ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 2, Issue – 2, March - April - 2019, Page No. : 609 - 612

Complications of Dental Implants Associated With Augmentation Procedure and Its Management: A Review

[1]Dr. Amit Mani, Professor and Head of Department of Periodontology, Pravara Rural Dental College and Hospital, Loni

[2]Shubhangi Mani,Professor Department of Orthodontics, Rural Dental College and Hospital, Loni

[3]Dr. Raju Anarthe, Reader, Departmentof Periodontology, Pravara Rural Dental College and Hospital, Loni.

[4]Dr. Shivani Sachdeva, Senior lecturer, Department of Periodontology, Pravara Rural Dental College and Hospital, Loni.

[5]Dr. Preeti Prakash Kale, 3rd PG Student ,Department of Periodontology, Pravara Rural Dental College and Hospital, Loni

[6]Dr. Meenakshi Singh Thakur, 2rd PG Student ,Department of Prosthodontics Pravara Rural Dental College and Hospital, Loni

[7]Dr. Shalakha maniyar, 3rd PG Student at Department of Periodontology,Pravara Rural Dental College and Hospital, Loni

[8]Dr.Sekharmantri Anuraga, 3rd PG Student, Department Of Periodontology,Pravara Rural Dental College and Hospital, Loni

[9]Dr. Asawari Lawande, Senior lecturer, Dept of Periodontology, Yashvant Chavhan dental college, Ahemadnagar

Corresponding Author: Dr. Preeti Prakash Kale, 3rd PG Student ,Department of Periodontology, Pravara Rural Dental College and Hospital, Loni

Type of Publication: Review Paper

Conflicts of Interest: Nil

Abstract

Treatment with dental implants has evolved from earlier much old procedures to a mainstream clinical activity however its potential benefits and high success rates have led to procedures sometimes being incorrectly used with unfortunate outcomes. Implants have evolved from its use as a functional device to a device which is esthetically acceptable. However, treatment is not always successful because implant is a foreign body. The focus of implant research is shifting from descriptions of clinical success to the identification of factors associated with its complications or failure. Present review gives insight about complications of dental implants associated with augmentation procedure and its management.

Keywords: Dental Implant, Augmentation, Implant Failure

Introduction

The pioneering work of Professor Branemark and Andre Schroder ushered a new era in Dentistry i.e. “The Era of Implant Dentistry.” Branemark and his colleagues created a new field from a serendipitous research thus exemplifying Pasteur’s dictum “Chance Favors the Prepared Mind”. Branemarks determined research in osseointegration enabled the surgically related and Prosthodontic disciplines an exciting scope in the new world of Dentistry and gave it a global stand. [1] Treatment with dental implants has evolved from earlier much old

procedures to a mainstream clinical activity however its potential benefits and high success rates have led to procedures sometimes being incorrectly used with unfortunate outcomes. Implants have evolved from its use as a functional device to a device which is esthetically acceptable. [2] However treatment is not always successful because implant is a foreign body. The focus of implant research is shifting from descriptions of clinical success to the identification of factors associated with its complications or failure. [3]

Implant Failure: It is defined as total failure of the implant to fulfill its purpose [functional, esthetic or phonetic] because of mechanical or biological reasons. [4]

Ailing implants: Ailing implants are those showing radiographic bone loss without inflammatory signs or mobility.

Failing implants: Failing implants are characterized by progressive bone loss, signs of inflammation and no mobility.

Failed implants: Failed implants are those with progressive bone loss, with clinical mobility and that which are not functioning in the intended sense.

Surviving implants: Surviving is a term described by Alberktson that applies to implants that are still in function but have not been tested against success criteria.

Classification: Classification systems of complications associated with osseointegrated dental implants. Numerous authors have attempted to categorize possible complications with implants.

Classification System proposed by Hubertus Spiekermann

A. Surgical complications

1. Intra-Operative Complications

a. Hemorrhage
b. Nerve injury
c. Opening of the maxillary sinus or nasal sinus
d. Jaw fracture

2. Consequences of improper implant placement

a. Osseous dehiscence
b. Osseous perforation
c. Damage to adjacent teeth
d. Insufficient primary stability

3. Post-Operative

A. Immediate Post-Operative Complications

a. Hemorrhage
b. Hematoma
c. Edema
d. Early infection
e. Wound margin separation
f. Mucosal perforation
g. Surgical emphysema
h. Implant mobility

B. Late Post-Operative Complications

a. Peri-implant pathology and soft tissue complications
b. Implant fracture
c. Chronic pain
d. Chronic sinusitis
e. Secondary nerve damage
f. Mucosal irritation

