Aadva implant in private practice

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Fig. 1_Morphology of the Aadva implant with the various locations where roughness was measured and where SEM images were taken. SEM image of micro-threads at the shoulder; SEM image of the middle of the implant; and SEM image of the implant apex.

_Several long-term studies have confirmed that oral implants can offer a predictable solution for the replacement of one or more teeth.[1, 2] The number of failures during the first years is limited. However, there are currently numerous disturbing reports about late infections around implants. Some authors have reported incidences of peri-implantitis above 50 per cent after 10 years of loading[3], while others have published more favourable data.[4, 5]

Of course, unlike the original, very strict protocol (with a healing period of 6 months after extraction, an osseointegration period of 3 to 6 months, splinting of the implants, minimum ridge width >7 mm, minimum implant length of 10 mm, etc.)[6, 7], the more recent procedures are much more flexible and perhaps even too flexible (immediate placement, immediate loading, narrow ridge, limited bone height, guided bone regeneration, etc.).

The implants themselves have also undergone a tremendous evolution. Their design has been adjusted (body shape, threads, connection type, platform switch) and a lot of changes have been made to the implant surface. This has come in response to fundamental research[8] which showed that a roughened implant surface would increase the chances of osseointegration and in particular accelerate osseointegration (ideal for fast loading). Today, implants are categorised as minimally rough implants with Sa <1 µm, moderately rough implants with Sa 1–2 µm, and rough implants with Sa >2 µm.[9] Very rough implants (for example, implants with Sa >3 µm) appear to be more susceptible to peri-implantitis, probably because of accelerated biofilm formation.[2] Moderately rough implants show a clearly higher chance of integration at the expense of only a slightly increased risk of peri-implantitis.[10-13]

Some major risk factors for peri-implantitis have now been identified. For example, it was found that a history of chronic adult periodontitis and especially of aggressive periodontitis significantly increases the risk of peri-implantitis.[14–17] This can probably be explained by the absence of an effective immune system. In such patients it is extremely important to offer a thorough follow-up programme.[18, 19]

Early bone loss can also be induced by the surgeon, for example through excessive bone compression,[20] failure to respect the biological dimensions,[21] or repeated removal of an abutment.[22]

Figs. 2a & b_Cumulative percentage of bone loss around the implants. Changes between the loading time and 1 (upper) or 2 (lower graph) years later respectively.

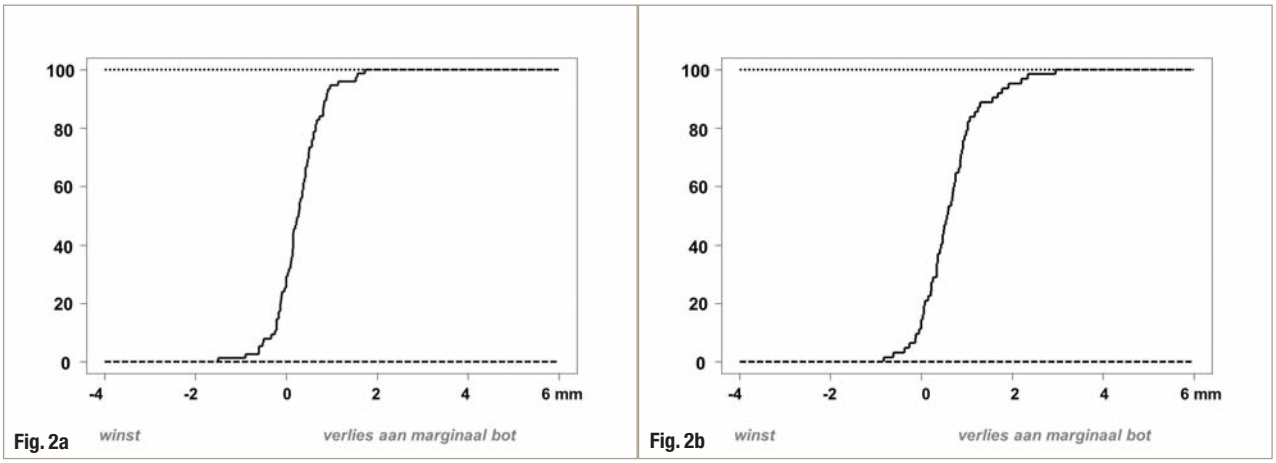

Fig. 2a

Fig. 2b

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like most of my colleagues.

