شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

بعض الوثائق الأصلية تالفة

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بالرسالة صفحات لم ترد بالأصل

Introduction

Through the immediate direction of dental practice, the treatment philosophy is based on the most conservative approach, whereby intact tooth tissue is conserved as much as possible [1]

The treatment method of molar or premolar replacement is either with a fixed partial denture (FPD) or an implant – retained crown.[2-4] Irrespective of the type of FPD, the clinician uses a crown preparation that is a risk to pulp vitality and may lead to pulpal inflammation or even pulpal necrosis in the long term.[5] In the light of this fact approximately 63% - 73% of the coronal tooth structure is removed when teeth are prepared for crowns & bridges.[6] In light of these facts, It seems desirable to adapt the type of abutment preparation to the extent of sound tooth structure after caries removal, not only for single –tooth restoration, but also abutment preparation for FPDS. There for, if a patient rejects implant treatment, and enough sound tooth structure is available, it would be desirable to restore a missing tooth with an inlay-retained FPD (IRFPD) instead of a crown retained bridges FPD. [4]

Some Clinical evaluation studies of IRFPD observed a failure rate for IPS Empress II. However, Kaplan-Meier observed that survival rates after 8 years for IPS E-MAX press , were recently reported. In those evaluation studies, failure was by de bonding or combination of de bonding and fracture. Despite those failure rates, IRFPD can be a favorable treatment option for biological and economic reasons.[4-6]

While other studies revealed that monolithic lithium disilicate not only for replacement of missed teeth in anterior region but also for

replacing missing teeth in molar regions (not as the manufacturer[s] recommendations) .[11]

Partial- coverage restorations may have an increased risk compared to complete coverage restorations.[2,7,8] Recent progress in material production and processing technology of high – strength dental ceramics and mode of resin cementation may overcome this disadvantage.[3] Recently, yttria-stabilized tetragonal zirconia (Y-TZP), translucent zirconia &recently Nano-ceramics and high performance polymers (Bio HPP) become available to dentistry through computer-aided design and computer-aided manufacturing or copy-milling techniques, and provides excellent mechanical performance, superior strength, and fracture resistance compared to other ceramics[3,9]. However, the use of some types of ceramics is still limited in posterior region where extensive masticatory forces are present [3,9,11]for example, a new lithium-di silicate glass-ceramics, IPS press features good wear resistance and excellent aesthetics, but limited strength[2]as recommendations of manufacturer. While other studies revealed that monolithic lithium dislicate not only for replacement for anterior region but also for replacement of molar region with same rate of success [11]. So the selected IRFPDs material must be tested to which extent can withstand masticatory forces without fracture , and which design gives higher resistance to masticatory forces .[12]

Review of Literature

Inlay retained fixed partial dentures

Implant is the first choice for replacing a missing tooth in posterior region with sound adjacent teeth and healthy oral condition. [13-17]

But when there is clinical contraindications (such as systemic diseases as uncontrolled diabetes cases or several cancer therapies or smoking patients) or other conditions as patients reject implant therapy due to fear or economic reasons due to high cost of implant.[16-19] so that a number of treatment modalities using various materials exist to replace a missing tooth in the posterior region of the mouth the first choice in these cases is three –unit fixed partial denture (FPD) full coverage. Actually when preparing teeth for full coverage, about 63%-73% of the dental structure has to be removed [15-6] , irreversible pulpitis and pulpal necrosis have been reported in multiple studies to occur in 15.6% of teeth treated with single crowns and in 32.5% of teeth restored with three –unit fixed partial denture (FPD) full coverage after 10 years of oral service. [9,20,21]the name invasive restorations due to invasive reduction occurred in preparation of adjacent teeth For a metal-ceramic shoulder preparation ,a facial tooth reduction of about 1.3 to 1.5 mm and an occlusal reduction of 2.0 mm are recommended ,[22-23]only 0.4% to 2% radiographic periapical pathologies were found ,[24] whereas in 1970, 2.9% was reported,[25] and about 10 years later up to 4.0% periapical pathologies were detected .[26]These results are explained by the use of air turbines and more invasive shoulder or chamfer preparations compared to the feather-edge design used in the 1960s.[27] And 1970s. A lower number of endodontic complications are associated with less invasive preparations. In a literature

review, inlay restorations at 10 years showed a lower rate of loss of pulpal vitality (5.5%) compared to complete crowns (14.5%).[26]

