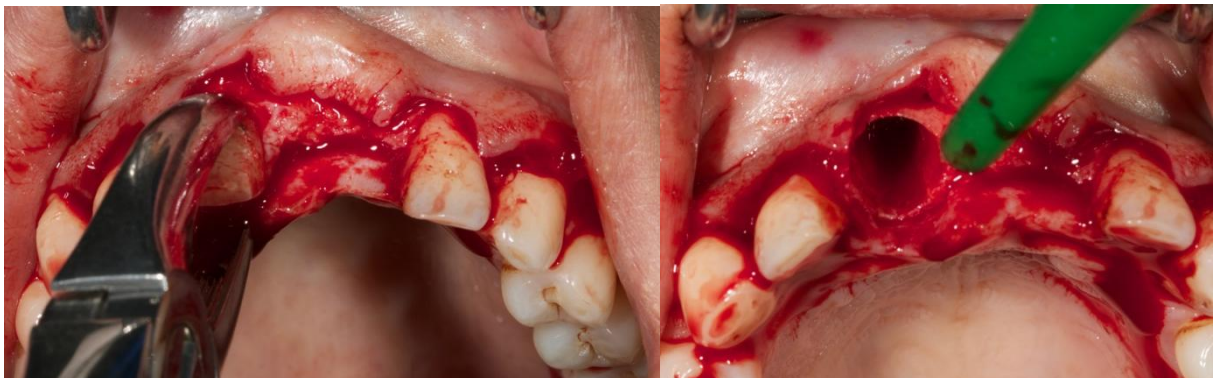


Figure 5 - Tooth in 11 position was extracted



Figure 6 - Gingiva formers were placed

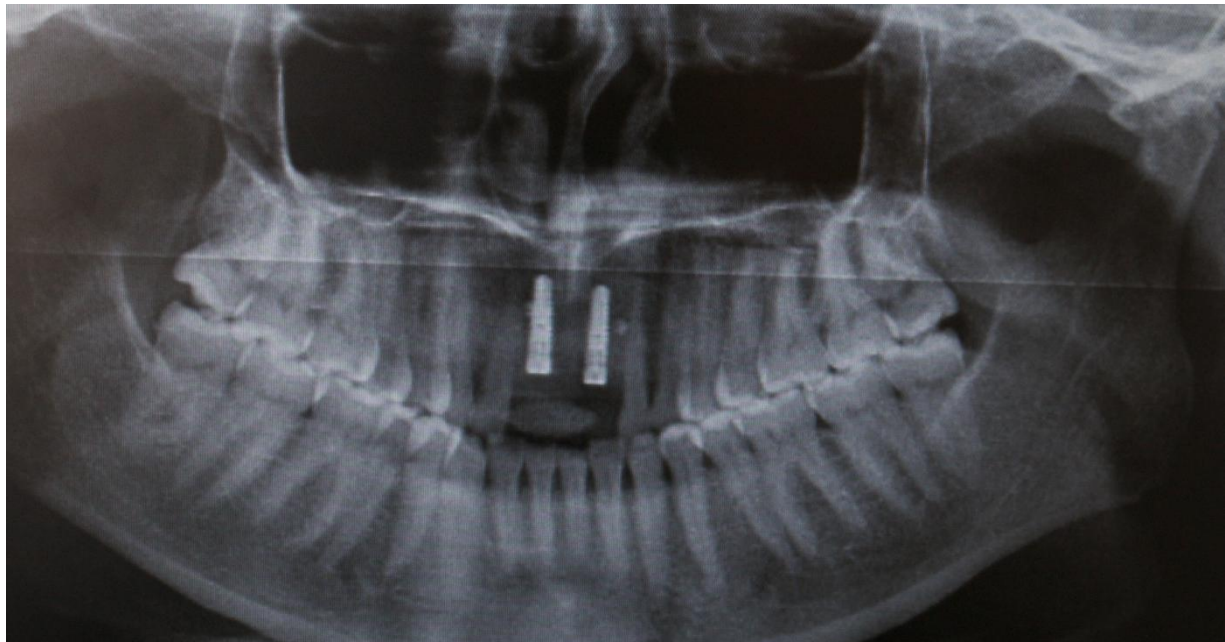


Figure 7 - Panoramic radiograph 3 months after

#### Restorative Phase.

The prosthetic planning was performed using information gathered from the clinical chart, radiographs, and diagnostic casts. The provisional restoration was fabricated on the soft tissue cast to create the same contours as the buccal aspect of the adjacent teeth. At this time, a definite discontinuity existed between the contour of the provisional restoration at the gingival aspect of the crown and the width of the fixture margin ( Figure 8). The temporary abutment was connected to make screw-retained provisional restoration. After making the provisional restoration, the soft tissue around the implant fixture in the area ( 11 and 21 ) was trimmed to make the desired gingival form ( Figure 9). A light-curing composite resin was added to fill the space the cervical contour of the provisional restoration and the ideal shape of the definitive contour. This procedure allowed the tissues to adapt to the pressure, which caused an impulse for reshaping without overstressing the elasticity of the marginal tissue.

To transfer the developed soft tissue contour to a light-curing composite resin filling, a temporary abutment was connected to provisional restoration.

The prepared lithium disilicate (IPS e.max CAD, Ivoclar Vivadent, Schaan, Liechtenstein) restorations were directly bonded to the Ti-Base abutments under laboratory conditions (Multilink Implant, Ivoclar Vivadent, Schaan, Liechtenstein).

Rehabilitation by implants supporting a prosthesis constructed of lithium disilicate implant abutments which are prepared buccal areas. Implant crowns were planned as screw-retained restorations, which were screwed with a controlled torque of 30N according to the implant provider's recommendations. The screw Access hole was sealed with teflon and composite restoration.

The internal surface of the laminate veneers and abutments was etched with 9% hydrofluoric acid ( Ultradent Porcelain Etch, South Jordan, UT, USA ) for 90 seconds, washed under water, and air-dried ( Figure 12). Silane agent was applied ( Monobond, Variolink Veneer, Ivoclar, Vivadent ( Figure 13) ) for 1 minute, followed by a layer of adhesive ( Heliobond, Variolink Veneer, Ivoclar, Vivadent ). The adhesive should not be polymerized in this stage. In the dental substrate, a total etching technique was carried out using 37% phosphoric acid ( Nova DFL Industry and Trade SA, Rio de Janeiro, Brazil ) for 30 seconds. The acid was removed with water before the total drying of surface. The surface was air-dried to remove the solvent and adhesive layer was unpolymerized. The resin cement (Variolink Veneer, Ivoclar, Vivadent) was used and was applied in the internal surface of veneers. Polymerization of resin cement was once light-cured at the facial and lingual sides for 90 seconds. The occlusion was assessed to make sure the anterior guidance.



Figure 8 - Provisional restoration with a natural emergence profile





Figure 9 - Recontoured gingival architecture by a provisional restoration



Figure 10 - A light-curing composite resin was added to fill the space between the recontoured gingival architecture and temporary abutment



Figure11 - Lithium disilicate abutments with laminate veneers



Figure 12 - Abutments was etched with 9% hydrofluoric acid and lateral tooth was etched with 37% phosphoric acid