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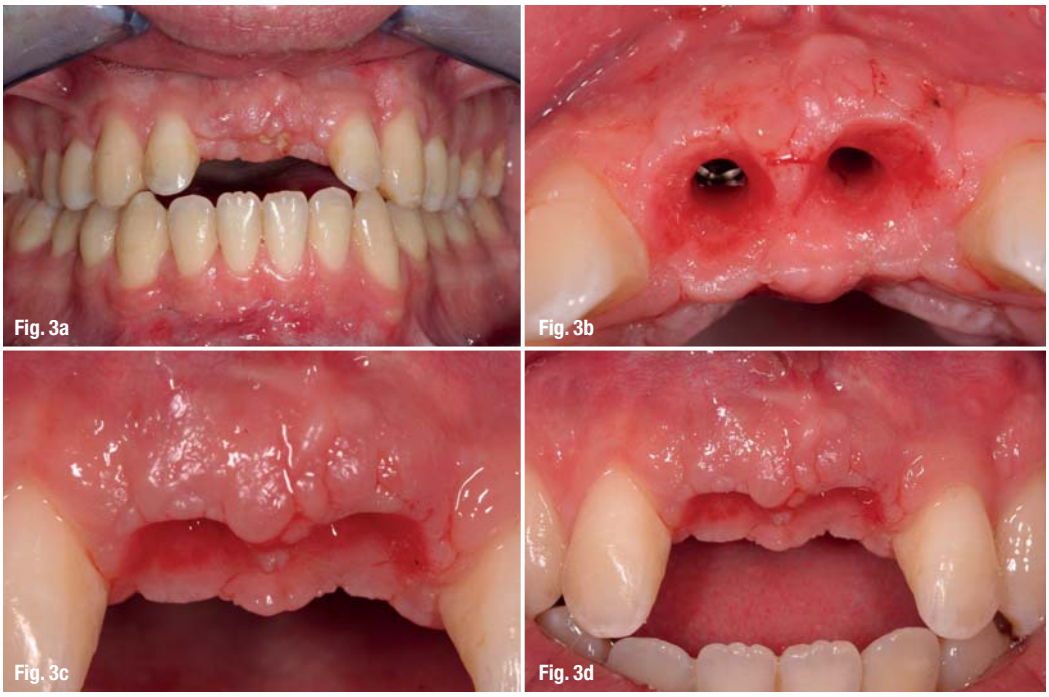


Fig. 3a_Teeth loss following trauma rendered hard and soft tissue reconstruction necessary.
Fig. 3b_The vertical positioning of the implant combined with a conical connection will guide the prosthetic emergence profile.
Figs. 3c & d_Stable soft tissues and nice biological width.

However, there is still a very strong desire to further improve oral implants and/or surgical procedures, and companies are inclined to keep on marketing new implant variants, unfortunately sometimes even without clinical validation. The aim of this study was to clinically evaluate a new implant with a moderately rough surface before it became commercially available. First, the implant's surface roughness was examined. Two private practices were also asked to treat a series of patients with different indications, medical backgrounds and jawbone dimensions using this new implant.

