Surgical Correction of Premaxillary Bone Defect Following Enucleation of Periapical Cystic lesion by using Autogenous Symphysis Bone Graft

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Abstract

In this study an attempt was done for correction of the alveolar bone defect that result from the surgical enucleation of periapical cystic lesion in the premaxillary region, by using autogenous symphysis bone graft.

Forty six patients were collected from different places of Iraq .A twenty nine patients from College of Dentistry / University of Baghdad, Fifteen patients were collected from private Clinic, and two patients were collected from College of Dentistry /University of Sulaymania in the period from (Feb. 2003-Jan.2005). The average age of the patients was ranged from (29-43) years of old, 33 were males and 13 were females. Surgical enucleation of periapical cystic lesion was done for all cases with measurement of mesio-distal dimension, superio-inferior dimension for the surgical wound of the cystic lesion. The labial alveolar bone defects were closure by autogenous symphysis bone from the lower jaw of the same patient by second operation. The region of symphysis bone graft was filled by Frios Algipore.

The results of the present study shows that osseointegration of symphysis bone graft in the region of post-surgical removal of periapical cystic lesion have a moderate healing during the first month 19 (41.3%). A significant osseointegration of symphysis bone graft after 6 months, which revealed an excellent healing process 36 (78.3%). A highly significance of osseointegration of Algipore augmentation occurs in the symphysis region 37 (80.4%).

Key words: Periapical cystic lesion, Algipore, Autogenous bone graft.

Introduction

Defects of the alveolar bones, particularly the anterior region of the maxilla are results mainly from the surgical enucleation of cystic lesion, which may effected on the esthetic appearance of the patients, as well as effect on the implant placement. (1)

The defect varies from patient to the others, according to the size, shape, location, and the etiology of defects. (2)

Various amount of alveolar bone resorption will occur after the surgical enucleation of the cystic lesion, and the resorption in many patients tends to stabilize after a period of time. Whereas in others a continuation of the process eventually results in total loss of alveolar bone and underlying basal bone. The results of this resorption are accelerated by wearing dentures that tend to cause ill-fitting dentures by the time. (3)

General systemic and local factors are responsible for the variation in the amount and pattern of alveolar bone resorption, beside the enucleation technique. The general factors include the presence of nutritional deficiencies, endocrine dysfunction like diabetes mellitus, that effect on the bone metabolism. The local factors affecting the alveolar ridge resorption include; surgical trauma, amount of bone removal, heat generation, and wearing

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of denture with inadequate distribution of occlusal forces. [4]

Many attempts have been made for many years ago and until now to employ bone graft material in surgical procedures. [5]

The first one who recorded a successful transplanted Xenogenic bone was by Van Meekren in 1668. He transplanted bone from a dog to man for restoring cranial defect. [6,7]

The first successful autogenous bone graft was reported by Merremin in 1809, While Macewen reported that transplanted allogenic bone successfully in clinic patients in 1878. [8]

Orell in 1939, mentioned that a graft material from bovine bone by the use of strong alkalies. Boiling and defatting procedures have been employed in the treatment of animal bone prior to it is use in Xenogenic grafting. [8]

An attempt has been made by Reynolds in 1951, to preserve allogenic bone by the use of chemical agents. Thimerosal (Merthiolate) coagulation was employed for sometimes as a method of storing bone taken at autopsy. [9]

Hunter in 1955, conducted experimentally on the host response to bone grafts. He found that the criteria of resorption and remodeling of the graft matrix. [9]

Terry, Albright, and Baker in 1974, have been used autogenous ribs as only bone graft for the maxillary alveolar bone resorption. While Bell in 1977 [10]; used an iliac crest from donor site for maxillary interpositional bone grafting, when there is adequate form of palatal vault, but of insufficient ridge height, particularly in the zygomatic buttress, and posterior tuberosity area and when excessive interarch space exists. [11]

Kent, and Jarcho in 1985 [12]; used hydroxyapatite in the reconstruction of the alveolar ridge, they found that histologically each particles appear to be surrounded in a fibrous tissue capsule, with some infiltration of vascular tissue throughout the graft material. [13,14]

Criteria used in bone graft evaluation:

1- The graft must be biologically acceptable to the host, without adverse immunological response.
2- The graft should actively or passively assist the osteogenic processes of the host.
3- The graft material should withstand mechanical forces operating at the surgical site, and contribute to internal support of the area.
4- The graft ultimately should become completely resorbed, and replaced by host bone. [15]

Types of bone graft:

Bone grafts are classified according to their immunologic origins into: -

1- Autogenous grafts; which composed of bone taken from the same individual. [16]
2- Allogenic grafts (Allografts) are taken from the individual of the same species who is not genetically related to the recipient. [16]
3- Isogenic grafts or implants(Isografts or Syngenc-isoplastic grafts) ;which composed of bone taken from an individual of the same species who is genetically related to the recipient. [17]
4- Xenogeneic (Xenografts); which composed of bone taken from a donor of anotherspecies, like animal bone grafted to man. [17]
5- Synthetic grafts; like titanium mesh, or hydroxyapatite, Which have a biocompatible material. [18]

6- Combinations of grafts. (19)

Autogenous Bone Grafts:

It is called as autografts or selfigrafts; it composed of bone from the same individual .It is the only type of bone graft to supply living, immuno-compatible bone cells essential to osteogenesis process. (20)

Autogenous bone is used most frequently in oral and maxillofacial surgery to restore large defective areas of the bones following the surgical correction of pathological lesions, or trauma. It can be taken in several forms of both cortical and underlying cancellous bone. (21)

Some of surgeons have preferred to used rib grafts for spanning such large defects, fabricating the transplant to the desired shape by notching and cutting the rib in order to bend the graft to the appropriate contour of the maxillofacial defects. While other surgeons have preferred to take solid, one-piece grafts from iliac crest, cutting these to described form and shape. (22)

The advantages of autogenous bone are that it provides osteogenic cells for phase I bone formation and no immunologic response occurs. While the disadvantage is that this procedure necessitates another site of operation for procurement of graft. (23,24,25)

Materials and Methods

Materials:

Forty-six patients were collected from different place of Iraq. A twenty-nine patients were attending College of Dentistry /University of Baghdad, fifteen patients were visited private clinic, and two patients were collected from College of Dentistry /University of Sulaymania, in the period from (February 2003-January 2005). The patients were of different socioeconomic status, the average age ranged between (29-43) years of old, 33 were males, and 13 were females as shown in table (1) Figure (6).

All the patients were healthy, and not complaining of any systemic diseases .The patients were complaining of periapical cystic lesion in the upper anterior region which associated with their infected upper anterior teeth according to the radiographic examination, and histopathological examination. The cystic lesions were of different duration periods, and of different size extension, as shown in table (2).

I. Radiographic Examination: (Figure 1; A, B)

All the patients were send for periapical, occlusal , and panoramic radiographs to records the followings :-

1- Location of cystic lesion.
2- Boundaries of cystic lesion.
3- Size of cystic lesion.
4- Extension to the surrounding structures.
5- The infected teeth involvement.

II. Histopathological Examination: (Figure 2: A, B)

All the cystic lesions were enucleated surgically, and send as excision biopsy for definite diagnosis.

III. Instruments: (Figure 3)

1- Surgical instruments for cystic enucleation.
2- Bone graft instruments.
3- Vernier caliper, for measuring superio-inferior, and mesio-distal dimension of alveolar bone defect.
4- Periodontal measuring probe for measuring the depth of alveolar bone defect.

5- Stainless steel dish for mixing of Bone graft substitute.
6. Normal saline.

IV. Bone Grafts:

1- Symphysis bone graft (Autogenous). (Figure 10,11)
2- Bone substitute (Frios Algipore) of grain sizes 1.0-2.0 (Friadent). (Figure 4)

Methods:

1- **Enucleation of cystic lesion :**

Forty one cystic lesions were enucleated by three sided flap that approach labially according to the size of the lesions, and only five cases were treated by through and through approach (labio-palatally), as shown in Figure (5,6,7,8). All the operation was done under local anesthesia. Bone were removal from labial side of the upper anterior region to enucleate the cystic lesion in one piece as much as possible with their lining capsule to send for histopathological study as shown in Figure (2).

Before, the cystic lesion send for histopathological study we record their diameter size by the help of Vernier caliper or ruler for each patient as shown in Figure (2). The infected teeth were treated by surgical endodontics, then bone smoothening to about (0.5-1mm) in all round to avoid recurrence of the lesion.

After complete enucleation the following measurements Should be recorded: - (Table 3)

1- Superio-Inferior dimension of bone cavity.
2- Mesio-Distal dimension of bone cavity.
3- Depth of bone cavity.

Then the bone cavity was packed by iodoform gauze until created a bone graft from the symphysis region of the lower jaw.

2- **Bone Graft Preparation:**

An enveloped flap was done in the lower anterior region from the canine of the left side to the canine of the right side Figure (9). A full-thickness flap reflection was done under local anesthesia to expose enough amount of labial alveolar bone. According to the records for the bone cavity measurements that will done previously in the upper jaw (Table 3), we used a round bur to pointed the boundary of bone graft that needed to closure the bone defect which created during the enucleated of cystic lesion, as shown in Figure (10).

