Consideration of an uncommon approach in the atrophied posterior zone

Part I: Extraction plus technique

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Fig. 1

Fig. 2

Figs. 1, 2, 3 & 4_Study cast frontal, bilateral views and the mandible cast with the partial denture.

_Introduction

In the past, it was a significant challenge for clinicians to achieve implantation in the alveolar ridge of the posterior zone with restricted bone height, for which the alternative treatment choices were limited. However, procedural and technological developments have enabled implantation in most cases of severe bone resorption through the use of complex bone augmentation techniques, such as bone transmission, sinus lifting, distraction and nerve transpositioning, and the use of bone substitute, membrane and nail fixation, which might increase the risk of complication and failure. Generating new bone in a free-end saddle in a vertical dimension is very difficult to achieve and some patients are unwilling to go through such a protracted treatment plan, considering the possible impact on their general health and psychological condition, as

Fig. 3

Fig. 4

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[1] Schwarz F et al. Clin. Oral Implants Res. 2008; 19 : 402-415

Fig. 5

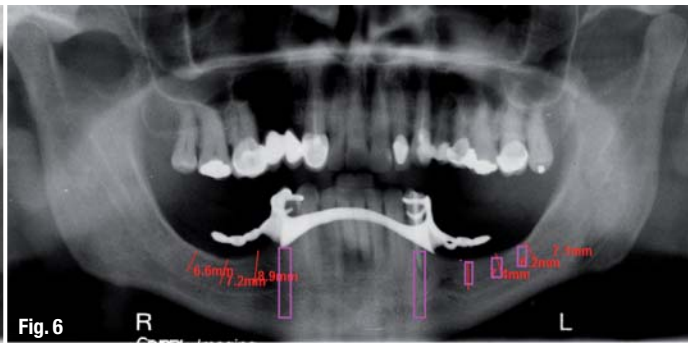

Fig. 6

Fig. 5_Panoramic radiographic with partial denture and limited alveolar bone height 7–9 mm above the inferior alveolar.
Fig. 6_Panoramic radiographic with the treatment plan drawing.

well as the cost. This scenario means that we have to find a good solution for those patients who cannot undergo such a difficult procedure, bearing in mind that the use of short implants alone is not advisable in many cases. The onus is on us to come up with a simple and standard means of implantation to save time and pain and to minimise the risk of complication and failure. The principle of the new technique proposed here—the extraction plus technique—is the extraction and sacrifice of the adjacent natural tooth, followed by the insertion of a long implant to support shorter implants that are inserted where bone height is limited. Through this new technique, we can convert a complicated procedure (guided bone regeneration – GBR) into a simple standard procedure with less pain, saving time and cost and minimising the risk of complications.

_Materials and methods

Method

The success and application of the technique discussed in this article were determined through two surveys and a clinical case. Two questionnaires were administered to the respondents (surveys 1 and 2). The respondents were then asked to rank the alternative techniques (including extraction plus technique) as a good alternative means of treatment for each of the two cases presented. They were given the following options: the first choice of alternative treatment (most preferable; indicated with +++); the second choice (more preferable; indicated with ++); the third choice (preferable; indicated with +); and not considered a viable alternative treatment (indicated with -).

Tab. 1_Survey 1 which presented Case A1 and Case B1 and all the alternatives under each case and clinicians can mark.

DANUBE UNIVERSITY KREMS
MSc in Oral Surgery / Implantology

Student: Dr. Maen Aburas
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Survey 1

Name: | Dentist: | Maxillofacial or Oral Surgeon
Beginner: □ | Intermedial: □ | Expert: □

Please mark (+) for preferable, (++) for more preferable, and (+++) for most preferable treatment for the cases given, **considering duration of treatment, minimum of risk and complications**

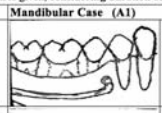
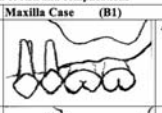
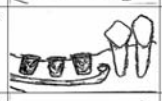
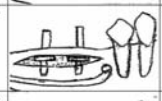
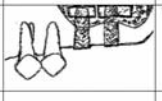
	Mandibular Case (A1)		Maxilla Case (B1)	
		Alveolar bone height above the nerve–8mm		Alveolar bone height 5-7 mm
1		To extract #4 to fix 1 long and 3 short implants (one stage surgery)		Extract #5 to fix 1 long and 2 short implants (one stage surgery)
2		To fix 3 short implants (one stage surgery)		To fix 2 short implants (one stage surgery)
3		To augment by bone block (two stage surgery)		Internal sinus lifting (one or two stage surgery)
4		Distractor device (two stage surgery)		Window with bone block (two stage surgery)
5		Nerve trans-positioning (one stage surgery) to fix 3 long implants		

