

The Saturn immediate load post extraction dental implant: a one year pilot study of 140 consecutive implants

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The desire for immediate load restoration of dental implants, particularly in the anterior esthetic zone, requires specific implant design strategies to enhance primary stability. In the presence of extraction sites, often with compromised bone, implant fixation is obtained apically and palatally. Though surface roughness is a factor in early osseointegration the macro-architectural design of the implant establishes the initial mechanical fixation important for the first 3-4 weeks of function in order to minimize implant mobility.



Fig.1- Saturn- New "winged" design.

A new implant design, the Saturn dental implant (Cortex Dental Industries, Shlomi, Israel) ,employs a unique new strategy, that of extended sub-crestal threads, expanded out in a wing-like effect to engage socket walls mid-crestally for added primary stability (Figure 1+2).



Fig.2- The extended "wing" engaging the corticalis of the socket`s wall.

The implant is a titanium grade 5 conical screw with internal hex suitable for immediate function. Two 2.4mm spiral channels with a thickened reverse buttress thread extends around the implant for vertical and horizontal bone compaction. Anti-rotational resistance is built into the thread design with a small platform switch for biological width. The

tapered form with deep threads is particularly well suited for maxillary bone and immediate function (Figure 3).

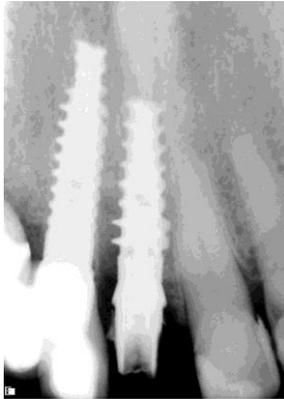


Fig.3- X-Ray demonstrates the extended "wing" engaging the corticalis of the socket`s wall.

Finite element analysis of the "winged" implant in compare to a regular implant revealed that when 20 Kg are applied at a 20 degrees , the amount of maximal displacement at the neck of a regular implant is 60% higher than the "winged" Saturn. (Fig.4)

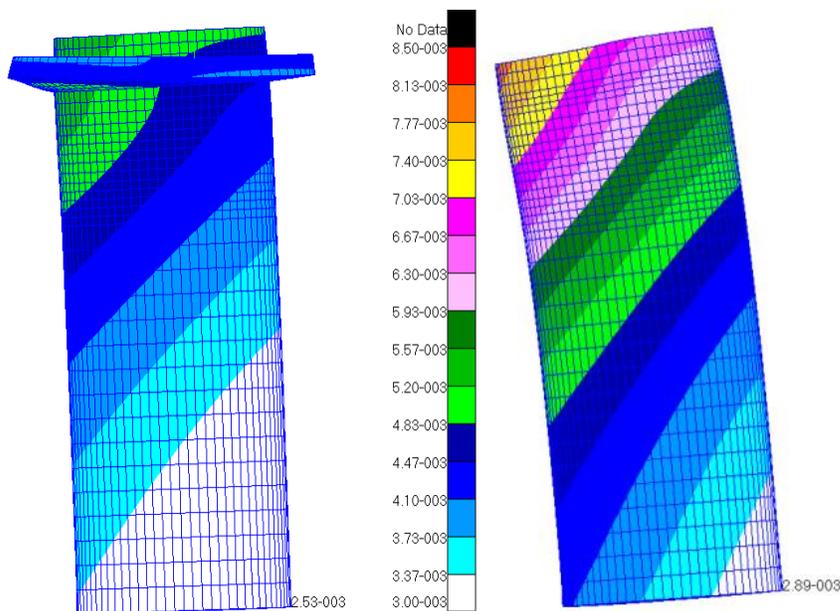


Fig.4- Max. displacement of the "Winged" implant is 5.2 mic. And 8.5 with the regular implant.

In order to evaluate the efficacy of this new implant a study was undertaken to evaluate the implant in both jaws under conditions of immediate function in the clinical setting.

