IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 6 Ver. 4 (June. 2018), PP 30-38
www.iosrjournals.org

Comparison Of Two Different Protocols For Immediate placement of Implants in Posterior Maxilla with Deficient Bone

Dr.Segin Chandran K R MDS (OMFS)[1],Dr.Subramonian S MDS (OMFS)[2].
Dr. Lakshmi A[3]

[1] *Associate Professor, Department of Dentistry, SMCSI Medical College, Karakonam, Kerala, India.*
[2] *Associate Professor, Department of Dentistry, SMCSI Medical College, Karakonam, Kerala, India.*
**Corresponding author: Dr.Subramonian S MDS (OMFS)*
[3] *Dr Lakshmi A. Private Practitioner.ThiruvananthapuramKerala,India*

***Abstract* :** *Dental implant placement in posterior maxilla with deficient bone height is a challenge as it demands grafting the sub-sinus bone to accommodate dental implant not less than 10 mm.The trauma and healing time associated with any grafting procedure and the chance of getting lesser primary stability in poor quality bone of maxilla may demand delayed loading of implants. Here we do a comparison between a minimally invasive sinus lift with grafting protocols to place implants of 10 mm length and placement of short and wide implants of 7mm height without any augmentation procedures .20 sub sinus edentulous areas with bone height more than 5mm but less than 10mm in single edentulous span guarded by natural teeth were selected for study .10 sites were grafted to accommodate 10 mm (Group A) or longer implants and the other10 sites with short implants (Group B). Results show higher primary stability, less surgical and osseointegrationtime, less trauma and pain for Group B as compared to group A. .Higher primary stability achieved in Group B allowed the implants to be early loaded with less procedural cost as there is no biomaterials involved.*

Keywords -*Sinus Lift, Short Implants, Dental Implants, Posterior maxilla, wide Implants,*

Date of Submission: 26-05-2018 Date Of Acceptance: 09-06-2018

I. Introduction

Maxillary first molars erupt early in oral cavity and are more susceptible to dental caries and are the most frequently extracted teeth in the upper jaw. The presence of maxillary sinus and its pneumatization or alveolar bone loss due to periodontitis makes the posterior maxilla compromised. Extensive surgical procedures like direct or indirect sinus lift are recommended to address such problems[1]. Typically, many patients prefer a non-surgical or a removable option, but it is not stable and functional as implants. The cost involved also influences the selection of treatment option to a greater extent. The need of bone graft, barrier membranes, extra oral donor sites etc add on to the cost. In most cases, the total treatment time will be increased threefold due to the time required for surgical wound healing, bone maturation as well as osseointegration and this, in turn, will result in delayed loading of implants. With grafting procedures there are chances of complications[2] such as wound dehiscence, sinus membrane perforation and extrusion of grafting material into the sinus leading to sinus infection.

Earlier modalities in vogue were a minimum 10 mm long implant to satisfy crown-root ratio. To gain adequate surface area for bone implant contact (BIC), osseointegration augmentation procedures were needed to increase available bone height greater than10mm[3]. Most of the time the grafted bone takes long maturation time, but never offers adequate quality required to offer adequate primary stability during implant insertion. A residual bone height (RBH) of 5 mm is usually considered as a must for implant placement simultaneously with grafting procedures.

In sub sinus areas of more than 10 mm residual bone height (SA-1) lateral condensation of bony trabeculae to change the quality of bone from loosely packed D3 type to denser D2[4] is more than enough, which can be achieved with expanders and condensers. When RBH is more than 5 mm, but less than 10 (SA-2), it is necessary to go for sub sinus grafting, crestal approach to gain a sinus lift more than 10 mm[5]. When sub sinus bone is less than 5 mm (SA-3), a staged lateral window approach for grafting along with delayed implant placement is suggested.

Short implants were in use in the past, but were not accepted widely because of the fear of being less than adequate. It is not the length alone that plays a major role in osseointegration, but the total surface area and bone implant contact (BIC) as well. The implant design from a narrow and longer one to a shorter and stout one does not make much difference. For example, 2 mm increase in the length of a cylinder will give 10 % increase

in surface area, whereas a marginal 0.25 mm increase in diameter will give the same surface area. So it is a good option to decrease the length and increase the diameter of an implant to be placed in sub sinus area without sinus elevation and grafting.

