Since many years, rehabilita-

tions according to the Brä-

emark protocol (Toronto-

implants) have been cur-

in six implants, axially placed in the pre-maxilla or in the anterior axial region of the mandible, supporting a fixed bridge with bilateral distal extensions (contourless). 2. Implant and prosthetic success rates were very high, approximately 99% after long-term, exceeding 20 years of follow-up 3,4. The original protocol entailed a healing period of at least 3 months for the mandible and 6 months for the maxilla, neces-

ary for the osseointegration of the implants before the prosthetic phases can start 5. Professor Bränemark, who stated the first protocol for implant dentistry 1, considered that period of time sufficient for the integration of the implants. Today, this perios-

esite is no longer fundamental for the final success of the rehabilitation and implants can be loaded immediately after placement 6.

In fact, as testified by recent consen-

sus reports and systematic reviews 7,8, full-arch rehabilitations and im-

mediate loading seems to be a pre-

dictable approach if precise guideli-

es during surgical and immediate pro-

sthetic phase are followed. In all those papers, authors pointed out that the key factor for the immediate func-

tion seems to be a minimum implant primary stability of 30 Newton. 7 This can be achieved by using specific implant morphologies and osseoint-

cussive surface in combination with a proper preservation of the surgical site that can guarantee a press fit of the implant and a stable bone enga-

gement 8. Therefore, a rigid splitting of implants with a final bridge is especially important to provide a firm structures stabilization under occlusal load 9.

The use of tilted implants

The trend in modern implant den-

tistry is the increase of number of fixtures supporting a full-arch fixed restoration as well as the time dapl-

ing between surgical phase and pro-

sthetic loading. The lowest number was recorded in the case of the Brä-

nemark concept 10, in which three implants of 5 mm diameter were in-

stalled in the interproximal area with the help of a surgical guide and prefab-

ricated components. This approach was not very versatile because of the predetermined components and it was indicated only in patients with a spec-

ific mandibular morphology and oc-

clusal plane. Therefore, the less of one fixture led to complete failure of the prosthetic structure in a high percentage of patients. Those results led to the conclusion that at least four implants properly distributed are required to support a fixed prosthesis and ensure long term success. Early studies on immediate loading rehabilitations have included a high number of dental implants 11, spe-

cifically when applied in the mandible because of its poor bone density, but recent reports have shown good out-

comes with the use of only four or six implants.

In a recent technique called All-on-4 (© Nobel Biocare AB, Göteborg, Swe-

den) 12,13, Paolo Malo proposed the use of two anterior implants placed axially in lateral incisors and two posterior fixtures tilted be-

tween 30 to 45 degrees relative to the occlusal plane. A provisional screw-

retained prosthetics with 10 teeth can be delivered after few hours from the surgery, while the final restora-

tion will be made after 8 months. Medium term results are very encour-

aging, Malo reported 98.5% implant survival rate for 867 mandibular den-

tal implants followed up for 10 years 14, while Allsberg showed 98.39% in the maxilla and 97.73% in the man-

dible, respectively, up to 60 months of loading 15.

One of the innovative aspects of this technique is the inclination of the di-

stal implant, which offers surgical and prosthetic advantages. By tilting the implants, it is possible to place longer fixtures and achieve higher levels of primary stability because of the pre-

terior implant surface in contact with the bone 16. Furthermore, the area of emergence of the anterior alveolar nerve and the anterior wall of the maxillary sinuses are characterized by a good bone quality and this enables clinicians to find a solid mechanical support. Therefore, when implants are tilted distally, the prosthetic con-

turer is also reduced. Further pros-

ethetic consequences from implant inclination consist of an increased intermaxillar distance, the creation of a more regular prosthetic pro-

tosis and an increase in the anteroposteri-

or (AP) spread 17 compared with the Toronto-Bränemark rehabilitation, especially in mandibles of a rectangu-

lar shape. With the reduction of the number of platforms, it is easier to achieve a passive prosthetic fit, both for the provisional and for the final rehabilitation. Patients can man-

tain optimal levels of oral hygiene because of the fewer number of sur-

faces and the wider distance between implants.

