

Why and When to use Tilted Dental Implants?

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ABSTRACT

Nowadays, prosthetic treatment plans often involve the use of dental implants, which are placed according to the results of the analysis of the concerned zone. For practical, aesthetic and functional reasons, practitioners generally insert these implants along axis closed to that of natural teeth to be replaced. However, in many clinical situations, it may be appropriate to perform implant anchorage along an oblique axis.

Keywords: Tilted implant, Oblique implant, Inclined implant

INTRODUCTION

Analysis of 3d radiological imaging often leads practitioners to consider implant placement along an oblique axis:

- To avoid breaching an anatomical obstacle (maxillary sinus, inferior alveolar nerve, adjacent natural dental roots)
- To find a favorable osseous anchorage, especially in the case of immediate implant placement after tooth extraction
- To allow the placement of longer implants with increased bone-to-implant contact
- To eliminate the use of prosthetic cantilevers.

The question then arises as to whether it is more judicious to use these inclined implants or rather to modify the anatomical site and/or the therapeutic timing in order to promote the placement of the implant in an axis that is a priori more favorable. Contrary to general belief, the scientific literature teaches us that these tilted implants have a functional behavior that is just as appreciable as implants placed more or less along the main axis of occlusal forces. A meta-analysis of this literature reveals the absence of significant differences, both in terms of survival rate, marginal bone loss and infections as well [1]. Results are just as favorable for single-tooth implants [2] as for multi-tooth restorations [3,4], including constructions with a 3-years (or more) follow-up [5].

Last but not least, let's mention that some *in silico* studies have indicated that tilted implants might react more favorably compared to straight implants from a biomechanical point of view [6,7].

Studies therefore report clinical success rates as good as those of axial implants, including in long-term follow-up of immediate implant procedures [8].

As with short implants and fixed tooth-implant-supported constructions [9], which are generally classified as 2nd-line indications, the use of inclined implants is often justified as a therapeutic compromise [10]. This does not mean that the treatment has poor chances of success, but that it is favorably initiated after weighing up the pros and cons of the treatment alternatives available in the given overall clinical situation (**Figures 1-6**).



Figure 1a. 66-years-old women patient (colleague's wife) looking for an effective, non-invasive solution to the failure of a posterior dental bridge. Failure of a teeth-supported cantilever bridge (that can be considered as a second line treatment).

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Figure 1b. 66-years-old women patient (colleague's wife) looking for an effective, non-invasive solution to the failure of a posterior dental bridge. Prosthetic correction introduced in 2017 (6 years of function to date) without bone grafting using a bridge on implants, one of which is steeply inclined in the subsinus area.



Figure 2a. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. Initial clinical and radiological presentation.



Figure 2b. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. 3D R-Ray analysis and treatment plan: after tooth extraction, we'll try to insert the implant according to a double lead angle axis in order to get an initial primary fixation of the implant, while also taking care not to touch the sinus cavity and the proximal vital roots as well.