A connection between these perforating points in the bone were done by using a fissure bur with help of cooling by normal saline with adequate depth to involved cortical, and cancellous bone, as shown in Figure (10).

By the help of osteotome, and hammer we removed a bone graft from their normal position, and then inserted immediately in a normal saline for a few seconds. We removed the iodoform pack in the upper bone cavity, and then inserted the bone graft to cover the labial bone defect with reshaping to accommodate the shape of bone cavity, with trying to perforate the bone graft for enhancement of reattachment, and maintain blood supply from labial tissue, and underneath areas, as shown in Figure (11). The bone cavity created in the symphysis region was filled with Algipore as augmentation technique, then closure the flap, and suturing, as shown in Figure (14, 16).

A heavy dose antibiotics were instructed for the patients to used,

includes; Ampiclox (500mg) I.M injection two times /day for three days according to the patients sensitivities, Non-steroid anti-inflammatory drugs includes Voltaren (25mg) orally three times /day for three days, analgesics if necessary and Chlohexidine as mouth wash for at least one week, with recalling of the patients for their follow up during 1month, 3months, and 6 months.

Results

1- Radiographic findings of symphysis bone graft Healing:

The study shows that the diameter of periapical cystic lesion in the upper anterior region range from 14-40 mm in correlation to the duration of cystic lesion that range between 2-5 years of their origin. The size of the cystic lesion shows increased in the diameter in all direction in correlation with their duration, as shown in Table (2).

Table (3); reported that the size of periapical cystic lesion extended toward the depth of the upper anterior jaw more than that of mesio-distal dimension, and superio-inferior dimension.

During First Month:

The radiographic findings of osseointegration of symphysis bone graft in the region of post-surgical removal of periapical cystic lesion shows that; 27 (59%) of all cases have moderate healing, in comparison to 19(41.3%) cases which shows delayed healing, as shown in Table (4).

During Third Month:

During this period the state of osseointegration of bone graft healing shows that; 27 (58.7%) from all cases were have significant excellent healing in comparison to 6(13%) cases that reveled delayed healing, and only 2(4.3%) cases were considered as failure cases, as shown in table (4).

During Sixth Month:

During this period the osseointegration of bone graft shows that 36(78%) were significantly excellent healing in comparison to only 1(2.2%) case that was considered failure of osseointegration, as shows in Table (4).

The study reported that a significant correlation of osseointegration of symphysis bone graft which have excellent healing 36(78.3%), in relation to the duration of periapical cystic lesion which range between (2-5 years) of their origin, as shown in Table (5) Figure (15).

Also Table (6); shows that a significant osseointegration of symphysis bone graft in relation to the size of periapical cystic lesion 36(78.3%).

2 - Radiographic findings of Algipore augmentation:

During First Month:

The study shows that Algipore augmentation in the symphysis region of the lower jaw shows that; 37(80.4%) cases have moderate healing in comparison to 9(19.6%) cases that shows delayed healing, as registered in Table (7).

During Third Month:

During this period the current study reported that a significant excellent healing of osseointegration were 38(82.6), in comparison to 2(4.3) cases that shows, delayed healing, and 6(13%) cases that reveled moderate healing process as mentioned in Table (7).

During Sixth Month:

Table (7) indicated that; osseointegration of Algipore augmentation reported significant excellent healing 45(97.9%), in comparison to only one case that was show moderate healing process.

Also the current study reported that there were a significant differences in the osseointegration between symphysis bone graft in the upper anterior region 36(78.3%), in comparison to 45(97.9%) of Algipore augmentation of the lower jaw, as mentioned in Table (8).

Table (1) The number of patients, gender, Average, Age and the duration of periapical cystic lesion

Patient No.	Place of sample collection	Sex		Average	Duration cystic lesion
		Male	Female	Age/years	
29	**College of Dentistry University of Baghdad**	18 (62%)	11 38%	29-43y	2.5-5y
15	**Private Clinic**	13 (86.7%)	2 13.3%	30-36y	2-4y
2	**College of Dentistry University of Sulaymania**	2 (100%)	- 0%	41-43y	2-3y
46	**Iraq (Total)**	33 (71.7%)	13 28.3%	29-43y	2-5y

*y: years ** Chi-square=3.774 P<0.05 significant

Table (2) The size measurement of cystic lesion in relation to the duration of the lesion

Patient No.	Place of sample collection	Duration cystic lesion	Diameter of P.A cyst
29	**College of Dentistry University of Baghdad**	2.5-5y	20-40mm
15	**Private Clinic**	2-4y	24-27mm
2	**College of Dentistry University of Sulaymania**	2-3y	14-15mm
46	**Iraq (Total)**	2-5y	14-40mm