Table I

Survey

For survey 1 (Table 1), case A1 was a free-end saddle mandible with atrophic alveolar bone height about 8 mm above the inferior alveolar nerve canal but with sufficient width; and case B1 was an atrophied free-end saddle maxilla with teeth #26 and 27 missing and an alveolar ridge height of about 5 to 7 mm to the sinus floor and sufficient alveolar width. For survey 2 (Table 2), the two cases presented were the same, except that in case A2 the first premolar and in case B2 the second premolar had a peri-apical cystic lesion and were considered unhealthy teeth.

Fig. 7_Post-operative panoramic radiographic revealed the implant placement as planned.
Fig. 8_The flaps were re-positioned in a submerged surgical approach except the extracted site implants.
Fig. 9_shows the impression caps and synOcta positioning cylinders snapped into place prior to the final impression.

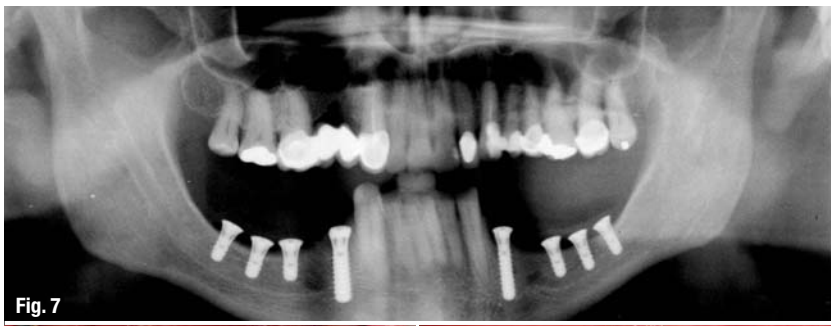


Fig. 7

Fig. 8

Fig. 9

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Respondents

The study respondents were clinicians involved in the implantology field (dentists and oral and maxillofacial surgeons). The data was collected from May 2008 to May 2009 from 77 respondents, self-categorised into three groups: beginners, intermedials and experts. We obtained 19 respondents from Brazil, Chile, Colombia, Latin America and Peru during the International Implantology Conference of Dentoflex held in São Paulo, Brazil, from 14 to 16 November 2008. Nine respondents, obtained through colleagues working in Dubai and Sweden, came from Sweden. Ten respondents were obtained through another colleague working in Oslo, Norway, and who visits Dubai regularly. The remaining 39 respondents were master's students in and professors of the MSc International Programme in Oral Surgery and Implantology at Danube University Krems, Austria, and came from Australia, Germany, and Eastern European and Middle Eastern countries.

Tab. 2_The only difference in survey 2 that the first premolar in Case A2, and, the second premolar in Case B2, both are considered as doubtful teeth.

DANUBE UNIVERSITY KREMS
MSc in Oral Surgery / Implantology

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Survey 2

Name: Dentist: Maxillofacial or Oral Surgeon
Beginner: □ Intermedial: □ Expert: □

Please mark (+) for preferable, (++) for more preferable, and (+++) for most preferable treatment for the cases given, **considering duration of treatment, minimum of risk and complications**

	Mandibular Case (A2)			Maxilla Case (B2)	
		Alveolar bone height above the nerve–8mm			Alveolar bone height 5-7 mm
1		To extract #4 to fix 1 long and 3 short implants (one stage surgery)	1		Extract #5 to fix 1 long and 2 short implants (one stage surgery)
2		To fix 3 short implants (one stage surgery)	2		To fix 2 short implants (one stage surgery)
3		To augment by bone block (two stage surgery)	3		Internal sinus lifting (one or two stage surgery)
4		Distractor device (two stage surgery)	4		Window with bone block (two stage surgery)
5		Nerve trans-positioning (one stage surgery) to fix 3 long implants			

Table II

Fig. 10_Shows the master cast lateral view with the synOcta selected abutment in parallelism.