The use of short implant in posterior maxilla[6]is accepted as an alternative treatment option to longer implants in the 'European Association for Osseointergration's 4th consensusconference held in Italy in 2015. Now the question is 'How short is Short'? A consensus is yet to be arrived at, but anything less than 10 or 8 mm is considered to be a short implant. In this study 7 mm implants of MegagenAnyridge (South Korea)- conical type with knife edge self-cutting threads designed to improve primary stability in difficult clinical scenarios were used and DentiumSuperline fixtures with regular threads and 10 mm length were placed after sinus lift and bone grafting.

II. Aim

To compare the merits and demerits of two protocols for implant placement in maxillary posterior single tooth missing region with SA 2 bone[4] volume and to evaluate the scope of short implants in such conditionsGroup A: molar missing tooth replaced with Dentiumsuperline fixtures after crestal sinus lift and bone graft placed. Group B: molar missing tooth replaced with "special 7' range of 7mm Implants of Megagen Any ridge system with lateral condensation only.

III. Materials and Methods

3.1 Inclusion criteria for Group A and B

Each group of 10 patients with ASA1 (American Society of Anaesthesiologists) medical status, without any systemic conditions, smoking habit[7] and preexisting sinus pathology were selected .The study was restricted to the maxillary molar extraction sites with a minimum healing period of 6 months with sub sinus bone height ranging from 5mm to 8 mm. All the selected cases had a mesio distal edentulous span of 11mm -12 mm and an alveolar width of 6 mm or more as confirmed with CBCT. All CBCT images were taken with SironaOrthophosSL machine and Galelios Software

3.2 Methodology

Group A

Selected edentulous area guarded by natural teeth on either side were infiltrated with lignocaine 2% with adrenaline 1:80000 dilution. After soft tissue punching, gaining access to sub sinus bone a depth controlled 2mm drill was used to create an initial osteotomy followed by gradual expansion and sinus lift was achieved by bone added osteotome technique. Regular root form implants with internal hex and 11 degree conical tapered connection (DentiumSuperline) with 10 mm length were placed in the osteotomy with an insertion torque of 40 N in implant hand piece and wrenched[8].Implant was positioned in a mid-pointbuccopalatally maintaining adequate space from adjacent teeth. After placement of implants ISQ values were assessed using Ostell (RFA device) for primary stability. Trans mucosal abutments of 6 mm diameter were placed for better emergence profile and waited for an average of 3 months healing time, after which trans mucosal healing abutments were removed and ISQ values rechecked. Implant level open tray impression copings were used for impressions. All cases were evaluated for primary stability, complications, duration of treatment, bio materials used, and patientsacceptance to procedure.

Fig 1

Fig 2

Fig 3

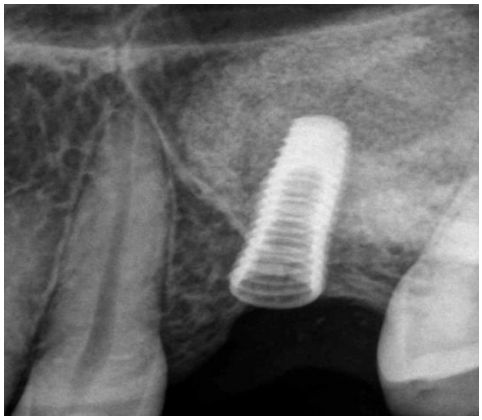


Fig 4

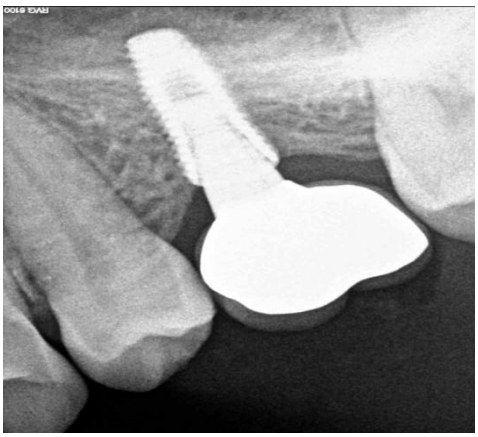


Fig 5

Group B

Selected edentulous area guarded by natural teeth on either side were infiltrated with lignocaine 2% with adrenaline 1:80000 dilution. After soft tissue punching, gaining access to sub sinus bone a depth controlled 2mm drill was used to create an initial osteotomy followed by gradual expansion done up to the core diameter of implant planned (3.8 mm) MegagenAnyridge .Implant with knife edge threads up to 5 or 5.5 mm diameter were placed with an insertion torque of 40 N in implant hand piece and wrenched to higher torque. It was positioned in a mid-pointbuccopalatally maintaining adequate space from adjacent teeth. After placement ISQ values[9] were noted using Ostell (RFA device) for primary stability. Trans mucosal abutments of 6 mm diameter were placed for better emergence profile and waited for 6 weeks healing time, after which trans mucosal healing abutments were removed and ISQ values rechecked. Implant level open tray impression copings were used for impressions. All cases were evaluated for primary stability, complications, duration of treatment, bio materials used, and patientsacceptance to procedure.