1.2. Metal-free inlay retainer restorations

Although the full-coverage metal–ceramic FDPs are still viewed as the gold standard for tooth replacement, they have disadvantages: decreased likelihood of retention, associated soft-tissue pigmentation and an opaque-to-darkish appearance in the cervical area of the abutment teeth [28] Although alternative, tooth- colored non-metal materials have been proposed, high-strength pressed ceramics have the potential for de bonding ,[29,30] and have insufficient fracture resistance .[31]

In the last decades, the use of inlays for retaining a three – unit(FPD) has increasingly been considered .[17-23,32] This new type of (FPDs) has been defined as minimal invasive treatment modality based on an adhesive approach for replacing posterior single missing tooth, which use box – shaped cavities as retainers and other design full-inlay shaped retainers made of gold, composite, ceramics, or other materials that are luted to the adjacent teeth .[33] This preserving the dental structure and the integrity of the periodontal tissues .[31,34-36] This allowed for conservative preparation and facilitate a proper load and stress distribution .[32,37,38] in addition to the aesthetic inconvenience .[39] The detachment of the retainers was a common problem, and often led to the development of secondary caries .[40,41] Mean failure rates of 46.4% have been reported for this type of restorations after 2.5–9 years .[33]

Although nearly parallel-sided box configurations with frictional retention seem to increase their clinical success until 96.1% at 5 years of

follow-up [42]it still remains unknown whether such positive outcome is confirmed in the long-term .[33]

Production of inlay – retained FPD Inlay retained FPD were introduced in 1960 and were originally made out of noble metals are been usually seated using the conventional cementation technique and cements [43]. Before adhesive techniques were introduced to restorative dentistry, conventionally cemented inlays, made of cast gold, were used instead of full coverage crowns to retain a pontic .[44] The main defect was the loss of retention of a retainer, and secondary caries development .[41]As additional way for retention to intra coronal retention addition of boxes, grooves and pins was demanded.[46] These solutions, however, reduced the advantage of minimal invasiveness compared with complete- crown retainers. In the 1980s, adhesive techniques allowed the luting of metallic frameworks to dental enamel by using metal retainer wings made of cast gold or non-precious metal.[7,48]Inadequate retentive preparation shapes and insufficient stability of the metal framework were perceived to have been contributing factors. After initially frequent losses of retention, more defined and retentive preparations, along with improved adhesives, led to acceptable retention rates, especially in anterior teeth .[49] The aesthetic limitations caused by the metallic framework remained a problematic issue. The dark frame work on the oral surfaces of abutment teeth eliminated translucency and gave the teeth a greyish appearance. [48]Restorations made of metal alloys are characterized by certain basic disadvantages. These base metal components that form on the surface of the alloy during the metal-ceramic fusing process may have a negative effect on the adjacent soft tissue. In addition, the opaque, darkish appearance created by certain metal denture retainers in the abutment

teeth is considered to be unattractive. Partial preparations like inlays, onlays or partial crowns are recommended as retainers for short-span FPDs in caries-resistant dentitions. In addition to facilitating superior periodontal health, partial retainers enable preservation of healthy tooth structure. The combination of highly translucent prosthodontics materials and resin composite cements has enhanced the use of the adhesive technique and launched a new era of restorative treatment options with promising initial clinical results.[29] New in vitro findings and a better understanding of stress formation in fiber-reinforced composite (FRC),[50,51]and in all-ceramic restorations led to less invasive preparations extended to existing systems. There has been limited use and no published clinical data of all-ceramic posterior (FPDs) retained either by wings or inlays, mostly because of the low strength, the strength scatter, and the time dependent strength decrease of ceramics owing to slow crack growth.[52]The reduced invasiveness of these resin-bonded inlay-retained FPDs makes them an appealing alternative to conventional preparations in cases where the residual dentition exhibits low caries activity. Metal-free materials such as fiber reinforced composites or high strength pressed ceramics exhibit outstanding corrosion resistance. The esthetics properties of these systems must be attributed to the high translucency of the materials and the fact than the restorations are entirely fabricated of tooth- colored materials thereby achieving a high degree of light transmission. However, restorations made of these materials are not as strong as those that are metal-supported because of their particular mechanical properties. To achieve adequately strong dental restorations, therefore, certain modifications are necessary in the preparations fabrications, and cementation methods. The preparation geometry on an

inlay retainer offers favorable prerequisites for the adhesive cementations technique. The preparation is usually surrounded by dental enamel, and the location of the preparation margin allows a rubber dam to be placed to ensure complete isolation. Adhesive cementation could offer one of the most effective ways of countering the loss of retention, which is one of the most frequent causes of failure of conventional inlay-retained fixed partial dentures .[7]

Abutment preparation designs of IRFPD.