Fig. 11_Shows the master cast occlusal view of the metal framework.

Fig. 12_Shows the radiograph taken to assess the marginal adaptation of the metal framework left side.

Fig. 13_Shows the radiograph taken to assess the marginal adaptation of the framework right side.

Fig. 14_shows the final restoration in seated left side.

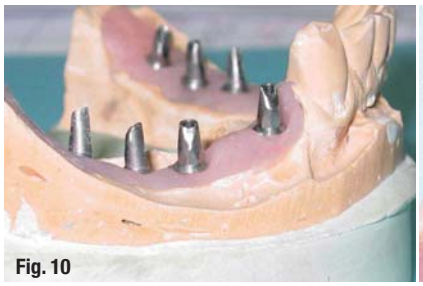
Fig. 10

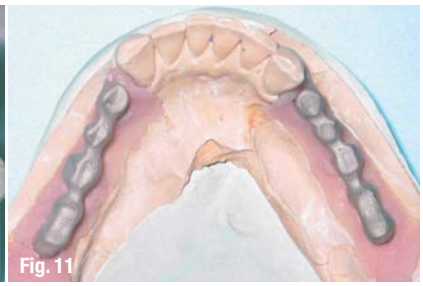
Fig. 11

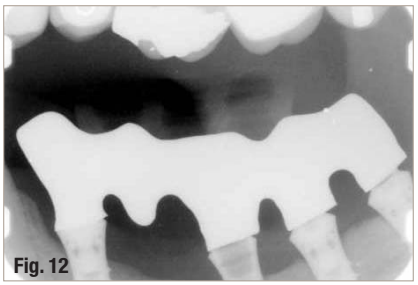
Fig. 12

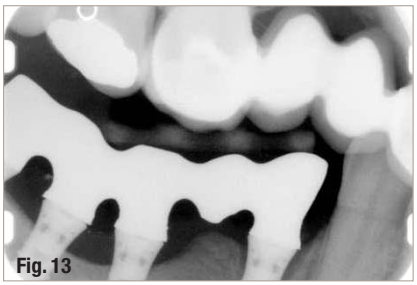
Fig. 13

Fig. 14

_Results of surveys

Of the 77 respondents, nine considered themselves beginners, 50 intermedials and 18 experts. The statistics of the data collected from the surveys for cases A1, B1, A2 and B2 are shown in Tables 3 to 4.

_Discussion

From the results that we obtained for case A1-1, we found that 18 % of the respondents agreed by (+++) and 30 % agreed by (++), which indicates that the extraction plus technique is their first choice of alternative treatment. If we consider them together, this means that 48 % would use the extraction plus technique in order to avoid the complications of other alternatives, but 40 % disagree with extracting an intact tooth. For case A2-1, 58 % of the respondents agreed by (+++) and 18 % agreed by (++), which totals 76 %, and only 16 % disagreed.

For case B1-1 (maxilla case), 10 % agreed by (+++) and 18 % (++), but 49 % disagreed with this alternative. In case B2-1, however, 45 % agreed by (+++), 26 % by (++) and only 20 % disagreed, which means that clinicians strongly preferred the extraction plus technique as a good alternative in the posterior zone, where there is an unhealthy tooth but not in the case of a sound and healthy one.

Regarding the alternative treatment using short implants in the mandible, for case A1-2, 58 % of the respondents agreed by (+++), 21 % agreed by (++) and only 9 % disagreed with this choice, which reflects that the clinicians strongly preferred the short implant alternative to the other difficult and complicated alternatives and would not use the extraction plus technique. But for case A2-2, 22 % agreed by (+++) and 22 % would not use this technique, which reflects clinicians' hesitation to use the short implant alternative in the case of an unhealthy tooth.

Fig. 15

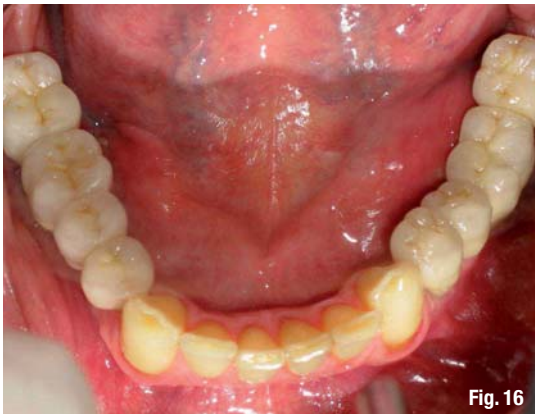
Fig. 16

Fig. 15_Shows the final restoration in seated right side.
Fig. 16_Shows the occlusal view of final restoration.

