EVALUATION OF THE SUCCESS RATE OF IMPLANTS PLACED IN NARROW RIDGE AFTER RIDGE EXPANSION: A CLINICO-RADIOGRAPHIC STUDY

Himanshu Tiwari[1], Saarika Suresh[2], Neha Srivastava[3], Ibadat Jamil[4], Nazia Qadeer[5], Anish Kapoor[6]

[1]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, Rama Dental College, Kanpur, Uttar Pradesh, India
[2]Senior Lecturer, Department of Pediatric and Preventive Dentistry, Maharana Pratap Dental College, Kanpur, Uttar Pradesh, India
[3]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, Rama Dental College, Kanpur, Uttar Pradesh, India
[4]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, Rama Dental College, Kanpur, Uttar Pradesh, India
[5]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, Maharana Pratap Dental College and Hospital, Kanpur, Uttar Pradesh, India
[6]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, Maharana Pratap Dental College and Hospital, Kanpur, Uttar Pradesh, India

Corresponding Author: Himanshu Tiwari
Email: dr.himanshutiwari11@gmail.com

ABSTRACT

Aim: To assess the success rate of implants placed in narrow ridges after ridge expansion. **Materials and Methods:** This study includes the placement of 20 implants, endosseous10 implants were surgically placed in well-formed ridge without expansion and 10 implants were placed in narrow-ridge with bone expansion in two-stage endosseous implant treatment of partially edentulous patients where ridge was deficient in horizontal bone volume. Pre-operative and Post-operative evaluations were done clinically and radiographically.
Results: The implants placed in well-formed ridges shown the less crestal bone loss when comparing to the implants placed in deficient ridges.
Conclusion: Although the treating the atropic ridges with the motorized expansion technique is an alternative to the ridge augmentation procedures and other expansion procedures, a thorough knowledge of a clinician and the proper case selection is required for the desired functional, biological and esthetic outcomes.

Keywords: Implant, Ridge, Endosseous, Expansion, Augmentation
DOI Number: 10.14704/nq.2022.20.11.NQ66338 **NeuroQuantology 2022; 20(11): 3276-3282**

INTRODUCTION

Strive to look young and perfect has been eternal. The same holds true for the oral cavity. History shows that many people have tried all the possible substitutes to replace missing dentition.[1-4] The pursuit for ideal replacement material for replacing missing tooth has been completed with the discovery of titanium as a

eISSN 1303-5150

biocompatible material by orthopedic surgeon Dr. Branemark in 1965. Since then dental implants composed of this alloy have become an epicenter of research.[5-7] The increasing survival rate of these endosseous dental implants has made it the treatment of choice for rehabilitation of the partially & complete edentulous arches. Among all the factors bone density & quality are the most important factors that should be considered for the long term success of the prosthesis supported by the dental implant.[8-11] Ridge resorption followed by tooth loss is highly unpredictable and determined by multiple factors like period of edentulousness, type of the previous prosthesis, reason of tooth loss, systemic conditions of the patient, method employed on tooth extraction of tooth etc.[12-15] All these factors determine the resultant bone morphology and density of the edentulous site. Current research was undertaken to assess success for evaluation of the dental implants placed in narrow ridges after ridge expansion technique.

MATERIALS AND METHODOLOGY

This study includes the placement of 20 implants, endosseous10 implants were surgically placed in well-formed ridge without expansion and 10 implants were placed in narrow-ridge with bone expansion in two-stage endosseous implant treatment of partially edentulous patients where ridge was deficient in horizontal bone volume. Patients aged between 18-55 years who were inclined to undergo recuperation with dental implants, having good oral hygiene, well rejuvenated partially edentulous site or narrow ridges were included in this study and patients having any periapical pathosis at the recipient site, bleeding disorders and functional, para-functional habit & abnormal occlusion were excluded.

Surgical Procedure

Following local anesthesia with 2% lidocaine of the bone was liberated from the remaining muscle and periosteal fibers, and complete thickness flap was raised to expose the edentulous ridge. First osteotomy was carried out on mid-crestal bone utilizing a #15 blade. The initial osteotomy was done with 1.5mm pilot drill at a recommended slow speed of 650 to 850 rpm without irrigation or at a speed of 800 rpm to 1,000 rpm with irrigation till the depth of 10 mm. Subsequent gradual enlargement of osteotomy site was done with 1.8 and 2.5 mm without irrigation to maintain a safe temperature for preserving bone and preserving washing away viable autologous material ideal for grafting. Followed by the no.1, no.2, no.3 and no.4 expender. Once ample resistance was achieved, a manual expender with ratchet was utilized to further widen up the osteotomy site. Approximately 2-3 mm of expansion was achieved without any vertical incisions in the bone. The osteotomy site for implant placement was prepared up to the final length of the implants; sequential surgical burs were used according to standard implant placement protocol. The implants were placed and initial primary stability around 25 ncm was achieved, the bind screws were sited and implants were flooded for a healing period of 4 months. Postoperatively, appropriate antibiotic coverage (500 mg amoxicillin 3 times daily for 5 days) and non steroidal anti-inflammatory medication. Patient was instruct clean without brush the operated site but rinses with 0.12% chlorhexidine digluconate (Peridex) were additionally prescribed twice daily for 2 weeks. Once the case satisfied the selection criteria, every patient underwent for oral prophylaxis with ultrasonic scaler and renovations, if required any. Following it an irreversible hydrocolloid impression (DPI, Bt.No.111715) was made and a diagnostic cast was poured