*y: years mm: millimeter

Table (3) The size measurement of alveolar bone defect in the upper anterior region in relation to the duration of the periapical cystic lesion

Patient No.	Place of sample collection	Duration cystic lesion	Size of alveolar bone defect		
			Superio Infeinor (mm)	Mesio-distal (mm)	Depth (mm)
29	**College of Dentistry University of Baghdad**	2.5-5y	17-23mm	19-32mm	24-30mm
15	**Private Clinic**	2-4y	16-21mm	18-28mm	22-26mm
2	**College of Dentistry University of Sulaymania**	2-3y	15-17mm	19-22mm	17-20mm
46	**Iraq (Total)**	2-5y	15-23mm	15-32mm	17-30mm

*y: years mm: millimete

Table (4) Radiographic findings of symphesis bone graft healing in the region of post surgical removal of periapical cystic lesion

No	Place of Sample Collection	State of osseointegration of bone graft											
		1 Month				3 Months				6 Months			
		D	M	EX	F	D	M	EX	F	D	M	EX	F
29	College of Dentistry University of Baghdad	11 38%	18 62%	- 0%	- 0%	4 13.8%	7 24.1%	17 58.6%	1 3.4%	- 0%	4 13.8%	23 79.3%	2 6.9%
15	Private Clinic	6 40%	9 60%	- 0%	- 0%	2 13.3%	2 13.3%	10 66.7%	1 6.7%	1 6.7%	2 13.3%	11 73.3%	1 6.7%
2	College of Dentistry University of Sulaymania	2 100 %	- 0%	- 0%	- 0%	- 0%	2 100%	- 0%	- 0%	- 0%	- 0%	2 100%	- 0%
46	Iraq (Total)	19 41.3 %	27 59%	- 0%	- 0%	6 13%	11 24%	27 58.7%	2 4.3%	1 2.2%	6 13%	36 78.3%	3 6.5%

D: delay EX: Excellent * Chi-square=4.255 P<0.05 significant M: Moderate F: Failure

Table (5) The relation of osseointrgration of symphesis bone graft in relation to the duration of periapical cystic lesion according to the radiographical findings

Patient No.	Place of sample collection	Duration cystic lesion	State of osseointegration after 6 month			
			Delay	Moderate	Excellent	Failure
29	College of Dentistry University of Baghdad	2.5-5y	- 0%	4 13.8%	23 79.3%	2 6.9%
15	Private clinic	2-4y	1 6.7%	2 13.3%	11 73.3%	1 6.7%
2	College of Dentistry University of Sulaymania	2-3y	- 0%	- 0%	2 100%	- 0%
46	Iraq (Total)	2-5y	1 2.2%	6 13%	36 78.3%	3 6.5%

*Chi-square=2.998 P<0.05 significant

Table (6) The relation of osseointegration of symphysis bone graft in relation to the size of periapical cystic lesion according to the radiographical findings

Patient No.	Place of sample collection	Size of lesion	State of osseointegration after 6 months			
			Delay	Moderate	Excellent	Failure
29	College of Dentistry University of Baghdad	20-40mm	- 0%	4 13.8%	23 79.3%	2 6.9%
15	Private Clinic	24-27mm	1 6.7%	2 13.3%	11 73.3%	1 6.7%
2	College of Dentistry University of Sulaymania	14-15mm	- 0%	- 0%	2 100%	- 0%
46	Iraq (Total)	14-40mm	1 2.2%	6 13%	36 78.3%	3 6.5%

*Chi-square=2.998 P<0.05 significant

Table (7) Radiographic findings of augmentation of Algipore in the region of symphysis bone graft taken from the lower jaw

No	Place of sample collection	State of osseointegration of bone graft											
		1 Month				3 Months				6 Months			
		D	M	EX	F	D	M	EX	F	D	M	EX	F
29	College of Dentistry University of Baghdad	5 17.2 %	24 82.8 %	- 0 %	- 0 %	2 6.9 %	4 13.8 %	23 79.3 %	- 0 %	- 0 %	1 3.4 %	28 96.6 %	- 0 %
15	Private Clinic	3 20%	12 80%	- 0 %	- 0 %	- 0%	2 13.3 %	13 86.7 %	- 0 %	- 0 %	- 0%	15 100%	- 0 %
2	College of Dentistry University of Sulaymania	1 50%	1 50%	- 0 %	- 0 %	- 0%	- 0%	2 100%	- 0 %	- 0 %	- 0%	2 100%	- 0 %
46	Iraq (Total)	9 19.6 %	37 80.4 %	- 0 %	- 0 %	2 4.3 %	6 13%	38 82.6 %	- 0 %	- 0 %	1 2.2 %	45 97.8 %	- 0 %

