

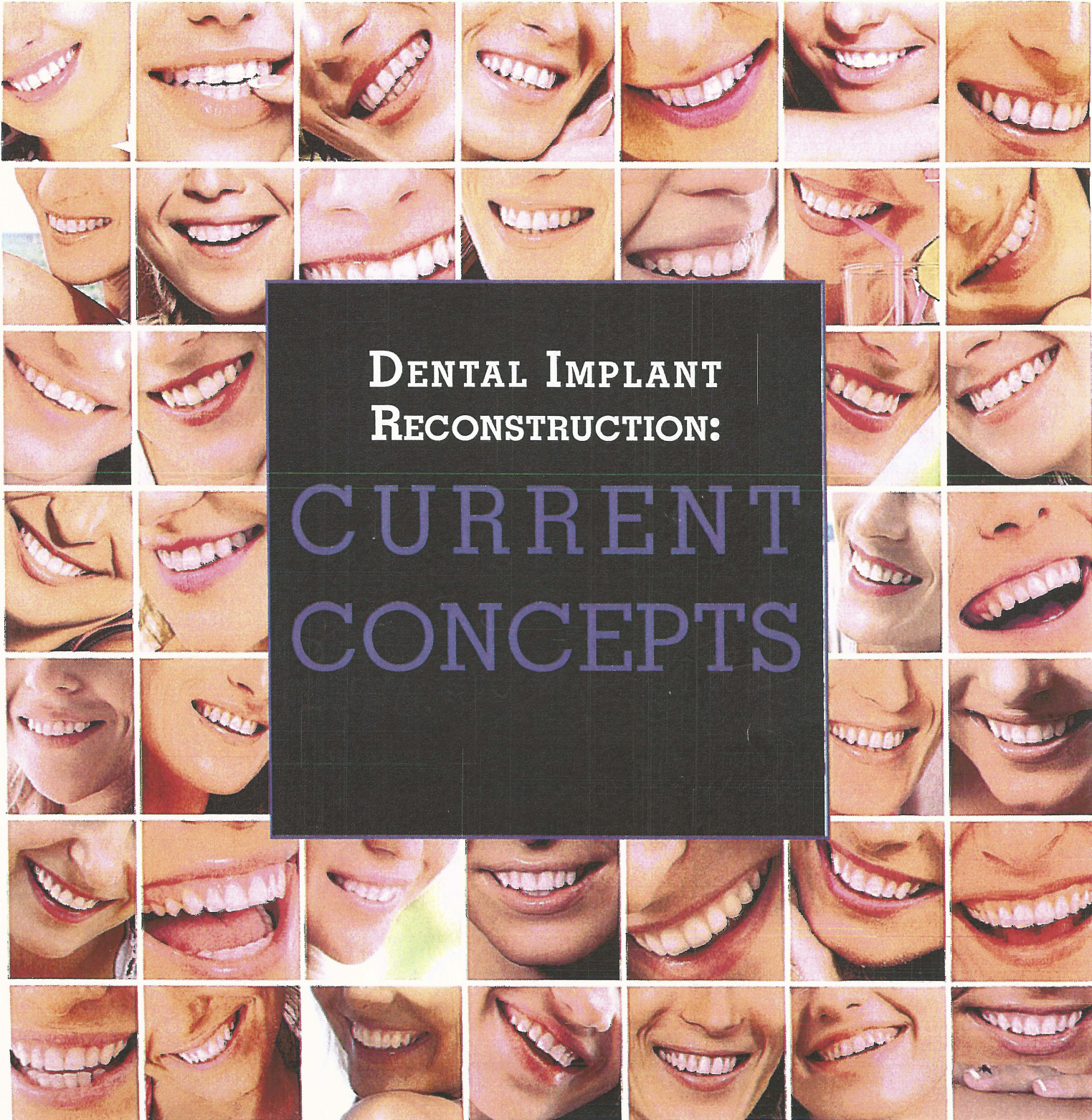
# Alpha Omegan

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DENTAL IMPLANT  
RECONSTRUCTION:

CURRENT  
CONCEPTS



AUTHOR



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As a highly sought after speaker on many oral care topics, Dr. Babbush has lectured at over 800 seminars, workshops, and clinics over the last 46 years. He has authored four textbooks.