B. Prosthetic Complications

1. Unfavorable implant location and axis orientation of implants
2. Loosening and fracture of prosthetic post
3. Loosening and fracture of occlusal screws
4. Framework fracture

C. Esthetic complications

D. Functional complications

E. Complications associated with augmentation procedure.

Complications Associated With Augmentation Procedure And Its Management:

Autogenous Bone Harvesting / Grafting [5]

Autogenous bone has long been considered the gold standard for osseous reconstruction and repair. The use of autogenous bone with dental implants was originally discussed by Brånemark et al. in 1975. Autogenous bone grafting offers a well-proven predictable method for ridge augmentation and defect regeneration for dental implant placement. The most common intraoral donor sites include the mandibular symphysis, mandibular ramus, and maxillary tuberosity. Although each donor area has specific associated complications the most common complications of intraoral autogenous harvesting/ grafting concern those from the mandibular symphysis. Potential complications associated with surgical harvesting of bone from the ramus include damage to the inferior alveolar nerve and trismus after surgery. Damage to the buccal nerve has been reported as well. Surgical harvesting of bone from the mandibular symphysis region are associated with a higher incidence of altered neurosensory disturbances to the mandibular anterior teeth and soft tissues of the chin area. Many of these complications can be avoided by proper surgical technique, good planning and an experienced operator. Recipient site complications include wound dehiscence, flap necrosis, graft exposure, graft contamination, infection, and problems with bone graft incorporation and resorption. Proper flap reflection, intimate fixation of the graft, and flap coverage without tension can avoid many of the potential postsurgical complications. Bone graft material including barrier membranes should be immobilized (fixated if possible). Provisional restorations should be adjusted to prevent pressure over grafted areas. Block grafts as well as other augmentation procedures require experience in handling hard and soft tissue as well as a clinician who is prepared to recognize and treat complications should they arise.

Guided Bone Regeneration [6, 7]

Guided bone regeneration (GBR) is a procedure that utilizes a barrier membrane to isolate an area for bone regeneration. Most common complication associated with GBR is premature exposure of the barrier membrane and necrosis of the overlying flap. Once exposed to the oral environment the membrane becomes colonized with bacteria within 3 to 4 weeks and the potential for bone regeneration under the membrane is limited to an area that is at least 2 to 3 mm from the contaminated surface.

On the basis of the evidence emerging from clinical practice a possible classification of complications in GBR with non-absorbable membranes can be suggested:

• **Exposure and infection of the membrane**

Class I: Small membrane exposure (≤3 mm) without purulent exudation

Class II: Large membrane exposure (>3 mm) without purulent exudation

Class III: Membrane exposure with purulent exudation

Class IV: Abscess formation without membrane exposure

• **Lesions associated with periosteal releasing incision**.

Topical application of chlorhexidine to the exposed membrane has been advocated as a method of reducing the amount of bacteria but it does not solve the problem and removal of the exposed membrane is necessary.

Other complications associated with GBR procedures include soft tissue or bone graft infection, failure to regenerate adequate bone volume and mucogingival problems including loss of keratinized tissue and decrease in the vestibule. Most of these complications are related to insufficient soft tissue healing after tooth extraction, inadequate flap design, movement of the membrane and/or graft caused by transmucosal loading and improper provisionalization, flap suturing under tension, poor surgical technique, contamination of the membrane or surgical site, compromise of the vascular supply and flap advancement for graft coverage that reduces the

keratinized tissue, and vestibular depth. To prevent complications associated with GBR procedures proper surgical technique should be employed. Allow adequate healing of the soft tissue before performing a GBR procedure. Remove all sources of infection before surgery (i.e. periodontally, endodontally, or hopelessly involved teeth).

Design the flap to ensure adequate blood supply and flap closure. Meticulous recipient site preparation is essential. Clearly locate (radiographically and clinically) important adjacent anatomic structures. Ensure adequate release of the buccal flap with a periosteal incision. Ensure appropriate membrane positioning and fixation. Suturing technique is important: first use internal horizontal mattress sutures, and then single interrupted sutures. Adequate presurgical and postsurgical care includes systemic antibiotics and local antiseptics. Adequate knowledge is required regarding oral anatomy and the prevention and treatment of complications.

Conclusion

Failure of implant has a multifactorial etiology. Often many factors come together to cause the ultimate failure of the implant. One needs to identify the cause not just to treat the present condition but also as a learning experience for future treatments. Proper data collection, patient feedback, and accurate diagnostic tool will help point out the reason for failure. An early intervention is always possible if regular check-up is undertaken.

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