D: delay EX: Excellent *Chi-square=4.112 P<0.05 significant
M: Moderate F: Failure

Table (8) Radiographic findings of state of osseointegration of symphysis bone graft in comparison to the region of Algipore augmentation of the lower jaw

No.	Place of sample collection	Osseointegration of symphesis bone graft of upper jaw after 6 months				Osseointegration of Algipore augmentation in the lower jaw after 6 months			
		D	M	EX	F	D	M	EX	F
29	College of Dentistry University of Baghdad	- 0%	4 13.8%	23 79.3%	2 6.9%	- 0%	1 3.4%	28 96.6%	- 0%
15	Private Clinic	1 6.7%	2 13.3%	11 73.3%	1 6.7%	- 0%	- 0%	15 100%	- 0%
2	College of Dentistry University of Sulaymania	- 0%	- 0%	2 100%	- 0%	- 0%	- 0%	2 100%	- 0%
46	Iraq (Total)	1 2.2%	6 13%	36 78.3%	3 6.5%	- 0%	1 2.2%	45 97.9%	- 0%

D: delay EX: Excellent ***Chi-square=4.225 P<0.05 significant**
M: Moderate F: Failure

(A) Periapical cyst involve Upper left central &lateral incisor

(B) Periapical cyst around upper right central , lateral & canine

Figure (1); Periapical cystic lesion

A

B

Figure (2) Specimen of cystic lesion after enucleation

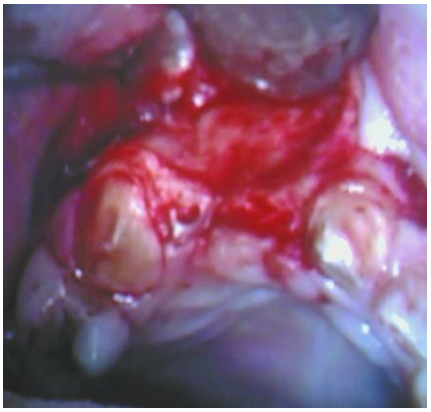
Figure (3); Surgical instruments

Figure (4); Bone substitute Frios Algipore (Friadent)

Figure (5) After cystic enucleation

Figure(6) Patient with periapical Cystic lesion in premaxilla

Figure (7) Three sided flap for cystic lesion approach



Figure(8) Flap reflection & exposed cystic lining

Figure (9) Horizontal incision in Symphysis region

Figure(10) Bone exposed and measure amount autogenous bone graft in symphysis region

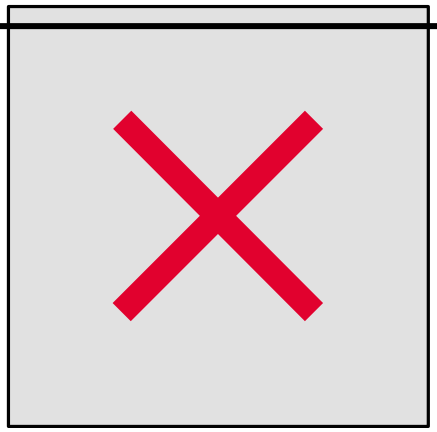
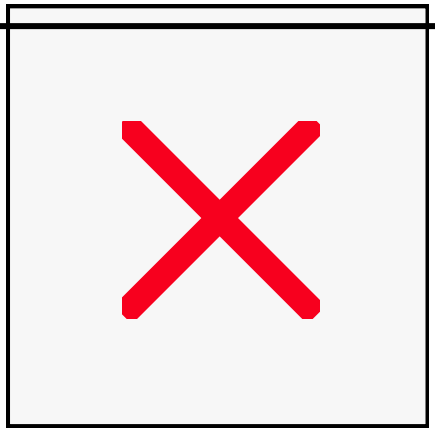


Figure (11); Remove of Symphysis bone graft



Figure(12); Autogenous bone graft cover labial defect of cystic region

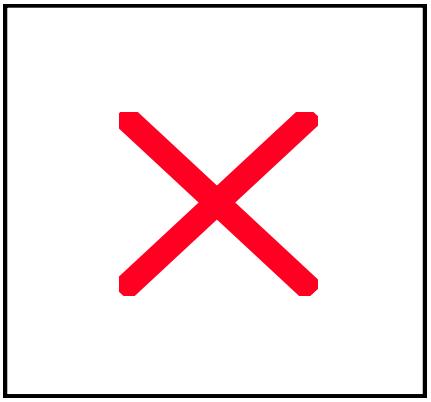


Figure (13); Suturing the region of Surgical removal of cystic lesion with autogenous bone graft