Figure 13 - Variolink Veneer, Ivoclar, Vivadent

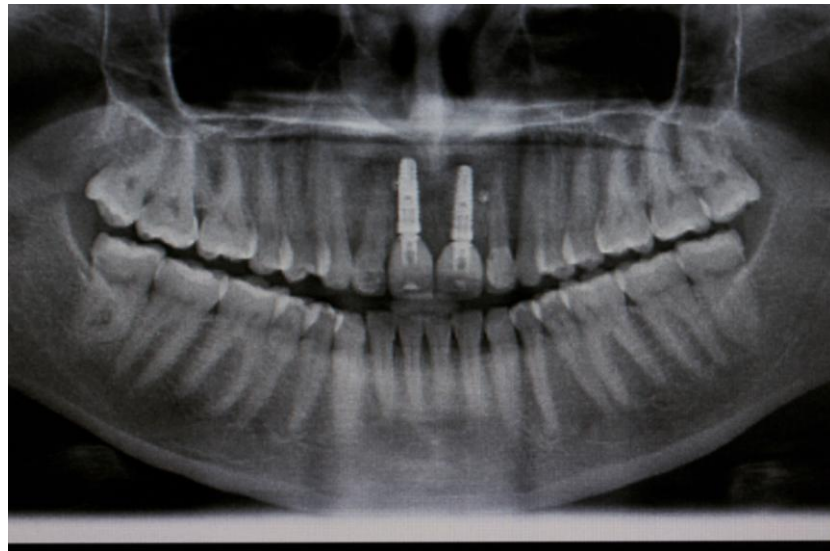


Figure 14 - Panoramic radiograph 1 year later



Figure 15 - Final clinical view 1 year later

### The results and discussion.

Three parameters are used to describe the aesthetics and health of implant restorations: residual alveolar bone, peri-implant soft tissue and material of crown. These factors must be considered for function and aesthetics. In this case, an emergence profile was achieved with the provisional implant restoration according to the emergence profile concept and the patient were satisfied with the final outcome. This method will help to improve interdental papilla and harmonious soft tissue form<sup>8,10,12</sup>.

Lithium disilicate is an esthetically advantageous material for implant abutment restorations. Few prospective data are available regarding lithium disilicate abutment outcomes for implant restorations<sup>13,14,15,16</sup>. Thus this case report offers a

favorable indication that CAD/CAM Ti-Base lithium disilicate abutments with laminate veneers for anterior positions offer excellent service in the short term.

The absence of crown fractures reported for the lithium disilicate material may be anticipated based on recently published data indicating the strength and clinical behavior of these materials, the anterior tooth application illustrated in this case. Only limited clinical data related to implant-supported lithium disilicate abutment and crowns, is presently available in the scientific literature<sup>13,15,16</sup>. The restoration using the lithium disilicate abutment and lithium disilicate veneers has more monolithic pressed structure than the single restoration without compromising the aesthetics. This provides a better restoration because of higher light transmission. The use of ceramic veneers enabled a conservative and aesthetic successful rehabilitation treatment. Thus, for the clinical longevity of restorations, it is necessary to carefully follow all clinical steps.

#### REFERENCES

- 1 Avivi-Arber, L. & Zarb, G.A. Clinical effectiveness of implant-supported single-tooth replacement: the Toronto study // International Journal of Oral & Maxillofacial Implants. – 1996. - №11. – P. 311–321.
- 2 Haas, R., Pollak, Ch., Fuhrhauser, R., Mailath-Pokorny, G., Dörnbudak, O. & Watzek, G. A long term follow up of 76 Branemark single tooth implants // Clinical Oral Implants Research. – 2002. - №13. – P. 38–43.
- 3 Scheller, H., Urgell, J.P., Kultje, C., Klineberg, I., Goldberg, P.V., Stevenson-Moore, P., Alonso, J.M., Schaller, M., Corria, R.M., Engquist, B., Toreskog, S., Kastenbaum, F. & Smith, C.R. A 5-year multicenter study on implant-supported single crown restorations // International Journal of Oral & Maxillofacial Implants. – 1998. - №2. – P. 212–218.
- 4 Phillips, K. & Kois, J.C. Aesthetic peri-implant site development. The restorative connection // Dental Clinics in North America. - №42. – P. 57–70.
