the ring technique ...

... also internationally established and applied

| Bernhard Giesenhagen | Orcan Yüksel

Single-tooth and extended edentulous gaps, as well as severely atrophied mandible or maxilla, are defects occurring worldwide that can often only be treated satisfactorily with bone augmentation or sinus floor elevations. Various techniques and methods have been developed for vertical bone reconstruction, which are more or less invasive depending on the defect depth.[1] Dr Giesenhagen presented his method – the bone ring technique – for the first time in 2003. This method has since become internationally established and is applied by a large number of foreign colleagues.[2] Representative of these, four cases from surgeons in Australia, China, South Africa and a practitioner from Switzerland are presented here.

The development of minimal-invasive procedures is internationally widespead.[3] Single-stage augmentation and implant placement, as it is the advantage of the ring technique, meets the patients' wish for the shortest possible treatment time. The bone ring technique shortens treatment by several months as compared with the two-stage approach. Provided the patient meets the requirements, the protocol for the bone ring technique using bone marrow aspirates can be viewed as a less stressful therapy alternative than iliac crest grafting. The authors themselves have inserted over 1,000 Ankylos implants in autogenous bone rings. As the Ankylos implant is placed subcrestally according to the surgical

1_Initial situation in the X-ray image
2_Initial clinical situation
3_Marked and centrally prepared bone rings
4_Detached bone rings
5_Bone rings in situ immobilized with cover screws

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Images 1 to 5: Dr Paul Toumazos, Australia

protocol, an implant-abutment connection free of micromovement, as with the tapered connection of the Ankylos implant, is an indispensable prerequisite.
The platform switch, as well as the micro and macro design of the implant, also support the healing process. The success rate of the bone ring technique in long-term observation (according to a study yet to be published) is around 98 percent. The primary donor sites are in the chin area, but bone rings are also successfully grafted from the palate and the retromolar area.

FINAL SOLUTION

In the case of our Australian colleague, Dr Paul Toumazos, after extraction of tooth 38, two implants were planned in region 36 and 37. To provide the necessary vertical bone augmentation, two bone rings were extracted from the chin area at a sufficient distance from the mental foramen and the apexes of the incisor and canine teeth and were placed in the prepared cavity.
The approach was in line with the surgical protocol:
Once the practitioner had measured the required diameter of the bone rings at the receptor site, he prepared the donor site on the chin and marked the bone rings around a millimeter deep with the trephine drill (Helmut Zepf Medizintechnik GmbH, Seitingen). The hole to accept the implants then also was drilled at the donor site. The practitioner was cautious not to fenestrate the cortical bone on the lingual side. He then finally prepared the bone rings with the trephine drill, detached their cancellous base from the contralateral cortical bone and carefully lifted it out. The autogenous bone chips produced were collected and used for filling the defect. In the next step, the receptor region was prepared with the trephine drill for receiving the bone rings. The bone rings were kept in autogenous blood during this period. The preparation was slightly undersized in order to be able to insert the graft with a press-fit. Dr Toumazos then finally prepared the two implant sites in the local bone, inserted the implants through the ring slightly subcrestally and then immobilized the bone rings. As the core of the Ankylos implant body tapers apically, rotation of the graft is precluded, particularly because the graft has previously been appropriately expanded at the implant shoulder level. The grafts and implants are then fixed using membrane screws to avoid loss of volume due to adaption atrophy during the healing phase.
The donor region in the chin area can be filled with a collagen sponge to stabilize the coagulum (Figs. 1 to 5).

SINGLE-TOOTH REPLACEMENT IN THE FRONT

In the case of our Chinese colleague, Dr Gang Chen, the task was to replace tooth 11 and reconstruct a buccal bone defect in the horizontal and vertical dimension – a delicate exercise, especially from an esthetic point of view. Dr Chan inserted a 4.5-millimeter Ankylos implant. He extracted the suitable bone ring from the retromolar region. Absolutely tension-free suturing was crucial for success. Only then can dehiscences and consequently tissue recessions be avoided (Figs. 6 to 9).

BRIDGE RESTORATION IN THE ESTHETIC ZONE

Our South African colleague, Dr Verster Cobus, was also faced with a very difficult situation in the anterior region.

