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Case Report»

Equipping the upper jaw with basal screw implants to treat a case with severe bone loss and after the failure of an "all-on-four"-type construction

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Case Report

Equipping the upper jaw with basal screw implants to treat a case with severe bone loss and after the failure of an all-on-four-type construction.

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1. Abstract

The article reports on a treatment attempt to resolve a situation after multiple dental implant losses in the severely resorbed maxilla. Modalities of the failed treatment and the new intervention are discussed. Screwable basal implants are suitable to equip the resorbed maxilla with endosseous anchorage points, however these implants require immediate splinting. They thereby allow immediate loading.

2 Introduction

As dental implantology becomes more widespread in the world, the number of implants in function is increasing dramatically. Although science-driven literature shows that dental implants are expected to be extremely successful, in clinical reality failures are frequent. If implants fail early (i.e. before they are integrated or loaded), the damage to the bone is usually limited. The restoration of cases with late implant failures is more difficult, because typically a massive destruction of bone has taken place. Traditional concepts in such cases involve offering bone transplants to resolve the situation.

In this article we show, how such a problematic situation can be resolved with the help of basal implants in an immediate load procedure.

3 Material and methods

A female patient without any general diseases requested implant treatment in the lower jaw. During the inspection she mentioned that 'every now and then` pus had been developing somewhere in the area where implants had been placed in the upper jaw (fig. 1).

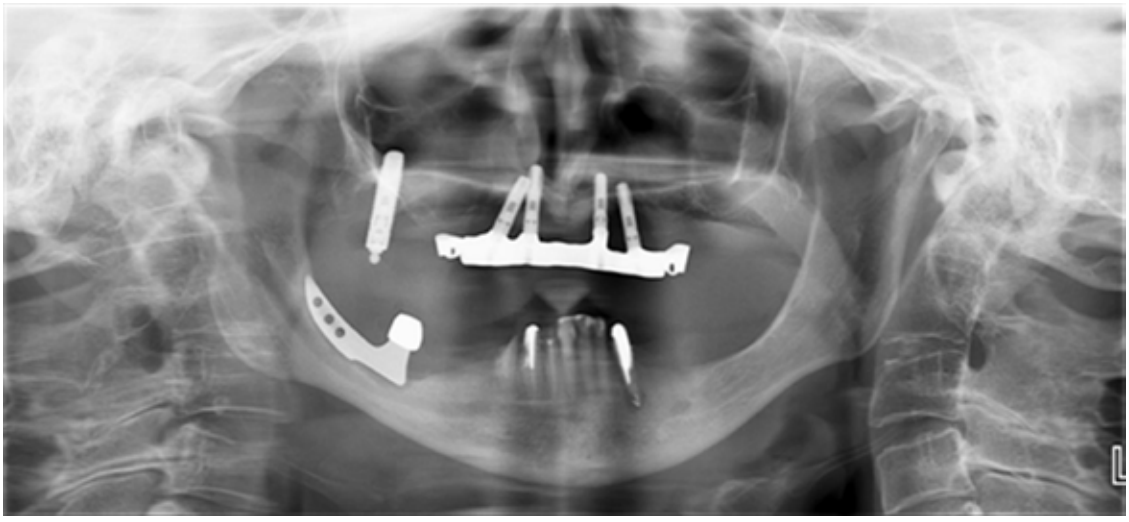

Fig. 1: Preoperative panoramic picture of the lower jaw, presenting a blade implant in the fourth quadrant. This implant had been in place for 15 years. The remaining lower dentition was compromised by vertical bone loss and endodontic problems. In the upper jaw five conventional screw-type implants had been placed. The anterior implants were splinted by a segmented bar. This splint was non-rigid. The overdenture was connected to the bar and the distal implant in the first quadrant. Along all upper implants the bone had retracted severely. Only the apics of the implants were osseointegrated.

