PRELIMINARY STUDY ON THE SUCCESS-FAILURE BALANCE IN IMPLANT THERAPY

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Abstract:

Implant therapy has been shown to be predictible, effective and reliable for the replacement of missing teeth in edentulous and partially edentulous patients. Prosthodontic rehabilitation with dental implants requires accurate implant placement for predictable functional and aesthetic outcomes. Implant dentistry has developed numerous advancements in technology, materials, techniques and concepts ti achieve the desire beneficial clinical results. Clinical evidence has demonstrated long-term (> 10 years) survival rates up to 95%. Despite the high success and survival rates of dental implants, failures can and do occur. There are certain factors such as smoking, history of periodontal disease which have been associated with higher rates of implant failure. Futhmore, implant site characteristics such as decreased quantity and or quality of bone, infected sited sites and anatomic localisation such as the posterior maxilla have also been corelated to decreased implant survival.

Key words: dental implants, hard tissue, infection, interdental space, local risk factors, soft tissue.

INTRODUCTION

The oral cavity has been described as a mirror that reflects the health of the body [1]. A correct diagnosis, elimination of the causes and reduction of modifiable risk factors are paramount for successful prevention and treatment of oral disesses [2]. Nowadays, the pathology of the oral cavity, especially edentation, represents a major public health problem [3].

The oral cavity is colonized by a complex microbiota that grows and lives as diverse biofilms on all mucosal and dental surfaces. Oral biofilms on dental hard and soft tissues are the main cause of dental

diseases, including caries and periodontal disease [4]. The low pH medium is a primary factor of decays that occurs trough saliva acidification as result of alimentary and hygiene individual behaviors like food diet and tooth brushing. The modifications of salivary pH could be also caused by the influence of bacteria, enzymes, hormones and other factors [5].

Concerning the etiology, location, extent or topography, edentation is considered a pathological entity that, through evolution and complications, causes serious imbalances in the stomatognathic system [6]. Teeth are extracted as a consequence of an oral complication, following the interaction between the patient and the dentist, the dentist's ability to provide treatment to sustain the functionality of the teeth and depending on the patient's preference [7]. Actually, the dental medicine is governed by special aesthetic demands based on avant-garde techniques and technologies in conjunction with the type of biomaterials used. [8].

The use of dental implants is considered a revolution in modern dentistry [9,10]. Osseointegrated dental implants have represented a breakthrough in clinical practice for replacing missing teeth and supporting prosthetic reconstructions in edentulous areas [11].

The use of dental implants to aid in the support of restorations replacing missing teeth has been reported in the literature dating back to the early 1960 [12,13]. Historically, dental implant treatments have had mixed results with regard to ruvival of the implants and prostheses. In the context of society development, the past two decades have seen theoretical and practical interest of manufacturers, reserchers and clinicians to improve the success of implant treatment outcomes through evolution in implant design, materials and clinical procedure [13, 14].

While the patients is usually concerned with esthetics and function, dental professionals expect success regarding biological and mechanical stability and the facilitation of oral hygiene [10,15]. There is consensus among authors that the success of dental implant tretamnet depends on the presence and maintenance of surronding bone mainly in the bone crets area. However, one of the major challenges encountered in implantology is the process of bone resorption around the implant after insertion or during its use. In the literature, bone resoprtion of approximately 1.2 mm in height during the first year of function is reported with 0.1 mm more resorption for every subsequent year [10,17,18 16,17]. This loss with a V or U shape has been called saucerization [10, 18].

In 1986, Albrektsson et al establish the following criteria for implant succes [10,19]. The implant should have no mobility and demonstrate no radiolucent areas radiographically, annual vertical bone loss after the first year sholud be less than 0.2 mm and there should be no perisitent and or irreversible symptoms. The most common parameter used in clinical reports is the survival rate, indicating whether the dental implant is physically in the mounth or has been removed [10,20]. However with this method, implants that should be removed owing to pain or ilness may be retained and erroneously considered successful.