6_The clinical situation after extraction
7_Bone ring and implant in situ
8_Tension-free sutured augmentation region
9_Final restoration with preservation of the interdental papillae


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Images 6 to 9: Dr Gang Chen, China

His 25-year-old patient had lost the front teeth 12, 11 and 21 in an accident at the age of twelve. She visited Dr Cobus because the outcome of the treatment recently performed elsewhere – three implants had been placed – was unacceptable for her. The clinical and radiological inspection showed that the residual bone situation allowed the three implants to be explanted and new implant sites to be created with two bone rings from the palate and to ensure their revascularization. Mucosa flaps from the palate were grafted for soft tissue coverage. Dr Cobus filled cavities and exposed threads with autogenous bone chips from the chin region, covered these with a thin layer of slowly absorbable bone replacement material, fixed the augmentation region with a barrier membrane, and sutured the wound again absolutely tension-free.
After five months the implants were exposed and an incision was made in region 11 to shape a pontic. The patient was very satisfied with the final restoration (Figs. 10 to 15).

ESTHETIC RESTORATION FOLLOWING PERIODONTAL LESION

Dr Marco Schwan from Switzerland reported on a case of missing teeth 11 and 21 due to periodontal lesions. With the ring technique he was able to reconstruct the front of the mandible and thus create a suitable implant site for Ankylos implants. He used zirconium oxide abutments produced individually and veneered with ceramic for esthetic optimization. He placed the two implants subcrestally, which necessitated an implant-abutment connection designed for bacteria tightness as is provided by the Ankylos implant. Stable integration of the implants, was, according to Dr Schwan, supported by the implant's macro and micro design to a large degree. Moreover, the growth-activating surface, the system platform-switching and the tissue-stabilizing connection inherent in the system contribute to good osseointegration (Figs. 16 to 20).

ALLOGENEIC BONE RINGS – NO HARVESTING SURGERY

Prepared allogeneic bone rings can also be used in order to reduce the risk of harvesting surgery (botiss dental GmbH, Berlin). Avoidance of the harvesting surgery significantly reduces pain, the risk of infection, morbidity, operation time and costs.

BONE RINGS DIGITALLY PLANNED

The ring technique can now also be performed as guided surgery. The tools available in the ExpertEase planning software and the guides produced on the basis of planning data

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10_Initial clinical situation with partial prosthesis
11_Initial situation in the X-ray image
12_Implants with bone ring placed after explantation
13_Uncovery in well-healed graft
14_Final bridge in situ
15_A highly satisfied and happy patient

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Images 10 to 15: Dr Verster Cobus, South Africa

allow transplantation and implantation to be planned and performed with high precision. Besides a reduced risk of morbidity, a high degree of forensic certainty and an improved prognosis are welcome consequences.

EXPERTISE AND EXPERIENCE

However, digital support does not absolve the surgeon from his/her duty to correctly assess the situation at hand clinically and to tackle it with all his/her expertise and knowledge. Because biology is still crucial in bone reconstruction and implantation. The bone ring technique should therefore only be performed by dentists and maxillofacial surgeons working in implantology with sufficient experience in augmentation. All the colleagues mentioned here have undergone training. This involves addressing the success factors and risks which are crucial for successful treatment. ■

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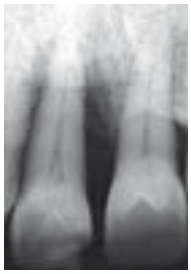
PDF of the case study
with references

16_X-ray image of the initial situation with severe bone atrophy
17_X-ray control image after surgery
18_The crowns after delivery
19_X-ray control image one year after surgery with stable bone conditions at the implant shoulder
20_Restoration one year after delivery with stable soft tissue situation



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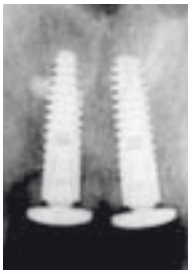

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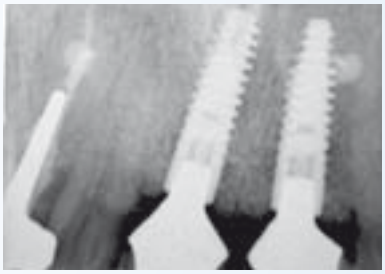

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Images 16 to 20: Dr Marco Schwan, Switzerland

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