Materials and Methods;

Three private clinics and the, Tiberias Medical Center, Upper Galilee Dental Center and the Department of Oral and Maxillofacial Surgery Poria governmental Hospital treated patients using the following selection criteria:

Bicuspid teeth and forward in the arch that required dental extraction and implant placement for immediate loading were selected for study. Patients were in general good health with no acute oral disease present.

Following dental extractions osseous wounds were debrided and implants placed on the palatal/lingual side of the sockets.

Bone was classified into four groups according to Zarb and Leukholm from Type I dense to Type IV low density cancellous bone. Insertion torque was then recorded. When insertion

torque was less than 35Ncm the implant was not loaded. Provisional restorations were to be fabricated and placed on the day of implant placement.

Case example;

A left lateral incisor was removed and implant placed at the palatal aspect of the socket (Figure 5).

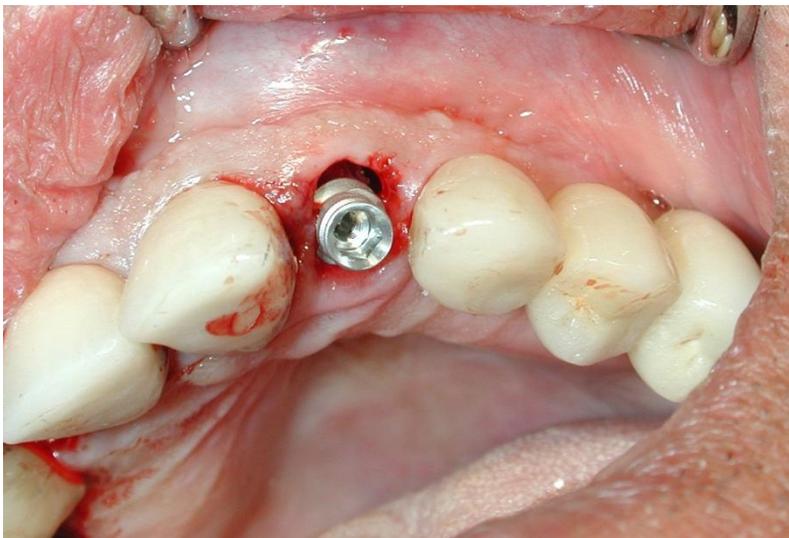


Fig.5- The Saturn is implanted into the extracted socket at palatal aspect.

Then seated into final position with a torque driver to 40Ncm (Figure 6).



Fig.6- Final positioning with Torque Driver to over 40Ncm resistance.

The temporary abutment was then placed (Figure 7),



Fig.7- Temporary abutment is placed.

and the temporary crown cemented into place avoiding Occlusal contact (Figure 8).



Fig.8- Temporary crown cemented avoiding Occlusal contact.

Figures 9,10 show the radiographic findings at the time of temporization and finalization after one year in function.

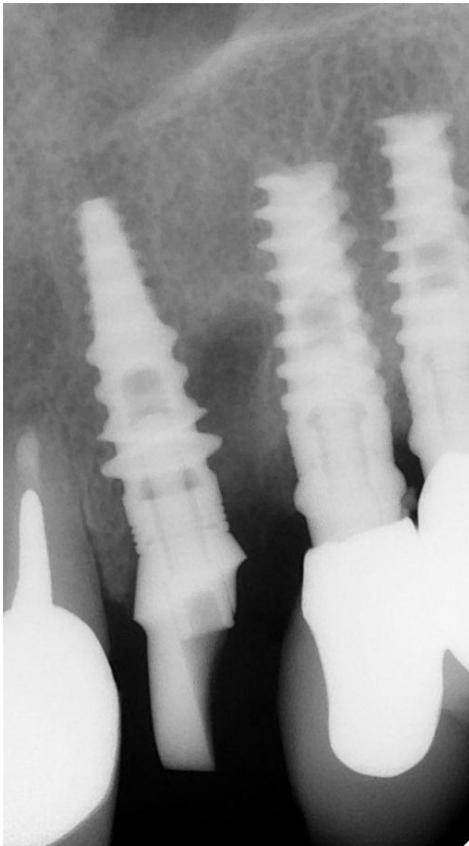


Fig.9- Post-Op x-ray on day of implantation.