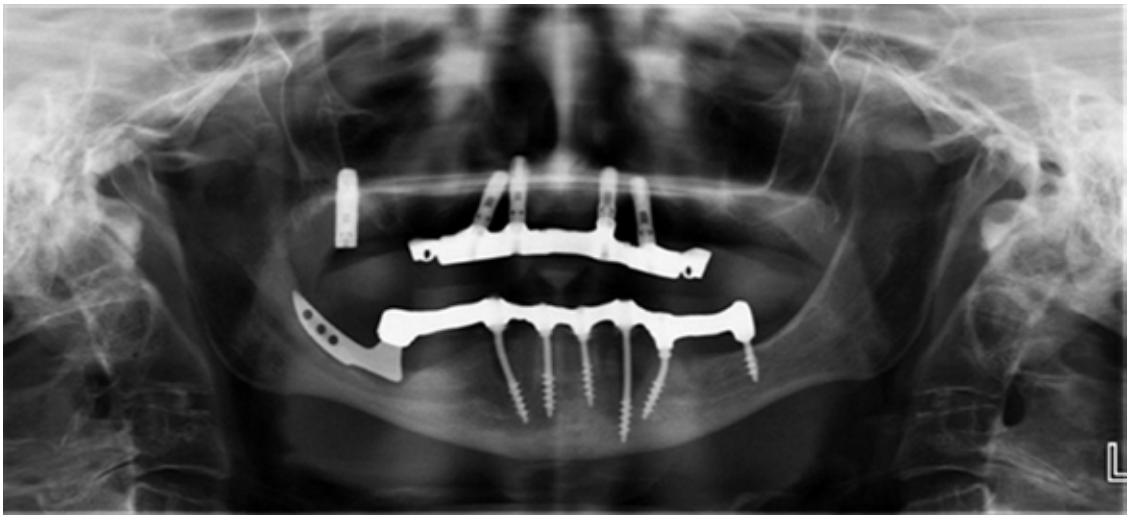

Fig. 2: The panoramic overview shows the situation after the lower jaw had been equipped with more implants and a fixed, cemented bridge.

Fig. 2a: For unclear reasons the first treatment provider had decided to place a segmented bridge bar instead of a rigid bar. The segments of the bar showed considerable mobility against each other, while the distal implant was connected to the denture through a ball abutment. The chance for instability had been increased additionally by intermediate implant parts (shown bottom right) which switched from the internal hex to an external cylinder platform. Those parts were unsuitable anyway because they were inappropriate for overcoming the disparallelism of the implants. Had the treatment provider used 'multiunit`-parts, the bar could have been fabricated in one piece.

As for the upper jaw the initial plan (based on the findings shown in fig. 1) was to save the distal implant in the first quadrant. After seeing fig. 2, it became clear that all implants had to be removed. All four anterior implants were removed after a small long incision had been made with a scalpel No. 15 under local anaesthesia and using topical Betadine® protection. Along with the implant vast amounts of granulation tissue were taken out. In all four implants the floor of the nose was covered with bone after the implants were out. The remaining bone height was approximately 1–2 mm, with the defect measuring 12–14 mm in length (fig. 3).

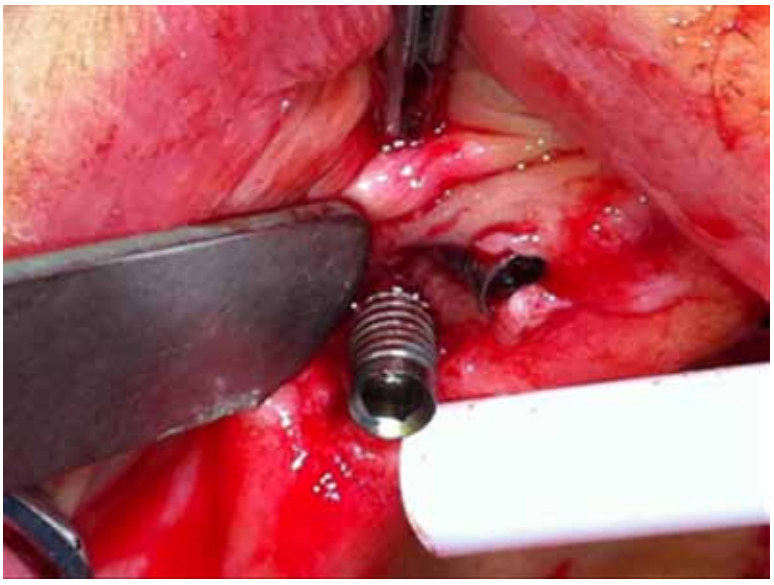

Fig. 3a: Clinical view during the removal of the upper-right anterior implants (during removal, just after the flap was made).