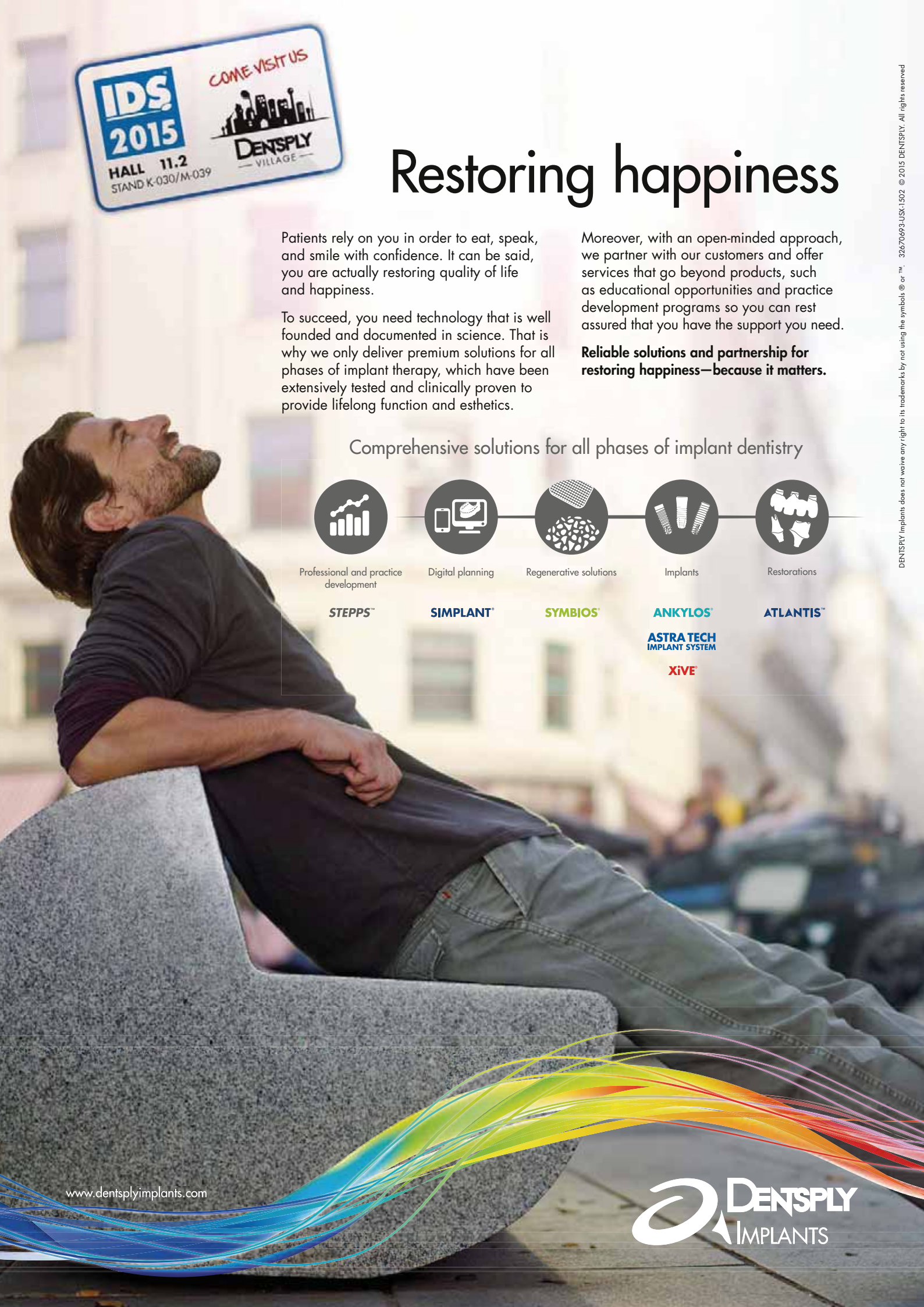
_Materials and methods

The implant's surface roughness was examined at three levels (Fig. 1): at the implant's shoulder, in the middle of the implant body and at the apex. This analysis was done with a Wyko Optical Profiler (Veeco, New York, USA) and a magnification of 50x. Electronic scans of these areas were also made with a SEM, JSM-6610LV (JEOL, Tokyo, Japan).

This retrospective clinical study was performed at two private practices in France (Jean Pierre Brun and Ph. Leclercq). A number of "consecutive" patients, who received one or more implants to replace one or several teeth in the upper or lower jaw, were included. The implants were placed in extraction holes and in healed sites, sometimes in combination with guided bone regeneration. The protocol was usually performed in two stages. The average age of patients receiving implant placement was 59.6 years. 137 patients were included: 56 men and 81 women. No special inclusion or exclusion criteria were used. Patients were not admitted to the study if they presented one of the following exceptional situations: (1) excessive alcohol or medication use; (2) a health condition not allowing surgical procedures; (3) unfavourable circumstances such as

Tab. 1_Intra-oral distribution of installed implants according to the position in the jaw.