eISSN 1303-5150

utilizing Type III gypsum product (DPI, INDIA) Wax pattern & study models were prepared for each case. Occlusal analysis was performed over the study models and surgical stents were prepared before the implant surgery. Patients were prescribed 0.12% chlorhexidine digluconate mouthwash, used twice daily for a period of 5 days. Instructions were given to patient for the oral hygiene maintenance and its consequentiality for the prosperity of implant therapy. Once it was ascertained that patient is medically fit and an implant can be placed patient was asked to sign consent from. All implant case was performed according in the standard protocol & withal considering manufacture's guidelines to standardize the study. Pre-operative and post-operative evaluations were done clinically and radio graphically.

Follow-up Protocol

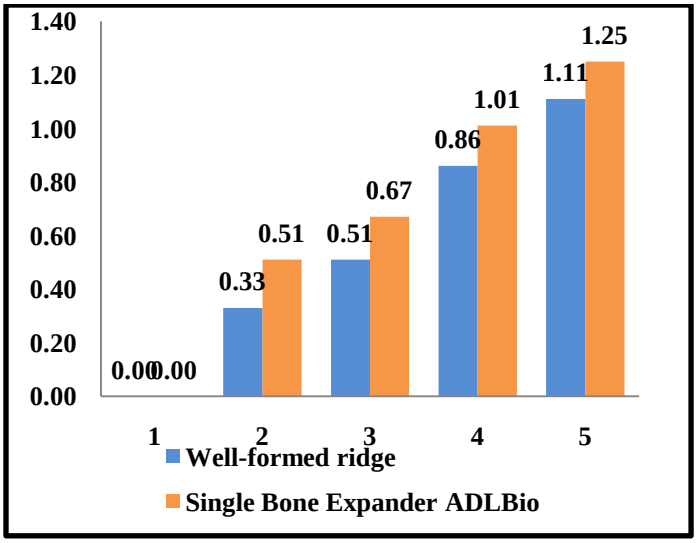
Follow-up routine: The follow-up inspection were performed, according to a definite protocol after placement, 3rd months, 6th months, 9th months and 12 months period. Finishing restoration (metal-ceramic crown) was given around 4-6 months later than the surgery.

Evaluation Criteria

Post operational evaluation of the without delay placed and immediately placed implants was incorporated following parameters to evaluate the objectives of the study.

RESULT

All resulting data were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The finalized data was subjected to appropriate statistical tests. There were a total of 20 dental implants placed immediately after the bone expansion procedure. Implant diameter ranged from 3.5 to 5 mm while implant length ranged from 8 to 11.5 mm. The mean Crestal bone loss at 3 months, at 6 months, at 9 months and at 12 months was significantly more among Single Bone Expander ADl Bio. There was no significant difference in mean Bleeding index at 3 months, at 6 months, at 9 months and at 12 months between Well-formed ridges and Single Bone Expander ADL Bio groups. There was no significant difference in mean Pocket depth at 3 months, at 6nmonths, at 9 months and at 12 months between Well-formed ridges and Single Bone Expander Adlbio groups.



Graph 1: The graph showing the mean crestal bone loss between the well formed ridges and the narrow ridges.

eISSN 1303-5150

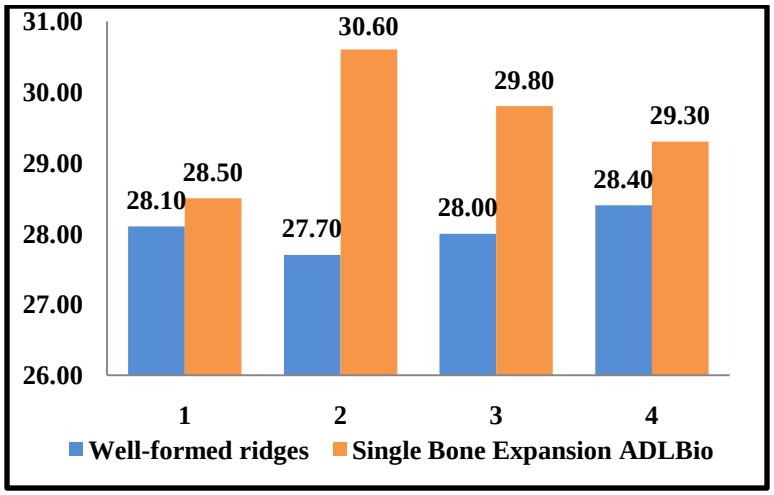
Crestal Bone Loss	Well Formed Ridges		Single Bone Expander ADLBio				
	Mean	Std. Deviation	Mean	Std. Deviation	Mean Difference	t-test value	p-value
At the time of placement of implant	0.00	0.00	0.00	0.00	0.00	0.000	1.000
At 3 months	0.33	0.10	0.51	0.11	-0.18	-3.978	0.001*
At 6 months	0.51	0.11	0.67	0.09	-0.16	-3.453	0.031*
At 9 months	0.86	0.11	1.01	0.18	-0.15	3.447	0.042*
At 12 months	1.11	0.33	1.25	0.30	-0.14	2.978	0.045*

Table 1: Comparison of crestal bone loss between the implants placed in well formed ridges and the narrow ridges.