In 1993, an implant quality of health scale was created by James and developed by Misch [10, 22, 22]. This scale was later modified at the International Congress of

Oral Implantologist's Pisa Consensus Conference in 2007, presenting four clinical categories that contain condition of success syrvival and failure of the implant. Survival can be divided into two categories:satisfactory survival which describes implants with less than ideal condition, but for wich there is no need for clinical intervention and compromised survival includes implants with less than ideal conditions required clinical treatment to reduce the risk of implants that require removal or that have been lost. Implant success is a term used to describe clinical conditions and must include at least 12-month period for implants servingas prosthetic abutments. Early success is suggested for implants that are retained for a period of one three years, intermediate success for three to seven years and long-term success for a period longer than seven years. In this new approach, pain, mobility, radiographic bone loss, probing depth and periimplant disease are evaluated [10,23].

Regarding periimplant disease, since teh bone loss caused by stress or bacteria leads to the deeping of the sulcular gap and decreases oxygen trnsion, anaerobic bacteria become the primary promoter of continous bone loss. Exudate or an abscess around an implant indicates exacerbation of periimplant disease and possibly accelerated bone loss. Exudate persisting for more then one or two weeks normally requires surgical intervention in the periimplant area to eliminate teh etiological factors. The reduce bone height after the exudate episode exposes the implant to secondary occlusal trauma. The surgeon specialist should re-evaluate and reduce the stress factors for the new bone condition to improve the performance in the long term [10,23].

The aim of our 15-year study is to determine the effects of factors with local potential risk on implant survival and success (primary outcomes) as well as on mucosal recession, bleeding on probing and proximal marginal bone loss (secondary outcomes). The following local risk factors were considered:interdental space, infected sites, soft tissue thickness, width of keratinized soft tissue, bone density and implant stability. As with any study involving the oral cavity, oral hygiene is a key variable. There is substantial evidence that poor hygiene is assciated with periimplant [24,25].

The following clinical and radiographic criteria proposed by Albrektsson et al and adapted by Buser et al and Karoussis at al were used to define implant success [26,27,28]: absence of mobility, absence of persistent subjective complaints (pain, foreign-body sensation and/or dysesthesia, absence of reccurent peri-implant infection with suppuration, absence of a continuous radiolucency around the implant, no pocket probing depth >5 mm, no probing depth >5 mm and no bleeding on probing, annual vertical bone loss after the first year of service not exceeding 0,2 mm (mesially or distal) [26,27,29,30,31]. Several secondary outcomes were also considered. These included mucosal recession, bleeding on probing and proximal marginal bone loss. Although these outcomes individually were not directly related to implant suvival or succes, they were determined to be significant when considering ourcomes in the esthetic zone.

It is important to differentiate between the meaning of Survival and Success. ,,Implant survival,, means that implants are still in the mounth at the time

of examination, regardless of the state of the prosthesis or patient satisfaction. A nonfunctional implant requiring additional treatment is counted in the surviving group while ,,Implant success,, means that implants are not only in the mounth but are also functional and satisfactory.

MATERIAL AND METHODS

This study included 624 patients who received 1127 implants and prostheses on implants in a private clinic in the period 2006-2021. These included completely and partially edentulous arches as well as single-tooth replacements. All the prosthetic bridges performed were fixed. Of the 624 patients studied, 345 (55.28%) are women and 279 (44,71%) are men.

After a complete medical and dental history, through clinical and radiographic evaluations including as indicated, periapical, panoramic, conventional and computerized tomographic films, diagnostic casts and consultation with the restorative dentist were carried out. Patients were presented with treatment options and advised of the potential problems associated with dental implants and an informed consent form was signed. Patients were not accepted for implant surgery if they were medically contraindicated for elective surgery or had unrealistic expectations.