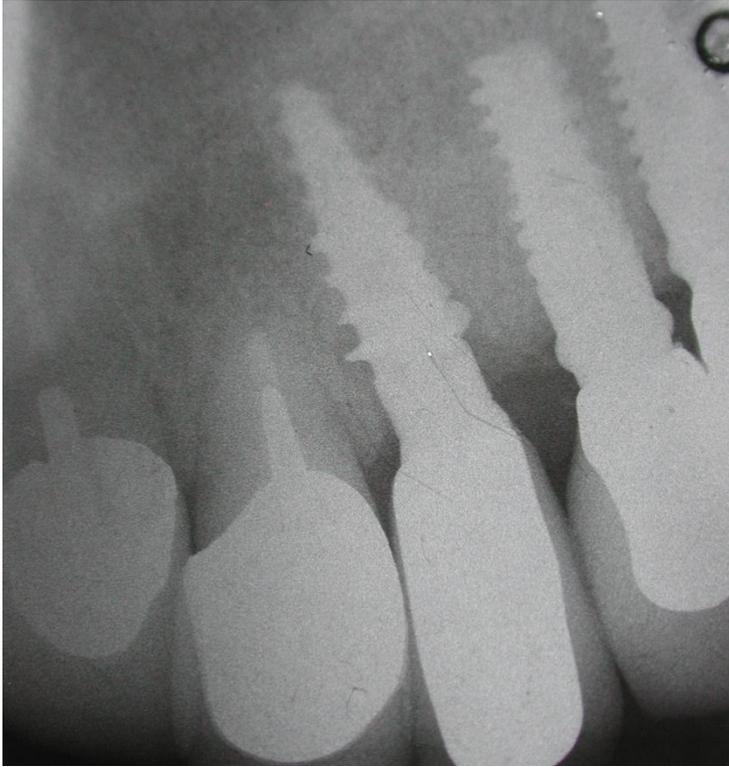


Fig.10- X-ray after one year in function.



Fig.11- Final restoration after one year in function.

Results;

140 implants were placed consecutively over a one year period during 2009 and 2010. 95 implants were immediately loaded and 45 implants left submerged for staged loading. Of implants placed into immediate function, 83 were in the maxilla and 12 in the mandible.

Implants were examined at 1,6,12 and 16 weeks post placement and then proceeded to final restoration. There was a one year followed up. All implants were placed into functional occlusion and judged to be satisfactory esthetically. Five of the immediately loaded implants failed for a 3.6% failure rate.

All 40 submerged implants found to be osseointegrated (100%) on exposure and proceeded for final restoration.

Discussion;

The rationale for the use of an extended thread in the mid crestal location for extraction site stabilization is based on finite element analysis which demonstrates that in the presence of a winged thread pattern displacement of the implant, when measured at the neck, is reduced 40% under off-axis force (Figure 4). Therefore, non-axial loads, which are detrimental to

a fragile mechanical fixation, is buttressed by this design strategy.

Moreover, single root extraction site locations may engage bone earlier during the insertion of winged implant which helps to avoid deep implant placement in order to gain fixation.

Overall, the findings were favorable for the placement of the Saturn implant which proved particularly useful when bone was cancellous Type III or Type IV.

Besides this study, due to the high insertion resistance, the "winged" implant proved to be very useful in cases of open and closed sinus floor elevation, and at the tuberosity. The "winged" implant was also found to be very useful in cases of immediate replacement of failed implants, when initial stability is critical.

Conclusion

A pilot study of 140 consecutively placed Saturn dental implants followed up to one year after placement revealed a 96.4% implant success rate despite immediate loading in the presence of large extraction defects and poor quality bone.

These favorable preliminary findings must now be corroborated by longer term studies.

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