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Clinical Evaluation Of Bovine - Derived Xenograft In Treatment Of Human Periodontal Class II Molar Furcation Defects.

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Abstract :-

The aim of this study is clinical evaluation of bovine derived xenograft in the treatment of human periodontal Class II molar furcation defects. Eighteen patients(8 males, 10 females) suffering from chronic periodontitis,with Grade II molar furcation defect, were treated using bovine derived xenograft , completed the study with the following clinical parameters were assessed immediately before the surgical procedure(Baseline) and at 6 months after treatment.These parameters were, Plaque index Score(PlI),gingival index (GI) periodontal pocket depth(PPD),Clinical attachment level (CAL),Gingival Recession(GR) and Closed horizontal probing depth (CHPD).This therapy resulted in significant PPD reductions and no significant improvement was seen (CAL),(GR) and(CHPD). For the mean values for the of (PPD)(5.47±1.39),(CAL)(3.1±1.4), (GR)(0.21±0.51) and(CHPD)(3.5±1.3) at baseline ,while these parameters at 6 months after surgical treatment were(3.8±1.52),(2.35± 1.34), (0.3±0.5)and(2.2±1.3) respectively.

The findings of this study suggest improvement in clinical results with bovine derived xenograft treatment in class II furcation molar defects.

Key words: periodontal; regeneration; furcations; graft, bone,bovine- derived xenograft .

الخلاصة

الهدف من هدة الدراسة هو لتقييم القياسات السريرية الناتجة عن استخدام الطعم العظمي المشتق من الابقارفي علاج مجموعة من الناس لديهم اضراس فيها منطقة تشعب او تفرع جذور مصابة سريريا (درجة ثانية) و هذة القياسات تمثلت بعمق الجيب اللثوي وفقدان التعلق السريري و انحسار اللثة و عمق الجيب العرضي و مقارنة هدة النتائج مع نفس القياسات ولكن بعد مرور ستة اشهر من العلاج باستخدام التجريف الجراحي.العينة تكونت من 18 شخصا مصابين بالتهاب لثوي مزمن يرافقة اضراس فيها منطقة تشعب او تفرع الجذور مصابة سريريا(درجة ثانية) .التحليل الاحصائي للقراءة الاولى و القراءة الثانية بعد ستة اشهر اوضحت النتائج ان نقصان عمق الجيب اللثوي وفقدان التعلق السريري و انحسار اللثة و عمق الجيب العرضي مما يدل على تحسن سريري واضح في علاج هذة الاضراس التي فيها منطقة تشعب او تفرع جذور المصابة سريريا باستخدام التجريف الجراحي و الطعم العضمي المشتق من الابقار .

Introduction:-

Molar furcation involvement is one of the most common dento-alveolar sequelae of periodontal disease. The term furcation involvement :refers to the involvement of bifurcation or trifurcation of the multirooted teeth by the periodontal diseases. The bacterial plaque is the causative agent of the gingivitis and destructive periodontal disease causes destruction of the periodontal tissues.Grade II molar furcation defects mean bone destruction on one or more aspects of the furaction ,but a portion of the alveolar bone and periodontal ligament remains intact.or :-horizontal loss of the periodontal tissue support not exceeding 1/3 of the width of the tooth(1). The application of a specific treatment method for furcation involvement requires a thorough understanding of tooth anatomy, etiologic factors, and the biologic basis for treatment modalities.(2)

Contributing factors to furcation involvement include systemic factors ,such as diabetes and smoking(3-6) and local factors, such as cervical enamel projections(7,8) furcation entrance width(9) ,furcation and root concavities(10),bifurcational ridges(8,11),accessory pulpal canals (12-14) ,enamel pearls(15) and furcation restorations(16).

These factors must be assessed thoroughly to ensure a correct diagnosis leading to effective management of furcation involvement(17).

Historically, various treatment methods have been proposed to treat molar furcation defects. These methods ranged from conservative therapy, such as curettage and open flap debridement, to surgical treatment procedures, such as gingivectomy,root amputation, hemisection,or tunneling. Regardless of the treatment method used, most longitudinal studies have shown that molars are at higher risk for tooth loss than non molar teeth.(18-20).

The introduction of bone grafting methods (21-23), and the concept of tissue regeneration(24-26) offered new hope for improved and more predictable treatment of furcation involvement.

