INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN[Online] : 2643-9875 || ISSN[Print] : 2643-9840

Volume 3 Issue 01 January 2020

Page No.- 01-09

Prosthodontics Clinical Cases (Patients with Decreased Inter-Arch Distance-Case Report)

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Abstract:

The aim: to describe a simple method to increase the inter-arch distance for patient with decreased inter-arch distance. **Methods.**The study done in the dentistry college of Babylon University at Prosthodontics clinic, the treatment plan was explained to the patient, he was informed of the benefit of this treatment and informed consent was obtained . The following cases report describe the rehabilitation of a patient with decreased inter-arch distance and worn dentition with interim acrylic partial denture to correct reduced inter-arch distance. This study include four patients, three with acrylic RPD and one of them construct complete over-denture. Diagnostic casts were made and mounted on a semi-adjustable articulator with face bow record and centric relation record. **Theconclusion.**Limitation in interocclusal space is a common problem in prosthetic dentistry. Several approaches have been proposed to solve this problem. The treatment presented here are two different treatment lines used, acrylic bite raising which consider as a primary step to the definite prosthesis. While the other one treated with complete overdenture to improve retention and increase the inter-arch distance with improve aesthetic, and muscle tone with reversible, non-invasive, and relatively inexpensive treatment.

key word: Prosthodontics, clinical, cases,patients, decreased ,inter-arch distance.

Abbreviations &symbols

FPD	fixed partial denture
RPD	removable partial denture
VPS	vinyl polysiloxane
TMJ	Temporomandibular joint
fig.	figure
mm	millimeter
cl.I	Class I Kennedy classification.
cl.II	Class II Kennedy classification.
OVD	Occlusal vertical dimension
TMD	Temporomandibular disorder
h	Hour

Introduction

Masticatory function is a specialized activity requiring the coordination of neural and muscular activity and the teeth in the oral cavity play a vital role, however, the number of teeth, the position of the teeth also is important for effective mastication ,so, when the tooth is lost/removed and not rehabilitated prosthetically for a long period of time, it will lead to supraeruption of the opposing tooth, thereby decreasing interocclusal clearance.[(1)]

Over time, edentulous areas that are not restored may lead to drifting, tipping, rotation, and supraeruption of neighboring and/or opposing teeth.[(2-4)]The extrusion of opposing teeth in combination with the alveolar extrusion of the edentulous areas reduce the space needed for fabricating a removable or fixed prosthesis when the edentulous areas are present in maxilla.[(5)] Clinically, unopposed teeth have been reported to be prone to overeruption, which can create occlusal interferences.[(6)] As a result of a

worn anterior dentition, the mandible tends to be habitually located more anteriorly. By recording the difference in the horizontal mandibular position when the mandible is in centric relation and maximal intercuspation, a horizontal space can be obtained inter-incisally.[7] This space can be utilized to provide adequate room for restoration of the anterior teeth. [7] Regaining the lost interocclusal space is a requirement for a successful prosthetic treatment for these cases.[3,4,8-10] Prosthetic management of partial edentulism can be challenging with the presence of limited interocclusal space. [2-4]

Analysis of an existing inter-arch distance is one of the first steps that must be carried out in planning for the restoration of missing teeth in a partially edentulous mouth.[11] Early identification of the lack of space would prevent complications in designing and constructing a fixed partial denture (FPD) or a removable partial denture (RPD) for a partially edentulous mouth.[12-14] However, intraoral visual or evaluation using measuring instruments is often limited and unreliable because of the limited access to the area of interest; in particular, the posterior segment of the arches.[12-14] The indirect procedure employs preliminary impressions made to generate the study casts and mount them on an articulator to examine the relation of the teeth and edentulous ridge area.[10,15] When hand articulation of the casts does not provide solid occlusal contacts (such as in an extension situation), the relation of the maxillary and mandibular casts is achieved with the aid of record bases and occlusion rims. The inter-arch distance is assessed and measured with a ruler on an articulator to determine the available space in seeking possible treatment options to restore the missing dentition, this indirect measurement of the inter-arch space.[15]