Fig 6

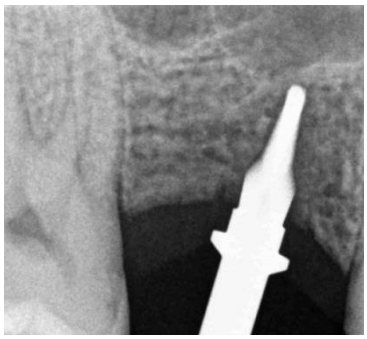


Fig 7

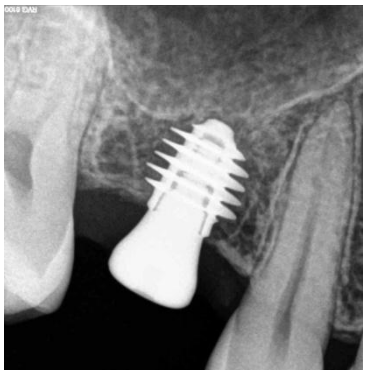


Fig 8

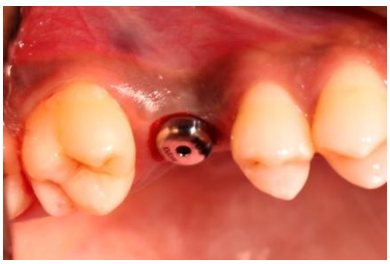


Fig 9

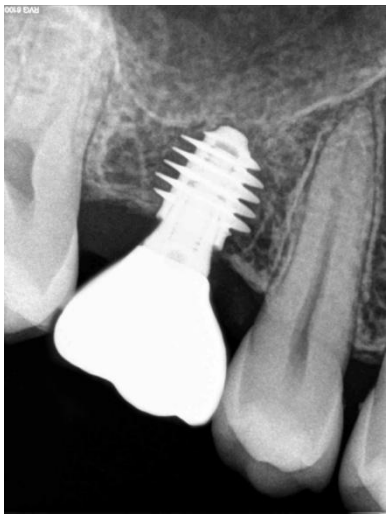


Fig 10

Fig 11

Patient's pain and difficulty assessment using PDI (Pain and Difficulty Index) was done after surgical and prosthetic stage of implant placement. Each parameters assessed with values Yes or No. Yes gets a value 1 and No gets a value of 0. A cumulative sum is noted in every case. The greater figure denotes multiple difficulties.

a) Pain and discomfort experienced
b) Unexpected time span for completing the entire procedure
c) wound infection or Sinus Infection
d) need for Antibiotics and Analgesics

GROUP A
CHART-1

Case No	Tooth No	Primary stability of Implant ISQ value	Secondary stability of implant ISQ value	Total time taken for surgical Procedure in minutes	Total time taken for entire treatment Procedure in days	Pain and Difficulty Index
1	**26**	**66**	**68**	**90**	**90**	**3**
2	**16**	**62**	**66**	**70**	**110**	**4**
3	**16**	**64**	**70**	**45**	**85**	**2**
4	**27**	**60**	**68**	**90**	**88**	**3**
5	**26**	**65**	**69**	**120**	**120**	**4**

Case No	Tooth No	Primary stability of Implant ISQ value	Secondary stability of implant ISQ value	Total time taken for surgical Procedure in minutes	Total time taken for entire treatment Procedure in days	Pain and Difficulty Index
6	**26**	**52**	**65**	**90**	**160**	**4**
7	**16**	**66**	**70**	**65**	**90**	**2**
8	**17**	**60**	**66**	**90**	**110**	**3**
9	**16**	**54**	**66**	**90**	**80**	**4**
10	**26**	**62**	**68**	**110**	**78**	**3**

