

Review Article

Clinical consequences of mandibular overdenture relying on implant: A Review

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Abstract: Survival of overdenture relying on implant in the mandible depends on different factors. The purpose of this review study was evaluation of the clinical consequences (amount of survival, clinical efficiency of implant, loosening of the implant) of mandibular overdenture relying on implant. In this review study, the electronic references including MEDLINE, PubMed, SCOPUS and EMBASE were searched. It was searched for all published retrospective and prospective researches until 2015 in English that to be in relation with evaluation of the clinical consequences of mandibular overdenture relying on implant. 35 papers were selected and evaluated. In the evaluated researches, 15 to 340 patients had been followed up for 1 to 13.8 years. The value of survival of implant was reported 55.1% to 100%. Findings of this research generally showed amount of survival of overdentures relying on implant in the favorable level.

Keywords: implant, overdenture, mandibular

INTRODUCTION

Despite the reduction of prevalence of edentulous being, need to denture especially in the lower developed countries has been not reduced. In addition, increase of longevity in developed countries and increase of old people, being edentulous has been changed to a chronic problem that in order to improve operation and quality of life needs treatment. Although many users of denture are capable to adapt with this type of treatment but the operational chronic disorder, pain, reduction of self-confidence and reduction of quality of life are created in some users of denture [1].

Over the past half century, different methods have been suggested to improve problems related to dentures and lysis of alveolar bone ridge. Providing stability and retention of denture of mandibular is not predictable in cases of using conventional techniques. Dentures conventionally are situated or on the basis of used implants clinically. Dentistry experiences with usage of types of implants had been very hopeful to provide the physical stability during the operation of the denture [2].

Overdenture of implant by using different systems is acceptable treatment for edentulous patients [3]. Edentulous patients in the mandibular are treated by using different methods such as overdentures relying on implant and complete prostheses relying on implant. In

the both methods loading is conducted as delayed or immediately [4].

The results have shown that advantages of dentures relying on implant in maxilla and mandibular have superiority compared with conventional dentures [5, 6]. Many edentulous patients face some problems in using dentures due to instability and losing retention of denture such as reduction of chewing operation. One of the probable methods to reform this problem is use of intraosseous implantation that overdenture can be linked to it. This therapeutic method in the mandibular has desirable prognosis and value of survival of different implant systems has been reported 87% to 100%. However the conducted researches generally have evaluated amount of success during the periods lower than 5 years [7]. In some researches the 10 years survival of implants of overdentures have been reported very favorable (93%) [8]. Survival of overdenture relying on implant depends on different factors such as the patient's satisfaction [8], tobacco consumption [9], techniques and connections systems [10-12].

Failure of implant treatment can occur due to three main causes: 1) Infection: the bacterial infection that leads to fraction of implant may occur in each time of the treatment period. At the present time some terms are used to show failure of implant or its complications that include "peri-implant disease: the general term to describe inflammatory reactions in the soft tissue

around the implant", "peri-mucositis: reversible inflammatory reaction in the soft tissue around the implant" and "peri-implantitis: inflammatory reaction associated with loss of bone in the soft tissue around the implant".

In some cases, peri-implantitis is considered as infection of site-specific which has many common specifications with adult chronic periodontitis. The infection due to plaque accumulation on the exposed surfaces of biomaterials can be classified as a type of peri-implantitis. Other complications of the soft tissue mainly have infectious cause (hyperplastic mucositis, mucosal abscess and fistula).

Hyperplastic mucositis and fistula often occur in connection with the looseness of prosthetic components. Abscess sometimes can be created in connection with the trapped food particles in the crevices around the implant [2]. Disorder in remission: it seems that severity of traumas during the surgery and some local and systemic features of host have important role in failure of implant related to disorder in remission [3].

Overloading: fraction of implant in connection with overloading is a situation that the applied load on implant is more than capacity of the bone strength. Fractions that occur in time interval between connection of abutment and delivery prosthesis are attributed to overloading [4]. Miscellaneous cases: fraction of implant also may occur due to unfavorable surgical techniques, weakbony structure, unsuitable design of prosthesis and traumatic loading situations [13].

