Natural Abutment and Oral Implant: A Review Article

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Abstract—*Natural tooth serves as natural abutment in the oral cavity. Attempts should be made to preserve the natural. Periodontal disease and other ailments weaken the teeth and cause loss of tooth structure. Tooth with hopeless prognosis can be replaced with oral implants. Oral implants are best substitute for strategically important tooth, weakened or lost by periodontal disease. Properly treated natural tooth serves the purpose best. Oral implants are best used as abutments in restorative dentistry. Oral implants should only be incorporated in oral cavities with healthy conditions, i.e. a thorough periodontal treatment has to precede restorative therapy.*

Keywords: Abutment, Oral Implant.

I. INTRODUCTION

Natural teeth should be preserved as natural tooth serves as natural abutment in the oral cavity. But sometime Periodontal disease and other ailments weaken the teeth and cause loss of tooth structure. In this case tooth may be replaced with oral implants.

Abutment can be defined as "Tooth, root, or implant used to support and/or anchor a fixed or removable prosthesis".[1]

Dental implant can be defined as an alloplastic material or device that is surgically placed into the oral tissue beneath the mucosal or periosteal layer or within the bone for functional, therapeutic, or aesthetic purposes.[2]

TABLE 1
ORAL IMPLANT VERSUS NATURAL ABUTMENT (TOOTH)[3]

Parameters	Natural Abutment (Tooth)	Oral Implant
Composition	Calcium and phosphorous (hydroxyapatitie)	Primarily titanium and titanium based alloys
Nature	Living	Non Living
Gingival sulcus depth	On enamel	On Titanium
Connectivity issue	Perpendicular to tooth surfaces	Parallel and circular fibres; no attachment to implant or bone
Gingival fibers	Complex array inserted into cementum above crestal bone	No organized collagen fiber attachment
Nerve supply	Present	Absent
Proprioception	Highly sensitive	No ligament re
Physical characteristics	Physiologic mobility caused by viscoelastic properties of the ligament	Rigid connection to bone, as if ankylosed
Adaptive Characteristics	Width of ligament can alter to allow more mobility with increased occlusal forces	No adaptive capacity to allow mobility; orthodontic movement impossible
Connection	Cementum, bone, periodontium	Osseointegration, bone functional ankylosis ligament
Junctional epithelium	Lamina lucida and lamina densa zones	Lamina densa and sub lamina lucida zones
Connective tissue	Thirteen groups; perpendicular to tooth surfaces	Two groups; parallel and circular fibers
Biologic width	2.04 to 2.91 mm	3.08 mm
Vascularity	Greater, supraperiosteal and periodontal ligament	less, periosteal
Bleeding on probing	More reliable	Less reliable

To insert a graft or alloplastic device into the oral hard or soft tissues for replacement of missing or damaged anatomical parts, or for stabilization of a periodontally compromised tooth or group of teeth.[2]

Fundamental differences between natural tooth and oral implant are mentioned in Table 1.

II. REVIEW OF LITERATURE

2.1 Evidences in support of properly treated natural tooth over dental implant

Properly treated natural teeth with healthy but markedly reduced periodontal support, are able to carry extensive fixed prosthesis for a very long time. They have survival rates of about 90%, if the periodontal disease was eradicated and prevented from re-occurring. The natural tooth is not an obstacle but a possibility for whether or not the treatment is to include implant placement. On the basis of assumptions that implants perform better than periodontally compromised teeth, teeth that could be saved and used as support, are extracted and replaced with implants, sometimes even on doubtful indications."[4] Peri-impantitis with loss of at least 2 mm of marginal bone, at one or more implants have been found to occur in 16-28% of implant patients after 5-10 years and with higher prevalence among patients with multiple implants.[4]

"Oral Implants when evaluated after 10 years of service; did not surpass the longevity of natural teeth. They were not even able to surpass the longevity of those that are compromised, for either periodontal or endodontic reason. [5]

Teeth with reduced marginal bone support have a better prognosis than implants with reduced marginal bone support. Such teeth should be preserved and shouldn't be advised for extraction. No evidence exists to support an aggressive approach in early extraction of teeth, to preserve bone for later implant placement. [6]

"Partnership with commercial enterprise now dominates continuing education. Emphasis should be on preservation of properly treated natural teeth, free from periodontal disease. " The integrity of purpose and scientific rigor that characterized the original osseo-integration clinical research has been largely discarded as passe'.[7]

"The risk of yet another anarchic phase in treatment decision making has resurfaced. "New lecture circuit celebrities keep being recruited to promote osseo-integration's newer and expanded promises, albeit it falls significantly outside the technique's initial oral ecological context." Safety, simplicity and prudence is being risked in clinical judgment." [7]

A systematic review was carried out to compare the outcomes, benefits, and harms of root canal treatment and a crown, an extraction followed by an implant and crown, extraction and replacement with a denture and extraction without replacement. Based on available evidence it appeared that initial endodontic treatment has high long-term survival rate for periodontally sound teeth that have pulpal and/or periapical pathosis. Equivalent long-term survival rates were reported for extraction and replacement of the missing tooth with an implant-supported restoration. Substantially lower long-term survival rates were reported for extraction and replacement of the missing tooth with fixed partial dentures. For patients with periodontally sound teeth that have pulpal and/or periradicularpathosis, implant, endodontic, and fixed prosthodontic treatments had superior psychosocial outcomes, primarily with respect to patient self-image, compared to extraction without replacement or with replacement using a fixed partial denture. [8]

Fundamental differences between endodontic and implant therapies are listed in Table 2.