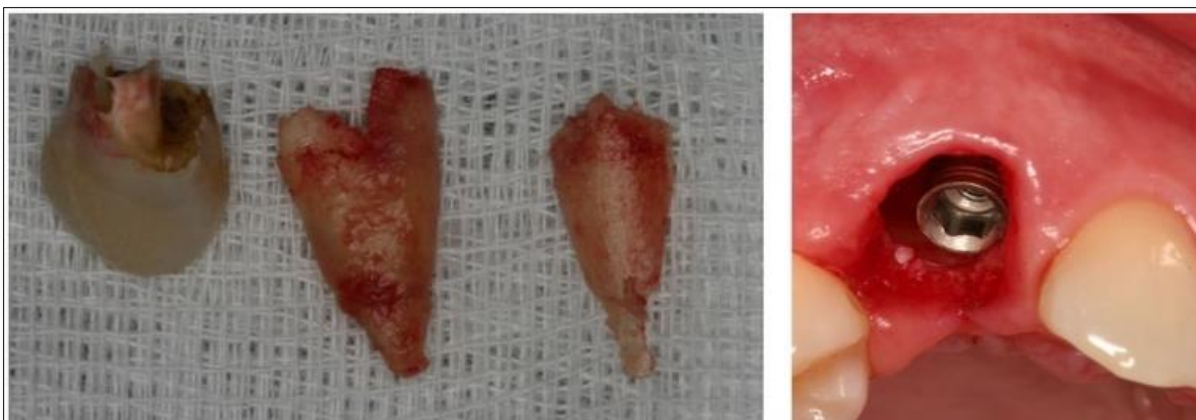


Figure 2c. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. Tooth extraction and immediate implant (ALPHABIO®) placement.



Figure 2d. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. The whole surgical-temporary-prosthetic protocol is achieved so that we can place a screwed-in (palatal access) temporary crown immediately after surgery.



Figure 2e. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. Bio-Oss® (Geistlich®) bone filling around the implant body, just before temporary crown placement (by direct screwing / no cement).



Figure 2f. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. Clinical and radiological result at 8 days postoperative.



Figure 2g. Young woman, 38 years old, presenting an internal resorption on her upper right canine. Her general practitioner cannot treat and save it. The demand consists in an immediate tooth replacement with respect of esthetic clinical appearance. Last clinical check, final crown in place (Dr. CHAPELLE) and X-Ray control at 4 months-postoperative.

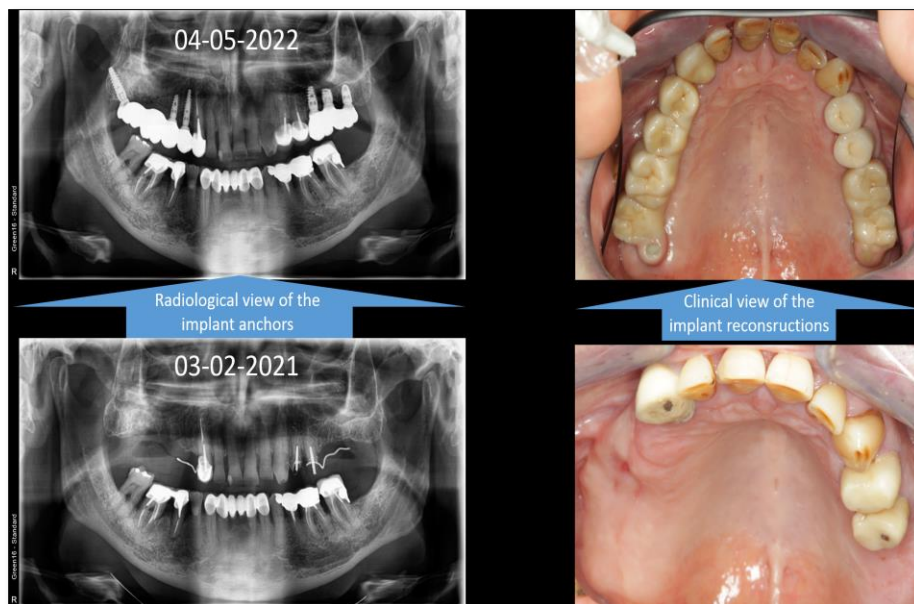


Figure 3. 70-years-old male patient (medical doctor) wanting an effective but time-saving prosthetic treatment. According to the osseous sites configuration, we have opted either for axial short implants (left) or for the realization of a bridge combining axial implants and an oblique one placed in the maxillary tuberosity.