# A Multi-Center Review of 53,802 Implants Utilized in Over 13,000 Jaws For All-On-4 Reconstruction

By Charles A. Babbush, DDS, MScD

One of the most challenging, technique sensitive, difficult, and complex reconstructions/restorations is the edentulous and/or soon to be edentulous maxilla and mandible. Years usually go by with patients in terminal, non-restorable dentition, which has previously undergone the usual gamut of multiple periodontal and restorative procedures. The aging edentulous patient population has also been a particularly difficult group to treat. In addition, the traditional process of sustained years using removable full arch prosthesis with accompanying continuous atrophy making function on a daily basis more difficult and challenging for both patients and

providers. A negative impact on the oral health related to quality of life has also been associated with the edentulous state.<sup>1</sup>

In past years reconstruction of these cases was not only complex but was also expensive. Some of these cases required an increase in the number of procedures as well as prolonging the time frame for treatment.<sup>2</sup> In numerous instances complex grafting procedures involving the ribs, calverium or iliac crest were required. Sinus augmentation and other segmental grafts from the symphyseal or ascending ramus of the mandible were also utilized.<sup>3</sup> In some cases the use of immediate provisional implants was not only desirable but necessary in order to support and retain interim provisional prosthesis to maintain not only masticatory ability but for esthetic improvement during this transition phase.<sup>4</sup> All of the above outlined procedures led to a less than desirable environment for these patients, which then decreased the acceptance rate for further treatment.<sup>5</sup>

The All-on-4 treatment concept was developed by Paulo Malo from Portugal over 10 years ago.<sup>6</sup> This concept provides the edentulous maxilla or mandible as well as the immediate post-extraction patient with an immediately loaded, fixed prosthesis utilizing four implants per-arch. Two implants are placed in the anterior region and are oriented in an axial direction, and two implants placed in the posterior region and tilted and oriented parallel to the anterior wall of the maxillary sinus and/or angled anterior to the mental foramen in the mandible.<sup>6-11</sup> Tilting of the posterior implants increases the inter implant distance which increase the A-P spread, which also reduced the cantilever length, reducing the need

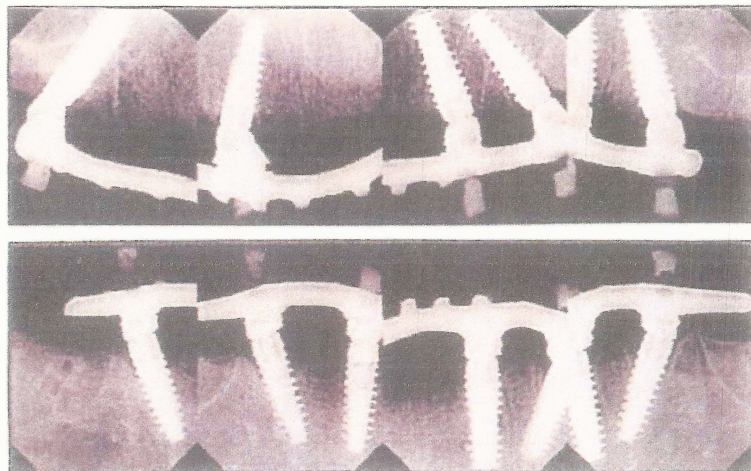


Figure 1a (top) and Figure 1b (bottom)  
Digital periapical radiographs of the maxillary and mandibular implants at 5.1 Years post-loading, note the very good bone levels around both the straight and tilted implants.

for bone grafting.<sup>6-12</sup> Excellent outcomes have been reported in various studies using tilted implants.<sup>6</sup>

The four implants are restored with either straight or angled multi-unit abutments in order to create ideal parallelism. These then support a provisional, fixed immediated loaded full-arch prosthesis placed on the same day as the surgical procedure. The definitive prosthesis is usually fabricated and placed 3 to 4 months later. This type of case has been developed to maximize the use of available bone as well as allowing for immediate function. Published data on this treatment concept reported cumulative survival rates between 92.2% and 100%.<sup>6</sup>

The All-on-4 concept has been previously reported, in the literature, utilizing the Nobel-Speedy and/or Branemark System dental implants.<sup>15</sup> This paper is relating to the All-on-4 concept utilizing the Nobel-Active implant system.<sup>19</sup> This implant features a tapered body with a variable thread design in a large group of cases in all indications carried out over a five year period of time from February 2008 to January 2013.