Another method to measure inter-arch distance was the clinical method. Conduct an intraoral visual examination of the partially edentulous mouth to identify the region of edentulous area and assess occlusal relation, orientation of occlusion plane, and incisal guidance. Then, dry the opposing dentition and isolate the residual ridge of the edentulous area by evacuating saliva and displacing the cheek and the tongue. Next, extrude the fast setting vinyl polysiloxane (VPS) bite registration material over the ridge between the buccal and lingual vestibules. Guide the mandible to relate against the opposing arch in the maximal intercuspal position and hold it until the material sets. Remove the processed VPS material out of the mouth, trim the excess, and return it to the mouth to verify its accuracy. Section the index either sagitally across the ridge at the site of interest, or longitudinally along the crest of ridge, using a surgical blade .Finally, measure the thickness of the silicone index using either a ruler or periodontal probe and determine the sufficiency/insufficiency of the existing inter-arch distance to restore the missing dentition .[16]Several approaches, such as no treatment, restoration with a shortened prosthesis, intrusion of the extruded teeth, posterior maxillary alveoloplasty, or the reduction of the extruded teeth (which may require endodontic treatment and periodontal surgery) have been proposed for the extension of interocclusal space.[2,4, 17,18] The clinical situations in combination with The desires of the patient are the critical factors in selecting the appropriate treatment option.[4]

Overdentures have been shown to improve the quality of life for edentulous patients and to contribute to the well-being of the patient's psychology. Implant-retained overdentures offer better satisfaction than conventional dentures and are indicated when full arch fixed implant prosthesis cannot be made. The removable implant-retained overdenture offers several advantages including enhanced access for hygiene, easy modification of the prosthetic base, and provision of an esthetic labial flange in cases of unfavorable jaw relations. [19,20] The retention and stabilization for the overdenture are provided by the denture-bearing area and attachment components like bar and clips, retentive ball and sockets, low-profile attachments and magnets.

The use of dental implants to replace missing teeth has become the standard of care for edentulous spaces. With the presence of restricted interocclusal clearance, screw-retained restorations have been proposed because it may not be possible to develop adequate retention to retain restorations on implants with cement.[9,21] Screw-retained restorations can be secured to implants with as little as 4 mm of space from the surface of the implant to the opposing occlusion.[21] However, if the crown length is too short, it may negatively affect the aesthetics; especially when the crowns are in the smile line.

Other option, fixed denture to restore the inter-arch distance, with cement retained restorations, all the principles of retention with conventional fixed prosthodontics will apply and a sufficient abutment size dimension and form are required for adequate retention. In situations when minimal inter occlusal space exists it may not be possible to develop adequate retention to retain restorations [22].

The Aim of the Study

The purpose of this clinical research is to describe a simple method to increase the inter-arch distance gradually as a primary step to the definite prosthetic treatment for patient with decreased inter-arch distance, or to restore the inter-arch distance by simple not invasive with least cost treatment.

Method

The study done in the dentistry college of Babylon University at Prosthodontics clinic, the treatment plan was explained to the patient, he was informed of the benefit of this treatment and informed consent was obtained . The following cases report

describe the rehabilitation of a patient with decreased inter-arch distance and worn dentition with interim acrylic partial denture to correct reduced inter-arch distance. Intraoral assessments and extra-oral examination prior to the clinical decision to increase the inter-arch distance. These include the facial profile and aesthetics, and status of the TMJ. This study include four patients, three with acrylic RPD and one of them construct complete over-denture. Diagnostic casts were made and mounted on a semi-adjustable articulator with face bow record and centric relation record.

Case no. (1):

A 63-year old male patient presented to the clinic for prosthodontics treatment with missing maxillary and mandibular teeth due to caries .Past medical history show that the patient denies any diabetes, hypertension, heart problems, kidney issues or any other chronic disease. After examining the patient, treatment options were explained and the patient elected to proceed with dentures for the esthetic and the function. However, he has reduction in the inter occlusal space(3mm from the occlusal surface of the premolar to the crest of lower residual ridge) when measured by indirect method, which need to be treated first. Examination (fig.1A&B). Record base and bite rim were completed for the patient (Fig.1C) and were checked in the patient mouth with raising the inter-arch distance 2mm), then transformed to acrylic, and installed for patient to accommodate for new inter-arch distance(Fig. 2A,B). We follow up with the patient after two weeks and increase inter-arch distance 2mm again (Fig. 2C).