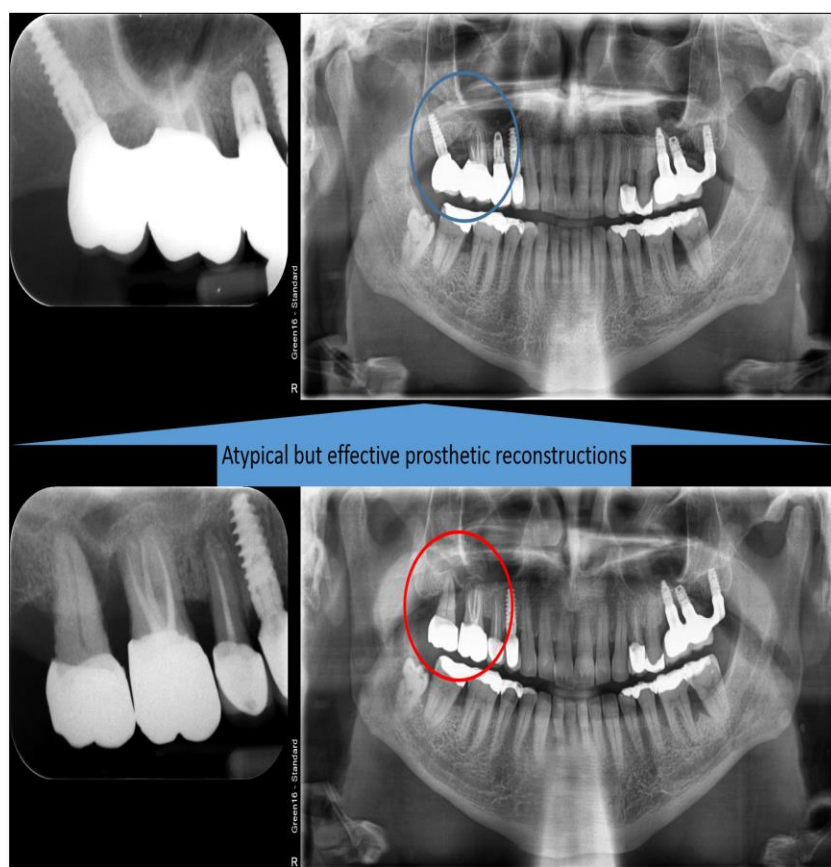


Figure 4. 74-years-old male patient (retired medical doctor): In the right upper jaw, we made a mixed tooth-implants supported bridge (9), using 1 short mesial implant and a posterior slightly oblique one to avoid breaking the sinus lobe.