- 5 Misch, C.E. Density of bone: effect on treatment planning, surgical approach, and healing // Contemporary Implant Dentistry. – St Louis: Mosby-Year Book, 1993. - №1. – P. 469–485.
- 6 Raigrodski A.J. Contemporary materials and technologies for all-ceramic fixed partial dentures: a review of the literature // J Prosthet Dent. – 2004. - №92. – P. 557–562.
- 7 Glauser, R., Sailer, I., Wohlwend, A., Studer, S., Schibli, M. & Scharer, P. Experimental zirconia abutments for implant-supported single-tooth restorations in esthetically demanding regions: 4-year results of a prospective clinical study // The International Journal of Prosthodontics. – 2004. - №17. – P. 285–290.
- 8 Lai, H.C., Zhang, Z.Y., Wang, F., Zhuang, L.F., Liu, X. & Pu, Y.P. Evaluation of soft-tissue alteration around implant-supported single-tooth restoration in anterior maxilla: the pink esthetic score // Clinical Oral Implants Research. – 2008. - №19. – P. 560–564.
- 9 Kapos T, Evans C. CAD/CAM technology for implant abutments, crowns, and superstructures // Int J Oral Maxillofac Implants. – 2014. - №29. – P. 117–136.
- 10 Glauser R, Sailer I, Wohlwend A, et al. Experimental zirconia abutments for implant-supported single-tooth restorations in esthetically demanding regions: 4-year results of a prospective clinical study // Int J Prosthodont. – 2004. - №17. – P. 285–290.
- 11 Pieger S, Salman A, Bidra AS. Clinical outcomes of lithium disilicate single crowns and partial fixed dental prostheses: a systematic review // J Prosthet Dent. – 2014. - №112. – P. 22–30.
- 12 Wittneben JG, Buser D, Salvi GE, Bürgin W, Hicklin S, Brägger U. Complication and failure rates with implant-supported fixed dental prostheses and single crowns: a 10-year retrospective study // Clin Implant Dent Relat Res. – 2014. - №16. – P. 356–364.
- 13 Fabbri G, Zarone F, Dellificorelli G, Cannistraro G, De Lorenzi M, Mosca A, et al. Clinical evaluation of 860 anterior and posterior lithium disilicate restorations: retrospective study with a mean follow-up of 3 years and a maximum observational period of 6 years // Int J Periodontics Restorative Dent. – 2014. - №34. – P. 165–177.
- 14 Wittneben JG, Buser D, Salvi GE, Bürgin W, Hicklin S, Brägger U. Complication and failure rates with implant-supported fixed dental prostheses and single crowns: a 10-year retrospective study // Clin Implant Dent Relat Res. – 2014. - №16. – P. 356–364.
- 15 Pieger S, Salman A, Bidra AS. Clinical outcomes of lithium disilicate single crowns and partial fixed dental prostheses: a systematic review // J Prosthet Dent. – 2014. - №112. – P. 22–30.
- 16 Fabbri G, Zarone F, Dellificorelli G, Cannistraro G, De Lorenzi M, Mosca A, et al. Clinical evaluation of 860 anterior and posterior lithium disilicate restorations: retrospective study with a mean follow-up of 3 years and a maximum observational period of 6 years // Int J Periodontics Restorative Dent. – 2014. - №34. – P. 165–177.