Tests on models and by finite element analysis performed on single angula-

red implants showed that tilted im-

plants may increase the stress to sur-

rounding bone. Tilted fixtures may also be subjected to bending, possibly increasing the marginal bone stress. However, when the implant belongs to a multi-implant supported pro-

stheses, the spread of the implants and the rigidity of the prosthetic structure should reduce the bending 18,19. Furthermore, no difference in the marginal bone loss between tilted and axially placed implants placed either implant has been reported 20, suggesting that tilting the implants causes no detrimental effect on the osseointeg-

ration process.

Immediate full-arch fixed prosth-

eses

Immediate loading procedures have gained high popularity among cli-

nicians. The reduction of total time of treatment and the possibility to deliver a functional implant bridge few hours after the surgery represent a notable advantages for patients. Therefore, partial edentulous patients with a failing residual dentition can avoid the psychological trauma and discomfort of a temporary removable pro-

stheses 21.

The rehabilitation of edentulous jaws is often complicated by a reduced bone quantity, especially in posterior region, because of the prosthomi-

tization of maxillary sinus or for the superficialization of the inferior alve-

olar nerve. To face these limitations, clinicians have different therapeutic options, such as long distal conical 22, the use of short fixtures 23, sinus lift and bone augmentation 24 or im-

plants placed in specific anatomical areas such as pterygoid region 25, the tuber 26 or the regiona 27.

Any of these procedures requires sur-

gical and prosthetic expertise and has its own advantages, limits, risks and com-

plications, involving sometimes high biological and financial costs. In the last years, different clinical studies assessed tilted implants as a feasible treatment option, with encouraging results. In this way, the lateral side and a mucoperiosteal flap was elevated exposing the vestibular bone and the palatal plate. Bone crest repositioning was done with bone graft and titanium mesh. The surgical segment was fixed with bone screws and titanium miniplates 28,29,30.

Case report

A 62-ys old male patient was re-

ferred to our office with a precise chief complaint: fixing his failing dentition without going through multiple sur-

geries and in a relative short period of time (Fig. 1). His functional and esthetic demand was high, but he has financial limitations. He has re-

ceived multiple partial and full pro-

theses in both jaws, but now the mobility of the remaining dentition in the posterior region has compromised the esthetics.

Therefore, he was not satisfied of his actual smile. After discussing possi-

ble treatment options, we decided to perform a sinus lift and bone augmentation to exclude the bone grafts. We used the residual bone available, restoring both arches with a hybrid titanium prosthesis supported by two anterior axial and two posterior angled fix-

tures, according to the All-on-4 con-

cept. Final prosthesis will be realized with titanium CAD/CAM framework with CAM Procera ® titanium frameworks and two posterior fixtures tilted at 45° (SR Phonares ® II, Ivoclar Vivadent) and using the Intrafix® injectors.

Surgical and prosthetic phases

Implant surgery was done under intravenous anaesthesia starting from the upper jaw. After local anaesthesia, compromised teeth were ex-

tracted, extracted sockets were carefully debrided with sterile saline solution. Mid-crestal incision was done in keratinized gingiva starting from first molar region. A trans-per-

central sulcus and a mucoperiosteal flap was elevated exposing the vestibular bone and the palatal plate. Bone crest repositioning was done with bone graft and titanium mesh. The surgical segment was fixed with bone screws and titanium miniplates 28,29,30. The rehabilitation of edentulous jaws is often complicated by a reduced bone quantity, especially in posterior region, because of the prosthomi-

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to the mental foramen without creating to engage the bone area anterior to the mental foramen. Implant is placed in an underprepared surgical site to increase primary stability. Fig. 10a and 10b: Anterior implants are axially inserted in positions of lateral incisors. Fig. 11: Occlusal view of mandibular implants with abutments. Fig. 12: Provisional acrylic prosthesis containing ten teeth were delivered three hours after the surgery. Fig. 13a and 13b: Full occlusal contacts are limited between canines with no lateral excursions. Fig. 14: Verification of passive fit of titanium CAD/CAM frameworks. Fig. 15a and 15b: Final prosthesis will be realized with titanium CAD/CAM framework with nano-hybrid composite teeth and using the Bioclear™ Injector. Fig. 16a and 16b: Final bridges containing 12 teeth Fig. 17a and 17b: Occlusal view of final prosthesis with limited posterior cantilevers. Fig. 18: Lateral view of patient’s smile with the final restorations. Fig. 19: Panoramic radiograph after one year of loading showing implants distribution and bone level maintenance.

References