All implants were placed under sterile conditions following this protocol: the patient was administrated intravenous sedation using fentanyl citrate 0,5 mg/ml injection, diazepam 5 mg/ml injection, as well nitrous oxide, oxygen inhalation. This was in addition to articaine hydrochloride 4% and epinephrine bitartrate 1:100 000 local anesthesia that was administrated in both block and infiltration technique. They also received antibiotics Augmentin 24 hours prior to surgery and 6 days thereafter (1mg twice a day), corticosteroid medication (Medrol) for control of the inflammatory response was given daily in a regressive mode (15 mg at surgery, 10 mg on the first 2 days postoperatively and 5 mg in days 3 and 4 postoperatively), antiinflamatory medication Arcoxia (Merk) 120 mg once day, was administrated on day 5 postoperatively every 12 hours. Anagesics were given on the day of surgery and postoperatively for the first 3 days as needed. Because the bone density allowed us, the insertion torque of the implants was >50 N.cm. Sinus lifts were performed in patients who did not have enough space for implant insertion, along with bone additions with Bio-Oss (Geistlich Pharma AG) and resorbable membrane Hypro-Sorb F.

All patient records, histories and radiographs were reviewed; all implant locations were recorded appropriately as posterior maxilla, anterior maxilla, posterior mandible or anterior mandible and all implant failure were recorded.

The succes and survival rates of the implants were analyzed based on the criteria of the Pisa Consensus Conference according to the following clinical parameters: pain (absent, absent in function, sensitivity in function, pain in function), mobility (present or absent), probing depth (PD), bleeding on probing (BOP), exudate (absent, with exudate history, with uncontroled exudate) and radiographic bone loss. The PD and BOP measurements were taken at four aspects of each implant: mesial (M), distal (D), buccal (B) and lingual/palatal (L/P).

For the assesment of radiographic bone loss, a periapical radiograph using the

bisecting angle technique was performed at the time of patient recall. According to the criteria, the implants were classifield as successfull or failed.
Biological and prosthetic complications such as periimplant mucositis, periimplantitis or any mechanical and prosthetic complication were also evaluated. Patient with BOP or positive suppuration, a PD greater than 5 mm and radiographic bone were diagnosed as having periimplantitis.

RESULTS

During the study period between 2006-2021 was analized a number of 624 patients who met the inclusion criteria for this study. At these patients we encountered a number of 1127 implants. The age range of these patients was between 20-75 years.

Table 1. Number of patients with dental implant

Patiens with implants					
women		**men**		**total**	
number	**%**	**number**	**%**	**number**	**%**
345	55.28	279	44.71	**624**	**100**

Table 2. Number of implants by placement area

Number of implants and placement area									
Anterior and posterior maxilla				**Anterior and posterior mandible**				**Total**	
women		**men**		**women**		**men**			
number	**%**	**number**	**%**	**number**	**%**	**number**	**%**	**number**	**%**
234	20.76	170	15.08	381	33.81	342	20.35	**1127**	**100**

The implants used in this study were: ANKYLOS DENT SPLY (32 implants-3,01%), ALPHA BIO (173-16,27%), MIS BIOCOM (63-5,92%), AB (TITAN IMPLANT) (341-32,07%), BREDENT BLUE SKY (536-50,42%), ADIN (1-0,094%), TUFF (1-0,094%), NORIS (2-0,188%).

Of the 624 patients, only 52 patients needed sinus lift interventions, of which only 29 required bone additions. The materials used were: BIO-OSS (Geistlich Pharma AG), NANO-BONE (Artoss Gmgh), HYPRO-OSS (natural hydorxyapatite and atelocalgen composite for bone suntitution), KASIOS (TCP DENTAL HP) (calcium phosphate ceramic bone filling) and and collagen resorbable membrane: HYPRO-SORB F (bilayer bioasbsorbable barrier for guided tissue and bone regeneration), R.T.R cone (SEPTODONT) (resorbable tissue replacement).

