



UNIVERSIDADE FEDERAL DE UBERLÂNDIA
FACULDADE DE ODONTOLOGIA



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**TOTAL REHABILITATION WITH TILTED
IMPLANTS BY DYNAMIC ABUTMENT: A
CLINICAL REPORT**

UBERLÂNDIA

2017

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CLINICAL REPORT**

Trabalho de conclusão de curso apresentado
a Faculdade de Odontologia da UFU, como
requisito parcial para obtenção do título de
Graduado em Odontologia

Orientadora: Prof^a. Dra. Letícia Resende
Davi

UBERLÂNDIA

2017

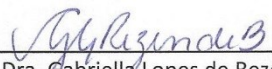


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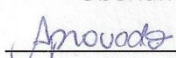
ATA DA COMISSÃO JULGADORA DA DEFESA DE TRABALHO DE CONCLUSÃO DE CURSO DO (A) DISCENTE **Vithor Xavier Resende de Oliveira** DA FACULDADE DE ODONTOLOGIA DA UNIVERSIDADE FEDERAL DE UBERLÂNDIA.

No dia seis de julho de 2017, reuniu-se a Comissão Julgadora aprovada pelo Colegiado de Graduação da Faculdade de Odontologia da Universidade Federal de Uberlândia, para o julgamento do Trabalho de Conclusão de Curso apresentado pelo (a) aluno (a) **Vithor Xavier Resende de Oliveira, COM O TÍTULO: "TOTAL REHABILITATION WITH TILTED IMPLANTS BY DYNAMIC ABUTMENT: A CLINICAL REPORT"**. O julgamento do trabalho foi realizado em sessão pública compreendendo a exposição, seguida de arguição pelos examinadores. Encerrada a arguição, cada examinador, em sessão secreta, exarou o seu parecer. A Comissão Julgadora, após análise do Trabalho, verificou que o mesmo encontra-se em condições de ser incorporado ao banco de Trabalhos de Conclusão de Curso desta Faculdade. O competente diploma será expedido após cumprimento dos demais requisitos, conforme as normas da Graduação, legislação e regulamentação da UFU. Nada mais havendo a tratar foram encerrados os trabalhos e lavrada a presente ata, que após lida e achada conforme, foi assinada pela Banca Examinadora.

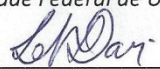
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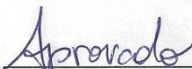
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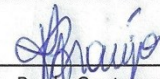
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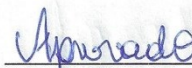
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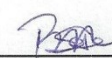
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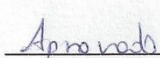
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ACKNOWLEDGMENTS

The authors are indebted to FAPEMIG, CNPq and CAPES for their financial support, to NEPRO Research Group for the technical support.

ABSTRACT

Tilted implant placement into the bone is an alternative for clinicians to avoid reconstructive surgeries, and enable rehabilitation with less morbidity and less cost. However, tilted implants restored with screwed prostheses may interfere with esthetics due to the access screw hole site. In addition, the exposure of the metal abutment in superficial implants or the graying effect in thin gingival tissue biotype could affect esthetics of the prosthesis. This clinical report describes a fixed prosthesis supported by tilted implants with angle modification using dynamic abutments in the edentulous maxilla.

INTRODUCTION

Dental implants have proven their long-term clinical efficacy, which has increased the demand for this type of treatment originally developed by Brånemark.¹ Rehabilitation with implant-supported restorations allows replacing the missing teeth, and offers great benefits such as esthetics, functional outcomes and durability.² Therefore, the correct placement of dental implants enables the execution of definitive prosthesis to achieve the success parameters expected for implant-supported rehabilitation.

