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Alveolar ridge augmentation with 3D-printed synthetic bone blocks: A clinical case series

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ABSTRACT

After tooth loss, when the residual bone volume is not adequate for a correct three-dimensional positioning of the implants, it is necessary to restore the appropriate bone volume both from a quantitative and qualitative point of view, through different surgical techniques and materials. In the case of extensive augmentation, the current technique is based on the use of autologous cortico-cancellous bone blocks harvested from intraoral sites. This technique is certainly considered the gold standard, but it has some limitations. This is why alloplastic graft materials represent an alternative to autogenic bone grafts. This report documents the clinical and histological outcome of 3D-printed calcium phosphate blocks placed in two-stage procedures to successfully rehabilitate atrophic alveolar ridges in two clinical cases. In the first case, the treatment plan for the severe atrophy of the alveolar ridge of a 39-year-old woman comprised a staged horizontal block graft augmentation. After the surgical preparation of the site, a synthetic bone block (Innotere 3D Scaffold, Innotere GmbH) was manually shaped to the recipient site anatomy, then fixated and stabilized by means of a titanium screw. In addition, xenogenic bone particles (OsteoBiol® *Gen-Os*®, Tecnoss®, Giaveno, Italy) and a collagen membrane (OsteoBiol® *Evolution*, Tecnoss®) were used to cover the augmented site. In a similar way, in the second patient synthetic bone blocks were shaped to surgical sites, stabilized with fixation screws, and then covered with a collagen membrane OsteoBiol® *Evolution*. In both cases, histological evaluations were performed after healing periods of 6 months and showed the bone substitute was largely osseointegrated and new bone was present. The bone substitute also supported the growth of mature lamellar bone. No signs of inflammation or adverse material reactions were detected.

CONCLUSIONS

The onlay technique using 3D-printed alloplastic bone blocks reported in this case series seems to represent a valuable and predictable surgical alternative technique for the reconstruction of extensive alveolar ridge defects. As underlined by the Authors, further investigations, especially in terms of the long-term stability of both augmented bone and implants, are needed to confirm the performance of these alloplastic blocks.

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