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Basal Implants: An Alternate Treatment Modality for the Atrophied Ridges

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Abstract

Dental implants emerged as a blessing in the field of dentistry and have helped both the operator and the patient for partial and complete oral rehabilitations with adequate bone supply. The conventional crestal implants are indicated in situations when an adequate vertical bone is available. The prognosis in the atrophied ridges always remained questionable and unpredictable when associated with the ridge augmentation procedures. The augmentation procedures are costly and time-consuming. These extensive surgical procedures abstain some patients from preferring implants and hence such patients paradoxically receive little or no treatment. Basal implant placement is the treatment of choice, whenever such situations arise. The technique of basal Implantology solves all problems connected with crestal implantology. This article discusses various aspects, importance and follow-up results of various studies with basal implants in severely atrophied ridges.

Keywords: atrophic ridge, basal cortical screw, Basal implants, disk implants

Introduction

Prosthetic rehabilitation of edentulous ridge is very important for the functional and esthetic need of patients. Dental implants provide a unique treatment modality for tooth replacement. Endosseous dental implants have been widely used to support different types of dental prosthesis such as removable and fixed complete dentures and fixed partial dentures. [1] Fabricating complete dentures on a severely resorbed mandible is a challenge to the clinician. Tooth extraction is followed by a loss of bone width by 25% and a loss in bone height of 4 mm during the first year. [2] In practical clinical terms the smallest Branemark implant requires minimal bone volume of 8 mm in height and 6 mm in width. [3] If the future implant bed has poor quantity and quality of bone, implantation becomes more challenging. But in many patients the minimal bone requirement is lacking due to a resorbed ridge or the close proximity of anatomic structures like mandibular nerve, mental foramen, maxillary sinus, nasal cavity, incisive canal etc. To overcome, such unfavorable anatomical and mechanical conditions bone grafts, sinus lift procedures, nerve displacement procedure are often used. Though this gives acceptable success rates, the donor and recipient sites can show an unpredictable degree of morbidity, also extensive surgical procedures refrain some patients to go with implants. An alternative are basal implants, that can be placed in very little vertical bone as it engages cortical bone for implant retention.[4] The basal or cortical bone when compared to crestal bone is highly dense, less prone to infection and resorption and high load bearing. Single piece basal implants were developed in 1972 by Jean-Marc Julliet. Gerard Sorctecci in 1980s developed a basal implant system which is easier to use with appropriate cutting tools. The so-called disk implants or lateral basal implants, which were in round shape with roughened surface were developed in 1997 by Stefan Ihde, who continued to improve them with a base plate design and fracture proofing.

This review article, discusses the types of basal implants, parts, advantages, disadvantages and its complications. Literature review with regard to basal implants demonstrated good success rate in aspect of primary stability and osseointegration, henceforth emphasizes that basal implant could be an alternative for atrophied ridges.

A literature search was performed in the databases of Pubmed, EBSCOHOST, and Google scholar. The search terms used in search of relevant articles was dental implants, basal implants, lateral implants, disk implants and resorbed /atrophied ridges.

Rationale of Using Basal Implants

Teeth are present in less dense bone portions of the jaw bones called the alveolar bone, also known as the crestal bone of the jaw. The less dense alveolar bone gradually starts getting resorbed and recedes once the teeth are lost. The basal bone which remains after resorption of the alveolar bone following tooth loss is the basal bone. The basal bone, which is highly dense is less prone to bone resorption, infection, and its corticalized nature, gives excellent support to implants. The implants which take support from the basal bone offer excellent and longlasting solution for tooth loss, compared to the conventional implants placed on the crestal alveolar bone. At the same time, load bearing capacities of the cortical bone are many times higher than those of the spongious bone. [5]

Types of Basal Implants

1. Basal Osseo Integrated (BOI)

2. Basal Cortical Screw (BCS)

Type 1: BOI (Basal Osseo Integrated)

BOI also known as lateral basal implants that are placed from the lateral aspect of the jaw bone. [5] Masticatory load transmission is confined to the horizontal implant segments, essentially to the cortical bone structures. Basal implants are region specific.