GROUP B
CHART-2

Case No	Tooth No	Primary stability of Implant ISQ value	Secondary stability of implant ISQ value	Total time taken for surgical Procedure in minutes	Total time taken for entire treatment Procedure in days	Pain and Difficulty Index
1	**26**	**68**	**74**	**30**	**40**	**1**
2	**16**	**72**	**68**	**40**	**38**	**2**
3	**16**	**74**	**80**	**60**	**30**	**1**
4	**17**	**70**	**78**	**50**	**44**	**2**
5	**26**	**72**	**78**	**45**	**45**	**3**
6	**27**	**72**	**76**	**48**	**38**	**2**
7	**26**	**76**	**86**	**62**	**30**	**2**
8	**16**	**70**	**78**	**38**	**48**	**1**
9	**26**	**72**	**76**	**40**	**50**	**1**
10	**16**	**74**	**84**	**35**	**52**	**1**

Table 1:- Comparison of primary and secondary stability between the study groups

	Group	N	Mean	Std. Deviation	Mean Difference (95% CI)	t	df	p-value
Primary stability	A	10	61.10	4.82	-10.90 (-14.45, -7.35)	-6.45	18	<0.001*
	B	10	72.00	2.31				
Secondary stability	A	10	67.60	1.78	-10.20 (-13.74, -6.66)	-6.05	18	<0.001*
	B	10	77.80	5.03				

Independent sample t test
*p<0.05 statistically significant, p>0.05 Non Significant, NS

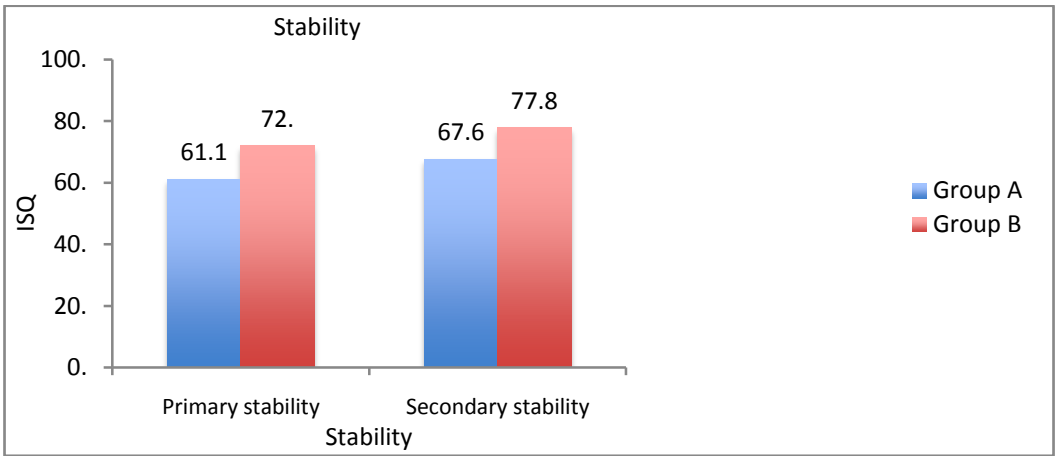
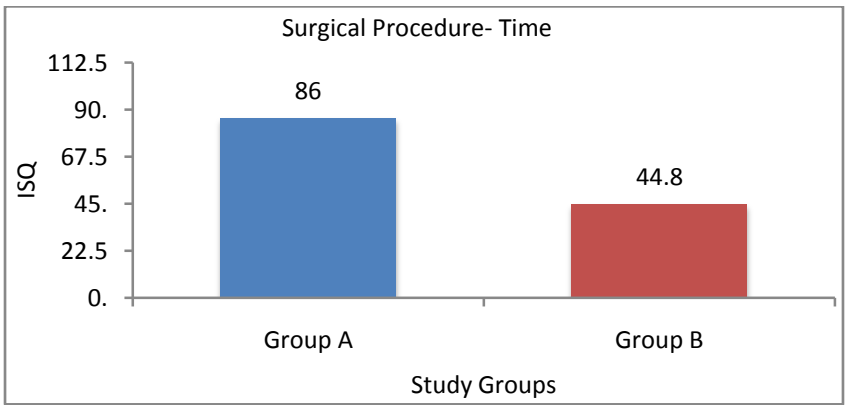


Table 2:- Comparison of total time taken between the study groups

	Group	N	Mean	Std. Deviation	Mean Difference (95% CI)	t	df	p-value
Surgical Procedure	A	10	86.00	21.58	41.20 (25.29, 57.11)	5.44	18	<0.001*
	B	10	44.80	10.39				
Treatment Procedure	A	10	101.10	25.04	59.60 (42.20, 77.00)	7.20	18	<0.001*
	B	10	41.50	7.71				

Independent sample t test
*p<0.05 statistically significant, p>0.05 Non Significant, NS