There are different methods of regenerative treatments like GTR (Guided Tissue Regeneration) technique, using bone graft and synthetic materials, and combination methods.Auto graft, Allograft and Xenograft bone and Aloplastic materials have been used in periodontal defects. However, there is no material for complete regeneration until now.The main reasons of using this material are improvement of bone regeneration and accessibility for patients, to remove microbial plaque, prevention of disease progress and losing tooth.(27) Many researches have performed successful results using Xenograft bone in periodontal defects. Some of these researches are in histological evaluation of Xenograft in human periodontal lesion(28,29) .The combination therapy of a membrane and xenograft for,molars has resulted in successful closure of furcations.(28,30-33). Class II furcations have been shown to be the best candidates for regenerative treatment(34-36)

In assessing the success of these treatment methods, complete closure of the defect is desirable.(2)

Therapeutic results can be measured by periodontal probing depth (PPD) and clinical attachment level (CAL) improvements,bone regeneration, and evidence of histologic periodontal regeneration. Although histologic evaluation is most accurate, surgical closure of the furcation defect and improvements in PPD and CAL serve as suitable and practical outcome measures.(37,38).

The aim of this study is clinical evaluation of bovine derived xenograft in the treatment of human periodontal Class II molar furcation defects

Material and Methods

Population screening

Potential patients (18 patients)were selected from those referred to the periodontal department clinic of the college of dentistry(Babylon university) &/or privet clinic. All patients received a complete periodontal examination, including a full-mouth periodontal probing (Fig 1), radiographic examination(Fig 2). The study inclusion criteria were (i) diagnosis of chronic periodontitis (according to the criteria of the 1999 international classification;)(39); (ii) presence of class-II furcations, presenting PD≥5mm and bleeding on probing , after nonsurgical therapy; (iii) good general health. Patients who (i) were pregnant or lactating; (ii)required antibiotic pre-medication for the performance of periodontal examination and treatment; (iii) suffered from any other systemic diseases (cardiovascular,pulmonary, liver, cerebral, diseases or diabetes); (iv) had received antibiotic treatment in the previous 3 months; (v) were taking long-term anti-inflammatory drugs; (vi)were smokers were excluded from the study).

Non-surgical treatment

All the subjects received a full-mouth periodontal treatment 2 months before the surgical procedure. All these treatments were performed by the same operator, with an ultrasonic device. At the same time the subjects underwent motivation session, during which oral hygiene instructions were given, to ensure that the subjects could maintain a proper level of oral hygiene before the surgical procedure.

Clinical parameters

The following clinical parameters were assessed immediately before the surgical Procedure(Baseline) and at 6 months after treatment.These parameters were, Plaque index Score(PlI) (40),gingival index Score(GI)(41) periodontal pocket depth(PPD),Clinical attachment level (CAL),Gingival Recession(GR) and Closed horizontal probing depth (CHPD) were calculated when probing with manual probe.(Fig 1)

1- Probing pocket depth (PPD): the distance from the free gingival margin to the base of the pocket. In each tooth, probing was applied in 3 areas and the highest Deep in the furcation was registered.
2- Clinical attachment level (CAL): the distance from CEJ to the base of the pocket.
3-Gingival Recession(GR): gingival margin position to the CEJ in 3 points of each Surface of the tooth.
4-Closed horizontal probing depth (CHPD): the distance from deepest area of probe Penetration vertically to buccal or lingual surfaces to connection line of hight of contour of mesial and distal roots.

Surgical procedures

Following local anesthesia, sulcular incisions were made and mucoperiosteal flaps were raised at furcation area.Carefully, the tissue was reflected, preserving the maximum of interproximal soft tissue.Granulation tissue as well as the visible calculus were removed with hand curettes and with an ultrasonic device.The bone graft was applied from the farthest end of the involved furcation until the buccal surface of the tooth was covered with it. The surgical flaps were then replaced at their initial position and sutured. A black silk suture(3-0) using vertical mattress or an interrupted technique. After suturing, slight pressure on the facial and lingual flaps is applied to minimize the clot beneath the flap. It is optional to place a surgical dressing to protect the wound. Placement of a dressing must be a complished, however, without displacement of the graft or compromise of the blood supply to the gingival flaps for a period of 7 to 10 days, at which time the dressing and sutures were removed. No further dressings were placed unless special conditions dictated otherwise.

Postoperative management/periodontal maintenance

The administration of antibiotics beginning immediately post-surgery is thought to aid in plaque control (42) Amoxicillin 500 mg t.i.d was prescribed for the 10-day immediate postsurgical period. NSAIDs were begun one hour prior to surgery and continued t.i.d for 3 days postsurgically. Patients should also be placed on achlorhexidine mouthwash to further aid in this process(43). For the first 4–6 weeks, patients should refrain from brushing the surgical area to prevent disturbance of the blood clot (44). Sutures are retained as long as they maintain closure and do not contribute to plaque accumulation and inflammation .Postoperative visits include plaque removal (mechanically), selective stain removal and reinforcement of oral hygiene. Periodontal probing should not be done prior to 6 months, since probing force may damage the healing site, thereby diminishing the regenerative outcome.

