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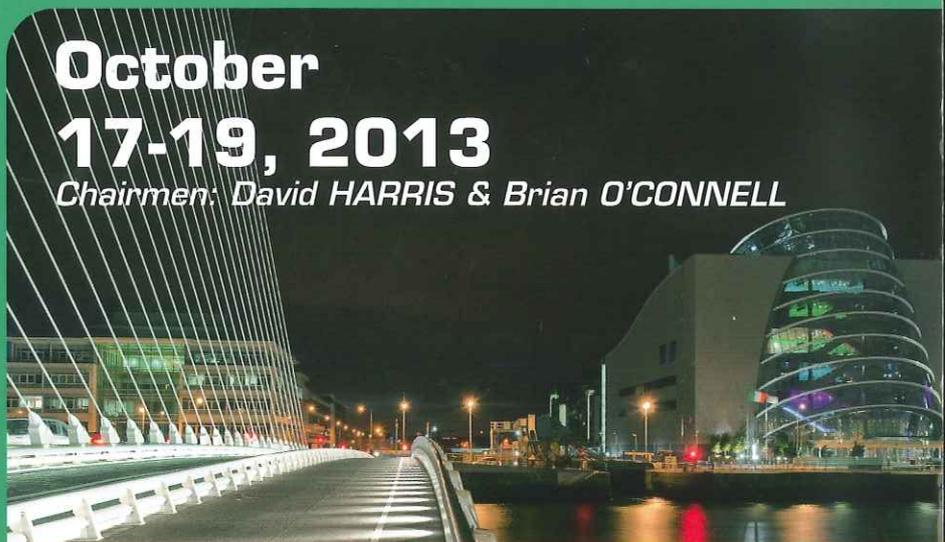
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Ten Cases of a Non-grafted One-stage Sinus Floor Elevation in the Severely Atrophic Maxilla

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Topic: Basic research

Abstract

Our previous study of sinus floor elevation using canine frontal sinus lifting the sinus membrane and placing implant simultaneously without any grafting (Fig.1,2,3), showed that new bone developed from sinus wall in the space under the detached membrane and osseointegration between new bone and implant was sufficient on HA coated implants (Fig.4). It was seen that the HA coated implants osseointegrated better than non-HA coated implants. Furthermore, the osseointegrated new bone remained on the surface of the HA coated implant for a long period of time. The results indicated the possibility of clinical application of the procedures in the severely atrophic maxilla.

This study reported findings when this procedure was performed in ten clinical cases.

In 14 sinuses in ten cases, sinus floor elevation with simultaneous implant placement and without grafting was performed. CT images showed the distance (available bone volume) between the sinus floor and the alveolar ridge bone crest was 2.8 ± 1.4 mm on average (1.1mm - 5.0mm). There were a total of 17 two-step HA coated implants. The average follow-up time was 4 years and 5 months. Although the volume of the available bone was minimal, all implants remained functional and there were no reports of sinus infection.

It was concluded that clinical applications of this procedure of sinus floor elevation with simultaneous implant placement without grafting in the severely atrophic maxilla is possible.

Background and Aim

Our experiment of sinus floor elevation

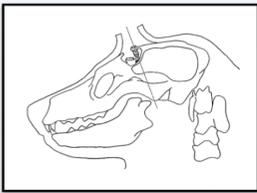


Fig.1: Canine frontal sinus

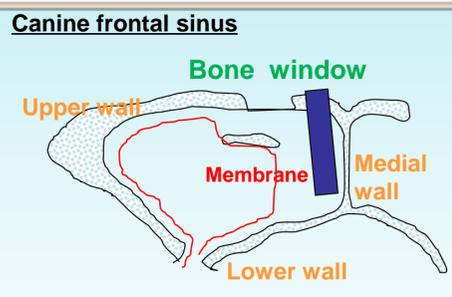


Fig. 2: Coronal view of frontal sinus

Fig.3: An implant was observed beside the medial wall in the cavity. Thin soft tissue can be seen on the surface of the implant.



Histological findings

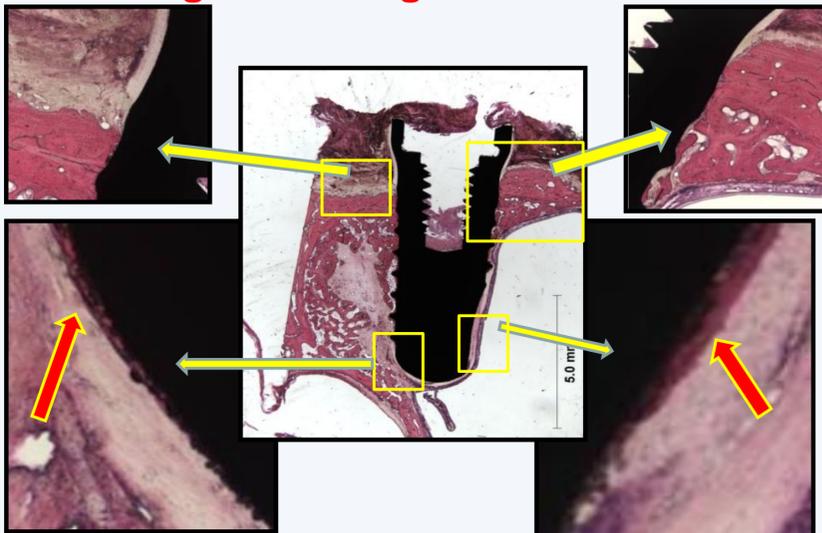


Fig.4: The thin layer (red arrow) of new bone covered 85.9% of implant surface after 6 months.

