

Clinical Multi-Criteria Study of Implantation Outcomes in Different Areas of the Jaws – Report

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Abstract: Dental implant is a medical operation used to restore the functions of damaged or missing teeth. Correct implantation requires the proper selection of size and shape among the implant structures. Osseointegrated implants as anchors for various prosthetic reconstructions have become a predictable treatment alternative. Current article, which is based on the study performed by Dr. I. Greshko, for more than 2 years period follow-up and includes total of 298 implantation procedures* performed on 69 patients, may be considered as a valuable information source, due to it being differentiated. The study does not concentrate on a specific implants location or specific patients group or special circumstances, but on overall outcome of multi-implantation procedures. In other words it describes the general implantation procedures outcome in real-time mode. The overall success rate after exposure was: **99%**. The study draws statistical conclusions as to the success rates of commonly used implant sizes in various anatomic areas. The results indicate that TAG implants conform to internationally accepted rates of success in the highest level.

Keywords: Implantation, restoration, implants design, success factors, surgical study.

INTRODUCTION

As known, dental implantation procedure is meant to restore damaged or replace missing teeth. The outcome of this surgically performed procedure is dependent on a variety of issues. Amongst others, the influential ones are correctly adjusted size, shape and overall design of the implant [1, 2].

The bone bed around dental implants is influenced by implant, materials from which the implant is produced, treatment protocol and surgeon professionalism.

The use of implanted teeth prosthesis is continuously growing worldwide. As per the literature, worldwide, 30% of people aged 65-74, losing their natural teeth [3]. Osseointegrated implants as bases (anchors) for various prosthetic reconstructions, have become a predictable treatment alternative, still they sometimes fail [4].

Like any other surgical intervention, the dental implantation procedure is affected by many factors. Being the procedure of restorative nature (meant to restore damaged or lost function of the organs - teeth), which outcomes has most evident effect on the quality of life, make the issue of procedure success a very contributive factor, capable to determine the willingness and readiness of the patient to be subject to implantation procedure [5].

There is no doubt, that the successful outcome of implantation process is strongly affected by quality of the materials, implants design and features, patient conditions and surgeon professionalism [6].

THE STUDY

Conditions and Circumstances

- All the surgeries were performed with the same criteria for case selection and procedure protocols.
- All the patients underwent periodontal training prior to implantation, periodontal bleeding control index
- All the patients were pre-evaluated for general health condition. Patients were selected on the basis of "good general health".

Before implantation surgery all patients had a medication treatment, as follows:

- Augmentin 500 mg – 1/2 tablet a day, for 5 days
- Fenkarol - 1 / 2 tablet a day, for 5 days
- Nimesil 100 mg – 1 a day, for 5 days

- Oral rinse containing 0.2% chlorhexidine for 10-14 days

In case of bone insufficiency (lack of bone) detected – grafting was used.

- The implants were subjected to following:
 - a) periodontal control – after 3-6 month (X ray)
 - b) prosthetic control – after 4 month (X ray)
- The study population was: 33% males, 67% females – age group from 35 to 70 years old

Table-1: The study population

Gender	Male	Female
	23	46
	33%	67%
Age	> 35-45 <	> 50
	32%	68%

- All the implants were of internal hexagon connection – 176 units of AXIS type and 122 units of Massif type, as visualized in Fig. 1



Fig-1: Implants Visual Appearance

Note: The majority of the implants were placed in one "single stage" surgery, with healing caps, but, some of the implants were immediately loaded.

MATERIALS AND METHODS

- The implants were made of Ti-6AL-4V Eli grade 23
- The surface roughness and microgeometry of the material was achieved by surface blasting, followed by acid etching.

The roughness index of the implants – 1.8-2.2mm

- The implants were irradiated (sterilized) by Gamma sterilization sequence (Cobalt 60 source)
- All surgical kits, were sterilized (autoclaved) at 134°C

Surgery Protocol

The operative protocol for submerged implant placement was as follows:

Local anesthesia, crestal incision, full thickness flap reflection, controlled-speed drilling with external irrigation, implant placement procedure with ratchet torque, closure with interrupted sutures.

Implants Repartition

- Lower Jaw (Mandible):
 - Total of 138 implants were placed –
 - a. In case of Torque insertion higher than 45Ncm an immediate loading was operated (36 implants).
 - 8 Axis in posterior position
 - 28 Massif anterior
 - b. Torque in the range 30 - 40Ncm, one stage implant with Healing cap was performed loaded after 2 months (99 implants).
 - 56 Massif posterior
 - 16 Axis posterior
 - 27 Massif anterior
 - c. Torque lower than 30Ncm a standard osseointegration was performed implant with cover screw loaded after 4months (3 implants).
 - 3 Axis posterior

- Upper Jaw (Maxilla):
 - Total of 160 implants were placed –
 - Note:** All the implants were implanted using cover screw and were loaded after 6 month.

- a. If the bone was sufficient for implantation (94 implants).
 - 24 Axis posterior
 - 24 Axis anterior
 - 11 Massif posterior
- b. When the residual bone 7mm – bi-cortical fixation with implant length 8mm (based on the regenerative properties of the Schneider membrane, 13 implants).
 - 13 Axis posterior
- c. Bone between 4 to 6 mm – implant placement with bone graft augmentation (27 implants).
- d. In case of Bone thickness lower than 4 mm - implantation after 6-8 months (26 implants).
 - 26 Axis posterior

Bone graft: BIOTECK (Italy): bone-plastic material BIO-GEN □ (BGS-05, the BGC-05; the BGM-05); collagen membrane BCG-GEL

Stitches - the horizontal U-shaped stitch + normal nodular. In all cases suture was removed after 3-10 days.