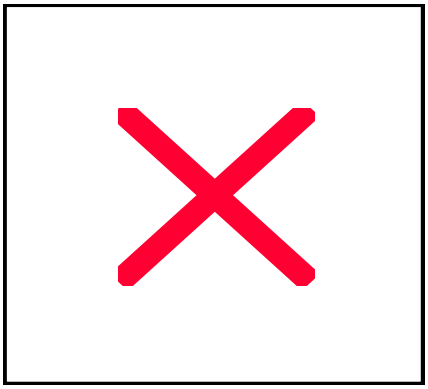


Figure (14); Algipore application in symphysis region

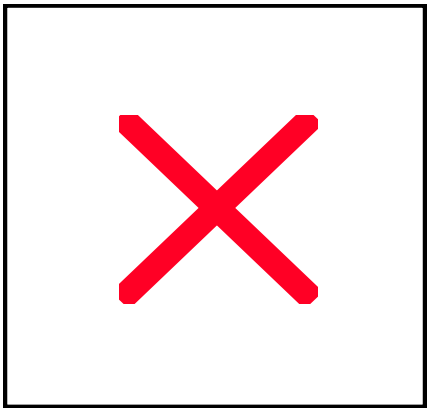


Figure (15); Complete healing of Bone graft region after 6 months

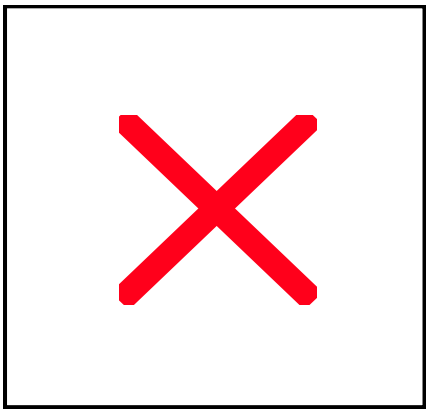


Figure (16); Suturing the symphysis region by Frios Algipore

Discussion

It is obvious that the optimal bone graft material should be autogenous in origin. While there is general agreement among surgeons that autogenous bone is a superior graft material, there has been considerable disagreement as to the optimal anatomical form that this type of graft should take.

Autogenous marrow and cancellous bone has also been utilized in large cystic cavities after the enucleation of keratinizing cyst, or after removal of benign, but locally aggressive tumors, such as ameloblastoma. [26]

It is found that in extensive cystic areas the autogenous graft produced a more rapid regeneration of the defect, and a more acceptable post-operative result than the blanked allograft, which still was continue remain an acceptable graft material in the treatment of moderate size cystic bone defects.

The study shows that the size of bone defect in the upper anterior region due to the extension of periapical cystic lesion in all direction particularly in the depth level more significantly than mesio-distal, and superio-inferior dimension, this may due to the presence of the adjacent teeth roots, and the presence of huge amount of marrow spaces toward the internal direction.

The explanation of cystic enlargement has been due to: -

1- An increase in the volume of the contents.
2- An increase in the surface area of the sac.
3- Displacement of the surrounding soft tissues or resorption of the surrounding bone where the cyst develops within bone, and these were agreement with Harris (1978) [27], and Harvey et al., (1984). [28]

The current study reported that there was a significant correlation between the osseointegration of symphysis bone graft at the upper anterior region in the site of post-cystic enucleation, and time of healing process, that is to say the osteogenesis of new bone formation with the transplanted bone graft will be excellent 36(78.3%) particularly within 6th months post-operatively. This long period of osseointegration were depend on the amount of bone defect and the size of periapical cystic lesion, and their duration which were in agreement with Max et al., (1986). [29]

There are two phases' theories of osteogenesis, that occur during transplanting bone graft from one area to another in the same individual.

1- First phase:

That lead to bone regeneration arises initially from transplanted cells in the graft that proliferate, and from new osteoid. The amount of bone regeneration during this phase depends on the amount of transplanted bone cells that survive the grafting procedure. When the graft is first removed from the body, the blood supply has been served. Thus the cells in the bone graft depend on diffusion of nutrients from the surrounding graft bed for survival. A considerable amount of cell death occurs during the grafting procedure, and this explain that delayed healing of bone graft in this study occurs within (1-3months) post-operatively, while excellent osteogenesis occurs within (3-6months).