a. Anterior Implants

When sufficient vertical space is available, the implants with two disks are usually used. The basal disk has a diameter of 9 or 10 mm, whereas the crestal disk is 7 mm in diameter. The multi-disc implants used for basal osseointegrated implants has different functions. The crestal plate provides additional stabilization of the implant and loses its importance when the basal plate is ossified to full load bearing capacity. A single BOI with a 7-9 mm diameter and shafts between 8-13.5 mm can be

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used on failure of insertion of double disk (due to lack of bone). [6,7]

b. Posterior Implants

Square-shaped implants having a disk of diameter 9-12mm or 10-14mm with shafts between 10-13.5 mm in length are used depending on the desired vertical dimension and available horizontal bone. If the vertical bone available above the mandibular nerve is, 2 mm, infranerve implant insertion (infra nerve implant insertion: The disk is introduced below the mandibular nerve; the threaded carrier is located at the side of the nerve. [8]

Type 2: BCS (Basal cortical screw/Screw Basal Implant)

Biocortical screws are flapless basal implants, which are inserted through the gums, without giving a single cut, like the conventional implants. Screwable basal implants (BCS brand) have been developed with a thread diameter of up to 12 mm for insertion into immediate extraction sockets. They are considered as basal implants as they

- Transmit masticatory load deep into the bone, into the opposite cortical bone, though it is not a prerequisite for full osseointegration along the implant axis
- 2. Provide some elasticity initially.
- 3. Due the polished surface and thin mucosal penetration diameter, they are not prone to peri-implantitis

Parts of Basal Implants

In conventional 2- and 3-piece implants failures are common with, which occur at the connection interface. To resolve this problem, a single section implants was developed. Here the implant body and abutment are fused. They have 3 parts as body, neck and surface. [8]

Implant body

Thin implant body combined with wide thread turns Enhance increased vascularity around the implant and increased mechanical bone implant contact.

Implant neck

Depending on the length of the implant the abutment can be bent from 15–25 degrees, provided the implant is placed in dense corticated bone.

The polished surface protects from bacterial attachment on implant surface.

Implant Surface

Polished surface

Stops bacteria and plaque from adhering to the implant neck or body.

Surgical Procedure of The Basal Implant Placement

After giving local anesthesia, the oral mucosa is elevated laterally. Lateral basal implants are placed from the lateral aspect of the jaw bone whereas BOI implants are inserted horizontally & transosseously, i.e. their base plate (disc) is designed to touch the outer and inner cortical bone. A vertical and a horizontal precision slot are cut into the jawbone to allow placement of the implant. A copious irrigation is given externally during the surgery. Basal implants changed treatment options in the upper jaw. Sinus lift procedures have become avoidable because all patients have sufficient horizontal bone naturally, even if vertical bone is missing. Screwable basal implants are flapless implants and are placed through gum, without giving a single cut. [9]

Basal implants get integrated in a totally different way than traditional two-phase implants do. One, the implantation site is different: it is fixed in the solid, bicortical part of the bone, and not in the spongy bone. This layer cannot be reduced to such a level that there would be not enough left for implantation. For another, basal implants can get fixed not only vertically, but also horizontally.[10]

Indications of Basal Implant [8]

- 1. Multiple teeth edentulous region
- 2. In bone augmentation failure cases.

3. Cases where bone height and width are insufficient.

Contraindications of Basal Implants [7]

- Medical conditions like uncontrolled diabetes, recent myocardial infarction, cerebrovascular stroke, patients under IV bisphosphonate, chemotherapy, immunosuppressive and anticoagulant drugs.
- Psychological and mental conditions like psychiatric syndromes mental instability, mentally uncooperative, irritational fears; phobias, unrealistic expectations.
- Habits and behavioral considerations- Smoking, tobacco use, parafunctional habits, substance abuse (alcohol, drugs).

Advantages of Basal implants

Various benefits of using basal implants in atrophied ridges are illustrated in table I.