Patients with optimal bone quality and quantity for implant placement is a very important aspect for the prosthetic rehabilitation of completely edentulous patients with dental implants. However, clinical and radiographic analyses may detect anatomical limitations, such as atrophic maxilla, alveolar ridge resorption, nerves and blood vessels, maxillary sinus pneumatization and presence of nasal cavity in the anterior maxilla, interfering with the ideal positioning of dental implants.³ To solve that problem, bone augmentation is necessary to regenerate bone loss, to achieve ideal dental implant position, in addition to increasing time, cost and morbidity of the surgical procedure and the possibility of surgical complications.^{4,5} To avoid reconstructive surgeries, tilted implant placement into the bone is a clinical alternative, yielding rehabilitation with less time, cost and morbidity.⁶

To rehabilitate tilted implants, screwed or cemented prostheses could be used, but some factors may influence this choice: Esthetics outcomes, ease of fabrication and cost, access, occlusion, retention, incidence of retention loss, retrievability, fit passivity, implant position restriction, effect on peri-implant tissue health among several others.^{7,8,9} Screwed prostheses offer advantages such as retrievability, retention predictability in interocclusal spaces < 4mm, no excess cement in the peri-implant region. However, there are also some problems which may hinder esthetics outcomes, namely, the implant is not in its ideal position

due to the access screw hole site in the esthetics area. To solve this problem angled abutments have been developed. However, for angled abutments in 17° a minimum gingival depth of 3 to 4 mm is required, because the metal strap ranges from 2 to 2.5 mm in size. Furthermore, the exposure of the metal abutment in superficial implants or the graying effect in thin gingival tissue biotype^{10,11} could affect esthetics of the prosthesis. Also, the cemented prostheses offer advantages such as resolving unfavorable dental implant position, achieving esthetics outcomes, easy execution by means of pre-fabricated components, and eliminating the access hole. Conversely, they also present some limitations such as difficulty in removing sub-gingival excess cement, which can cause chronic inflammation of peri-implant tissue.^{12,13,14}

In order to meet these demands, dental implant companies (Mangran International) have developed a different method. A new type of abutment was launched in the market, which corrects angulation up to 28 degrees,² without metal straps. This dynamic abutment containing a plastic tube is articulated to form the angle up to 28 degrees with the base, enabling rotation of around 360° (<https://www.youtube.com/watch?v=SiMiJpjYQ-Q>). To achieve optimal waxing, the expected angulation should be defined prior to casting. The octalobular screw design enables torque transmission to the prosthetic screw out of the conventional insertion axis, solving the problem with the access screw hole of screwed prostheses in tilted implants. The aim of this case report is to present a total rehabilitation in the edentulous maxilla using seven dynamic abutments to correct angulation without using an angled abutment, which could increase the cost and may affect esthetics.^{2,3}

CLINICAL REPORT

A 47-year-old woman checked into a private clinic called *Saude Oral Maruki Pereira*, with 8 external hexagon implants (ø3.75x13mm, Neodent) in the edentulous maxilla for an implant-supported fixed prosthesis (Fig 1). During the clinical examination, it was verified

that the implants were tilted and could interfere with esthetics, with the screw access holes located in the buccal region (Fig. 2). In addition, little gingival depth made it impossible to use angulated abutments because esthetics would also be affected. Furthermore, the tilted implants would interfere with the path of insertion of fixed prostheses and dynamic abutments were indicated to fulfill the esthetics requirements.

Provisional restoration was made and the screw access holes were located on the buccal surface, confirming the unfavorable angulation of the implants. Impressions for making the final prostheses were performed using open tray transfers (Neodent, Curitiba, Brazil) and polyvinylsiloxane impression material (Zetaplus, Zhermack, Badia Polesine, Italy). After obtaining the plaster casts -by means of Type IV die stone (GC Fugirock EP, GC America, USA), bite registration was performed using the provisional prosthesis and three registration points with red acrylic resin (Pattern Resin, GC, Bad Homburg, Germany), on the occlusal surface of one posterior teeth of each side and one anterior teeth. Face bow register (Bioart, São Carlos, Brazil) was used to mount the upper cast on a semi-adjustable articulator. The provisional prosthesis with bite records was used to mount the lower cast on the articulator.

An impression of the provisional prosthesis was made to reproduce the tooth position, which-helped the dental technician with the construction of the metal framework. Because of the tilted implants, rotational dynamic plastic abutments (Mangran Internacional, Curitiba, Brazil) were used to correct the inclination of the implants. Despite using dynamic abutments, however, it was not possible to fully correct the inclination of the implants, and the screw access holes were still in the buccal region. After the angulation correction with the dynamic abutments, it was possible to make the metal framework without excessive contour of the prosthesis. Misfit and bascule movement of the metal framework were tested in the

patient and then pink ceramic was applied in the region corresponding to the patient gum for further testing (Fig. 3).