Successful Procedure Outcome - Criteria's

The determined success criteria's are as follows:

- During the period of osseointegration there is no pain or infection
- At the bone/implant interface there is no radiographic gap.
- No mobility when applying 25Ncm Reverse Torque before restoration.

STUDY RESULTS

Generally, the performed study achieved overall success rate of 99%, after exposure.

- The two types of implants (Axis and Massif), were well represented (A - 41% and M - 59%), as well as the distribution of lengths and diameters, therefore the outcome may be considered as valid and reliable
- Both types of implants were implanted either in Mandible and Maxilla, also in most difficult cases
- 36 implants have been immediate loaded either Axis or Massif implants in Anterior & posterior position without any failure
- 27 implants with bone graft augmentation during the implantation with successful osseointegration
- 26 implants with bone graft augmentation and a 8 months delay in the implantation with the same

success

After two years evaluation:

Three implants failed -

- 1 Axis 3.75/11.5 #Maxilla position 21 - Fibrous integration with no signs of inflammation.
- 1 Axis 3.3/11.5 #Maxilla position 23- mobility when applying 25Ncm Reverse Torque before restoration.
- 1 Axis 3.75/8 #Maxilla position 16 – remove after 3 weeks due to inflammation and pain.

The remaining 295 implants were well osseointegrated and loaded independent of the procedure that has been used.

Table-2: Implants range and distribution

AXIS				Massif			
Diameter	Length	Quantity	%	Diameter	Length	Quantity	%
3,3	10	32	18.2%	3,75	8	21	17.2%
	11,5	31	17.6%		10	38	31.1%
	13	6	3,4%		11,5	6	4.9%
	16	1	0.6%		13	2	1.7%
3,75	8	23	13,1%	4,2	6	2	1.7%
	10	43	24.4%		8	16	13.1%
	11,5	27	15.3%		10	25	20,5%
	13	4	2.3%		11,5	11	9.0%
4,2	6	2	1,1%	5	8	1	0.8%
	8	1	0.6%			122	100,0%
	10	5	2.8%				
	11.5	1	0.6%				
		176	100,0%				

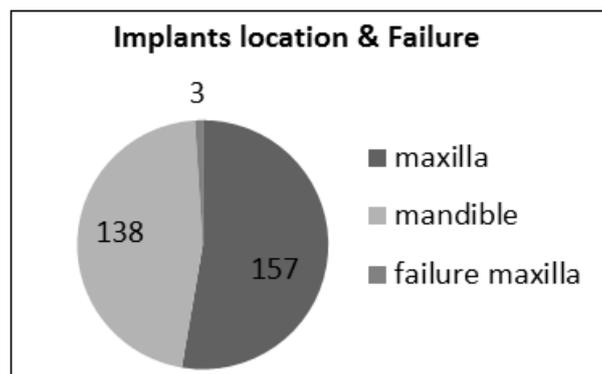


Fig-2: Implants location & failure

Maxilla – success rate is 98%

Mandible – 100%

Overall success rate – 99%

Table-3: Data Base

Implant quantity from April 2015 to February 2016	298 = 100%
Axis	176 =59%
Massif	122- 41%

Sex	Male	Female
	23	46
	33%	67%
Age	> 35-45 <	> 50
	32%	68%

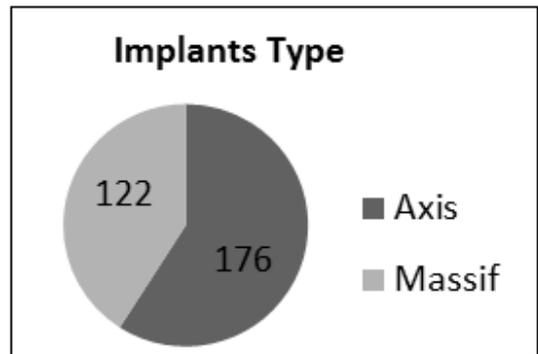


Fig-3: Implants type

Table-4: Implants location

Jaw	Implant quantity	Case Number	position	Axis	Massif	Anterior	Posterior
Maxilla	160	38	Anterior	59	-	114	184
			Posterior	90	11		
Mandible	138	44	Anterior	-	55	114	184
			Posterior	27	56		

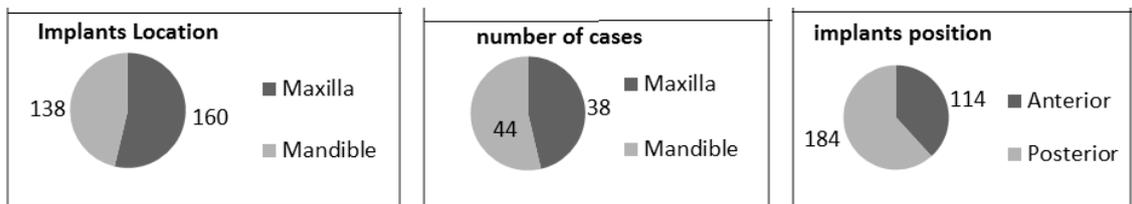


Fig-4: Implants location, Implants position & number of cases

CONCLUSIONS

A pilot study of 298 consecutively placed dental implants followed up to 2 years after placement revealed a 99% implant success rate despite different site, procedure and loading time. All implants type and diameters (Axis and Massif) have been used in this study.

All cases of procedures have been accomplished – conventional/delay/early and immediate loading, procedure with bone graft augmentation, sinus elevation.....

Those multi criteria clinical cases reflect a real situation which surgeons are facing. Situations were large scales of protocols are used.

On the basis of this study, it appears that TAG implants have a very high success rate similar to that of other leading well-known implants companies.

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