Reactions of tissue around the implant are considered an important factor in long-term survival of overdentures relying on implant. Parameters of peri-implant such as plaque index, bleeding indexes and probing depth are determinant factors of health of tissue of peri-implant and amount of survival of implant. Bleeding and probing depth have been known as

valuable parameters to diagnose peri-implant disease. Peri-implant diseases in some cases only involve mucus of peri-implant (mucositis peri-implant) and the involvement of supporting bone is seen in the acute cases (peri-implant). Probing pocket depth is an important criterion that shows losing attachment and bone lysis around implant [9].

In evaluation of results of treating overdentures relying on implant, considering some important factors is important such as maintenance period, types of consequences and failures, time and type of reformation, the complexity of procedures and prosthetic design [14].

According to this issue that very different implant systems are used in oral implantology [15] and in addition to this issue that different factors are effective on survival of implant, the present research aims to evaluate consequences of overdenture relying on implant of the mandibular in a review study based on findings of the previous studies.

MATERIAL AND METHOD

In this review study, the electronic references including MEDLINE, PubMed, SCOPUS and EMBASE were searched by using combinatorial words of MeSH including Implants, overdenture, survival, clinical, performance, mandibular and success. It was searched for all published retrospective and prospective researches until 2015 in English that to be in relation with evaluation of the clinical consequences of mandibular overdenture relying on implant. First the abstracts of the papers were reviewed and in the case of existing communication with subject, the complete texts of papers were prepared. The review papers were extracted from the studies. Based on this 35 papers were selected and evaluated (table 1-1). Number of the evaluated patients was variable from 15 to 340 people who had been followed up for 1 to 13.8 years. Value of survival of implant was reported from 55.1% to 100%.

Table-1: Keyword Search

Selected Articles	All Articles	Keyword
27	208	implants, mandibular, overdenture, success
6	189	implants, mandibular, overdenture, survival
2	41	implants, mandibular, overdenture, clinical performance
35	438	Total

DISCUSSION

The edentulous patients are suffered by medium to acute oral operational disorders based on both quantitative and qualitative criteria. Effect of intraosseous implants has been confirmed to a great extent in reduction of these problems and improvement of operation and stability of denture and also speech ability [2]. Therefore evaluation of survival of this

therapeutic method is important in the clinical and intraoral conditions. In this research the amount of survival of overdentures relying on implant in the mandibular was evaluated in review way. In the present research, evaluation of 35 papers showed that during 1 to 13.8 years follow up; amount of survival of relying over dentures on impant in the mandibular was variable between 55.1% and 100%. Most of these researches

showed survival more than 80%. Only in researches of Meijer [11], Meijer [16], Payne [18], Kuoppala [17] value of survival was reported lower than 90% to 55.1%. In the review study of Batenburg *et al.*, the mandibular of relying overdentures on bony implants showed value of survival 87% to 100% [19] which is similar with findings of the present research. Value of survival in follow ups lower than 5 years has been reported 84.6% to 100%. And had been variable between 55.1% and 100% in periods more than five years.

Based on these findings it seems that some other factors such as type of implant system and the treatment method perform role on clinical operation of relying overdentures on implant more than the time factor. Features of implant, surgery operation and also patient's dependent variables which are effective on quality and quantity of bone can affect Osseo integration and as the result they have remarkable effect on amount of survival of the treatment [20].

Type of implant has been known as one of effective factors on amount of survival. According to findings of Meijer *et al.*, the implant systems of Intra Mobiele Zylinder and Brånemark showed longer survival and better clinical efficiency in the mandibular compared with system of Transmandibular [11]. But research of Kline *et al.* showed that results of treatment with relying overdentures on implant didn't depend on the type of implant, bone density, oral anatomical location or type of prosthesis [21].

Some etiologic factors have been known as the cause of failure of the implant treatment. In the research of Meijer *et al.* the most causes of failure of overdenture treatment were reported depending on the type of the used implant system including losing implant (TMI system), fraction of abutment (IMZ system) or disorder in denture base or dental problems (Brånemark system) [11].