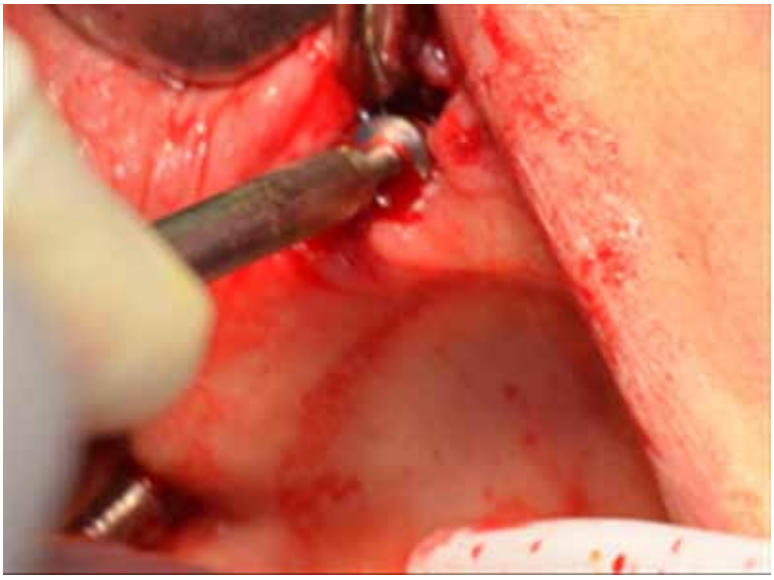

Fig. 3b: Immediately after the extraction of the failed implants and the removal of the soft tissue, a 5.5 mmd, 12 mm BCS implant was inserted in the same location. The implant anchored firmly in the 1–2 mmh basal bone areal, and partly in the floor of the nose.

The distal maxilla was then equipped straight away with two tubero-pterygoid screw implants. Five more implants were inserted, utilising the available bone, both (i.e. the first and second) cortical. Two BCS 5.5 12 implants were seated into the extraction sockets and these implants were penetrating the bony border towards the nose with a small portion of their thread.

To overcome parallelism and space problems two implants on the left side were splinted with an individual angulation adaptor (fig. 3).

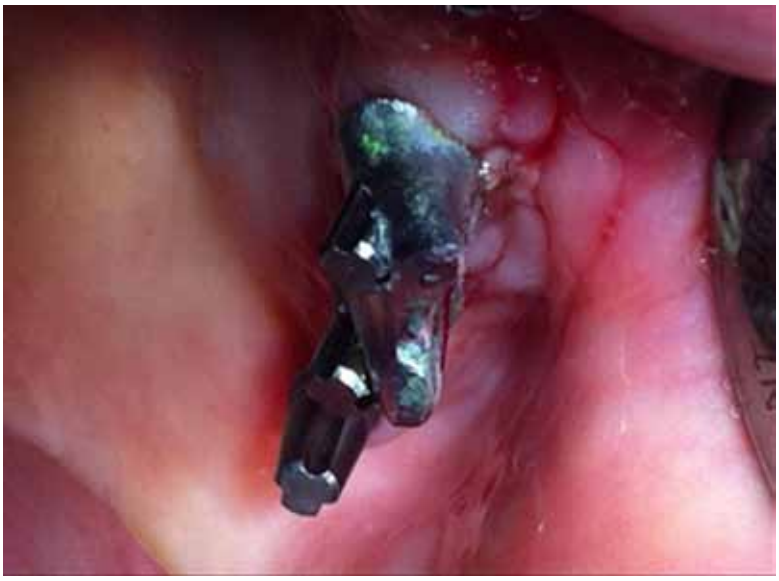

Fig. 4: Clinical view of the upper-right maxilla during the fitting of the angulation adaptor. The projecting heads of the implants will be trimmed after cementation.