Statistical Analyses

The changes of pretreatment and post-treatment (PlI,GI ,PPD,CAL,GR and CHPD) surements were the basis for data analysis with the use of a statistical software program.The paired-samples t-test was used to compare the mean values of presurgical and postsurgical treatment .

Results

Subject recruitment started in January 2008 and was completed by the end of June 2011. The first surgical procedure was carried out in March 2008, and all the 6-month follow-up visits were completed in December 2011. Data entry of all information and statistical analysis were performed by the end of December 2011.

Eighteen patients completed the study with clinical data collected at baseline and after 6 months post-treatment. (8 males, 10 females).

Table 1. showed Patient characteristics at baseline.The mean age was 50±10.5 years, including a majority of females.

Table 1.Patient characteristics at baseline.

Age	50±10.5
Female(%)	10(55.6)

The means of full-mouth plaque and gingival index scores at surgical site are shown in Table 2. The plaque and gingival index scores were maintained at low throughout the study, without statistical difference from baseline to 6 months for both parameters at the surgical site.

Table 2.Changes in clinical parameters(PlI. And GI.)

	mean±S.D
Plaque index	
Baseline	0.52±0.3
6 months	0.41±0.2
P-value	N.S
Gingival index	
Baseline	1.62±0.3
6 months	1.51±0.28
P-value	N.S

PPD,CAL,GR and CHPD means are shown in Table 3.A reduction in PPD was observed ($p<0.05$). The periodontal pocket depth was reduced to (3.8±1.52 mm) 6 months after surgery(Fig 3&4),where it was (5.47±1.39mm) at baseline(presurgical treatment).

The amount of CAL presurgical treatment was (3.1±1.4),while after 6 months was(2.35± 1.34 mm). It was reduced but the analysis showed that there was no significant difference in change of means before and 6 months after surgery ($P>0.05$).

There was an increase in GR after 6 months (0.31±0.54 mm),GR was (0.21±0.51)before surgical treatment .The difference between pre & post-surgery Wasn't significant ($P>0.05$).

CHPD pre surgical treatment (Baseline) was(3.5±1.3 and 2.2±1.3) mm after 6 months.

They showed more reduction after treatment ,but there's non-significant difference between them.

Table 3.Mean values and Standered deviations(±SD) For Presurgical(baseline) and Postsurgical treatment(after 6 months) of Periodontal pocket depth(PPD),clinical attachment level(CAL).gingival recession(GR)and closed horizontal pocket depth (CHPD) and Significant Differences between them.

	PPD	CAL	GR	CHPD
Baseline	5.47±1.39	3.1±1.4	0.21±0.51	3.5±1.3
6 months	3.8±1.52	2.35± 1.34	0.3±0.5	2.2±1.3
P-value	S.	N.S.	N.S.	N.S.

Discussion

The treatment of furcation-involved teeth, however, still represents a challenge for clinicians(45). This class of lesions presents a poor response to non-surgical treatment (46,47).

Thus, the present study aimed to evaluate the clinical response and defect closure in human periodontal Class II molar furcation defects by mucoperiosteal flap surgery with a bovine-derived xenograft. Evaluation the clinical outcome(Plaque index(PlI).,Gingival index(GI.), Periodontal pocket depth(PPD),clinical attachment level(CAL),gingival recession(GR)and closed horizontal pocket depth (CHPD))and re-evaluate these clinical parameters 6 months after treatment without surgical re-entery for a better diagnosis of bone regeneration and defect repair, other methods are needed among which, re-entry is the best,since it investigates furcation directly.

In our society ,it's not easy to do surgical re-entry procedure ,from ethical point of view. The use of re-entry surgery for evaluation may be questioned, but such secondary revision surgery is often necessary in non-research bone graft therapy as the average response in osseous defects is defect fill. Often, this leaves a residual defect that requires further therapy (either additional grafting, debridement, or conservative osseous resection).(48).

Because a bovine-derived xenograft applications have demonstrated good clinical results in infraosseous and furcations(28,32,33,49-52) .The present study showed improvements in the clinical parameters evaluated.The furcations presented a PPD reduction ,this reduction was also similar to that obtained in previous studies. The results of measuring PPD were approximately the same as (28,31,32,51).They reported a reduction of packet depth after 6 months.