A

B

C

Fig.(1) A:Partially edentulous maxilla and mandible, B:profile view of the reduced inter-occlusal space ,C:checking the bite rim in patient mouth(raising the inter-arch distance 2mm).

A

B

C

Fig.(2) checking the raising bite in patient mouth(raising the inter-arch distance 2mm),A: profile view, B: facial expression after first increase, C; the second raising after 2weeks.

Case2:-

A 43-years old male patient presented to the clinic for prosthodontics treatment of the missing mandibular teeth due to caries with reduced inter-arch distance(3.5mm from the occlusal surface of the upper molars to the crest of lower residual ridge) when measured by indirect method. Past medical history was not significant. After examining the patient, treatment options were explained and the patient elected to proceed with dentures for the esthetic and the function . Examination and impression was taken, (fig.2A),then the diagnostic casts was mounted. Record base and bite rim were completed for the patient, and were checked in the patient mouth with raising the inter-arch distance 2mm, then transformed to acrylic, and installed for patient to accommodate for new inter-arch distance (Fig. 2B&C). We follow up with the patient after two weeks and increase inter-arch distance 2mm again by adding a new layer of cold cure acrylic , and the patient was under the follow up.

A

B **C**

Fig.(2) Partially edentulous mandible cl.I kennedy classification, A: the impression for lower arch, B&C: checking the bite rim in patient mouth(raising the inter-arch distance 2mm).

Case 3 :-

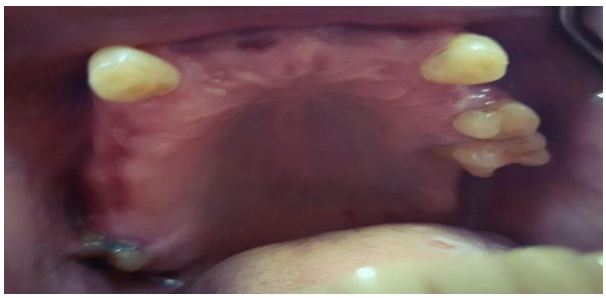
A 56-years old male patient presented to the prosthodontics clinics for comprehensive care ,intraoral examination reveal multiple loss of maxillary and mandibular teeth due to caries and periodontal disease. Past medical history was not significant. Patient denies any diabetes, hypertension, heart problems, kidney issues or any other chronic disease. After examining the patient, treatment options were explained and the patient elected to proceed with dentures for the esthetic and the function .

Prosthodontics Clinical Cases (Patients with Decreased Inter-Arch Distance-Case Report)

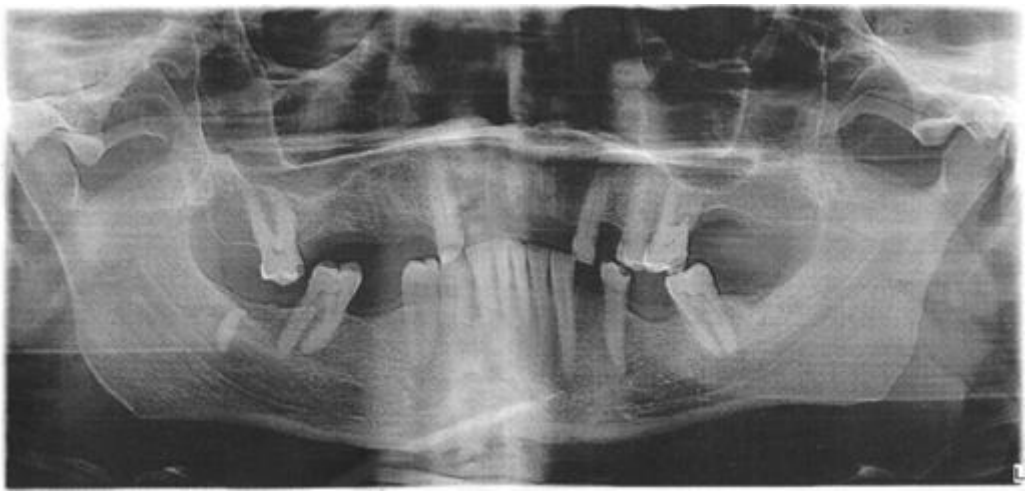
The patient with limited inter-arch distant (3mm from the occlusal surface of the lower molars to the crest of upper residual ridge) when measured by direct & indirect method. The patient have partially edentulous mandible cl.II kennedy classification and partially edentulous maxilla cl.II (fig.3 A&B).