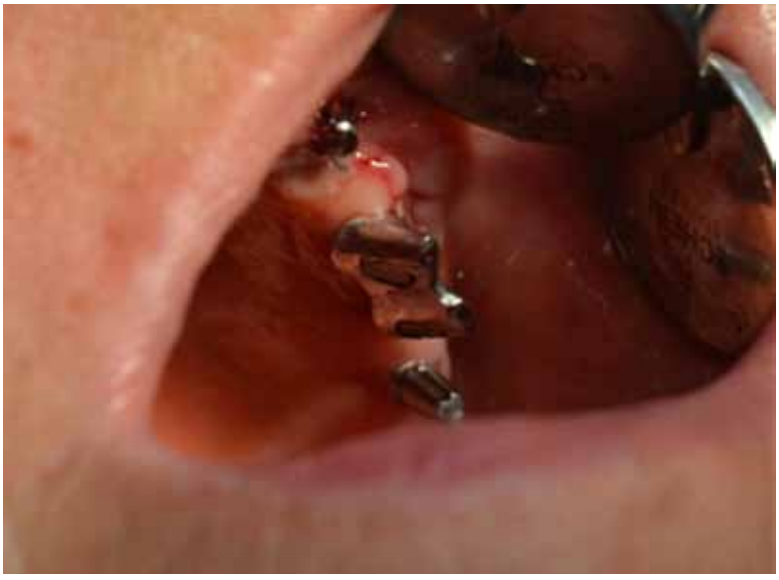

Fig. 4a: An individual double-angulation-adaptor moved the prosthetic heads of the implant on the upper-left maxilla to the lateral.

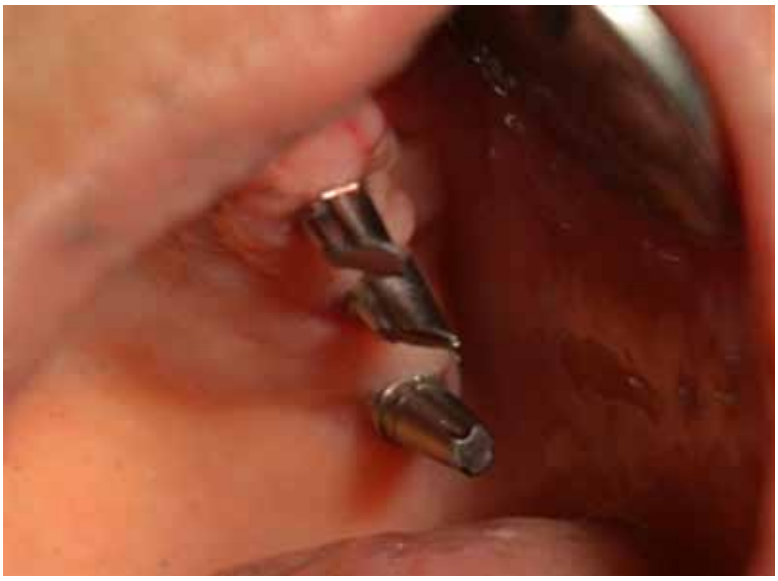

Fig. 4b: View of the shortened angulation adaptors

The main difficulties in this case was found not only in the compromised bone supply, but also in a severe angle class III skeletal situation. In addition the maxilla showed asymmetrical morphology. Presumably the left part of the patients own upper dentition had been in a crossbite position all her life.