The 29 bone additions were performed in the following cases: one case of bone addition and resorbable membrane immediately, two cases of bone adtions and immediate placement of the implant, two

cases of bone addition+extraction and implant placement, two cases of extractions with curettage and bone addition and immediate placement of the implant, one case of periapical resection and immediate placement of the implant, 21 cases of extractions with bone additions and placement of implants immediately post-extraction.

Of the 52 sinus lift procedures: 26 cases were simple sinus lift, one case of bilateral sinus lift, one case of sinus lift+cystectomy+implant, 10 cases of sinus lift+bone additions+resorbable membranes+immediate placement implants, two cases of sinus lift+extractions+implant placed immediately post-extractional, five cases of sinus lift+implant placed immediately+membrane on implant, five cases of sinus lift+immediate implant placement, two cases of sinus lify+bone addition+membrane resorbable+extraction.

The size of the implants used in the jaw were: 3,3/10 mm, 3,5/10 mm, 3,5/11 mm, 3,75/8 mm, 3,75/13 mm, 3,75/16 mm, 3,75/10 mm, 4,8/8 mm and in the mandible were: 3,5/14 mm, 3,5/8 mm, 3,75/13 mm, 3,5/10 mm, 3,75/11,5 mm, 3,75/10 mm.

Based on the criteria for failure outlined above, 28 implants were rejected, of which 7 in the jaw and 21 in the mandible.

Of the 28 cases of rejection: 5 cases were rejected at 7 days with pain, mobility positive, positive depth probing (PD) as well as positive probing bleeding (BOP). These were suppresed and bone addition was affected with Bio-Oss. Another 3 cases of implants were rejected after 10 days showing pain, mobility, positive probing depht (PD), positive bleeding on probing (BOP), exudate and the presence of bone loss on radiography. They were suppressed and bone addtion was affected with Bio-Oss. Anothet 6 cases suffered rejection at 30 days with mobility, positive probing depht (PD), positive bleeding on probing (BOP), radiographic bone loss present. They were also suppressed and bone addition was performed with Bio-Oss. Another 4 cases were rejected at 21 days for the same resons, two cases were rejected at 10 days being present in all these cases: mobility, pain, positive probing depht (PD), bleeding on probing (BOP) as well as bone loss radiograph. For cases were rejected immediately due to suppurative phenomena, pain, mobility, positive probing depht (PD), bleeding on positive probing (BOP) exposing the vestibular wall. Two cases suffered rejection 32 days after implantation due to mobilility, positive depht probing (PD), positive bleeding on probing (BOP), exudate presence and radiographic bone loss. In these two cases, gingival curettage and addition of Bio-Oss were performed. Another case was that of an implant rejected after 14 days due to the presence of mobility, inflamatory exudate, positive PD and positive BOP with vestibular wall exposure. The last rejection appeared 90 days after implantation due to mobility, PD positive, BOP positive, exudate presence and radiographic bone loss. It was suppresed and Bio-Oss was added.

DISCUSSION

This study aimed to evaluate the success, survival and failure rates of implants based on the implant quality of health scale developed at the Pisa

Consensus Conference. The success category describes optimal conditions, the failure category includes implants that should or could be removed.

In this study, patients who underwent implant rejection first observed mobility, PD positive and BOP positive, then the presence of inflammatory exudate and then pain. So among the first signs that alerted patients were: mobility, positive PD, positive BOP, inflammatory exudate and then was pain and final confirmation was made based on radiographic bone loss.

The literature shows a lower success rate of implants placed in the maxilla compared with tha mandible, a fact that is related to the lower density of the maxillary bone [32,33]. The residual bone height becomes insufficient owing to the loss of alveolar bone. However, the molar area in both the maxilla and mandible dispalys substantial bone defiency owing to increased occlusal forces, incresing the failure rate of implants in this area [32]. In type IV bone, the cortical bone is very thin and the lack of dense bone markes it difficult to achieve adequate stability. The mandibular retromolar area and the maxillary molar region are formed by low-quality bone, while implants placed in the anterior mandible area have high success rates owing to incresed cortical bone. In this study, there was no difference between implants palced in different regions of the jaws regarding their success or survival coroating the findings of Kim et al [34,35].