The usual design of IRFDP includes a pontic with mesial and distal inlay wings as retainers. The retainers take the form of inlay restorations that occupy the whole depth and width of almost class II cavities which are prepared in the adjacent abutment teeth .[53]

The preparation of abutment teeth of inlay – retained FPD require occlusal reduction and one of proximal surfaces, the preparation should have round internal line angles, occlusally slight divergent walls and supra gingival margins of the proximal box to minimize the risk of periodontal inflammation . [7,54,55]

A lot of researches suggested different designs for inlay retained FPDS such as tube, box shaped proximal preparation, occluso -proximal preparations of inlay design which consider the traditional preparation of inlay retained FPDS, use of rest seat on the occlusal surface, lingual tooth reduction and retentive –slot preparations [7,56,57] the size of these preparations features depends on the size of molar occluso- proximal inlay preparation are suggested .[58,59,60]

Preparation design is influenced by the selected restorative material (weaker materials requiring additional bulk), the fabrication method, and the ability to bond the restoration. Clinicians must further consider aesthetics, fracture resistance, and edge-strength capabilities of the selected restorative material. The potential advantages of enamel bonding versus dentin bonding should also be taken into consideration, as well as the variance in bonding to different qualities of dentin and the possibility of limited retentive form .[7]

Ceramics are brittle. Though significant progress has been made in the development of new and improved materials, the inherent brittleness remains a limiting factor that can be minimized through proper preparation design .[7]

Preparation guidelines for ceramic inlays differ from those form cast gold, Retention form is not as critical due to the bonded nature of the restoration, and bevels are contraindicated. Cavosurface angles of 90° are preferred, and the preparation must have smooth-flowing margins to facilitate the fabrication of the restoration. Rounded internal line angles and the butt-joint cavosurface margins facilitate many aspects of conventional laboratory or chair-side inlay fabrication. The bulk of ceramic must be established in areas of potential contact from adjacent and opposing teeth, and good visual access to all prepared surfaces facilitates optical capture and subsequent fabrication .[7,54,56]

Indications of IRFPD:

Highly strict observations must be done when the direction of the treatment planning towards inlay – retained fixed bridge**.** Good oral hygiene tendency, Low caries tendency ,Parallel alignment of abutment teeth ,No mobility of abutment teeth ,Minimum height of abutment >5mm ,Maximum extension mesio-distally of the interdental space gap 9mm, Width for premolar if pressed ceramics used and 12mm width for molars if fiber reinforced composite materials are used ,Abutment teeth are fillings and Replacing 1 or 2 teeth in the premolar, molar region.[7]

Contraindication:

Pontic span too large , excessive Para functions ,clinical crown too short (<5mm) ,compromised periodontal condition ,occlusal anomalies , abutment teeth tilting ,Allergy to one of component of adhesive cement (absolute contra indications).[7]

Issues must be treated before cementation of IRFPD

Gingival bleeding:

Which compromise the adhesive bond between the resin and the prepared tooth ,So that in preparation for adhesive cementation all signs of periodontal inflammation must be eliminated, Proximal caries of abutment teeth detected by intra oral examination and periapical radiograph, High attention for generalized wear facets ,the position of antagonist contacts, the length of clinical crown ,pontic span, alignment of abutment teeth and canin guidance occlusion must be ensured to protect the inlay retained fixed bridges from torsional stress.[6]

Materials for construction

Metal-ceramic, All-ceramic material, Fiber-reinforced composite and Bio-Hpp. To overcome IRFPD problems aesthetic compromise and loss of retention with preparation of minimal invasion –even with parallel sided boxes related to PFM constructing material ,within last few years development of new dental materials with better mechanical, biological and optical properties for construction of IRFPD as dental ceramics ,glass fiber reinforced composites[61,62] and High Performance Polymer (BIO-HPP) these restorations which are bonded to the abutment teeth through adhesive cements that give addition retention for the restoration.[63,64] may be used as definitive treatments instead of implants in the presence of scarce bone or other anatomical, medical, or economical constrains .[65,67] and also in juveniles as temporary solutions that can be readily replaced or modified .[65–67] DE cementation has been rated as the most common failure type of resin-bonded FDPs .[68] Other typical events are secondary caries on the abutments ,[66] chipping of the veneering material ,[69] and/or fracture at the connectors and retainers .[70] The long-term success of these prostheses, which range from 59% to 100% at 5 years, mainly depends on the mechanical properties of the materials used, the preparation configuration ,[65,71] the occlusal loads, the presence of parafunctional habits ,[17,63,72]and the quality of the adhesion at the tooth/ restoration interface. [65,71]

Dental ceramics review:

Metal Ceramics

Metal-ceramic systems for dental restorations have been available since the 1960s. They rely on the application and firing of a veneering