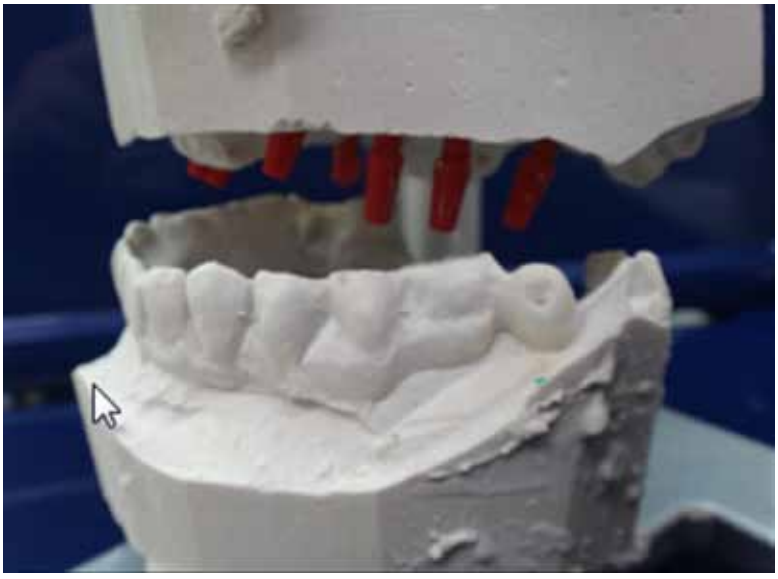

Fig. 5: View of the upper model in the articulator. All implants were positioned considerably to the inside of the dentition of the lower arch.

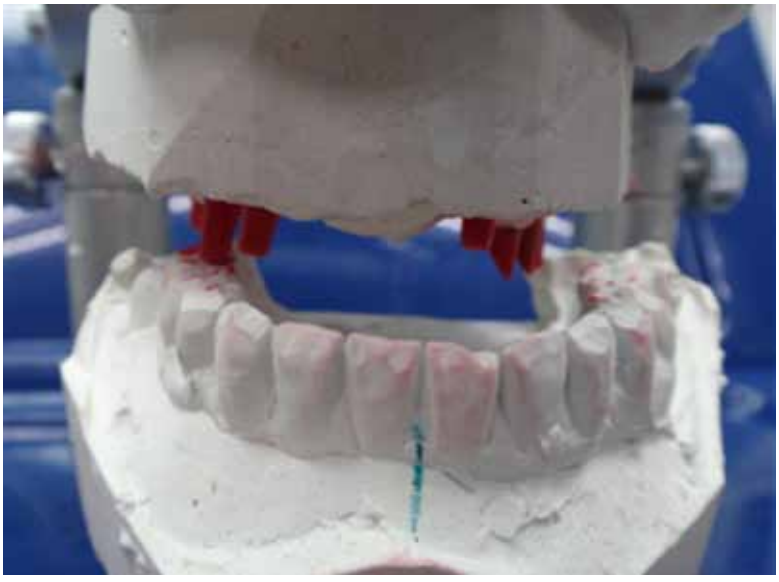

Fig. 5a: The frontal view on the models in the articulator reveals the asymmetry of the maxilla.