In our study, various implant systems were analyzed without differences in the success rate or acceptable survival rate, corroborating the findings of Ferrigno et al and Telleman et al who found similar results for the survival of different types of implant designs [36,37,38]. In a literature review, Opperman et al concluded that regarding implant survival, there are no types surfaces or implant systems that present clear advantages over others [39,40].

In summary, in the present study, of the 1127 implants made, only 28 (2.48%) were rejections.

CONCLUSION

Whitin the limitation of this study, the data suggested that the implant success rate does not seem to be related to factors like age, sex, systemic disease, macroscopic characteristics or area in wich the implant was placed. This study can be considered preliminary and provides the basis for the design of further studies.

REFERENCES

1. Loredana Liliana Hurjui, Irina Gradinaru, Claudia Dorus, Daniela Maria Tanase, Adina Armencia, Ion Hurjui, Claudia Cristina Tarniceriu, Mihaela Mitrea, Ludmila Lozneanu, Carina Balcos, Ionela Lăcrămioara Șerban. Oral mucosa - pathophysiological and pharmacotherapeutic aspects. Romanian Journal of Oral Rehabilitation Vol. 13, No.4 October-December 2021, p.108-114
2. Mihaela Mitrea, Edlibi Al Hage Walid, Radu Razvan Maxim, Simona Partene Vicoleanu, Gabriela Dumachita Sargu , Niculescu Simona, Liliana Loredana Hurjui, Irina Gradinaru, Cristina Claudia Tarniceriu, Claudia Florea, Norina Consuela Forna. intervention for replacing missing teeth at patients with periodontitis. Romanian Journal of Oral Rehabilitation Vol. 13, No.4 October-December 2021, p.92-103