For the maxilla case B1-2, 22% of the respondents gave (+++), 26% gave (++) and 39% disagreed, but for case B2-2, 16% gave (+++), 21% gave (++) and 45% disagreed. These results reflect a balance between those who agreed and disagreed with this technique, which means that the clinicians were hesitant to give definite decisions on the short implants alternative in the posterior maxilla.

For the bone block augmentation technique in the mandible through two-stage surgery in case A1-3 and case A2-3, there were no significant differences in the results of the case A1-3, where 9% agreed by (+++), 19% agreed by (++) and 38% disagreed, compared with that of case A2-3, where only 6% agreed by (+++) and 17% agreed by (++) and 50% disagreed. This indicates that clinicians tried to avoid the complications on both donor and recipient sides associated with bone augmentation by the bone block (autogenous) technique, aside from it being a more time-consuming alternative treatment.

From the results of cases A1-4 and A2-4, it is clear that the mandible distractor device was not preferred because for case A1-4, 3% gave (+++), 9% gave (++) and 59% disagreed and for case A2-4, only 1% gave (+++) and 69% disagreed. This reflects the rare use and difficulties of application of this device and clinicians' desire to avoid complications of this alternative treatment.

For the last alternative presented for cases A1 and A2, nerve transpositioning, the results for both cases A1-5 and A2-5 were the same, where only 3% agreed by (+++) and almost 80% disagreed with this complicated and risky technique being a viable alternative treatment.

The results of case B1-3 demonstrate that internal sinus lift is the most preferable alternative technique (60% agreed by (+++), 21% by (++) and only 5% disagreed), compared with the results of case B2-3, which demonstrate that clinicians did not support the use of this technique in the case of an unhealthy tooth (31% gave (+++) and 13% disagreed). This demonstrates clinicians' confusion and no definite decision when it seems doubtful that the natural tooth can be preserved, and clinicians may prefer the extraction plus technique alternative in this situation.

In comparison, using external window sinus lift with a bone block graft for case B1-4 was not much more preferable, as evident from the results: 14% agreed by (+++), 26% agreed by (++) and 34% disagreed. The positive results for this technique decreased even further in case B2-4, where only 8% gave (+++), 14% (++) and 55% disagreed. These results demonstrate that the clinicians considered this technique a good alternative treatment when the natural tooth is healthy but not when its survival is doubtful, in order to avoid the complications associated with this technique.

_Conclusion for surveys

The extraction plus technique was considered by the respondents as one of the better alternatives, especially when the tooth to be extracted was unhealthy but less so when the tooth to be extracted was healthy. Using the short implant technique in the mandible was

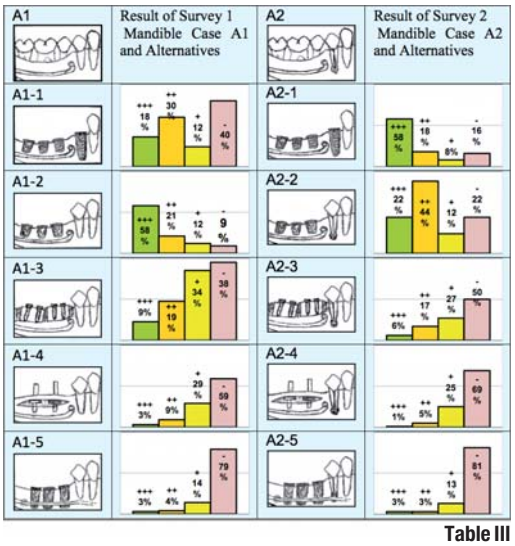

Table III

Tab. 3_Comparison between the result of survey 1 mandible case A1 and alternatives with the result of survey 2 mandible case A2 and alternatives.

Tab. 4_Comparison between the result of survey 1 maxilla case B1 and alternatives with the result of survey 2 maxilla case B2 and alternatives.