TABLE 2
FUNDAMENTAL DIFFERENCES BETWEEN ENDODONTIC AND IMPLANT THERAPIES (ADAPTED FROM WHITE *et al.*) [9]

Parameters	Endodontic treatment	Implant treatment
Fundamental aim	To retain teeth	To replace teeth
Basic requirement	Addresses presence of disease	Requires absence of disease
Measurement of "success"	Healing or regeneration of previously inflamed, infected or lost periradicular tissue	Absence of inflammation, infection or bone loss
Management of failure	Retreatment and/or apical surgery	Surgical replacement with or without hard tissue replacement
Consequences of irretrievable failure	Extraction and consideration of prosthodontic alternative, including implants	Prosthodontic alternatives which may requireBone+/- soft tissue augmentation

2.2 Evidences in support of dental implant

Three major indications can be defined for the use of oral implants: [10]

• To increase subjective chewing comfort

• To preserve natural tooth substance and adequate, existing reconstructions

• To replace strategically important missing teeth.

Studies have demonstrated that the installation of a small number of mandibular implants (two to four) in edentulous mandibular ridge showing severe resorption, may dramatically improve chewing function. If natural tooth substance can be preserved, oral implants are ideal abutments, but the preparation of a tooth to serve as an abutment for a crown or a bridge anchor opens about 40,000 to 70.000 dentinal tubules per mm2, which in turn will compromise the vitality of natural tooth. [10]

It has been documented that only a small proportion of abutment teeth will lose their vitality immediately as a sequelae of the preparation procedure but approximately 10% of all vital abutments will lose their vitality after 10 years [11;12,13].

TABLE 3
PREDICTORS OF IMPLANT SUCCESS OR FAILURE (ADAPTED FROM PORTER *et al.*) [15]

Positive factors	Negative factors
Bone type (type 1 and 2)	Bone type (type 3 and 4)
High bone volume	Low bone volume
Patient is less than 60 years old	Patient is more than 60 years old
Clinical experience (more than 50 cases)	Limited clinical experience
Mandibular placement	Systemic diseases (eg uncontrolled diabetes)
Single tooth implant	Autoimmune diseases (eg, Lupus or HIV)
Implant length >8mm	Chronic periodontitis
Fixed partial dentures with more than two implants	Smoking and tobacco use
Axial loading of implants	Unresolved caries, endodontic pathology
Regular post-operative recalls	Maxillary placement, particularly posteriorly
Good oral hygiene	Short implants (<7mm)
	Eccentric loading
	Inappropriate early clinical loading
	Fixed partial denture with two implants
	Bruxism and other parafunctional habits

Hence, the most biologically sound way of replacing a missing tooth is an implant installation avoiding tooth preparation. Loss of a strategically important natural abutment or tooth may lead to costly, time consuming and complex restorative treatment planning. Installation of an oral implant may be performed for prosthetic reconstructions. In such cases presence of bone dehiscence and inadequate bone volume may require bone augmentation procedures. [10]

Di Fiore et al.[14] who reported that dental students preferred implants more than dental faculty, and the newer graduates on the dental faculty opted for implants more than more experienced dentists that may be due to the fact that implants are a relatively recent inclusion in the dental curriculum.

Predictors of implant success or failure are listed in Table 3

III. FUTURE ASPACTS

Unless affected by oral diseases or service interventions, teeth will last for life. Many retained teeth ae thus an indicator of positive oral health behaviour throughout the life course. Tooth longevity is largely dependent on the health status of the periodontium, the pulp or periapical region and the extent of reconstructions. Multiple risks lead to a critical appraisal of the value of a tooth and it's longevity in oral cavity.[5]

When evaluated after 10 years of service, oral implants present with a longevity; that does not surpass that of even compromised, but successfully treated and maintained teeth. Oral implants have become valuable, indispensable, and welcome treatment alternatives to traditional dental reconstructions.

If subjective chewing comfort has to be increased, natural tooth substance or existing satisfactory reconstructions have to be preserved or strategically important missing teeth have to be replaced; oral implants are best used as abutments in restorative dentistry. Oral implants should only be incorporated in oral cavities with healthy conditions, i.e. a thorough periodontal treatment has to precede restorative therapy. [10]

IV. CONCLUSION

Oral implants are best used as abutments in restorative dentistry. Oral implants should only be incorporated in oral cavities with healthy conditions, i.e. a thorough periodontal treatment has to precede restorative therapy.

CONFLICT OF INTEREST

None declared till now.

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