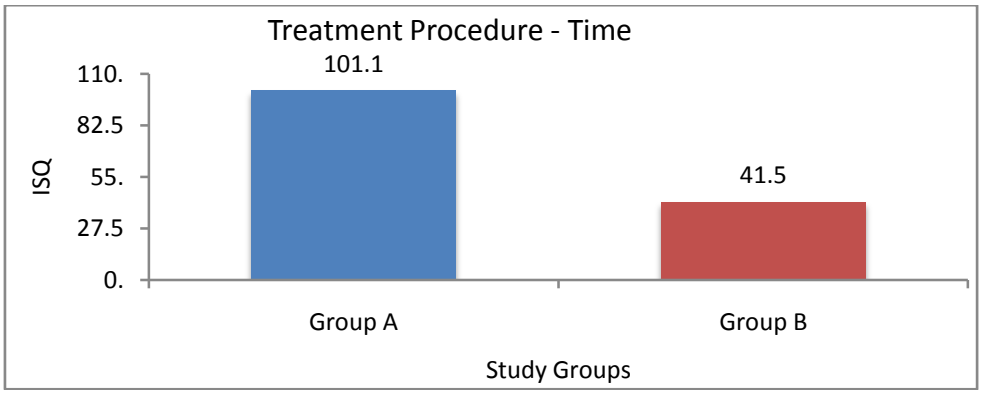
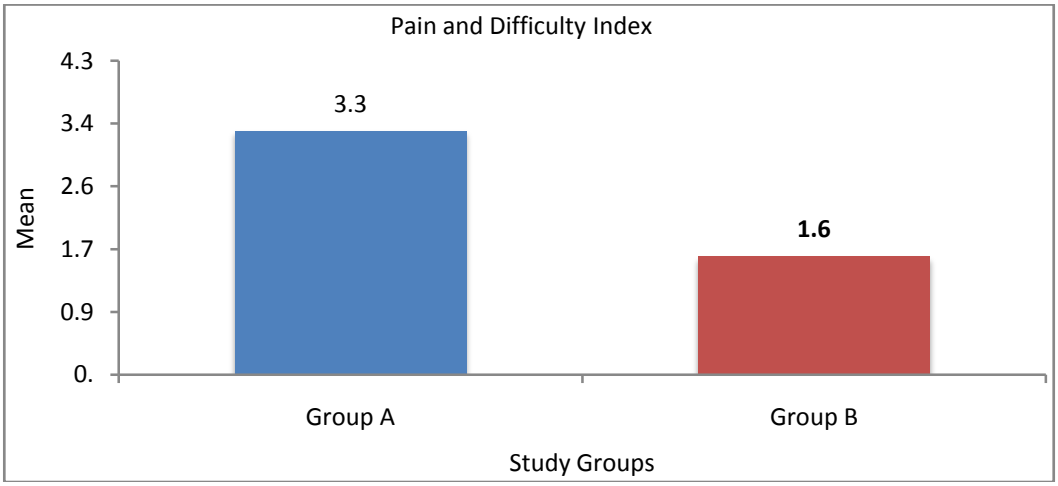


Table 3:- Comparison of Pain and difficulty index score between the study group

	Group	N	Mean (SD)	Range	Median (Q1-Q3)	Mann whitney U test p-value
Pain and Difficulty Index	A	10	3.30 (0.95)	2.00- 5.00	3.00 (2.75- 4.00)	0.001*
	B	10	1.60 (0.70)	1.00- 3.00	1.50 (1.00- 2.00)	

*p<0.05 statistically significant, p>0.05 Non Significant, NS



IV. Results

Results from parameters analyzed, Group B shows higher primary stability, less surgical and osseointegration[10] time and there is immediate restoration of function & aesthetics with less trauma and pain as compared to group A with high incidence of surgical complications and loss of primary stability in many situations. The procedural cost for group B is lesser as there is no biomaterials involved.

V. Discussion

Posterior maxilla undergo a high rate of resorption as it is composed of D-3 type of bone and implant placement in such sites with greater primary stability purely depend on implant design and osseodensification around the osteotomy by means of lateral condensation, thus making a better quality bone. Reducing the core diameter and increasing the thread pitch and depth and incorporating a progressive pattern are the measures incorporated in Any Ridge design of MegaGen Dental Implant. This offers high primary stability. Having a regular thread designing with or without micro threads in the crestal region may provide adequate stability if there is native bone around the implant at the time of placement.