Complication of Basal Implants

- 1. Functional overload osteolysis
- Masticatory forces transmitted through the basal implants may create local microcracks in the cortical bone. These microcracks are repaired by a process called remodelling.
- 3. Microcracks will temporarily increase the porosity of the affected bone region and temporarily reduce the degree of mineralization [11]

Discussion

Dental implant placement is a trending rehabilitation method among dentist now-a-days and it has become a routine dental treatment. Basal implants for its advantages like time saving and better support from basal cortical bone gained lots of attention. The functional load of a basal implant is disseminated through horizontal cortical bone that bears the masticatory loads. Patients with generalized vertical and horizontal bone loss are given basal implant supported fixed prosthesis within 72 hours of surgery [23]. The treatments were planned using a 3D computed imaging. These implants have been successfully employed in pterygopalatine regions, anterior maxilla and mandible and also for full mouth rehabilitations, where these implants anchored the cortical bone of the roof and floor of the nose, wall of maxillary sinus and base of atrophic mandible. [24,25]

The included articles had nine case reports [12-15,17-21], one prospective study [16], and one clinical trial [22]. The observation period by the various authors were from two months [14] to three years [16]. The surgical method used were flapless [14,19-21]; without bone augmentation [12,14,15,17]; open surgical method under general anesthesia [13,22]; removal of root with hemisection and immediate implant placement [18] and single-stage BOI [16].

The basal implants used were BOI, EDADS, DISKOS-ID Brand, BCS, KOS and Root implant system. The surgical procedures were flapless or open surgical methods and, in all cases, early loading were done. Depending on the situation, flap or flapless technique can be performed but a substantial knowledge and understanding is recommended. The super structures were PFM crowns and cement retained hybrid dentures. Basal implants were used for rehabilitation of any form of edentulous arches even the atrophied one, in extraction socket or healed bone. Recent advances with respect to the materials used in implant manufacturing, surface modifications, immediate loading and custom implants have improved the success rate of implants. [4,7]

The technique of Strategic Implant® solves all problems connected with conventional (crestal) implantology. In all the articles, primary stability and osseointegration were present, except in the case report by Omar et al [22]. Out of 15 implants, 13 had osseointegration but two failed. The sharp threads of Root basal dental implants allowed good bone anchorage and high primary stability which is one of the main factors of implants success.

Conclusion

Evolution of basal implants had given positive hope for the patients with atrophied ridges which can be rehabilitated in lieu of a complicated augmentation procedure. Less arduous, economical and immediate loading of the prosthesis make the patients more confident and socialize normally. Follow up results from the literature review also give a clear-cut picture that basal implants are an alternative treatment modality in atrophied ridges.

References

- Branemark , Tissue-Integrated Prostheses Osseointegration in Clinical Dentistry. Journal of Prosthetic Dentistry Chicago: Quintessence. 1985: pp199-209.
- Darby I, Chen S, De Poi R. Ridge preservation: what it is and when should it be considered. Aust Dent J 2008; 53:11-21.
- Lekholm, U.&Zarb, GA. (1985) Patient selection and preparation. In: Brånemark P-I, Zarb GA, Albrektsson T (eds).
- Yadav, RS. Sangur, R. Mahajan, T. Rajanikant, AV. Singh, R. An Alternative to Conventional Dental Implants - Basal Implants, Rama University Dent Sci, 2015; 2:22-8.
- Nair C, Bharathi S, Jawade R, Jain M. Basal implants
 a panacea for atrophic ridges. Journal of dental sciences & oral rehabilitation. 2013:1-4.
- Sharma R, Prakash J, Anand D, Hasti A. Basal implants – an alternate treatment modality for atrophied ridges. Inter J of Res in Dent. 2016;6(5):60-72.
- Prasad DK, Mehra D, Prasad DA. Recent advances, current concepts and future trends in oral implantology. Indian J Oral Sci. 2014; 5:55-62.

