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TUBERO-PTERYGOID IMPLANTS: THERAPEUTIC OPTION FOR PATIENTS WITH DISTAL MAXILLARY DEFECTS

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Summary

Distal maxillary aspects traditionally are considered unfavorable for dental implantation due to non-adequate quantitative and qualitative bone characteristics, topographic vicinity of maxillary sinus etc. On the pre-implant stage of patient's rehabilitation additional surgical procedures aimed to increase a bone volume, usually cost- and time-consuming, are carried out.

Historically, a plethora of surgical techniques have been proposed to restore the atrophic posterior maxilla, including partial or complete osteotomies, bone grafting, etc. Sinus floor elevation became the most popular procedure for this purpose. Since J.F. Tulasne in 1985 described the original technique of placement of pterygoid implants, the engagement of strong cortical areas of pterygoid plates became a matter of interest for many dental practitioners, especially those working in the field of cortical implantology.

In this scientific work the results of our own clinical experience of employment of tubero-pterygoid implants in 12 patients are displayed, the technique of their installation is briefly described and clinical examples are given.

Key words

- maxilla
- edentulism
- tubero-pterygoid area
- tubero-pterygoid implant

Rationale

The availability in distal skeletal maxillary structures of corticalized, stable to resorption pterygoid processes of sphenoid bone directly connected to the maxillary tuberosity, and the possibility of their use for dental implants in order to avoid additional surgical interventions aimed at the increase in volume of the alveolar ridge, including sinus lift, bone augmentation or transplantation, has attracted professional implantologists for a long time [2,5,12]. As early as in 1972, L. Linkow [7] suggested using the pterygoid process of sphenoid bone for additional support of subperiosteal implants of his own design. In 1985, J.F. Tulasne first fixed a screw implant in the area of maxillary tuberosity by perforating its posterior wall and retaining the apical part of implant in the cortical bone of pterygoid process, reaching thus excellent primary stability. Subsequently, the original author's technique was described in several publications [13,14], and terms "tubero-pterygoid area" and "tubero-pterygoid implant" became widely used in professional literature.

Despite complex technique of installation of tubero-pterygoid implants due to anatomic and topographic proximity of important anatomical structures (maxillary artery, palatine artery and nerve, pterygoid venous plexus, maxillary sinus, etc.), the aforementioned idea has gained popularity, which is confirmed, in particular, by a large number of clinical studies published in recent decades showing extremely high results of 5- and 10-year implant survival [6,9,10,11,15]. It shall be noted that in order to reduce the risk of potential damage to adjacent anatomical structures, such technologies aimed at facilitating the placement of tubero-pterygoid implants as computer visualization, planning and navigation have been actively practiced in recent years [3,4,8]. Interest of scientists in this technique is also caused by the fact that reliable retention of implants in strong cortical pterygoid processes allows to realize immediate loading protocol, thus restoring aesthetic and functional status of patients in very short time.

The aim of this work was to generalize our own experience of the use of tubero-pterygoid implants for prosthetic rehabilitation of patients with partial distal maxillary defects and complete maxillary edentulism under immediate loading protocol.

Materials and Methods

Within the framework of the Agreement on scientific cooperation between the Department of Surgical Dentistry and Maxillofacial Surgery of Danylo Halytsky Lviv National Medical University, the International Implant Foundation (Munich, Germany), LLC "Implant Company" (Kyiv, Ukraine) acting as official distributor of "Dr. Ihde Dental AG" (Switzerland) in Ukraine, we have initiated and conducted clinical research on the use of tubero-pterygoid implants TPG® (Dr. Ihde Dental AG, Switzerland) for the rehabilitation of patients with partial free-end distal defects or complete maxillary edentulism. Study group consisted of 12 patients in the age of 35-65 years with 20 TPG® implants installed as distal maxillary support (Fig. 1) with the diameter of 4.1 mm and the length of 15 - 23 mm, their main characteristics are as follows:

- Internal conical connection (8°, compatible with the Straumann system);
- Additional internal three-lobe connection for fixing of installation tool;
- Full machine processing of the implant in order to prevent peri-implantitis;
- Aggressive cutting thread intended for the implant retention in soft bone in the maxillary tuberosity;
- Compression apical part that penetrates the second (third) cortical plate of the pterygoid process.