The impression was taken, then the diagnostic casts was mounted (fig.3E). Record base and bite rim were completed for the patient and were checked in the patient mouth with raising the inter-arch distance 2mm,then transformed to acrylic (Fig.4C&D), and the acrylic raising bite was installed for patient to accommodate for new inter-arch distance. We follow up with the patient after two weeks and increase inter-arch distance 2mm again, and arrange the teeth with the newly inter-arch distance, then the try-in denture was checked in the patient mouth (Fig.5A&B), then completed RPD at the newly inter-arch distance was inserted for the patient (Fig.5C).

A



B

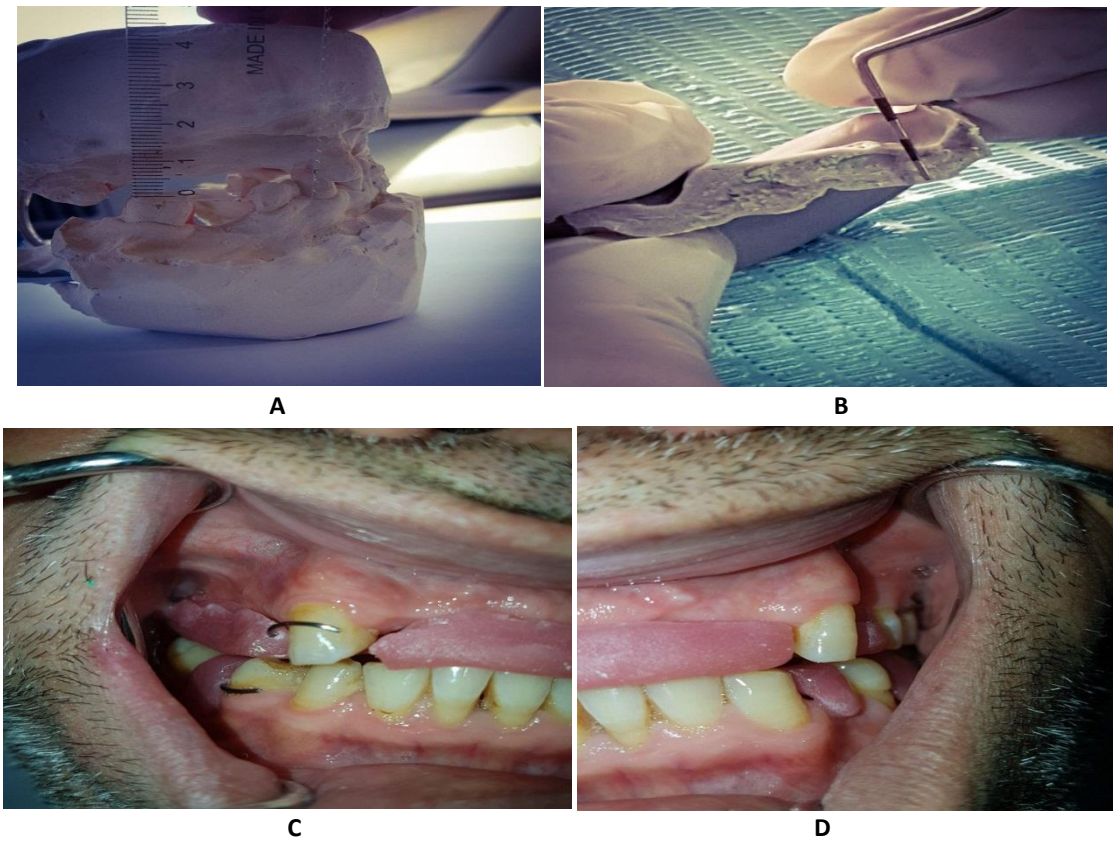


C

D

E

Fig.(3) A:Partially edentulous mandible cl.II kennedy classification ,B: Partially edentulous maxilla cl.II, ,C: Panoramic x-ray shows the presence of ruminant of root ,and the limited interarch distance, D:face bow registration, E: the mounted casts.



A B C D

Fig.(4)A: indirect measurement of inter-arch distance ,B: direct measurement of inter-arch distance,C&D: insertion of the raising bite in patient mouth(raising the inter-arch distance 2mm).