	Central incisor	Lateral incisor	Canine	First premolar	Second premolar	First molar	Second molar
Upper jaw (n = 248, 63.1 %)							
Number	30	30	25	48	42	46	27
%	7.6	7.6	6.4	12.2	10.7	11.7	6.9
Lower jaw (n = 145, 36.9 %)							
Number	11	5	15	12	18	47	37
%	2.8	1.3	3.8	3.1	4.6	12.0	9.4



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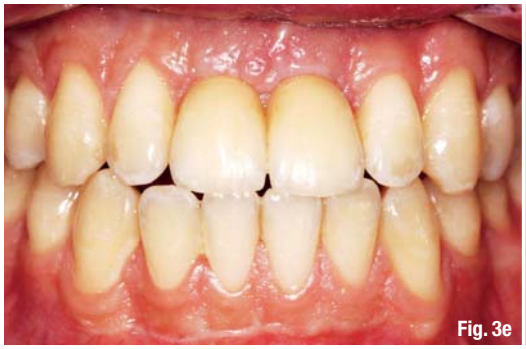
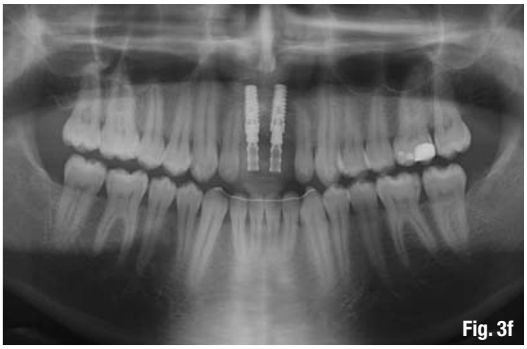


Fig. 3e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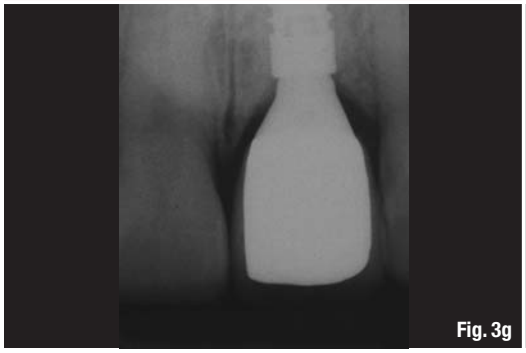
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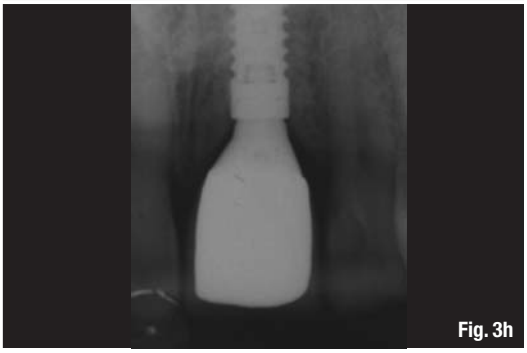


Fig. 3h

Fig. 3e_The tissue contour is improved by the crestal design of the Aadva implant.
Fig. 3f_The radiographic control at the impression stage shows the importance of implant positioning.
Fig. 3g_Missing central Incisor (21) treated with an Aadva implant; 1 year follow-up.
Fig. 3h_Same clinical case; 4 years follow up.

tumours, chronic bone diseases or prior radiation of the area of the planned implants; (4) severe bruxism; (5) a psychiatric condition or related problems; (6) inability to give consent for the treatment. The patients were recruited between 16/11/2009 and 18/12/2012. The clinical procedure was performed according to the manufacturer's guidelines. Depending on the bone density, a wider final drill was used to prevent over-compression of the bone. Both clinicians saw the patients again after 3 months, 6 months and every year after that, unless check-ups were performed by the colleague who referred the patient to them. For the calculation of the implants' cumulative survival rate, the patients who did not have any check-ups were contacted by phone to verify the proper functioning of the implants. Panoramic images or preferably intra-oral X-rays (using the long-cone, parallel technique) were made at the time of placement, at the time of loading and every year after that. Two independent clinical researchers (J. Merheb and W.-F. Simons) evaluated the X-rays. An extra analysis was performed in cases where there was a difference ≥ 1 mm.

_Results

The GC Aadva implant is made from grade V titanium and is cylindrical in shape, slightly tapered towards the apex to improve its self-tapping characteristics. The neck of the implant (1.8 to 2.5 mm wide) has micro-threads. More apically the threads are larger towards the apex, with a spacing of 1 mm. At the apex, there are several cut-aways to make room for any bone released when the implant is screwed in. The implant is available in diameters of 3.3, 4.0 and 5.0 mm and in lengths of 8, 10, 12 and 14 mm. The surface of the implant has been sand-blasted, except the shoulder, which is very smoothly polished. This section tapers inward to provide a platform switch in order to promote

Tab. 2_Implant cumulative survival rate.