Depending on the clinical and radiological situation, medially to tubero-pterygoid implants, such implants as BOI® BAC (Dr. Ihde Dental AG, Switzerland) plate implants and/or BOI® or TOI® (Dr. Ihde Dental AG, Switzerland) disc implants were installed at the level of the 1st or 2nd upper molars, taking into account the topography of maxillary sinus, and KOS® (Dr. Ihde Dental AG, Switzerland) compression screw implants were installed in the area of premolars.

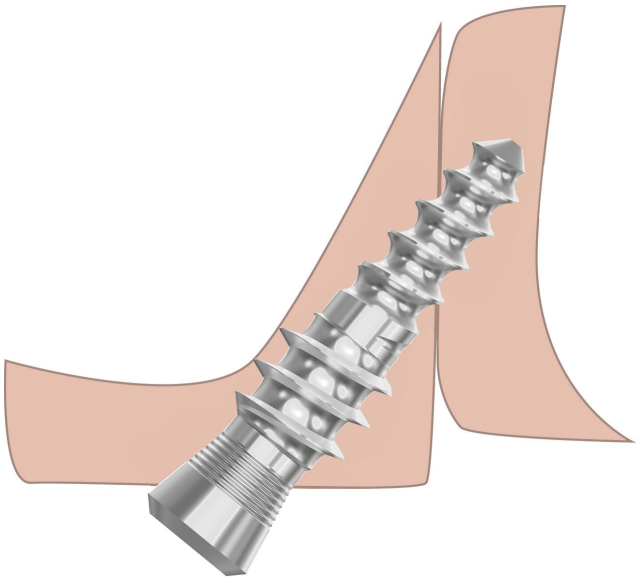

Fig. 1. TPG® implant in the pterygoid maxillary tuberosity. It should be noted that the submergence of the implant platform into the bone is different at the medial and distal sides. This does not matter at all, because the implant is completely polished and hence no rough surface areals are looking out.

The introduction of TPG® implants into pterygoid maxillary tuberosity was carried out under local (infiltration, conduction) anesthesia. During the preoperative period, all patients underwent a thorough examination of distal maxilla bone structures with the use of panoramic radiography and palpation, but informational value of the latter could be often distorted due to rather massive mucosal layer, the thickness of which can be measured by a marked probe. In some cases, a CT of the maxilla was used.

In cases of wide maxillary tuberosity and small thickness of mucosa, the insertion of implants was carried out without surgical incision; while in all other cases an extensive detachment of muco-periosteal flaps was conducted at vestibular and palatal sides of the alveolar process, after the linear incision along the top of the alveolar ridge (and if necessary, additional vertical incisions) for adequate visualization of distal maxillary anatomical structures, including greater palatine foramen. As the bone in the area of the ridge is soft, pilot drilling was not mandatory. More often a handle for manual drilling techniques with the "Pathfinder" drill (BCD 1) was used, enabling to feel the resistance of the second (third) cortical plate. Depending on the anatomical and topographical conditions, the drill (and later the implant) was inserted at the angle of 15°-45° in both medial and distal directions (Fig. 2). When it was necessary, drilling was conducted by means of DOS-type drill at low speed in order to expand the implant bed. After the insertion of the implant and assurance of its tight cortical fixation, the wound suturing was performed. The maximum force in the case of manual insertion was 60-80 Ncm, because the application of higher forces could cause the break of the instrument or the implant.

Immediately after the surgery transfers were installed onto implants in order to take impressions by "open tray" technique, with the aim to produce a temporary metal-acrylic non-removable bridge that was fixed to implants no later than 5 days after surgery. Check-up examinations of patients were conducted in 1, 3, and 6 months after the surgery. The replacement of temporary bridgeworks with permanent (usually fused porcelain) was carried out no earlier than 8 months after the implant insertion.