- Kumar K, Kumar S, Singh R, Vaibhav V, Kedia NB, Singh AK. Basal implants-A new era of prosthodontic dentistry. IP Annals of Prosthodontics and Restorative Dentistry. 2020;15;6(1):1-3
- IHDE Dental. [Online]. Cited 2015 Feburary 2; Available from: URL: http://www.boi.ch/index.php/en/.
- Disadvantages of basal implants.[Online]. Cited 2015
 January 30. Available from: URL:http://drmurugavel.in/content/boi-dentalimplants-india-basal-dental-implants-india.
- Martin R, Burr D, Sharkey N. Skeletal Tissue Mechanics. 1st edition. New York: Springer; 1998.
- Ihde, S.& Eber, M. Reconstruction Of Edentulous Mandible With 4 BOI Implants In An Immediate Load Procedure Case Report. Bio Med Pap Med Fac Palacky Olo Mouc Czech Repub:2004;148:195-8.
- Konstantinovic, VS. Todorovic& VS. Lazic, M.Possibilities of reconstruction and implantprosthetic rehabilitation following mandible resection. Vojnosanit Pregl 2013;70(1); 80-85.
- 14. Nabeel, M. Ihde, S. &Lazarov, A Case Report Re Implantation Using Strategic Implants After Multiple Dental Implant Loss. International Journal Of Science And Research (IJSR)ISSN (Online) 2014;2319-7064.
- Sumit, N.& Anu, N. Multiple Immediate Implant Placement with Immediate loading. Journal of Indian Society of Periodontology. 2014;18(5)648-650.
- 16. Ritesh, G. Nehra, M. Mohan, A. & Sunil, K G. Implant Survival Between Endosseous Dental Implants In Immediate Loading, Delayed Loading, And Basal Immediate Loading, Dental Implants A 3-Year Follow –Up. Ann Maxillofac Surg 2017;7(2):237-244.
- 17. Amit, G., Bhanu, M., Mansha, B., &Meenu, G. Full mouth rehabilitation with immediate loading basal

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- implants.Int Jour of Preventive and clinical dental research, 2017;4(2):11-3.
- Mahender S, Ranmeet, B. &Debdutta, D.A Noel Approach for Restoration of Hemisected Mandibular first Molars with Immediately Loaded Single Piece BCDS Implants –A Case Report.J Oral BiolCraniofac Res., 2017;7(2):141-146.
- Daniel T S, Alina, O. Emine, M. Alveolar bone resorption evaluation around single piece designed bicortical implants, using immediate loading protocol, based on orthopantomographs.Journal of interdisciplinary medicine, 2017;2(4):328-331.
- M Shanmuga, S.& Priya, B. "KOS One piece implant" an excellent choice in resorbed and narrow bridges. International journal of advances in case reports. 2018;5(8):44-46.
- Vivek, G. Anita, D. Stefan, I. & Gabriel, F.Immediate loading of edentulous mandibular arch with screw Legend Tables

Table 1: Advantages of basal implants

- retained final prosthesis on strategic implants with single piece multiunit abutment heads- A case report BAOJ Dentistry 2018:4:040
- Mostafa M. Omar, Riham M. Eldibany, Lydia N. Melek. Evaluation of basal dental implants in posterior mandible. Alexandria Dental Journal. 2020: (45) 45-49.
- 23. Harish Kumar.A Simran Kaur, Ruchika Raj ,Sachin Sunda. Basal Implants: An alternate treatment modality for the hopeless a review article. International Journal Of Current Advanced Research 2018;7(9) 15650-15654
- Otoum A, Bsoul T. Basal screw implantology without sinus lifting. Pakistan Oral & Dental Journal 2014; 34(3):414-416.
- 25. Thukral P, Bali S, Bhatia N, Arora S. Rehabilitation of atrophic maxilla with basal implant: a case report. Int J Curr Res 2016;8(1):28601-2860

Indication	Used for multiple unit restoration especially in extraction socket allow placement in						
	bone deficient in height and width.						
Mechanism	Cortical anchorage of thin screw implants (bicortical screws, BCS). Excellent primary						
	stability can be obtained along the vertical surfaces of these implants with no need for						
	corticalization only Osseoadaptation occurs.						
Surgical procedure	Single sitting surgical procedure and very often flapless (no open surgical procedures						
	are necessary). Implant procedures are less time consuming than that required for						
	bridgework.						
Armamentarium	Simple – the implant surgery kit is very simple with very few instruments						
Cost	Very cost effective						
From the patient point of view	Less complex placement procedure						
Long term maintenance	Single piece, strength provided by implant is excellent						
Eligibility to patient	Almost every one						
Size and design	Wide range of size and design are available						
Bone used	Basal bone more dense, mineralized and less prone to bone resorption						
	·						