Also the failure cases that result from this study may due to huge amount of bone cells death, during the grafting procedure, heat generation, unstability of bone graft, and bone

necrosis, and these findings were in agreement with Gray et al., (1979). [30]

2- Second phase:

This phase is beginning in the second week. Intense angiogenesis and fibroblastic proliferation from the graft bed begin after grafting, and osteogenesis from host connective tissue soon begins. The fibroblasts and other mesenchymal cell differentiate into osteoblasts and begin to lay down new bone. So during this phase a possible resorption of bone graft suspected to be the causes of failure osteointegration of some cases during this study or even a delay healing process 6(13%), which were in agreement with Urist, (1970) [31]; Urist, (1972) [32]; Gospodarowicz, (1990) [33]; and Wodarski, (1990). [34]

The osseointegration of Algipore augmentation of the symphysis region of the mandible shows significance excellent healing process 45(97.9%) without any failure cases, the explanation of these results were as followings: -

1- Is non-resorbable.
2- Non post-operative loss of the graft augmenting the mandible.
3- Adequate vascular bed for future soft tissue graft.
4- No need for donor – site surgery.

Also the osseointegration of Algipore augmentation were effected by the size of bone graft removal from the symphysis region of the mandible, and shows significant result than symphysis bone graft that used in the maxillary region, and these findings were in agreement with Goshima et al., (1991) [35]; and Grundel et al., (1991). [36]

The immunological complications usually do not occur when a bone graft transplanted from one site to another in the same individual. However, when a bone graft is transplanted from one individual to another or from one species to another, the immune system may act against the success of the grafting. The type of response of the immune system is primary a cell-immediate response by T-lymphocytes. [37]

For the above reasons no rejection of the symphysis bone graft were occurs, and this is because no donor patients were needed or even used to enhancement of the immune system against the bone graft, also no necessary need to used an immuno-suppression medications during the grafting procedure in this study, and these findings were in agreement with Larry Peterson, (1998).

Conclusions

1- The study shows that there is correlation between the size of the periapical cystic lesions and their duration. The average diameters were range between (14-40 mm) for duration periods of (2-5) years.
2- The extension of the periapical cystic lesion is highly significant in the depth distance than mesio-distal and superio-inferior dimension.
3- The osseointegration of symphysis bone graft in the region of post-surgical removal of periapical cystic lesion shows a moderate healing during the first month 19 (41.3%).
4- A significant osseointegration of symphesis bone graft after 6 months reveled an excellent healing 36 (78.3%).
5- There is significant correlation of symphysis bone graft, and their size, and duration of periapical cystic lesion.

6- Highly significant of osseointegration for Algipore augmentation occurs in the region of symphysis region of lower jaw 37 (80.4%).
7. Highly significant of osseointegration will occurs by the use of Algipore augmentation after 6months following the operation 45 (97.9%).
8. There are significant differences of osseointegration that reported between the symphysis bone graft in the premaxillary region 37 (80.4%), and Algipore augmentation of the lower jaw 45 (97.9).