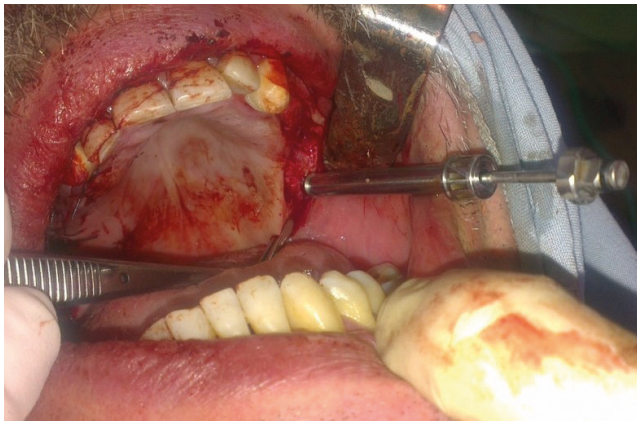

Fig. 2 Correct direction of insertion of TPG® implant. Extensive detachment of flaps aimed to visualization of anatomical structures.

Results

Early and postponed (up to 24 months) results were evaluated as satisfactory in all 12 cases. During the check-up examinations of patients within the aforementioned terms, all implants were stable, non-tender at the percussion, with no signs of inflammation around them. On control X-ray after 12 months after the implant insertion, the loss of bone height of about 2 mm was observed around 2 (10.0%) implants, as compared to the original situation, which had no effect on the stability nor the clinical success of the implant. It should be noted that only 4 patients requested the replacement of their metal-acrylic bridgeworks with fused porcelain structures.

We can conclude that the clinical success rate of TPG® implants in our indication was 100%. We can further conclude that KOS® implants may be successfully combined in one prosthetic construction with TPG® implants. We can also conclude that the combination of cemented and screwed-on implant abutments is successful and results in the stable fixation of the prosthetic workpiece. And finaly we can conclude, that the strategy to choose the length of the TPG® implant according to the distance between the 1st and 2nd/3rd cortical, resulting in the usage of endosseous implant lengths of up to 23 mm, is successful.

The following clinical case (Fig. 3-7) may serve as an example of effective total rehabilitation of the patient's maxilla with the use of TPG® implants in combination with one-component implants and combined (cement and screw) fixation of the prosthetic device under immediate loading protocol.

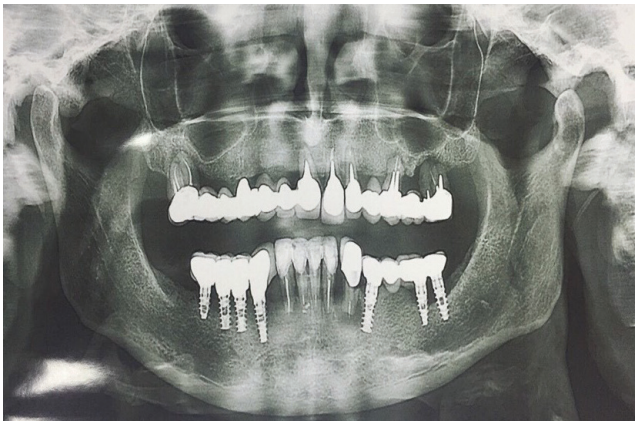

Fig. 3 OPG of the patient P., aged of 55 years at the moment of reference. Severe maxillary periodontium lesion.

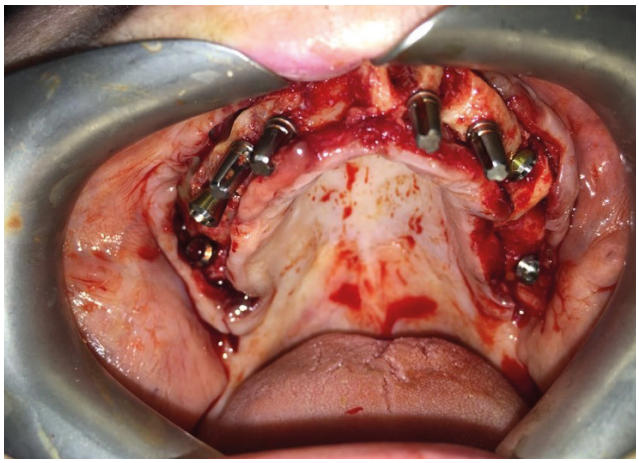

Fig. 4 Intraoperative picture of the patient taken after the removal of all maxillary teeth, bone curettage, sanitation of the bone bed with Betadine® antiseptic solution (5%), and insertion of 8 implants, namely: 4 KOS® X compression one-component implants with their palatal positioning in the frontal area, and 4 TPG® implants inserted behind and in front of the maxillary sinuses.