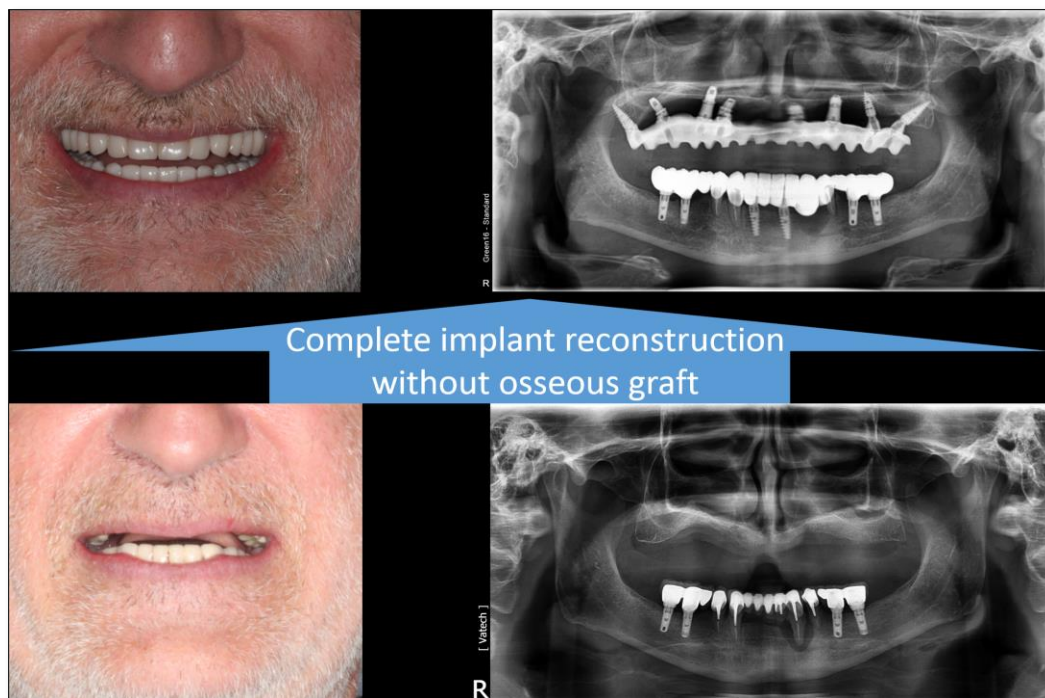


Figure 5. We had to use extra short implants (Southern Implants®) as well as oblique implants to meet the specifications of this 66-years-old patient who no longer wanted to undergo bone grafting after 2 failures in this area. Note the tilted implants (Magix® by Cortex Dental Implants®) in the tuberosity zone to avoid prosthetic cantilevers.

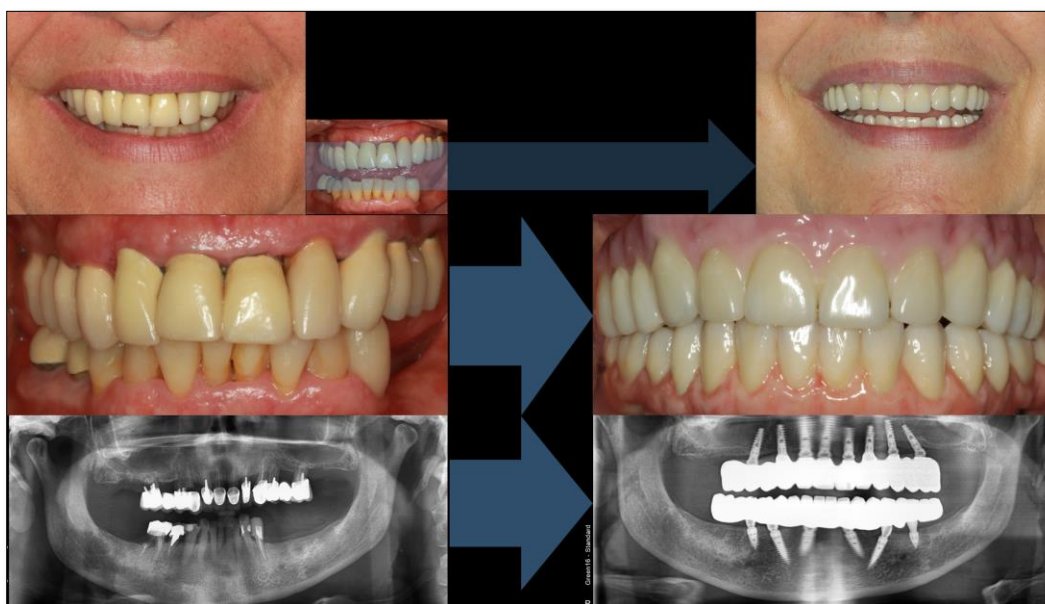


Figure 6. Most of the time, tilted implants are placed in this way to avoid an anatomical obstacle or to augment/optimize bone anchorage. But according some studies (6,7), this obliquity could also contribute to the good behavior of the reconstruction in terms of biomechanics.

Implants can be tilted in both bucco-lingual and mesio-distal directions, or a combination of both (**Figure 2**). In addition to the purely surgical aspect, which must be managed in the light of a 3D radiological study, the practitioner must also

include in his treatment plan the appropriate prosthetic modalities to ensure that the inclination of the implant(s) does not hinder the successful realization of the prosthesis,

particularly in terms of aesthetics and possible removability [11].

The various examples in this article illustrate the clinical choices made with inclined implants. In each case, this procedural choice is based on either the patient's preference with regard to therapeutic alternatives, or the practitioner's preference, based on his or her knowledge and experience.

CONCLUSION

Tilted implants can be considered as part as Evidence-Based Dentistry since, not only they are useful and widely used in various clinical settings, but all studies to date show no significant difference between oblique and axial implants in terms of efficacy, complications or survival rates.

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