



Divergence of Implants and Asymmetry of Fixed Prosthesis on Implants Case Report

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Abstract: This report presents the case of a 62-year-old man, who went to the dentist's office in May 2022 to rehabilitate the edentulous maxillary area. It was planned to place implants in positions 16, 14, 12, 22, 24, and 25, with a delayed technique in the placement of the fixed prosthesis. The implant 24 had a divergent position towards buccal. There was also an asymmetry in the prosthesis, since implants 24 and 25 were closer to each other, to avoid the proximity of the maxillary sinus on the left side, while piece 16 could be placed on the right side. The non-parallel placement of an implant is not a complication, but rather an unscheduled inconvenience. In many cases, it depends on the availability of bone to be able to place the implants in the positions programmed as ideal. To improve esthetics in screw channel 24, a making agent was applied. We have found it more reasonable to place tooth 16, even though it results in an asymmetric prosthesis. It is a tooth that is useful for the patient to chew and the asymmetry is minimal, concerning the whole of the prosthesis. Bone limitations in width and depth condition the position and angulation of the implants. The divergence and asymmetry of these implants also condition the way of making the fixed prosthesis on them. The choice between a cemented or screw-retained prosthesis is not essential, since in both cases a good oral, functional, and aesthetic restoration can be made.

Keywords: Implant, divergence, Nonparallel, asymmetry, prosthesis, cemented, screwed.

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INTRODUCTION

Regarding implant divergences, it has been described that they are more frequent when they are placed in the maxilla than in the mandible [1]. Implants placed on the opposite side to where the clinician is located have more divergences than those located on the same side [1]. Implants located in the anterior region diverge more than those located in the premolar and molar regions [1]. Implants located adjacent to teeth had greater divergences than those implants located in an edentulous region [1]. However, dental implants placed by hand by an experienced clinician are said to have only slight axial deviation from the optimal position [2]. Some authors point out that implants placed on the ipsilateral and contralateral sides by

clinicians, with the dominant right or left hand, have similar angulations [2]. When implants are placed by hand, the presence of adjacent teeth, the quadrant, and the location of the implant influence its direction and angulation deviation from its ideal position, but the number of missing teeth does not [3].

Regarding the taking of impressions with non-parallel implants, some authors point out that when the open tray technique is used, the results are better than with the closed tray technique [4]. Non-parallel implants can retain the impression during tray removal and this can have a significant impact on the accuracy of the impression [4]. Unfavorable parallelism can be corrected prosthetically, however

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lack of parallelism can distort the impression material giving an inadequate master cast [4]. To obtain a good passive fit in the final prosthesis, the working casts must be adequate. It appears that increased divergence between implants does not affect the accuracy of conventionally created stone models, but the digital technology was more accurate when the implants were more divergent [5]. Making a removable denture is challenging when the implants are not parallel, but an overdenture can give excellent results [6].

Regarding the way to fix the prosthesis on implants, it has been described that cementation on a prefabricated abutment is possibly the most used

[7,8]. Cement-retained implant crowns are considered more esthetic than screw-retained implant crowns, as they do not have an access hole [7]. One challenge is to remove excess cement that may remain in the form of subgingival debris and cause peri-implantitis [7]. It is advisable to take a post-cementation radiograph and check that there are no subgingival remains of cement [7]. Screw-retained implant crowns have the advantage of minimizing the risk of peri-implantitis and are easier to remove [7]. The latter makes it easier to repair, or replace the crown in case of porcelain fracture [7]. The drawback is that the screw access hole can give an unsightly result [7] (Table 1).

Table 1: Advantages and disadvantages of cemented and screw-retained prostheses on implants [8-10]

	Cement-retained prosthesis	Screw-retained prosthesis
Advantages	-It is of choice in aesthetic areas. -They are more resistant to fracture in porcelain.	-Easy access: if the prosthesis is damaged it can be removed for repair, replacement, or cleaning. -Avoiding the complications of using cement is an advantage.
Disadvantages	-Difficult to remove: if a crown needs to be repaired, it will need to be broken to access the screw. -Invisible cement can extend outside the implant area, leading to peri-implantitis and bone loss.	-Appearance: a hole is visible in the esthetic zone, even when filled with a similarly colored material. -They are less resistant to fracture in porcelain. -The screws can be lost or loosened by the cyclical chewing loads day by day.