Interval in months	Implants interval	Failed implants	Interval survival	Cumulative survival percentage
0 – 6	300	3	99.0	99.0
7 – 12	297	2	99.3	98.3
13 – 18	259	0	100	98.3
19 – 24	158	0	100	98.3
25 – 30	86	0	100	98.3
31 – 36	24	0	100	98.3
37 – 42	6	0	100	98.3

Fig. 3i_Contained tooth gap treated with 2 Aadva implants; 2 years follow-up.
Fig. 3j_Posterior tooth gap treated with 3 Aadva implants; 3 years follow-up.
Fig. 3k_Posterior tooth gap treated with 3 Aadva implants; 4 years follow-up.
Fig. 3l_Posterior tooth gap treated with 3 Aadva implants; 5 years follow-up.

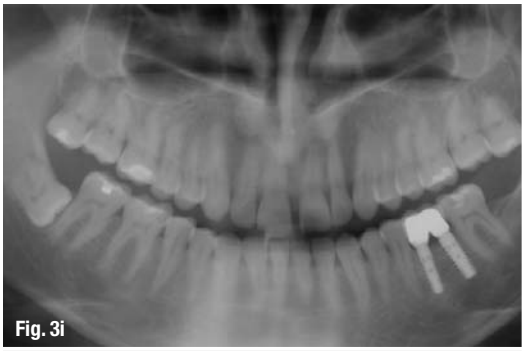
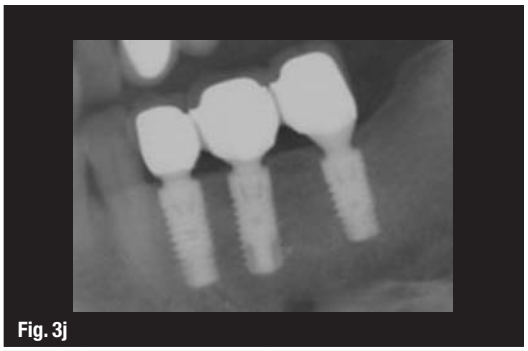


Fig. 3i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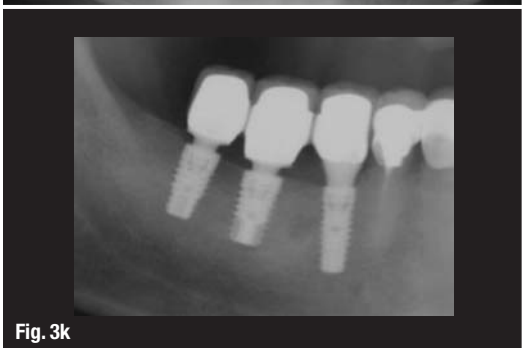
Fig. 3k

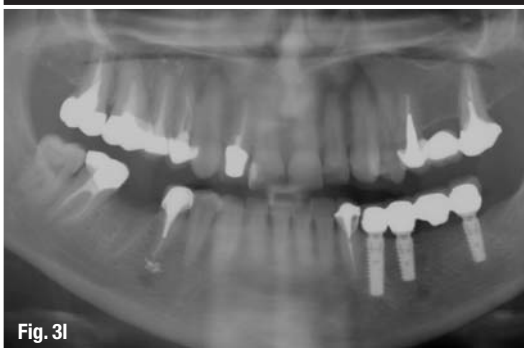
Fig. 3l

a strong soft tissue collar. The internal connection consists of a machine taper (11°) and a hexagonal index. The implant shows a fairly homogenous roughness over the entire surface with a Sa-value ranging from 2.0 to 2.3 µm. The corresponding Ra-values vary from 1.3 to 2.5 µm. This means that this implant falls just within the category of moderately rough implants.