The amount of CAL showed a reduction after 6 months following treatment, which was similar to that reported by(31,32.51),they mentioned a significant improvement of CAL following treatment ,in addition (28,31,46)found a significant reduction of CAL following treatment with xenograft accompanied with absorbing Membrane(28,31-33,46,47) .

This study also showed no significant reduction of CHPD and GR compare to baseline(pre-surgical treatment)this results may be due to increase trauma to the soft tissue during surgical operation,the improvement of CHPD indicates the resistance of the treated defect to the probe penetration. these results also agreed with the results of (Ak.Khoshkhoo N. 2004)(51),while (Reddy 2006)(31) found the same results(reduction of CHPD and GR)but theres a significant differences when compared these results to baseline. Bovine derived xenograft can be a favorable graft material replacing bone because of its biocompatibility and osteoconductive properties, its chemical composition, and crystalline structure and porosity morphology similar to human bone.

Conclusion

Bovine derived xenograft can be a clinically useful graft material in treatment of Class II Molar Furcation Involvemen.

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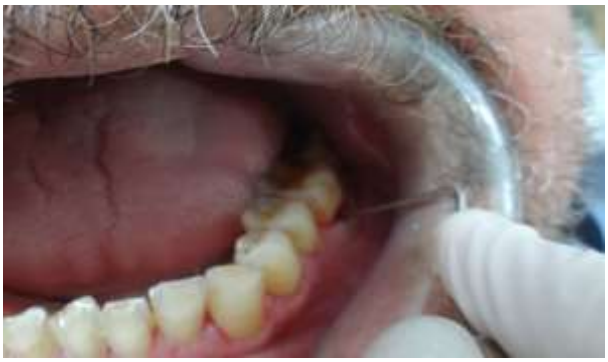

Fig 1.pre-op periodontal pocket depth

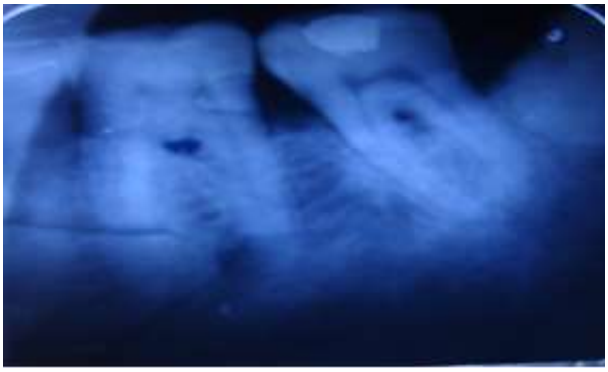

Fig 2.Pre-op radiograph

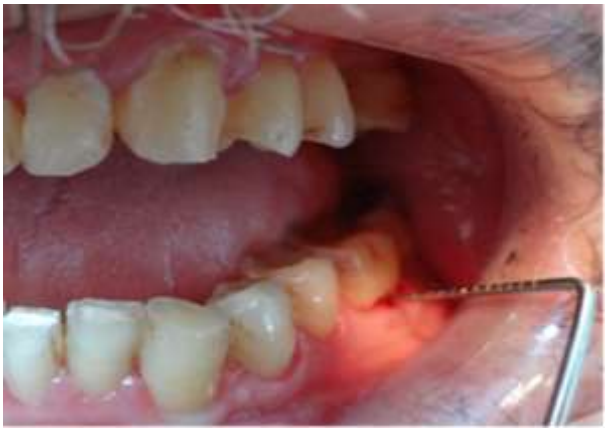

Fig 3.post-op periodontal pocket depth(after 6 months)

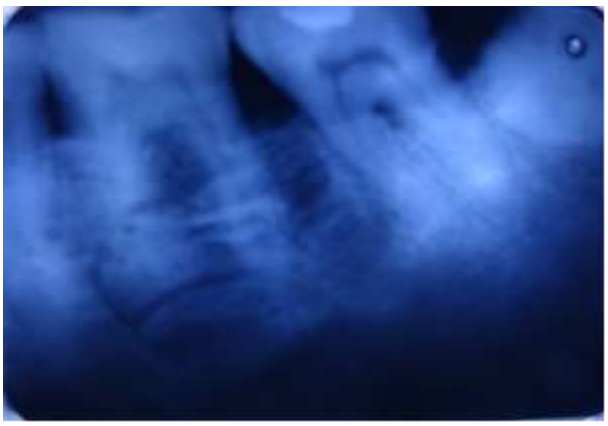

Fig 4.post-op(after 6 months) radiograph.