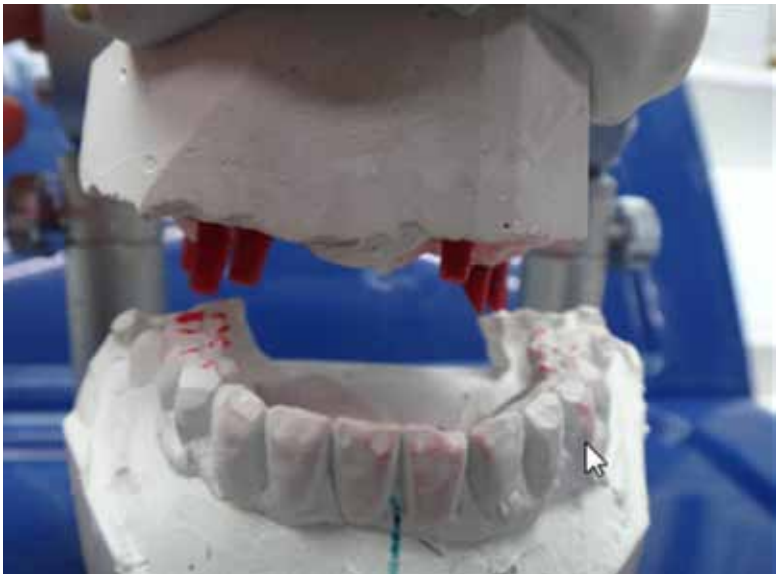

Fig. 5b: By increasing the vertical dimension (to a normal height) it will be easier to overcome this discrepancy.

The final bridge was created from acrylics on a firm metal frame. The bridge was cemented using Fuji Plus cement on day four after the operation. Figures 6a–6d illustrate the prosthetic workpiece which resembles an epithesis more than a dental bridge.

Fig. 6a: View of the bridge from the lateral.

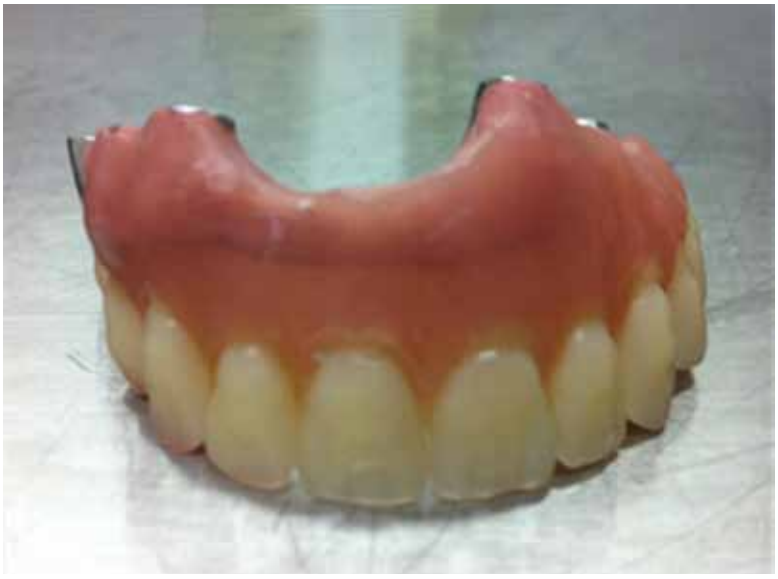

Fig. 6b: View of the upper bridge from the front. After the loss of implants a huge vertical dimension was given. Note the asymmetrical shape and the medial position of the implants on the left side of the patients upper jaw.

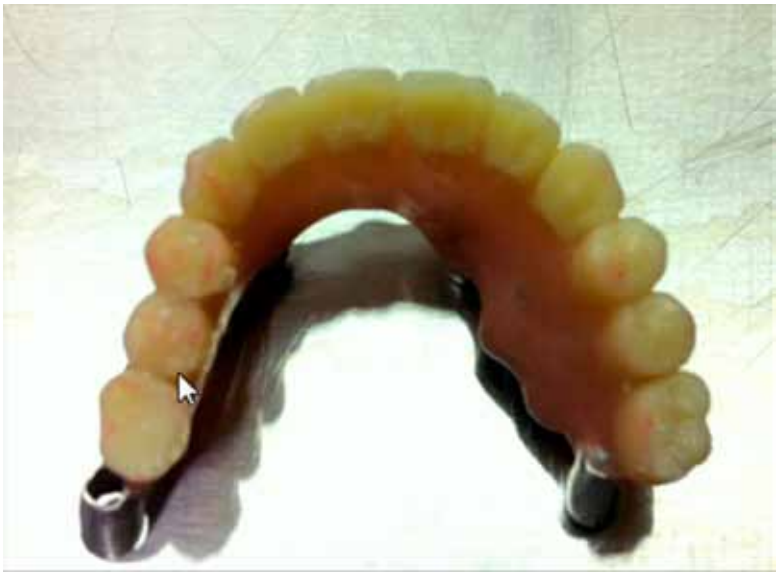

Fig. 6c: View of the upper bridge from above. The asymmetrical shape on the right side is clearly visible – the implants are not under the masticatory surface.

