

Feb 06, 2017

“Monday Morning Pearls of Practice by Bobby Baig”

baig@buildyoursmile.com

Prosthodontic Associates
2300 Yonge St, suite 905
Toronto, M4P1E4
www.buildyoursmile.com

Tilted (Angulated) Implants: Review of Success Rate and Marginal Bone Loss

Purpose:

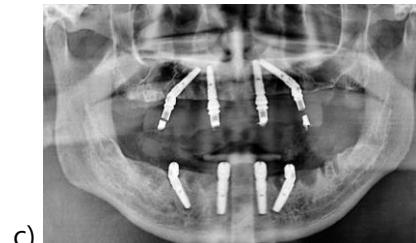
To compare patients treated with tilted implants versus those treated conventionally with axial implants, analyzing the success rate and marginal bone loss.

Introduction:

The term tilted implants refers to implants placed at an angle of normally 15 degrees or more with respect to axially or vertically positioned implants. According to many authors, the use of tilted implants in the posterior maxillary sector offers advantages over axial implants.



a)



c)

Advantages of using tilted implants over axial Implants:

1. The placement of tilted implants offers both surgical and prosthodontic benefits.
2. In effect, the combination of tilted and axial implants allows the use of longer implants, increasing the osseointegration by increasing in the surface area.

3. Improves primary stability by anchoring in more than one cortical layer.
4. Avoids cantilever extremities by placing the implants more distal and with better load distribution over the dental arch.
5. Avoids the use of bone grafts and sinus lift procedures with the resulting reduction in morbidity.
6. Tilting of the implants may engage greater quantity of residual bone, which may be beneficial to implant stability. Moreover, a more even distribution of stress around implants is achieved.
7. It was also suggested that the reason for the high survival of tilted implants may be the increased contact between cortical bone and tilted implants, increasing the initial stability, which may be true for the maxilla, but not necessarily for the mandible.

Marginal Bone loss:

1. Full-arch prosthesis that the reduction of the cantilever length achieved by tilting of the distal implants allows for a more widespread distribution of the occlusal forces under loading, and consequently for a reduction of the stresses at the implant neck.
2. Analyzing tilted implants in splinted full-arch prostheses observed more favorable results for tilted implants concerning marginal bone loss, due to the splinting effect.
3. The cantilever length of the prosthesis also has some influence; as shorter cantilevers have been correlated to a reduced peri- implant bone loss.
4. The present review of the data did not find an apparent significant effect of tilted dental implants on the occurrence of greater marginal bone loss in comparison with axially placed implants.
5. However, these results should be interpreted with caution due to the lack of use among the included studies of a standardized technique aiming to obtain a precise and reproducible bone loss measurement, and also due to the variability of the follow-up period among the studies.

Success Rate:

1. It has been considered that loaded tilted implants can fail due to the presence of unfavorable forces applied to the bone surrounding the implants. However, this theory was rejected by Celletti et al in 1995, whom used these implants splinted so as to adequately distribute prosthetic loading.
2. In the year 2009 Agliardi et al published the largest series to date, with 61 rehabilitated maxilla's in which four implants were placed: two more anterior in an axial position and two more posterior in a tilted position parallel to the anterior wall of the maxillary sinus. The success rate was 100% for both the axial and the angled implants, after a mean follow-up of 27.2 months.
3. Penarrocha et al 2010. In turn rehabilitated 10 patients with over dentures on four tilted implants. Only one implant failed, after 12 months of follow-up, the corresponding success rate being 97.7%.
4. Malo et al. (2005) published a study of 32 patients with the placement of 128 dental implants (64 angled and 64 axial), the reported success rate being 95.3% and 100%, respectively. The marginal bone loss was 0.9 mm on average, with no differences between the tilted implants and the axial implants.
5. Rosen and Gynther (2007), in a study involving follow-up for as long as 12 years, with the placement of 103 tilted implants, recorded a success rate of 97%. Their mean marginal bone loss was 1.2 mm. These authors concluded that angled implants placed in the extremities of atrophic maxilla's constitute a viable and evidence-based treatment option, and may be viewed as an alternative to bone grafting.
6. Malo et al; 2014. A total of 324 patients were rehabilitated with 1,296 implants supporting 324 full-arch fixed immediately loaded mandibular prostheses. Sixty-four patients (19.8%) were lost to follow-up. Prosthetic survival was 323/324 (99.7%), and 14 patients lost 18 implants, with an estimated cumulative survival rate of 95.4% at 7 years. Variables associated with implant failure were smoking. Mean MBL at 5 years was 1.81 mm, and smoking was associated with MBL \geq 2.8 mm.

Conclusion:

1. Based on the findings there is **no evidence of differences** in success rate between tilted and axial implants in either the prospective or retrospective studies subjected to review.
2. The **marginal bone loss** observed with the tilted and axial implants likewise proved **very similar**.
3. It thus can be concluded **that tilted implants** exhibit the same evaluative behavior **as axial implants**.