The approved infrastructure was scanned using CEREC CAD/CAM (computer-aided design and computer-aided manufacturing) system, an intraoral scanner (Omnicam, CEREC, Beinshein, Germany). The virtual models were obtained (Fig. 4), and then the virtual design of the crowns was generated on the software (Fig. 5). Anterior crowns were milled in leucite-reinforced glass ceramic (IPS Empress.Cad multi, Ivoclar Vivadent, Ellwangen, Germany) and posterior crowns were milled in lithium disilicate glass ceramic (IPS e.max Cad, Ivoclar Vivadent, Ellwangen, Germany). The infrastructure was again screwed in the patient to check the fit of the crowns and esthetic adjustments were made with the texture, make up and glaze of ceramic crowns, after the patient's approval.

The final prosthesis was installed over the implants with the retaining screws and tightened with the recommended torque. The dynamic abutments screw sites were recorded in the patient's chart, since the dynamic abutments screws have different insertion axis (Fig. 6). The head screws were protected with polytetrafluoroethylene tape and crowns were fitted, evaluating the final color using a slurry of glycerin gel base try-in (Variolink® Try-in, Ivoclar Vivadent, Ellwangen, Germany). The crowns were then removed with a tray and condensation silicone putty consistency (Zetaplus, Zhermack, Rovigo, Italy) for crowns stability during internal acid etching. For the etching 10% hydrofluoric acid (FGM Produtos Odontológicos, Joinville, Brazil) was applied to the lithium disilicate crowns for 20 seconds, and for 60 seconds on the leucite reinforced crowns. To remove debris after conditioning, 37% phosphoric acid (Attaque Gel, Biodinâmica, Ibiporã, Brazil) was applied for 60 seconds. The crowns were rinsed for 60 seconds, air spray dried, and silane (Monobond Plus, Ivoclar Vivadent, Ellwangen, Germany) was applied for 1 minute. Finally, the resin cement (Variolink II, Ivoclar Vivadent, Ellwangen, Germany) was inserted into the crowns, excess

cement removed and light cured. The occlusal adjustments were made after cementation process (Fig 7). An additional backup of CAD files was performed for precaution, and the patient was satisfied with the final resolution of the case (Fig 8).

DISCUSSION

The achievement of optimal planning allows for better treatment predictability and identifying possible problems, both success drivers of oral rehabilitation.¹⁵ Total rehabilitation in edentulous maxilla usually presents anatomical limitations, such as resorbed alveolar ridges, maxillary sinus pneumatization, noble anatomical structures, and bony defects. Possible treatments should be explained to the patient. In the event of some limitations, treatments could include reconstructive surgery to restore the quantity of bone suitable for the placement of dental implants. However, this technique offers some disadvantages: increase of patient morbidity, costs, and treatment time. Other treatment possibilities without bone grafting could be implant-supported fixed partial denture with a distal cantilever, placement of a distally tilted posterior implant (anterior to the maxillary sinus), short implants, implant placement in the zygoma or the tuberosity.¹⁶

Tilted implants have been frequently used in clinical practice in different plannings.¹⁷ Some authors have reported the advantages of using tilted implants, namely, allowing the installation of longer implants increasing primary stability, decreasing cantilevers and avoiding bony grafts.^{18,10} A systematic review comparing tilted implants with axial implants, demonstrated that tilted implants do not lead to significant alteration in crestal bone level as compared to conventional axial placement after 1 year of function, but more randomized clinical trials with larger sample size and long-term follow-up are needed⁴ especially in splinted multiple cases.