This paper is a 5-year retrospective, single center report in addition to a 10 center overview survey of experiences of the All-on-4 concept over an average of 4.51 years. Patients who were edentulous in either the maxilla and/or mandible or required extraction of a non-restorable terminal dentition were reconstructed with the All-on-4 concept utilizing the Noble-Active implants. The first implant was placed in February 2008 and the last was placed in January 2013; 5,002 implants were placed in this series. All patients received an immediately loaded fixed provisional complete denture provisional prosthesis. This prosthesis consisted of an all acrylic resin appliance with denture teeth with no palatal coverage and totally implant supported on the day of surgery. According to the All-on-4 protocol, the definitive prosthesis was fabricated 3 to 4 months later, consisting of a milled titanium frame with a warp around heat cured acrylic resin with denture teeth.

**Results**

In this series there were 2,376 males and 2,676 females with a mean age 58.9 ±12.4312 implant were placed in the All-on-4 procedure and 684 implants were used in the partially edentulous cases/patients. In the maxilla, 2,549 implants were used; whereas 1,814 implants were placed in mandibular All-on-4 cases. Each prosthesis was supported by four

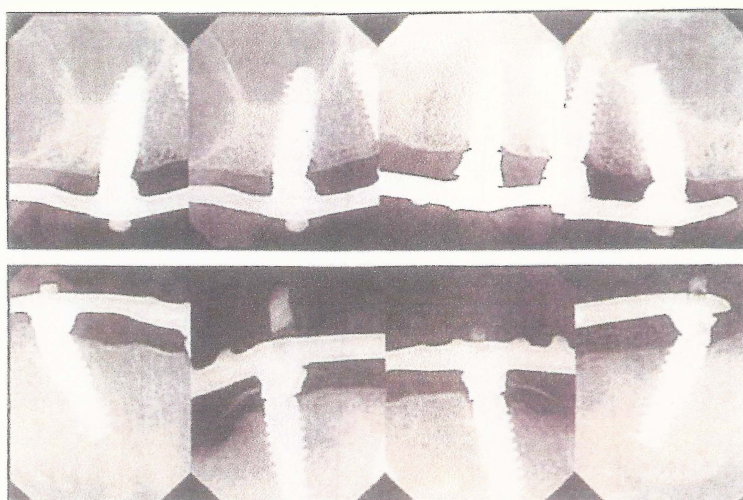


Figure 2a (top) and figure 2b (bottom)  
Digital periapical radiographs of the maxillary and mandibular implants at 4.1 Years post-loading, note the very good bone levels around both the straight and tilted implants.

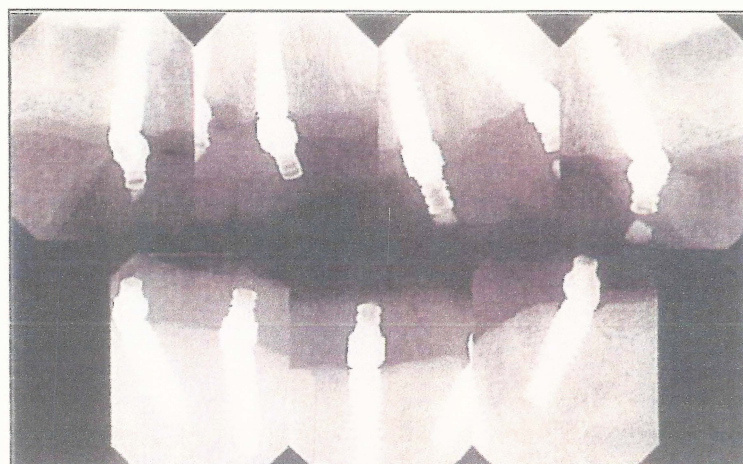


Figure 3a  
Digital periapical radiographs of the maxillary and mandibular implants at 3 months post-insertion just prior to fabrication of the definitive prosthesis.

TORQUE VALUES (IMPLANT INSERTION)		
NcM	n	%
< 35	140	2.8
35	483	9.7
36-45	597	11.9
46-55	706	14.1
56-65	330	6.6
66-70	2690	53.8
NOT RECORDED*	56	1.1
TOTAL	5002	100

Table 1.

\* Implants achieved primary stability although torque values were not noted in numerical values.