In the scenario like our study, where there is SA2 type of bone with poor quality, where when you insert an implant of 10 mm will gain its primary stability[11] only from native bone and not from the grafted bone. Group B implants all with 7 mm length and width of 5 mm and 5.5 mm, with core diameter 3.8 offers better primary stability with available bone levels. Creating a sub sinus bone height of 10 mm or more by means of crestal or lateral sinus lifts will not contribute the primary stability as that of an implant with knife edge design.

Increased surface area and greater Bone Implant Contact (BIC) and primary stability maintained for a longer duration satisfy the requisites to be the immediately loaded.

Short implants are justified by many literatures. It can be considered for nonfunctional immediate loading like in any other site when primary stability is more than 65 N and ISQ value more than 70.This study done in single edentulous sites guarded by the natural teeth on either sides with sinus lift and without sinus lift gave fairly good primary stability. Group A failed to offer the required primary stability in few cases and demanded more osseointegration time to depend on secondary stability offered by grafted bone.

Group B offered the required primary stability to be considered for early loading in all cases and taking only 6 weeks protocol to load. Checking its primary stability using ISQ again after 6 weeks of insertion, confirmed that there is no decrease in primary stability achieved and there is considerable increase in primary stability in most of the cases. Biomaterials (bone grafts) are avoided in group B thus reducing the procedural cost considerably more important than it avoids bone maturation time.

More stable the implant, faster the osseointegration. If the short implants[12] are offering greater primary stability and it avoids sinus lift, bone graft and other biomaterials, it can be considered as an alternative in routine implant practice as cost is much lesser with less trauma and morbidity and with high patient compliance.

VI. Conclusion

This study concludes that,in sub antral classification of SA-2 where there is more than 5 mm bone, but less than 10 mm, when the edentulous span is single and guarded by natural tooth, short implants specially designed to offer primary stability can be considered for immediate loading instead of sinus lift and delayed loading with regular thread design implant.

References

[1]. Lazzara R J. The Sinus elevation procedure in endosseous implant therapy. CurrOpinPeriodontol. 1996; 3:178-183.
[2]. Ziccardi V B. BeHSNJ complications of maxillary sinus augmentation. In: Jensen OT(ed). The Sinus Bone Graft. Chicago, Quin tessence, 1999:469-495
[3]. Fugazzotto PA. Sinus floor augmentation of the maxillary molar extraction socket – A modified technique to increase bone height. Int J Oral Maxillofac Implants 1999; 14:536-542
[4]. Misch CE: Density of bone; effect on treatment plans, surgical approach, healing and progressive bone loading, Int J Oral Im plantol 6:23-31,1990
[5]. Zitzman N, Scharer P. Sinus elevation procedures in the resorbed posterior maxilla: Comparison of the crestal and lateral ap proach. Oral Surg Oral Med Oral Pathol Oral RadiolEndod 1998;85:8-17
[6]. Renouard F, Nisand D. Short Implants in the severely resorbed maxilla. A 2 year retrospective clinical study. Clin Implant Dent Relat Res 2005;7(Suppl 1):S104-S110
[7]. Bain CA, Moy PR. The association between the failure of dental implants and cigarette smoking. Int J Oral Maxillofac Implants 1993; 8: 609-615.
[8]. Hyo-SookRyu, CheolNamgimg, Jong Holee, Young-Jun-Lim. The influence of thread geometry on Implant osseointegration under immediate loading: a literature review. The J Advanced Prosthodontics. 2014.
[9]. StijnDebruyne, Nicolas Gronard, Gino Verleye, Komeel Van Massenhove, DimitosMarreas, BantVandeVannet. ISQ calculate ion evaluation of in vitro laser scanning vibrometry-capatured resonance frequency. Int J Implant Dent 2017.
[10]. FawadJaved, Hameeda Bashir Ahmed, Roberto Crespi, Georgios E Romanos. Role of primary stability for successful osseoin tegration of dental implants. Factors of influence and evaluation. Interv Med ApplSci 2013 Dec, 5(4) 162-167.
[11]. FawadJaved, George E Romanos. The role of primary stability for successful immediate loading of dental implants. A litera ture review Journal of Dentistry Vol 38 Issue 8 2010. 612-620.
[12]. Franck Renoumad, David Nisand. Clinical Implant Dentistry & Related Research. 10 Aug 2006.

Dr.Subramonian S MDS (OMFS) "Comparison Of Two Different Protocols For Immediate placement of Implants in Posterior Maxilla with Deficient Bone."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 6, 2018, pp 30-38.