We present a clinical case of a screw-retained prosthesis on six implants, in which there was a divergence of an implant and asymmetry in the length of that prosthesis.

Case Report

This report presents a case of a 62-year-old man, who attended the dentist's office in May 2022 to assess the possibility of rehabilitating the edentulous maxillary area. For this reason, an orthopantomography was requested (Fig 1). In it, little bone was seen in the posterior areas of the maxilla, due to the proximity of the maxillary sinuses. It was planned to place implants in positions 16, 14, 12, 22, 24, and 25, with a delayed technique in the placement of the fixed prosthesis. The diagnosis was completed by taking several periapical radiographs of the area from different angles, with 4-mm-diameter metal balls as references (Fig 2). An upper model of the mouth was also made, cast in plaster.

Days before surgery, the entire procedure (oral and written) was explained to the patient, written informed consent was obtained, and antibiotic (amoxicillin/clavulanic acid 500/125 mg every 8 hours) was recommended for prevention. On the day of surgery, a simple opening flap was performed and drills were used sequentially until six Galimplant IPX implants (Sarria, Spain) were placed, all of them 4.5 x 10 mm, in positions 16, 14, 12, 22, and 24. 25. Bone reaming was carried out correctly in width and depth, achieving good primary stability. Implants 24 and 25 were placed close to each other, to avoid the proximity of the maxillary sinus (Fig 4). It was closed with 22 non-absorbable silk sutures 4/0 (Fig 4). After surgery, he was advised to take ibuprofen 400 mg every 8 hours if he had inflammation or pain. The next day the patient was suffering from mild discomfort and inflammation. In a review carried out a week later, he was already fine.



Figure 1: Orthopantomography before treatment

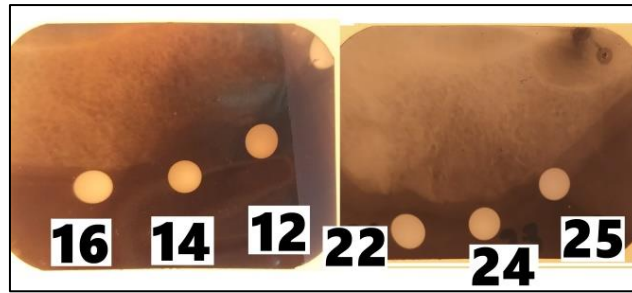


Figure 2: Periapical radiographs with 4 mm reference metal balls



Figure 3: Placement of Galimplant IPX 4.5 x 10 implants in positions 16, 14, 12, 22, 24, and 25

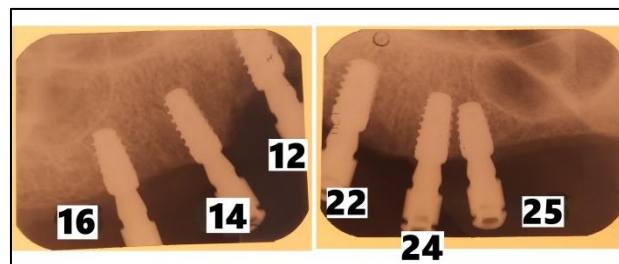


Figure 4: Periapical radiographs with the implants in their positions

After six months, transepithelial abutments were placed on each implant (2 mm high rotational aesthetic straight multiposition, Galimplant. Sarria, Spain) (Fig 5). To check aesthetics and occlusion, a previous prosthesis was made with the teeth in wax (Fig 6). The fit in the mouth of the structure of the final prosthesis was good (Fig 7). Figure 8 shows the finished metal-ceramic prosthesis on the stone model. There, the divergent exit of implant 24 towards the buccal can be seen. An asymmetry can also be seen in the prosthesis, since implants 24 and

25 were closer to each other, to avoid the proximity of the maxillary sinus on the left side, while piece 16 could be placed on the right side. Once the prosthesis was placed in the mouth (Fig 9), the screws were isolated with Teflon and the channels of each screw were covered with composite (Herculite XRV, Kerr, USA). To improve esthetics in screw channel 24, a making agent (IPS Empress Direct opaque, Ivoclar-Vivadent, Liechtenstein) was also applied.