	Mean	Std. Deviation	Mean	Std. Deviation	Mean difference	t-test value	p-value
AT 3rd months	28.10	7.06	28.50	7.89	-0.40	-0.119	0.906
AT 6 th months	27.70	6.20	30.60	10.51	-2.90	-0.751	0.462
At 9 th months	28.00	6.70	29.80	8.99	-1.80	-0.508	0.618
At 12th months	28.40	6.85	29.30	8.50	-0.90	-0.261	0.797

Table 2: Comparison of periodontal index between the well formed ridges and the narrow ridges treated with bone expansion.

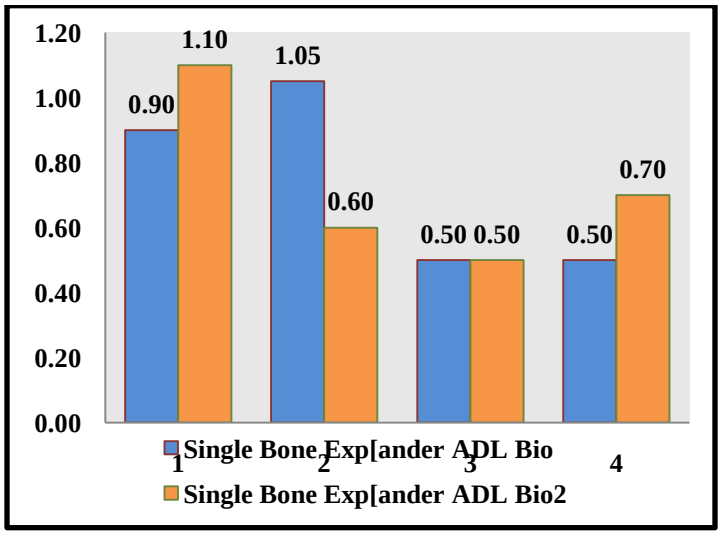
eISSN 1303-5150



Graph 2: the graph showing the mean differences in the periodontal index between the well formed ridges and narrow ridges.

Bleeding index	Well-formed ridges		Single Bone Expander ADl Bio				
	Mean	Std. Deviation	Mean	Std. Deviation	Mean Difference	t-test value	P-value
At 3 months	0.90	0.57	1.10	0.32	-0.20	-0.973	0.343
At 6 months	1.05	1.54	0.60	0.66	0.45	0.852	0.406
At 9 months	0.50	0.53	0.50	0.53	0.00	<0.001*	1.000
At 12 months	0.50	0.53	0.70	0.67	-0.20	-0.739	0.470

Table 3: Comparison of bleeding index between the well formed ridges and the narrow ridges treated with bone expansion.



Graph 3: The graph showing the mean differences in the bleeding index between the well formed ridges and narrow ridges.

eISSN 1303-5150

DISCUSSION

The present study examined the success of implants placed in narrow ridges with the help of bone expansion technique. They were further evaluated with the help of clinical implant mobility scale, marginal bone loss with a follow-up period of 12 months and periodontal index. The bone expansion procedure was utilized in this study, making the bone crest expansion procedure less technically challenging and reducing the overall learning curve. The risk of soft tissue injury was significantly reduced and any shape/design of the bone incision could be facilely performed without hazard to the adjacent structures. This fact was also supported by many of the pioneer researchers in the literature.[16-18] In this study, the implant mobility was assessed at different intervals of time in both well formed and narrow ridges there was no sign of mobility the success rate was 100 percent. Further radiographic evaluation was done to assess the marginal bone changes at different intervals of time that is three, six, nine and twelve months of follow-up. The implants placed in well formed ridges shown the less crestal bone loss when comparing to the implants placed in deficient ridges. Literature has well evidenced about studies of similar outcomes and inferences.[19,20] The variation between them was also statistically significant at different follow-up periods. The bleeding index and periodontal indexes were also assessed, both the treatment modalities have shown the good results, although there were variations between the readings at different interval of follow-up but they were not statistically significant.

CONCLUSION

In this study, the implants placed in atrophic ridges shown the greater bone loss although but treating them with the expansion technique is an advent in rehabilitating with the endosseous dental implants. The conventional expansion procedures using chisel mallet, was not that conservative as that can leads to further complication such as fracture, trauma. Motorized expansion overcomes all the limitations of the conventional technique as it is more conservative approach, atraumatic and less technique sensitive. Although the treating the atropic ridges with the motorized expansion technique is an alternative to the ridge augmentation procedures and other expansion procedures, a thorough knowledge of a clinician and the proper case selection is required for the desired functional, biological and esthetic outcomes.

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eISSN 1303-5150