Fig. 6d: View of the upper bridge from below. The 'housing` on the left side was later cemented onto the double-angulation-adaptor shown in figs. 4. Note that the mucosal contact area does not feature and concavities, which could lead to food and debris retention. The bridge touches the gums in a line.

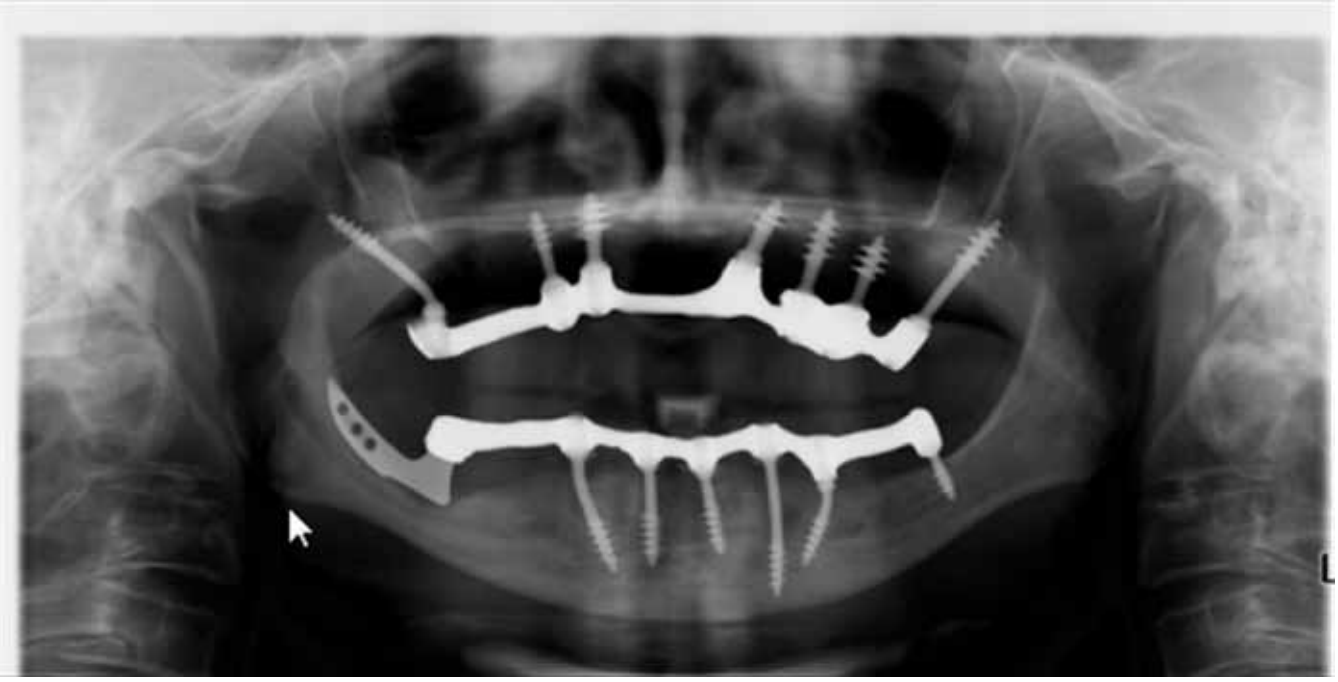

Fig. 7: Panoramic overview picture after placement of all implants and equipping them with a fixed bridge. The decision to replace also the distal upper implant had been taken at a later stage of treatment . Therefore the fit between the crown and the implant`s abutment is not perfect. The position of the upper-right implant in the tuberosity seems not to be perfect on this picture. During insertion the resistance of the bone was good, however. This implant might have to be positioned 2–-3 mm higher. This corrective intervention can typically be done without removing the bridge.