3. Hurjui Loredana Liliana, Serban Ionela Lacramioara, Hurjui Ion, Delianu Carmen, Tarniceriu Claudia Cristina, Jipu Raluca, Mitrea Mihaela, Popovici, Diana, Gradinaru Irina. The value of salivary biomarkers in oral cancer diagnosis. Romanian Journal Of Oral Rehabilitation, Vol.12, No.2, APR-JUN 2020, p. 59-64
4. Carina Balcoș, Loredana Hurjui, Irina Gradinaru, Vlad Danila, Dana Budala, Raluca Vieriu, Ramona Feier, Sorana Roșu. Evaluation of knowledge, sanogenous attitudes and efficient methods and means of transmitting information among teenagers. Romanian Journal of Oral Rehabilitation Vol. 12, No. 1, January - March 2020, p.66-74
5. Gradinaru Irina, Ignat Leonard, Giurgiu Levente-Cristian, Dascalu Cristina Gena, Hurjui Loredana Liliana, Ignat Maurusa-Elena, Doroftei Florica, Surlari Zinovia, Fotea Silvia, Gurau Gabriela, Beznea Adrian, Antohe Magda-Ecaterina. Study on the Surface Condition of Composite Biomaterials Related to Saliva pH. MATERIALE PLASTICE, Volume 57, Issue 3, Page 174-179, SEP 2020
6. Gradinaru Irina, Jipu Raluca, Hurjui Loredana Liliana, Pendefunda Arina Alice Ciocan, Armencia Adina Oana, Mitrea Mihaela, Antohe Magda-Ecaterina. Current aspect of metal-ceramic-biomaterial restorations and technology. Romanian Journal of Oral Rehabilitation, Vol.12, No.2, APR-JUN 2020, p. 116-127
7. Gradinaru Irina, Hurjui Loredana, Macovei Georgiana, Antohe Magda-Ecaterina. Interrelations between skeletal removable prostheses and the improvement of patient` s quality of life. Romanian Journal of Oral Rehabilitation, Vol. 11, No. 4, October - December 2019, p.85-92
8. Antohe Magda Ecaterina, Hurjui Ion, Gradinaru Irina. Implications of non-metallic prosthetic approaches in the formative aspects of dental medicine, EDU WORLD 2018 - 8TH INTERNATIONAL CONFERENCE 67, p.1220-1226
9. Pimentel GH, Martins LD, Ramoa MB, Lorenzoni FC, Queiroz AC,Perda Oseea. Peri-implantas e diferentes sistemas de implantes [Peri-implant bone loss and different implant system]. Inoov Implant J Biomater Esthet 2010, 5(2):75-81.
10. Amanda Bandeira de Almeida, Luciana Prado Maia, Umberto Demoner Ramos, Sergio Luis Scombatti de Souza, Daniela Bazan Palioto. Success, survival and failure rates of dental implants: a cross-sectional study. Journal of Oral Science and Rehabilitation 2017,3(2):25-31.
11. Mihaela Mitrea, Claudia Rusu, Irina Grădinaru, Adina Oana Armencia, Simona Niculescu, Cristina Claudia Tărniceriu, Loredana Liliana Hurjui, Raluca Jipu, Edlibi Al Hage Walid, Hurjui Ion. Case report and literature review regarding reconstruction of fracture mandible with implants. Romanian Journal of Oral Rehabilitation, Vol. 12, No. 2, April - June 2020, p.220-228
12. Cobb JR. Subperiosteal vitallium implats in dogs. Oral Surg Med Oral Pathol 1960, 13:1153-1162.
13. William Martin, Emma Lewis, Ailsa Nicol. Local risk factors for implants therapy 2009, 24(supplement):28
14. Mirela Teodorescu, Laurence Schacher, Dominique Adolphe, Irina Gradinaru, Irina Zetu, Sorin Stratulat. Experimental and Theoretical Investigations in Polyamide Spin-Coated Thin Films. Materiale Plastice, Vol.50, No. 3, 2013, p.225-229
15. Pietrokovski J. The bony residual ridge in man. J Prosthet Dent 1975, 34(4):456-462.
16. Adell R, Lekholm U, Rockler B, Branemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg 1981, 10(6):387-416.
17. Pertea M, Velenciuc N, Grosu O, Veliceasa B, Poroch V, Lunva S. Reconstruction of heel soft tissue defect's using sensate medial plantas flap. J Mind Med Sci 2018, 5(2):250-254.
18. Wyatt CC, Zarb GA. Bone level changes proximal to oral implants supporting fixed partial protheses. Clin Oral Implants Res 2002, 13(2):162-168.
19. Albrektsson T, Zarb G, Worthington P, Eriksson AR. The long-term efficacy of currently used dental implants: a review and proposed criteria of succes. Int J Oral Maxillofac Implants 1986, 1(1):11-25.
20. Ten Bruggenkate C, van der Kwast WA, Oosterbeek HS. Success criteria in oral implantology. A review of the literature. Int J Oral Implantol 1990, 7(1):45-51.