A B C

Fig.(5), A &B: after two weeks raising the inter-arch distance again 2mm, arrange the teeth with the newly inter-arch distance on the articulator(frontal and profile view) ,C: the completed RPD at the newly inter-arch distance .

Case4 :-

A 59-years old male patient presented to the prosthodontics clinics for comprehensive care ,intraoral examination reveal maxillary cl.I mod1kennedy classification and mandibular cl.I mod1kennedy classification. Past medical history was not significant. Patient denies any diabetes, hypertension, heart problems, kidney issues or any other chronic disease. After examining the patient, treatment options were explained and the patient elected to proceed with dentures for the esthetic and the function. The patient presented with fractured upper lateral without pulp exposure ,caries upper left central tooth and sound upper right canine with limited inter-arch distant. In the lower arch have caries left lateral incisor and right canine with pulp exposure and mobile right lateral. The preprosthetic treatment was done, preparation of upper lateral and left central tooth to receive upper partial over-denture and in the lower arch make root canal fillings with amalgam dam for left lateral incisor and right canine and extraction of lower mobile right lateral incisor. Then the prosthetic treatment begin by making of preliminary impression using a stock tray and irreversible hydrocolloid (alginate); and final impression using custom trays and light-bodied silicone impression material, after border molding. The denture bases were polymerised with light activated acrylic resin . Occlusal wax rims were made over the denture bases and adjusted as necessary. The bases were mounted in centric relation at a corrected occlusal vertical dimension in semi-adjustable articulators. The artificial acrylic resin teeth were arranged in balanced occlusion and tried in, and the dentures were flasked and polymerized (72°C/12 h) and then inserted and adjusted.

A B C D E

Fig.(6)-A&B diagnostic appointment upper &lower arch, C&D: the preprostheric preparation of the carious teeth, E: border molding &final impression for upper arch.

A B

Fig.(7) A :the try-in denture checked in the patient mouth. B: insertion of the finish complete lower over denture and upper partial over denture.

Discussion

The problem of worn dentition can consider common in elderly patients and this condition always related with reduce in occlusal vertical dimension VDO. Overdenture and bite raising consider treatment lines for increase vertical dimension result from moderate to severe worn dentition [(23)].However, overdenture could offer an advantage over bite raising as patients could worn them all the time and during normal function like speaking or eating[(24-27)]. In this study the removable appliance used instead of fixed denture due to its offer a little or no surgical intervention with restore the functional occlusion of the patient, in addition to financial limitation for fixed prosthodontics [(25-28)]. Therefore, the removable prosthesis treatment comparing to the fixed prosthesis could produce less invasive, less expensive and simple design therapy that improved the function, esthetics, and muscle tone. According to many parameters, studies showed that the results are similar to extensive fixed restorations with risks of material fracture [(25,29)]. In the present study, two different treatment line used, the first one used acrylic bite raising (increase 2mm) that changed its dimension every two weeks to reach total increase (4mm) then after restoring the OVD, the bite raising replaced with RPD . However, many studies showed that there were no limits to increase OVD but still the safe limits is up to 5mm [(30,31)].

While the other one treated with complete overdenture as the remaining two teeth were severely worn so they had been used to improve retention and increase the vertical dimension with improve aesthetic. It had been found that the assessment of the status of the temporomandibular joint (TMJ) is critical before intervention therapy [(30,32)]. Although the compelling evidence that support the relationship between the OVD and TMD is lack, however; TMJ examination can allow observation of the initial TMJ status of the patient. In addition, increase the OVD may not exaggerate signs and symptoms of TMD, patient adaptation potential could be masked by discomfort that already exist. So, comprehensive restorative treatment including an increase in OVD must be achieved with carful for patients with TMD. many authors had been suggested that stabilizing TMD patients and reducing the signs and symptoms of TMD with a removable occlusal appliance prior to use irreversible prosthodontics treatment [(30,33)].

Conclusion

Limitation in interocclusal space is a common problem in prosthetic dentistry. Several approaches have been proposed to solve this problem. The treatment presented here are two different treatment lines used, acrylic bite raising which consider as a primary step to the definite prosthesis.

While the other one treated with complete overdenture to improve retention and increase the inter-arch distance with improve aesthetic, and muscle tone with reversible, non-invasive, and relatively inexpensive treatment.

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