Reference:

1. Block MS, Haggerty CJ, Fisher GR. Nongrafting implant options for restoration of the edentulous maxilla. *J Oral Maxillofac Surg*. 2009;67:872-81.
2. Krekmanov L, Kahn M, Rangert B, Lindström H. Tilting of posterior mandibular and maxillary implants for improved prosthesis support. *Int J Oral Maxillofac Implants*. 2000;15:405-14.
3. Aparicio C, Perales P, Rangert B. Tilted implants as an alternative to maxillary sinus grafting: a clinical, radiologic, and periotest study. *Clin Implant Dent Relat Res*. 2001;3:39-49.
4. Calandriello R, Tomatis M. Simplified treatment of the atrophic posterior maxilla via immediate/early function and tilted implants: A prospective 1-year clinical study. *Clin Implant Dent Relat Res*. 2005;7:S1-12.
5. Malo P, Rangert B, Nobre M. All-on-4 immediate-function concept with Bränemark System implants for completely edentulous maxillae: a 1-year retrospective clinical study. *Clin Implant Dent Relat Res*. 2005;7:S88-94.
6. Capelli M, Zuffetti F, Del Fabbro M, Testori T. Immediate rehabilitation of the completely edentulous jaw with fixed prostheses supported by either upright or tilted implants: a multicenter clinical study. *Int J Oral Maxillofac Implants*. 2007;22:639-44.
7. Testori T, Del Fabbro M, Capelli M, Zuffetti F, Francetti L, Weintraub RL. Immediate occlusal loading and tilted implants for the rehabilitation of the atrophic edentulous maxilla: 1-year interim results of a multicenter prospective study. *Clin Oral Implants Res*. 2008;19:227-32.
8. Agliardi EL, Francetti L, Romeo D, Del Fabbro M. Immediate rehabilitation of the edentulous maxilla: preliminary results of a single-cohort prospective study. *Int J Oral Maxillofac Implants*. 2009;24:887-95.
9. Balleri P, Ferrari M, Veltri M. One-year outcome of implants strategically placed in the retrocanine bone triangle. *Clin Implant Dent Relat Res*. 2010;12:324-30.
10. Agliardi E, Panigatti S, Clericò M, Villa C, Malo P. Immediate rehabilitation of the edentulous jaws with full fixed prostheses supported by four implants: interim results of a single cohort prospective study. *Clin Oral Implants Res*. 2010;21:459-65.
11. Hinze M, Thalmair T, Bolz W, Wachtel H. Immediate loading of fixed provisional prostheses using four implants for the rehabilitation of the edentulous arch: a prospective clinical study. *Int J Oral Maxillofac Implants*. 2010;25:1011-8.
12. Francetti L, Romeo D, Corbella S, Taschieri S, Del Fabbro M. Bone Level Changes Around Axial and Tilted Implants in Full-Arch Fixed Immediate Restorations. Interim Results of a Prospective Study. *Clin Implant Dent Relat Res*. 2010 Oct 26.
13. Mattsson T, Kändell PA, Gynther GW, Fredholm U, Bolin A. Implant treatment without bone grafting in severely resorbed edentulous maxillae. *J Oral Maxillofac Surg*. 1999;57:281-7.
14. Rosén A, Gynther G. Implant treatment without bone grafting in edentulous severely resorbed maxillas: a long-term follow-up study. *J Oral Maxillofac Surg*. 2007;65:1010-6.
15. Peñarrocha M, Carrillo C, Boronat A, Peñarrocha M. Maximum use of the anterior maxillary buttress in severe maxillary atrophy with tilted, palatally positioned implants: a preliminary study. *Int J Oral Maxillofac Implants*. 2010;25:813-20.
16. Celletti R, Pameijer CH, Bracchetti G, Donath K, Persichetti G, Visani I. Histologic evaluation of osseointegrated implants restored in nonaxial functional occlusion with preangled abutments. *Int J Periodontics Restorative Dent*. 1995;15:562-73.
17. Javier Ata-Ali et al; Oral rehabilitation with tilted dental implants: A metaanalysis *Med Oral Patol Oral Cir Bucal*. 2012 Jul 1;17 (4):e582-7.
18. Malo et al; All-on-4® Treatment Concept for the Rehabilitation of the Completely Edentulous Mandible: A 7-Year Clinical and 5-Year Radiographic Retrospective Case Series with Risk Assessment for Implant Failure and Marginal Bone Level. *Clin Implant Dent Relat Res*. 2014 Dec 23
19. Bruno Ramos Chrcanovic et al; Tilted versus axially placed dental implants: A meta-analysis; *journal of dentistry* 43 (2015) 149–170.