Figure 5: Placement of transepithelial abutments on each implant



Figure 6: Waxed teeth to determine esthetics and occlusion



Figure 7: Metal structure of the prosthesis placed in the mouth

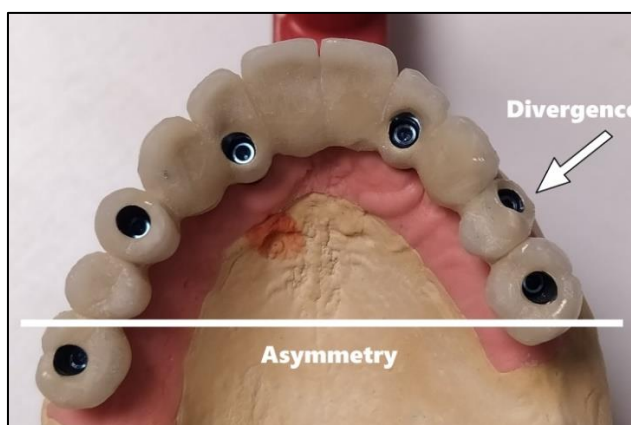


Figure 8: Divergence of the screw channel 24 and asymmetry of the prosthesis



Figure 9: Completed prosthesis, with aesthetic correction of the divergence in 24

DISCUSSION

Successful implant placement varies from site to site and patient to patient but depends on biocompatibility, implant design, material, patient factors, tissue health, bone quality, and quantity, procedural issues such as insertion torque, healing duration, biomechanical loading, loading moment, and prosthetic design [11, 12].

In dental implantology, there can be mechanical complications such as porcelain or resin fracture, prosthesis screw loosening or fracture, abutment screw loosening or fracture, and implant fracture [13-15]. This is due to material fatigue and/or corrosion [16], or due to a lack of passive adaptation between the prosthesis and the implant. There may also be clinical complications of a nervous or vascular type, or due to invasion of the

maxillary sinus [17-19]. The non-parallel placement of an implant is not a complication, but rather an unscheduled inconvenience. In many cases, it depends on the availability of bone to be able to place the implants in the positions programmed as ideal.

The divergence between implants conditions the way to fix the prosthesis on them. However, it has been reported that there are no statistical differences in the success or survival of implant prostheses, whether screw-retained or cemented [9]. Cement-retained prostheses are more esthetic than screw-retained prostheses [9]. This is because screw-retained prostheses always have a screw channel [9]. The passive fit of the prosthesis is very important to minimize inappropriate forces. If it is a cemented prosthesis, the cement space allows a better passive fit [9]. If the trajectory of the screw access channel is lingual, then screw retention can be used. If the trajectory is buccal, that canal cannot be hidden, and then the crown is cemented to avoid this complication [9]. The clinician must assess which is the best option, whether to screw or cement [20-22]. In the clinical case presented, it was thought from the beginning to make a screw-retained prosthesis. The divergence in implant 24 caused an aesthetic inconvenience, but it is a posterior area that is not seen when the patient smiles. The solution was to add a masking agent to closed the screw channel.

To solve the asymmetry of the prosthesis, there were two possibilities: a) not placing tooth 16, and b) placing tooth 26 extended outside the support of implant 25. The first option is bad since it means leaving the prosthesis without a useful tooth for chewing. The second option is also bad since it creates a pressure lever on the prosthesis. Cantilever restorations are used with caution and it require careful planning. We have found it more reasonable to place tooth 16, even though it results in an asymmetric prosthesis. It is a tooth that is useful for the patient to chew and the asymmetry is minimal, concerning the whole of the prosthesis.

CONCLUSION

Bone limitations in width and depth condition the position and angulation of the implants. The divergence and asymmetry of these implants also condition the way of making the fixed prosthesis on them. The choice between a cemented or screw-retained prosthesis is not essential, since in both cases a good oral, functional, and aesthetic restoration can be made.

Conflict of Interest: The author reported no conflicts of interest related to this study.

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