A part of failure of reling over dentures on implant is related to prosthodontic factors such as exhaustion in the creating components of retention, loosening of the abutment or gold screw, change in clip of connections of bar or change in some components (rubber ring or magnetites). Fracture of relying overdentures on implant more occur in stress concentration sites - usually on implant-. Therefore strengthening denture base on implant can increase strength against stress concentration [22].

The most important cause of failure of the treatment in the research of Zancope *et al.* was reported fracture of overdenture [4]. Results of research of ELsyad showed that however the type of attachment didn't have effect on amount of satisfaction of patients with relying overdentures on implant but about components of prosthesis (maintenance and reformation

of prosthesis, intensity of exhaustion and need to change prosthesis, problem of separation of connections from denture base) and patient's problems (mucositis, hyperplasia) had remarkable effect [23].

Research of Meijer *et al.* showed that the plaque index is different in the treated patients by different implant systems and this difference was attributed to quality of the implant level. Grades of plaque index were lower in designs that the part in the soft tissue had the flat surface compared with types of irregular surfaces. This difference was explained based on higher retention of plaque and calclose in the irregular surfaces [11].

Although it seems that situation of mandibular bone is effective on success of the treatment but Pan *et al.* by evaluation of patients who had received the relying prostheses on implant after six months after treatment showed that height of mandibular bone didn't have a remarkable effect on the patients' satisfaction of capability of chewing operation, stability, comfort and beauty [6].

Evaluation of implants of the prosthesis basis in the anterior mandible during a short-term period (72 months) in ectodermal dysplasia patients who often suffer dental abnormalities (adoneshi and hypodoneshi), lack of evolution of alveolar ridge and disorder in craniofacial structures, showed the acceptable value of survival 91% although value of survival of implants of anterior maxilla part was only 76% in the same time [22]. Pistilli *et al.* found that in patients with severe jaw bone lysis, using implant with bone graft as a prosthesis basis can provide acceptable results [24].

According to suggestion of some researchers, volume of supporting mandibular bone of prosthesis can perform an important role in advantages of this type of treatment and based on this has been suggested to evaluate volume of mandibular bone as a part of evaluating efficiency of the relying prosthesis on implant [25]. Osseointegration is measured as one of indexes of successful treatment of implant, based on percentage of touch between the implant surface and bone. Existence of an initial stability in the required amount is necessary to be provided the osseointegration. Therefore the osteoporosis which is specified with lysis of bone, change in microscopic structure and reduction of capacity of bone regeneration, has been considered as one of probable cases of prohibit usage or risk of factors of implantation. It seems that osteoporosis affects jaws in a similar way with other bones of the body and also change in metabolism of the body may lead to reduction of scar around the implant. Studies on the animal models show that the created osteoporosis experimentally in the before, after or simultaneous stages with implantation can change process of

osseointegration especially in trabecular bone and reduce touch of bone-implant remarkably [20].

In patients with implants, tobacco consumption as well as causes to analysis of gums around the natural teeth can also be used as a risky factor that negatively affects on implant survival. Imbalance in biomechanical and infection, dental plaque and gingivitis can also reduce the lifetime of the basic implants of denture. Implant treatment failure may be associated with the quality of the structure and anatomy of the jaw bone [26].

The number of implants used as the basis of overdentures can also have an impact on treatment outcomes. Overdentures on two implants have shown the survival of 100% over short periods. However, fraction of treatment usually occurs during the first year and fraction probability decreases with passing time. Another important factor is in the success of connection. Ball connects system because of erosion and looseness of components and need to replacement leads to high money and time costs, in addition, by moving in different directions leads to damage and erosion of the rings. But the connections of Bar due to low rotational movements and vertical transmission of power, provide better results and are known as a good technique [14].

CONCLUSION

The present review study showed that value of survival was in favorable level in most of treatments of relying overdentures on implant of the mandible. Amount of survival depends on different factors such as factors related to implant (implant system, number of implant, loading time, type of connection), factors related to prosthesis (maintenance and reformation of prosthesis, intensity of exhaustion and need to change the prosthesis, the problem of separation of connections from denture base) and factors related to patient (incidence of mucositis, implantitis, hyperplasia, situation of mandibular bone, tobacco consumption).

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