A total of 393 GC Aadva implants were placed. Their intra-oral distribution is summarised in table 1. The implants were primarily placed in the upper jaw (248 implants, 63.1 %) and often in the premolar area (120 implants, 30.5 %) or the molar area (157 implants, 39.9 %). The diameter of most implants was 4 mm (n = 284), but narrow (n = 69) and wide implants (n = 40) were used as well. Several implant lengths were used: 8 mm (57), 10 mm (144), 12 mm (160) and 14 mm (32). Most implants were placed in bone quality type 2 (79.9 %), while 10.4 % were placed in type 1 bone and 9.7 % were placed in type 3 bone.[23]

Several patients presented risk factors: 10 % of the patients were smokers; bone dehiscence occurred in 12.9 % and pre-operative guided bone regeneration was necessary at 6 % of the sites. A sinus floor elevation was required in 11 % of the cases, and 11.5 % of the implants had only limited primary stability at the time of placement. A total of 5 implants were lost. These losses were probably due to an excess of clinical indications in order to push the capabilities of the implant Aadva. A Kaplan-Meier analysis (Tab. 2) showed a 98.5 % cumulative success rate for the implants after 42 months. For 334 implants (118 patients) the marginal bone loss could be followed longitudinally (Tab. 3). The cross-sectional data (not always with the same implants at any given time) revealed a 0.2 mm bone loss between placement and loading, 0.2 and 0.4 mm during the first and second years, and no further loss afterwards. The longitudinal analyses (with the same implant observed at several points in time) showed a 0.3 mm relative bone loss during the first and second year of loading, with an unchanged situation afterwards (Fig. 2). The number of implants with more than 1 mm bone loss was 5.5 % during the first year and 8.8 % during the first two years.

_Discussion

Initial bone remodelling after implant placement and loading is presently a focus of industrial competition. Some companies advertise their implant as having minimal bone loss during this period of remodelling. With some implant designs, connections and topographies, bone level was sometimes reported to be as low as the first or second macro-thread in the first months after loading.

The data of this study showed a 0.4 mm average bone loss during the healing period, which is similar to the best performing implants currently on the market. These observations contrast with studies on other implant designs that report much higher bone losses during this period.[24,25] Bone level appears to subsequently remain relatively stable with an average loss of 0.3 mm during the first and second year. Afterwards it was found that this bone resorption could be further reduced. It should nevertheless be pointed out that this paper reports on a field study, far away from the academic environment but

Marginal bone level at a specific observation time (cross sectional data)			
Time	**Number of Implants**	**Average bone level**	**S.D.**
Placement	225	0.46	0.46
Loading	170	0.67	0.64
After 1 year	167	0.88	0.66
After 2 years	156	1.26	0.80
After 3 years	115	1.26	0.73
Marginal bone loss (longitudinal observations)			
Interval	**Number of Implants**	**Average bone level**	**S.D.**
Placement – 1 y in use	129	0.47	0.61
Placement – 2 y in use	103	0.75	0.84
Placement – 3 y in use	81	0.80	0.75
Placement – loading	113	0.40	0.72
Loading – 1 y in use	75	0.27	0.52
Loading – 2 y in use	62	0.65	0.69
Loading – 3 y in use	51	0.57	0.47

Tab. 3_Marginal bone level (cross-sectional observations) and longitudinal bone loss around GC Aadva implants.

probably closer to clinical reality. Clinical studies in an academic setting are often very strictly managed, with stringent inclusion and exclusion criteria and strict patient follow-up. All these factors, which can only improve the results, were not present in this study.

The new implant performed well in various situations, from a single tooth implant to full-fixed dental restorations in all tooth positions and in different bone types. No significant changes were observed in the survival rate between treatment options (immediate placement, GBR, etc.). The survival rate (98.5 % after 3.5 years) is within or better than the survival rates reported in clinical studies until now.[26, 27] In the current study, only 5 out of 399 implants were lost, probably due to insufficient primary stability.

These findings can further be supported with data from an in-vitro study in pigs by Joke Duyck's group, comparing the osseointegration process between the GC Aadva and Osseospeed Astra Tech implants. After 1 and 3 months, only very limited differences were observed in many parameters such as bone-to-implant contact, marginal bone level, etc.[28]

Clinical observations showed almost no soft tissue recession, as illustrated in a case (Fig. 3). It is assumed that this is due to the favourable crestal bone height and the internal connection (platform switching).

_Conclusion

The recently introduced implant design showed stable bone and soft tissue levels. This is a promising result, but a long-term study is required to confirm these initial very favourable results._

Editorial note: A list of references is available from the publisher.

contact

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