The use of tilted implants for atrophic maxilla rehabilitation may be a feasible alternative to solve inclination and restore parallelism by means of angled abutments. No difference in the pattern of strain distribution predicted using a straight or an angled abutment in the anterior maxilla was detected, and the angled abutments developed function with favorable predictability. However, esthetics limitation was found, because of inclination with minimal straps ranging from 2mm-3mm required to optimal angulation. In areas where the patient did not possess gingival tissue depth, these straps compromised esthetics.^{19,20}

In this clinical report, the initial proposal to rehabilitate the patient was to perform a conventional protocol type. However, the provisional prosthesis over the tilted implants already installed in the maxilla showed that the access screw holes could compromise the esthetics of the final prosthesis, because this access was located in the marginal gingiva area and the patient did not agree to that solution. Furthermore, in the final prosthesis that problem was minimized, using the dynamic components as shown in Fig 8, the holes corresponding to teeth 23 and 24 had to be restored with pink gingival resin, but these corresponded to only two of the 7 implants rehabilitated. It must be highlighted that to resolve that inclination, prefabricated angled abutments could be used as a correction device although the metal display on the buccal surface created a problem since the patient had a high smile and a major esthetic demand. Also, the esthetics was compromised because of thin tissue that cannot hide the gray effect of the metal abutment.

Thus, the dynamic components were selected for angling the access screw holes, with the aim to produce a metal framework simulating tooth preparations to receive all-ceramic crowns using the CAD/CAM charside system, since this reduced fabrication time of the final prosthesis. After scanning the infrastructure, the digital crowns design is registered in the software, simplifying the process should changes be made to any crowns. The problem of reversibility still remains, however, because if one of the screws loosens grip, it is necessary

to remove the crowns to access the screws. After removing the prosthesis and retightening the screws, it is necessary to make new crowns to be cemented, increasing the cost and clinical time. In view of this, an additional backup is required.

Dynamic components have some peculiarities, among which we can highlight the prosthetic key–octalobular shape for screwing (Fig. 7), which unlike other conventional formats, must be registered on Dental record. This component is the new prosthetic alternative for rehabilitation of tilted implants, so clinical cases or case series reports are important for dentists to know their advantages and then choose to use in their clinical practice, since there were no randomized clinical trials available in the literature. Despite the good resolution of the case, these authors recommend, at a time of software for guided surgeries, special care in the positioning of the dental implants through a reverse planning.

Five problems must be taken into account. The first problem regards the use of the UCLA dynamic to substitute the angles abutment, which leads to safety lock (prosthetic screw). The second problem lies in the fact that, even after correction, it is necessary to use a specific key, which may lead to an emergency treatment requiring the assistance of another dentist. The fourth and fifth problems refer to technical issues such as the increase in cost, time and difficulty when compared to a conventional protocol.

CONCLUSION

Besides the limitations of the technique presented in this clinical report, fixed prostheses supported by tilted implants associated with dynamic abutments ~~is~~ are an alternative for clinicians to rehabilitate the edentulous maxilla. The patient was satisfied with the functional and esthetic oral rehabilitation. All information regarding maintenance of the prosthesis was provided to the patient to enhance clinical success, including the specifications of the prosthetic key used.

DECLARATION OF INTEREST

The authors claim to have no financial interest, either directly or indirectly, in the products or information listed in the article.

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FIGURE LEGENDS

Fig. 1. Hexagon implants in the edentulous maxilla.



Fig. 2. Screw access holes located in the buccal region



Fig. 3. Metal framework



Fig. 4. Virtual models obtained by CEREC CAD/CAM.



Fig. 5. Virtual design of the crowns.



Fig. 6. Difference between keys.

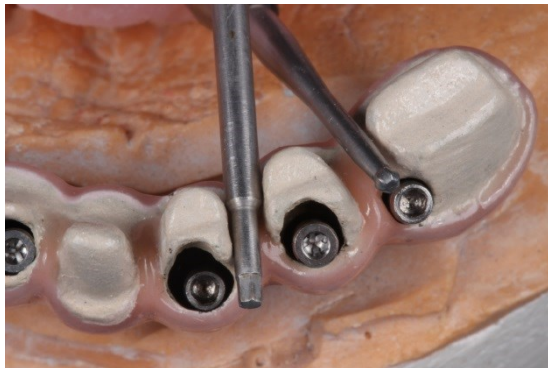


Fig. 7. Final occlusal adjustments



Fig 8. Final smile.



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The clinical report describes the author's methods for meeting a patient treatment challenge. It should be no longer than 4 to 5 double-spaced, pages and be accompanied by no more than 8 high-quality illustrations. In some situations, the Editor may approve the publication of additional figures if they contribute significantly to the manuscript.

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