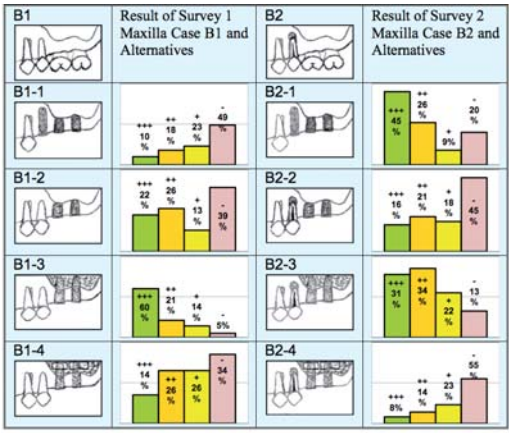

Table IV

preferred to using it in the maxilla posterior zone. The internal sinus lifting technique was the most preferable technique for use in the maxilla than the other alternatives. Overall, the clinicians found complicated alternatives, such as the bone distraction and nerve transpositioning techniques, the least preferable.

_Clinical case

On 24 September 2005, a 49-year-old, healthy, non-smoking male presented with a bilateral free-end saddle mandible and had worn a removable partial denture for more than 11 years. The patient's chief complaint was discomfort when eating, which called for the replacement of the posterior missing teeth for functional reasons. The patient's medical history revealed no significant findings. The results of the extra-oral examination showed a normal facial profile and the intra-oral examination revealed missing teeth #35–37 and 45–47 and a removable partial denture (mandible; Figs. 1–4). Upon radiographic examination, an inadequate root canal treatment with peri-apical cystic lesion (tooth #34) and limited alveolar bone height (7–9 mm in length above the inferior alveolar nerve canal) but with an acceptable bone width on both sides of the mandible was confirmed (Fig. 5).

During the evaluation of the case, the bone augmentation technique (GBR) was introduced to the patient but he refused to undergo this procedure because it was difficult for him to accept the idea of harvesting bone from other parts of his body for use as the bone graft. His other reason for rejecting this treatment was his limited time for visits for the long treatment period necessary for the procedure suggested. The new extraction plus technique was suggested to the patient as an alternative treatment. The treatment would entail extracting teeth #34 and 44 and immediately inserting long implants in the sites of the extracted teeth as support of the short implants to be inserted where the alveolar bone height is limited in place of the missing teeth #35–37 and 45–47 (Fig. 6). The patient accepted the treatment.

During the surgical procedure, an incision was made from the canine crest of the keratinised gingiva to the distal of the second molar of the left mandible mucosa. After a sulcular incision, the full thickness mucoperiosteal flaps were elevated, exposing the alveolar ridge. Using a non-traumatic tooth extraction technique, teeth #34 and 44 were removed with no damage to the surrounding alveolar ridge and the vestibular and lingual bone plate kept intact. The peri-apical cystic lesion on the socket was removed by curettage. After preparation of the tooth socket, a 12 mm length implant was placed. Then drilling was done in region 36 to avoid a mental foramen, followed by drilling in regions 37 and 38 at regular 3 to 4 mm distances. The three short implants placed were 6 mm in length and standard ITI Straumann implants, with 4.1 diameter and 4.8 mm platform diameter. The same procedure was followed on the right mandible, other than the curettage of the socket of 44. Primary stability was achieved in all implants and the submerged surgical approach was followed except for the implants placed into the extraction sites. Panoramic radiography was done after surgery (Figs. 6 & 7). The patient was prescribed a 625 mg antibiotic and instructed to rinse with a 0.2 % chlorhexidine mouthwash, use a cold compress and eat a soft diet.

Three months post-treatment the patient returned for a follow-up treatment and it was found that all implants had gained osseointegration successfully and healing caps were provided. The prosthetic phase was begun on 1 April 2006, which was later than the usual time owing to the patient's travelling timetable. Probing of the peri-implant soft tissue found that it was healthy and there was no bleeding around the mucosa of the implant. It was decided to take the final impression for prosthodontics using the impression caps and synOcta positioning cylinder (Straumann) to obtain the master cast (Figs. 8 & 9). After selection of the appropriate abutments, a metal framework was constructed and the prosthetic procedures followed the protocol until the correct seating of the prosthesis was achieved and cemented in the patient's mouth (Figs. 10–16)._

_contact implants

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