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**ТИТАН ИМПЛАНТАТТАР ЖӘНЕ ДИСИЛИКАТ ЛИТИЙ АБАТМЕНДЕРДІ  
ЭСТЕТИКАЛЫҚ АЙМАҚТА ҚОЛДАНУ**

**Түйін:** Эстетиканы және имплант арқылы қалпына келтіруде үш түрлі параметрлер қолданылады: альвеола ісінісінің сақталған мөлшері, имплант аймағындағы жұмсақ тіндер мен дасанды тіс сауытының материалы. Аталмыш факторлар қызметтік және эстетикалық тұрғыдан ескерулері қажет. Дисиликат литий абатмендер өздерінің артықшылықтарымен қатар винирлерді дайындағанда қолданылады. Эстетикалық шешім керамиканың өте жұқа фрагменттерін қолданумен қатар жоғарғы оптикалық қасиеттерге де ие болады. Ұсынылған клиникалық жағдай дисиликат литийен қалпына келтіру мүмкіншілігін баяндайды.

**Түйінді сөздер:** оральді имплантация, дисиликат литий абатменттері, винирлер, имплантаты уақытша қалпына келтіру, контурын қабаттастыру, жарықпен қатаятын композитті пластмасса, эстетикалық аймақ, қызылиек пішінін қалпына келтіру.

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**ИСПОЛЬЗОВАНИЕ ТИТАНОВЫХ ИМПЛАНТАТОВ И ДИСИЛИКАТ ЛИТИЕВЫХ  
АБАТМЕНТОВ В ЭСТЕТИЧЕСКОЙ ЗОНЕ**

**Резюме:** Для восстановления эстетики и успешности реставраций имплантата используются три параметра: остаточная альвеолярная кость, пери-имплантированная мягкая ткань и материал коронки. Эти факторы должны учитываться для функциональности и эстетики. Дисиликат литиевые абатменты имеют преимущества, когда керамические материалы также используются для ламинированных виниров. Это эстетическое решение использует не более чем тонкие керамические фрагменты, но обладают отличными оптическими свойствами. Данный клинический случай описывает использование дисиликат литиевых реставраций с ламинированными винирами.

**Ключевые слова:** оральная имплантация, дисиликат литиевые абатменты, виниры, временное восстановление имплантата, формирование контура, светоотверждаемая композитная пластмасса, эстетическая зона, восстановление десневой архитектуры.