3 Discussion

The first question which has to be discussed in such cases, is why this failure occurred. The patient had no accompanying diseases and she did not smoke. Her compliance and her oral hygiene were excellent. For this reason we do not assume that more intense cleaning could have prevented the problem. Rather, we believe that the non-rigid splinting with a segmented bar led to a situation where the forces were not distributed between all implants under function, and hence an overload in the neck area of each single implant occurred. Furthermore it could have been possible that the occlusive condition under the denture was contributing to the problem: under such conditions the discharge of debris and pus from the implant site was blocked for most of the day.

The next question which we have to raise is the justification of our treatment plan in view of alternatives. Such an alternative could have been an extensive bone-block transplant followed by conventional two-stage implants.

All this after the extraction of the implants in the upper jaw and after a healing period of several weeks. Of course the patients will typically not wish to have such a multistage surgical procedure and it would have probably also been too expensive. Therefore, as a minimally invasive alternative, our treatment with seven polished bicortically inserted screw implants (GBC/BCS) seemed justified, although this treatment meant that we would not attempt to correct the severe Angle class III and crossbite situation by surgical means. Therefore a part of the masticatory surfaces were positioned outside the supporting polygon and frontal contacts were not possible at all.

Furthermore, it might be questioned whether doing this intervention at this moment was justified. Admittedly at the time of intervention 80–90 % of the vertical bone was already lost and the implants were amazingly stable. Besides a chronic infection and pus development no adverse effects were visible. The four anterior implants were anchored in 1–3 mm of basal vertical bone and we know that this bone tends to be highly mineralised and more resorption would only have taken place slowly. We did not decide to remove the also compromised blade implant in the lower jaw, because it did not cause any problems like the upper implants did. After15 years in function we estimated that this implant could perform well for another five or more years.

The shape of the final bridge clearly was the result of many compromises: as the bone was not at all available in the 'prosthetically desired place`, the implants had to be placed in those places where bone was available and after this the dentist technician connected all cementing abutments to a bridge. Fortunately, sufficient vertical dimension was available. This allowed a smooth slope between the implants abutment and the masticatory surface.

Supporters of traditional two-stage systems, namely the disciples of the company Nobel Biocare claim that our treatment approach is not evidence-based. This is in as much true, as the positioning of the implants depends strongly on the experience and the knowledge of the surgeon. There is no standardised treatment protocol and the intervention even to this day cannot be planned on the computer screen, due to the lack of precise templates for such long implants. The vast number of implantologically active colleagues today is presumably neither able nor willing to offer this kind of intervention. It requires a considerable stock of implants as well as experience to find bone for seven implants in such a resorbed case. It also requires a well-trained dentist technician with experience in overcoming problems of disparallelism. But even if all this is given, failure is still possible. We do believe that our approach – due to its minimally invasive nature and the speed in which results are achieved – should be the method of first choice before other interventions are proposed to the patient. In the elderly we should always consider the relationship between the duration of a treatment plan and the remaining lifespan of the patient.

If we consider the quality of life after treatment, as well as the masticatory performance and compare our solution to the possible result after a bone-block transplant, we do not

notice any difference at all. Even though our treatment is much cheaper and faster, the patient is fully satisfied with the treatment outcome.

One possible alternative treatment approach could have been the placement of zygomatic screw implants in both sides. This option remains, if our treatment should fail or show complications. Zygomatic screw implants are reported to have a high chance of survival, but only a few treatment providers have really sufficient experience with this technique and the devices. Zygomatic screw implants belong to the group of basal implants, because they utilise as a second cortical resorption-free maxillo-facial bone areals for anchorage.

4 Conclusion

In the last years the limitations of 'conventional` dental implantology have become obvious and an increasing number of cases of failure returned to the treatment provider. As bone augmentations have not become more predictable during this period, practitioners have been seeking alternatives.

The treatment outlines here have enabled us to restore masticatory function after multiple implant losses in the severely resorbed maxilla in a few days only. Seven tilted basal screw implants were placed and immediately splinted. A fixed cemented bridge was inserted.

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