Figure 3b  
Digital periapical radiographs of the maxillary and mandibular implants at 5.9 Years post-loading, note the comparison to the bone level in fig 3a as well as the excellent bone levels around both the straight and tilted implants.

implants. Most of the implants (4,806) were seated with a minimum of 35 NcM of torque with a mean of 57(NcM). 140 implants had a torque value 35 NcM and 56 implants had no torque value recorded (Table1). All implants achieved primary stability at

the time of placement. 3,474 implants were placed in extraction sockets (69.5%) immediately following tooth removal and 1506 (30.5%) were placed in healed primary bony sites. Localize bone grafting was carried out in 2260 (45.2%) of the implant sites and no grafting was necessary in the remaining sites 2742 (54.8%). (Figures 1-3)

**Failures**

Of the 5,002 implants utilized in this clinical evaluation, 98 implants (1.9%) failed and were subsequently removed. The failures occurred in 35 males and 63 females, age distribution again was at 58 years (±12). Extraction immediate replacement took place in 62 of the 98 sites, with bone grafting in 68 of the sites. The original torque values were at 35 NcM or less in 18 implants and the remaining 80 implant at 36NcM-70 NcM with a mean of 54 NcM. The average time in place prior to removal/failure was 7.5 months. Of the 98 failures 57 implants were replaced immediately with larger size implants, 21 were delayed placement, and 20 were not replaced for a variety of reasons. Only 3 of the cases were not reconstructed. The three cases were converted to full arch removable prostheses.

ClearChoice Data					
CLINICAL CENTERS	JAWS/ IMPLANTS	ALL-ON 4	ALL-ON 3,5,6	DURATION YEARS	FAILURES V/L
KANSAS CITY CIPRA, CAMARATA	606/2492	538	68	4.2	1/2
ST. LOUIS WILLIS. KAPITAN	1700/7200	1150	550	5.2	9/2
PHOENIX GALLINDO, BUTARA	1595/6443	1543	52	5.5	1/0
CLEVELAND BABBUSH, KANAWATI	1256/5050	1149	107	5.11	3/1
ATLANTA RAZOOK, BERRY	1536/6162	1487	49	5.4	2/2
HOUSTON VELASCO, IERO	929/3791	871	58	3.5	1/1
DENVER ADAMS, JENSEN	2451/9804	2394	57	7.1	9/4
DALLAS PAREL, PHILLIPS	558/2132	449	109	2.8	10/2
MINNEAPOLIS ECKERT, SANDLER, HUELER	788/3393	593	195	3.3	0/0
CHICAGO STEIN, WANG, SHAH, CHIN	642/2587	612	30	3.0	0/0
WASHINGTON, D.C. GRAVES, YAGHMAI, ARMALLINE	1187/4748	1127	60	4.5	2/0
TOTAL	13,248/53,802	11,913	1,335	4.51	38/13(51)

Table 2.

### Multi-center Survey

In addition to the Cleveland center, 10 other centers, which concentrated on the All-on-4 treatment concept, were surveyed as to the outcome results. Those centers were located in Kansas City, St. Louis, Phoenix, Atlanta, Houston, Denver, Dallas, Minneapolis, Chicago, and Washington, D.C. (Table 2). The most important aspect of this preliminary survey was the massive numbers with extremely favorable outcome that were generated. In total, 13,248 jaws were reconstructed with the All-on-4 concept utilizing Noble Speedy and Nobel Active implants in the majority of cases with a total of 53,802 implants placed over an average of 4.51 years with 2.8 years as the shortest time period and 7.1 years being the longest. Only 51 total jaw failure cases were reported; all 4 implants failed with 38 in the maxilla and 13 in the mandible, with an overall jaw success rate at 99.99%.

### Summary

When the Blade-Vent implant was first utilized in clinical cases by Linkow, Lew, Cranin, Judy, Babbush, [20] there was no basic laboratory research, histological specimens, clinical studies, failure analysis, and certainly no data at 5-10 years or more. This group consisted of numerous doctors in private offices mostly dedicated to general practice who initiated the renaissance in contemporary dentistry related to what we presently see in the field of implant reconstruction.

The All-on-4 concept has certainly reached an impressive level. Currently more than 10 years have passed since the procedure was originally introduced by Paulo Malo. The clinical results as well as the impressive number of procedures all adds up to one of the greatest clinical success stories in the field of implant dentistry. Not only are the overall number of procedures as well as the longevity impressive but the shortened treatment time and considerable improved quality of life has proven to be a major factor in the treatment of these patients. Further clinical studies are needed to continue the documentation of this treatment modality. **AO**

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