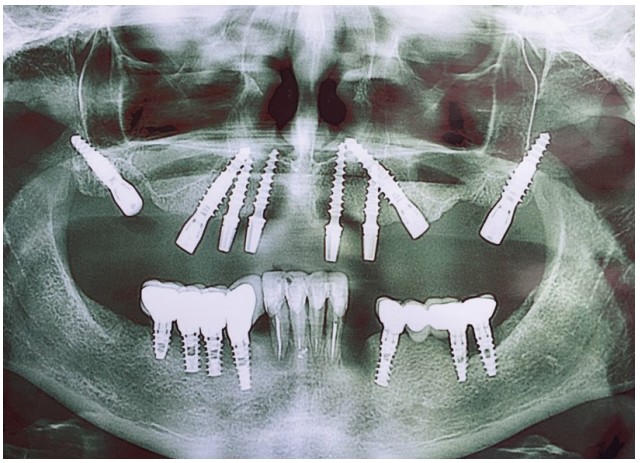

Fig. 6 OPG taken 1 day after the implant insertion. This example denies the dogma of the necessity of "verticality" and "parallelism" of implants; in this case, tilted and non-parallel implants provide better retention and more important success rate, especially in the cases of cortical fixation of implants.

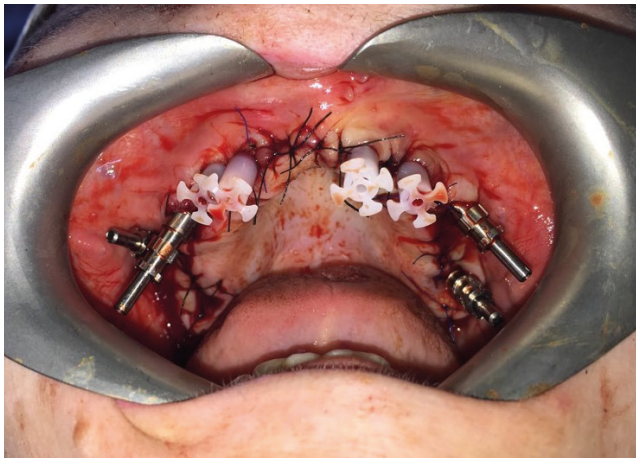

Fig. 5 Installation of transfers onto implants in order to take impressions by "open tray" technique after the wound suturing.

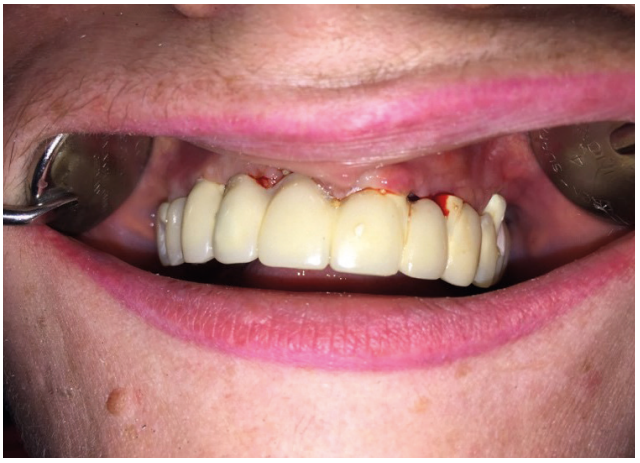

Fig. 7 Full-arch metal-acrylic bridgework with combined (cement and screw) fixation on 8 implants, 5 days after the implant insertion.