Additional surgery	No need of bone augmentation sinus lift.
Prosthetic procedure	Very simple. Conventional impressions of the implants can be made just as is the case with routine bridgework. Very less chair side time.
Peri-implantitis incidence	Judicious use of Monoblock smooth surface basal implants eliminates the threat of peri-implantitis by almost 98%.
Medically compromised situations	Basal implants work well in controlled diabetics, in smokers, in patients suffering from chronic destructive periodontitis.

Table 2: Characteristics of studies on basal implants

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Author	Type of	Impla	No:	Obse	Surgical	Locati	Loadin	Supra	Primary	Osseointegr
	study	nt	patients/imp	rv	method	on	g time	structu	stability	ation
		type	lants	time				re		
Ihde S et	Case	BOI	1/4	3	Without	Mandi	Immedi	Acryli	Present	Present
al	report	EDA		mont	bone	ble	ate	c		
2013[10]		DS		hs	augmenta			mount		
		9/14G			tion			ed on		
		7						chrom		
		7G5						e		
		EDD						cobalt		
		S						bridge		
Konstantin	Case	Disko	1/3	2	Open	Mandi	10 days	PFM	Present	Present
ovic VS,et	report	s-ID		years	surgical	ble	post	bridge		
al		Brand			method	right	operativ			
2013[11]					under	and	ely			
					general	left				
					anesthesi	molar				
					a	region				
Nabeel M	Case	BAS	1/3	2	Flapless	Mandi	3 rd post	Ceram	Present	Present
et al	report	Т		mont	procedur	ble	operativ	ic		
2014[12]		9/16		hs	e		e day	bridge		
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		BOI			bon					
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		BCS								
		impla								

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Sumit N et	Case	BCS	1⁄4	6	Without	Mandi	Immedi	Ceram	ccccPre	Present
al	report	impla		mont	bone	ble	ate	ic	sent	
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		KOS			tion			S		
		impla								
		nt								
Garg,R,et	Prospec	Basal	4/52	3	Single	Mandi	Immedi	Fixed	present	Present
al	tive	impla		years	stage	ble	ate	bridge		
2017[14]	study	nts			BOI		loading	s		
Gupta,A,et	Case	BCS	1/19	4-6	Without	Mandi	Immedi	Ceme	present	Present
al	report	KOC		mont	bone	ble	ate	nt		
2017[15]				hs	augmenta		loading	retaine		
					tion			d		
								hybrid		
								dentur		
								es		
Mahender	Case	BCS	1/1	6	Removal	Mandi	3 days	PFM	present	Present
S,et al	report	single		mont	of root	ble 36	post	crown		
2017[16]		piece		hs	with	distal	operativ			
		impla			hemisecti	root	ely			
		nt			on and					
					immediat					
					e implant					
					placemen					
					t.					
Daniel TS	Case	KOS	10/56	1	Flapless	Mandi	Immedi	PFM	present	Present
,t al	report	BCS		year	procedur	ble	ate	crown	-	
2017[17]	1				e		loading			
M	Case	KOS	1/1		Flapless	Mandi	3days	PFM	Present	Present
Shanmuga	report	impla			procedur	ble	post	crown		
s		nt			e	(46)	operativ			
2018[18]							ely			
Vivek, G.	Case	Singl	1/8	6	Flapless	Mandi	Immedi	Metal	Present	Present
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		piece		hs	e		loading	cerami		
		impla						c		
		nt						screw		
		BEC						retaine		
		ES						d		
		MU						bridge		
		impla								
		nt								
Omar M	Clinical	Roott	8/15	3	Open	Mandi	3month	Porcel	Yes	Present for
2020[20]	trial	Impla		mont	surgical	ble	S	ain		13 implants
		nt		hs	method			fused		Absent for
		syste			under			to		2.
		m			general			metal		
					anesthesi					
					a					