21. Misch CE. Implants success or failure:clinical assessment in implant dentistry. In: Misch CE, editor. St. Louis, MO:Moshy, 1993, pag.33-66.
22. Misch CE. The implant quality scale: a clinical assessment of the health-disease continuum. Oral Health 1998, 88(7):15-20,23-6, quiz 25-6.
23. Misch CE, Perel ML, Wang HL, Sammartino G,Galindo-Moreno P, Trisi P, Steigman M, Rebaudi A, Palti A, Pikos MA, Schwarts-Arad D,Choukroun I, Gutierrez-Perez JL, Marenzi G, Valavanis DK. Implant success survival and failure:the International Congress of Oral Implantologists (ICOI) Pisa Consensus Conference. Implant Dent 2008, 17(1):5-15.
24. Ferreira SD,Silva GL, Cortelli JR, Costa JE, Costa FO.Prevalence and risk variables for peri-implant disease in Brasilian subjects. J Clin Periodontol 2006,33:929-935.
25. Lindquist LW,Carlsson GE, Jemt T.Association between marginal bone loss around osseointegrated mandibular implants and smoking habits: a 10-year follow-up study. J Dent Res 1997,76:1667-1674.
26. Albrektsson T, Zarb G, Woethington P, Eriksson AR.The long-term efficacy of currently used dental implants: A review and proposed criteria of success. Int J Oral Maxillofac Implants 1986,1:11-25.
27. Buser D,Mericske-Stern R,Bernard JP et al. Long-term evaluation of non-submerged ITI implants Part 1:8-year life table analysis of a prospective multi-center study with 2359 implants. Clin Oral Implants Res 1997, 8:161-172.
28. Karoussis IK,Bragger U, Salvi GE,Burgin W, Land NP.Effect of implant design on suvival ans success rates of titanium oral implants. A 10-year prospective cohort study of the ITI dental Implant System. Clin Oral Implants Res 2004,15:8-17.
29. Mombelli A,Lang NP. Clinical parameters for the evaluation of dental implants. Periodontol 2000 1994,4:81-86.
30. Albrektsson T.On long-term maintenance of the osseointegrated response. Aust Prothodont J. 1993, 7(suppl):15-24.
31. Ovidiu A, Stefan GT, Dragos P, Bogdan V, Dana AI. Survival of nonagenarian patients with hip fractures: A cohort study. Acta Ortop Bras 2017, 25(4):132-136.
32. Adell R,Eriksson B,Lekholm U,Branemark PI,Jem T. Long-term follow-up study of osseointegrated implants in the treatment of totality edentulous jaws. Int J Oral Maxillofac Implants 1990, 5(4):347-359.
33. Gheoghevici TS, Veliceasa B, Puha B, Toader S, Alexa ID, Alexa O. Preoperative hemoglobin dynamics in patients with trochanteric fractures: a multivariate analysis. Rev Chimie 2018, 69(11):4220-4224.
34. Kim YK,Kim SG, Kim JH, Yi YJ, Yun PY. Prospective study of tapered resorbable blasting media surface implant stability in the maxillary posterior area. Oral Surg Oral Med Oral Pathol Oral Radiol 2012,114(1):19-24.
35. Veliceasa B,Filip A, Pertea M, Popescu D, Carp C and Alexa O. Omega plate for the treatment of acetabular fractures involving the quadrilater plate. Exp Ther Med 2021,22:1064.
36. Ferrigno N, Laureti M, Fanali S, Grippaudo G. A long-term follow-up study of non-submerged ITI implants in the treatment of totality edentulous jaws. Part I-ten year life table analysis of a prospective multicenter study with 1286 implants. Clin Oral Implants Res 2002;13(3):260-273.
37. Telleman G,Meijer HJ, Raghoebar GM. Long-term evaluation of holow scsrew clinical and radiographic results after 10 years. J Periodontol 2006, 72(2):203-210.
38. Malancea RI, Gavriliuc ER,Veliceasa B,Puha B, Popescu D,Alexa O. Methodology of three-dimensional printing acetabular fractures. Mater Plast 2017,54(3):513-516.
39. Opermann RV,Gomes SC,Fiorini T.Epidemiiologia e fatores de riscoo para as doencas periimplntares. Epidemiology and risk factors for peri-implants diseases. Portuguese 2008,18(4):14-21.
40. Alexa O,Puha B,Veliceasa B,Paduraru D. Posterior dislocation of the hip associated with ipsilateral trochanteric fractures- a very rare case.. Chirurgia (Bucur) 2009, 104(6):761-764.