Conclusions

We believe that an important advantage of TPG® implants is avoidance of the need for parallelism of implants, and the use of angular abutments, as implant design provides screw fixation of the bridgework, while in the case of other implants cement fixation is possible, as shown in the above clinical example. Certainly, the mentioned study is preliminary, and requires study of much more clinical material and analysis of long-term (5-10 years) remote observations. However, the results of our own experience [1,16,17] are fully consistent with the reports of other leading schools, and give reason to believe that the involvement of powerful cortical distal maxillary areas is gaining popularity in protocols for implant treatment. Tubero-pterygoid implants pose a serious alternative to traditional crestal implants requiring a number of additional surgical procedures, and have high levels (up to 95.0% within 10 years) of success. Procedure of the insertion of tubero-pterygoid implants does not require general anesthesia, maintains the integrity of the sinus, provides not only aesthetic but also functional component of treatment, improving thus the quality of life of patients. Finally, it is appropriate to note that techniques of installation of implants in tubero-pterygoid aspects require deep knowledge of the anatomy of the maxillofacial area and shall be performed by experienced specialists.

Bibliography

Vares Ya, Medvid Yu, Pasternak Yu. Tubero-pterygoid implant as a distal support for prosthetic rehabilitation of patients with partial or complete maxillary adentia. Dental news (Ukraine) 2006; V.11-12: 23.

hde S, Vares Ya, Ihde A. Introduction into the work with Strategic Implants (ukrainian edition) 2015. Munich: International Implant Foundation Publishing, 82 p.

Balshi S, Wolfinger G, Balshi T. Surgical Planning and Prosthesis Construction Using Computed Technology and Medical Imaging for Immediate Loading of Implants in the Pterygomaxillary Region. JOMI 2006; V.26(3): 239-246.

Grecchi F, Busato A, Grecchi E, Carinci F. Surgically-guided zygomatic and pterygoid implants— a no-grafting rehabilitation approach in severe atrophic maxilla — case report. Ann. Oral & Maxillofac. Surg. 2013; V.1(2): 17.

Ihde S. No more sinus-lifts. CMF Impl. Dir. 2009; V.4: 160-174.

Khayat P, Nader N. The use of osseointegrated implants in the maxillary tuberosity. Pract. Periodontics Aesthet. Dent. 1994; V.6: 53–61.

Linkow L. The pterygoid extension implant. J. Mississippi Dent. Assoc. 1972; V.28(4)10-19.

Marcelat R. Interet des implants pterygoidiens dans la strategie d'evitement des sinus maxillaires. Implantologie 2014; V. 42: 53-61.

Peñarrocha M, Carillo C, Boronat A, Peñarrocha M. Retrospective study of 68 implants placed in the pterygomaxillary region using drills and osteotomes. Int. J Oral & Maxilofac. Implants 2009;V.24(4): 720-726.

Ridell A, Grondahl K, Sennerby L. Placement of Brånemark implants in the maxillary tuber region: anatomical considerations, surgical technique and long-term results. Clin. Oral Implant Res. 2009; V.20(1): 94-98.

Rodriguez-Ciurana X,Vela Nebot X, Mendez V, Segala M. Alternativas a la elevacion de seno maxilar: rehabilitacion del sector posterior del maxilar atrofico mediante implantes pterigoideos. Rev. Esp. Cir. Oral y Maxillofac. 2008; V.30: 412-419.

Shan S, Ihde, S. Ihde A et al. The Usage of the Distal Maxillary Bone and the Sphenoid Bone for Dental Implant Anchorage. CMF Impl. Dir. 2013; V.8(1): 13-31.

Tulasne J.F. Implant treatment of missing posterior dentition. In: Albrektsson T, Zarb GA. The Branemark Osseointegrated Implant. Chicago: Quintessence, 1989: 103-115.

Tulasne J.F. Implants pterygo-maxillaires experience sur 7 ans. Implant 1992; V.1: 39-48.

Valeron JF, Valeron PF. Long-term results in placement of screw type implants in the pterygomaxillary-pyramidal region. Int. J. Oral & Maxillofac. Implants. 2007; V. 22: 195-200.

Vares Y, Diederich H, Ansel A. Posterior Maxilla Implant Rehabilitation: a Challenging Task. Dentaltown 2015 (March): 75-84.

Vares Y, Diederich H. The use of cortical implants in cases of posterior maxillary adentia: first ukrainian experience. Mater. Intern. Sci. Pract. Conf. "Modern dimension of medical science and practice". Dnipropetrovsk (Ukraine), 2014: 42-43.