References

1- Czitrom, A.A., and Gross A. E. Allografts in orthopedic Practice Baltimore: Williams & Wilkins 1992.
2- David Wray, David Stenhouse, David Lee and Andrew, J.E.Clark.Text Book of General and Oral Surg 2003; P: 229-238.
3- Briene, U. and Branemark, P.I. The reconstruction of alveolar jaw bone, second. J. Reconstr. Surg. 1980; 14: 23.
4- Gustav O. Kruger. Textbook of Oral and Maxillo-Facial Surgery. 1984; P: 296-330.
5- Burwell, R.G. History of bone grafting and bone substitutes with special reference to osteogenic induction. Bone grafts and Derivatives, Ch.2.Oxford: Butterwoth Heinemann. 1994.
6- Auchincloss, H. Jr. Xenogenic transplantation .A Review. Transplantation.1988; 46:1.
7- Carnesale, P.G. The bone banck, Bull. Hosp Spec.Surg 1962: 5; 76.
8- Merrem. Animadversions quaedam chiurgicae experiments. Cited by Peer, L. A. Transplantation's of, Baltimore, the Williams and Wilkins co 1955; P: 152.
9- Reynolds, F.C., Oliver, D.R., Ramsey, R.L Clinical evaluation of the Merthiolate bone bank & homogenous bone graft . J. Bone Joint Surg 1951; 33A: 873.
10- Bell Wh et al., Surgical correction of the atrophic alveolar ridge; a preliminary report on a new concept of treatment. Oral Surg 1977: 43: 485-498.
11- Ariyan, S. The viability of rib grafts transported with periosteal blood supply. Plastic and Reconstructive Surgery 1977; 65: 140.
12- Kent JN, Jarcho M. Reconstruction of the alveolar ridge with hydroxyapatite. In Fonseca R, Davis W, editor: Reconstruction preprosthetic and maxillofacial Surgery, Philadelphia, WB Saunders. 1985.
13- Bucholz, R .W., Cartton, A., and Holmes, R .E. Hydroxyapatite and tricalcium phosphate bone grafts substitutes. Orthopedic Clinics of North America 1987; 18: 323.
14- Heise, V., Osborn, J. F., and Duwe, F. Hydroxyapatite ceramic as a bone Substitute. Inter.Orthopaedics (SICOT) 1990; 14: 329.
15- Whitt Kamph AR. Augmentation of the maxillary alveolar ridge with hydroxyapatite in fibrin glue. J. Oral and Maxillofacial Surg 1988; 46: 1019.
16- Habal, M. B., and Reddi, A. H. Bone grafts and bone substitutes. Philadelphia; W.B.Saunders. 1992.
17- Bernard S. L. and Picha, G.J. The use of coralline hydroxyapatite in a Biocompsite Frees flap. Plastic and Reconstructive Surgery 1991; 87: 96.
18- Herr, G., Wahl, D., Kusswetter, W., and Reis, H.J. Hydroxyapat ceramics as BMP carriers .Int new trend in bone grafting , An International Symposium, Tampere, Finland 1991.
19- Damien C.J., and Parsons, J.R. Bone graft and bone graft substitutes: a review of current technology and applications. Journal of Applied Biomaterials, 1991; 2:187.
20- Babe, I., Gazit, D. Muhlrad, A. and Shteyer, A. Regenerating bone marrow produces a potent growth-promoting activity to osteogenic cells. Endocrinology 1988; 123: 345.
21- Connolly , J.F.,Guse,R.,Tiedeman,J.and Dehne,R. Autogenous marrow injection as substitute for operative Grafting of tibial non-unions. Clinical Orthopedics 191; 266: 259.
22- Larry J. Peterson, Edward Ellis, James R.vbMR.Tucker. Contemporary Oral and Maxill- Facial Surgery 1998; P: 646-654, 248-303.
23- Bassett, C. A.L. Clinical Implications of cell function in bone grafting. Clinical Orthopedics and Related Research 1992; 87: 49.

24- Beresford, J.N. Osteogenic stems cells and the stromal system of bone and marrow. Clinical Orthopedics 1989; 240: 270.
25- Horowitz, M.C., and Fried Laender, G.E. Induction of specific T-cell Responsiveness to allogenic bone. J. of Bone and Joint Surgery 1991; 73A: 1157
26- 26.Clark, I., Zawadsky, J.P., Berg, R.A., and Lin, W. Activities of a cancellous bone- Cell-stimulating substance. Clinical Orthopedics 1991; 265: 228.
27- Harris M. Odontogenic cyst growth and prostaglandin – induced bone resorption. Ann .R. Coll. Surg 1978; 60: 85-91.
28- Harvey W., Cuat Chen F., Gordon D et al. Evidence of fibroblasts as the major source of prostacy--clin and prostaglandin synthesis in dental Cysts. Arch Oral Biol 1984; 29: 223-229.
29- Marx R E, Saunders TR. Reconstruction and rehabilitation of cancer patients. In Fonseca RJ, Davis W H, editors; Reconstructionpreprosthetic Oral and Maxillofacial Surgery, Philadelphia, WB Saunders 1986.
30- Gray J C., Elves M. Early osteogenesis in compact bone, Calcif. Tissue Int 1979; 29: 225.
31- Urist MR The substratum for bone morphogen-esis Dav. Bid.1970; 4 (suppl): 125.
32- Urist MR. Osteoinuction in undermineralized bone implants modified by chemical Inhibitors of endog--enous matrix enzymes. Clin Orthop. 1972; 78: 132.
33- Gospodarowicz, D. Fibroblast growth factor; chemical structure and biologic function . Clinical Orthopedics 1990; 257: 231.
34- Wodarski, K. H. Properties and origin of osteo-blasts. Clinical Orthopedics 1990; 252-276.
35- Goshima, J., Goldberg, V .M., and Caplan, A. I. The origin of bone formed in composite grafts of porous calcium phosphate ceramic loaded with marrow cells. Clinical Orthopedics 1991; 269: 274.
36- Grundel, R. E. Chapman, M. W. Yee. T. and Moore, D.C. Autogenic bone marrow and porous biphasic calcium phosphate ceramic for segmental bone defects in dog ulna. Clinical Orthopedics 1991; 266: 244.
37- Stevenson, S., and Horowitz, M. The response to bone allografts. Current concepts review . J. of bone and Surgery 1992; 74A: 939.