The bone-implant contact rate was 76.7%

Methods and Materials

In 6 sinuses of 14 sinuses in ten patients (3 males and 7 females, average age; 60 ± 5.4), the lateral approach method was used and in 8, the vertical approach method was used.

There were a total of 17 two-step HA coated implants (Kyocera, Japan and Zimmer, USA, 4.2-5.5mm in width, 12.0-16.0mm in length). CT images showed the distance between the sinus floor and the alveolar ridge bone crest was 2.8 ± 1.4 mm (from 1.1mm to 5.0mm). Surgeries were performed from March 2005 to July 2008.

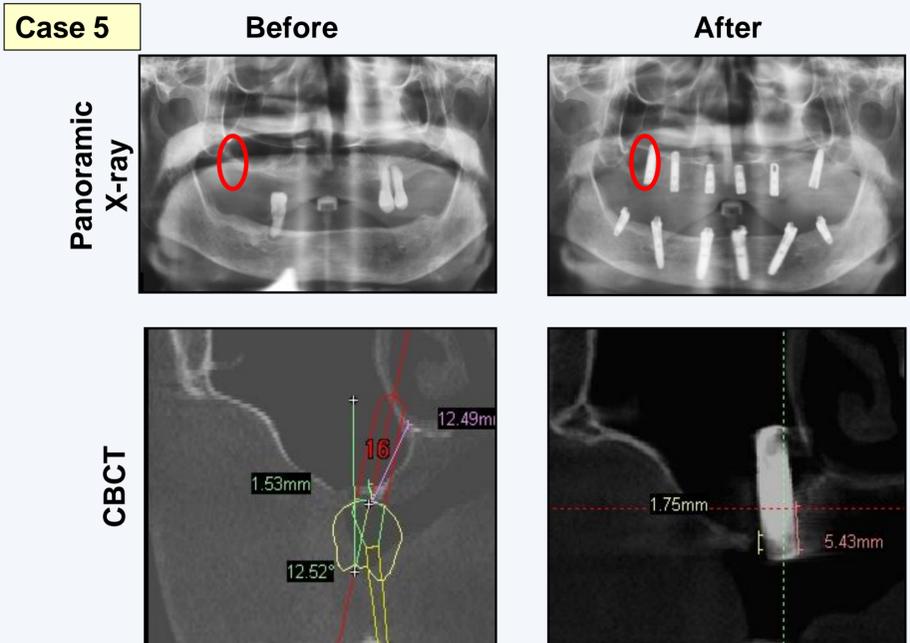
A secondary surgery was carried out from 4 to 9 months later.

Results

The average follow-up time until the most recent checkup was 4 years and 5 months (minimum of 3 years and 3 months, maximum of 5 years and 11 months).

Periosteal values at the time of the secondary surgery were on average 0.4 ± 1.3 (minimum -2, maximum 3).

Although the volume of the available bone between the sinus floor and the alveolar ridge bone crest was minimal, all implants remained functional. None of the cases have shown maxillary sinus infections up to the present time.



Discussion and Conclusions

A series of our canine experiments of the maxillary sinus floor elevation without grafts using canine frontal sinuses proposed a new concept (AntraNa) of maxillary sinus floor elevation as follows;

- HA coated implant should be used.** New bone osseointegrates with HA coated implants better than non-HA. A thin layer of new bone (HS-bone) osseointegration with HA coated implants at the zone remained over an extended period of time.
- Implants should be placed in the 4mm zone from existing bone (sinus wall or sinus septa).** New bone develops from it in the space under detached sinus membrane and forms up to 4 mm in height (4mm zone) even if no grafting. New bone covers and osseointegrates the implant surface located at the 4mm zone.
- Existing bone needed for initial fixation of implants to obtain the new bone osseointegration is 1mm minimal.** The stability of implants at the initial stage is important than initial fixation to obtain the new bone osseointegration. The initial stability is a few Ncm at most.
- Surgery can be performed in one-stage even though the height of the existing bone is minimal.**
- Grafting is minimal.** Grafting can be used to promote new bone formation. It is not the main factor in obtaining new bone osseointegration.
- The healing period between implant placement and the second surgery is over 6 months. Implant loading should not be done until 9 months later** when sufficient maturation of new bone is completed.
- Non-HA implants need sufficient initial fixation to induce osseointegration.** So, sufficient volume of existing bone (matured bone) is an important factor for non-HA implants. HA implants are available for AntraNa concept.

It was concluded that clinical applications of sinus floor elevation with simultaneous implant placement and without grafting in the severely atrophic maxilla is possible.