Consequence of Bisphosphonate on Dental Implant Success in Osteoporotic Females

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Abstract

Objective: To evaluate the effect of Bisphosphonate on Dental Implant failure rate in osteoporotic female patients.

Patients and Methods: Fifteen osteoporotic female patients underwent surgery to place 72 fixtures, in upper jaw, loaded completely within 4 months. Patients take Alendronate tablet 10 mg once daily for 8 months, 2 months preoperative and 6 months postoperative. Compares with healthy females underwent implant surgery too.

Results: Six dental implants were failed at the time of second step surgery (Gingival Former Step), with no other complication faced by the patients whether related to drug used or to surgery. Three fixtures were failed in healthy females. Statistically no significant differences in the effect of bisphosphonate on dental implant failure.

Discussion: Patients who take oral Bisphosphonate are no more at risk of implant failure than normal patients with no drug use.

Keywords

Alendronate; Bisphosphonate; Implants; Postmenopausal

Introduction

Osteoporosis as a metabolic disease characterized by low bone mass and micro architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk [World Health Organization] [1]. Bone resorption-formation balance tips off towards the resorption more so weakness and breaking of the bone can occur [2].

Physiologically bone is constantly being rebuilt and goes through a balanced process of bone break-down and new bone formation. After menopause, and aging process; balance; is disrupted and loose bone faster than it is rebuilt [3]. Increased dietary calcium and vitamin D intake, smoking cessation, moderation of alcohol and caffeine consumption, regular weight-bearing exercise regimen, and regular outdoor activities, all these factors can reduce osteoporosis postmenopausal [4,5].

Bisphosphonate (bone-sparing drugs) are currently the first choice for the medical treatment of osteoporosis [6]. Bisphosphonate can be administered in two ways: orally and intravenously. Oral bisphosphonate are usually prescribed for osteoporosis, while intravenous bisphosphonates are typically prescribed for patients with advanced bone cancers to help decrease pain and fractures [7].

These drugs preserve bone by decreasing rate of bone turnover and enhancing bone mineralization. Optimal duration of therapy is average five years duration [7].

Bisphosphonate and Implants: In 10 studies, The authors concluded from the results that dental implants can osseointegrate and remain functionally stable in patients using Bisphosphonate [8]. Brian M. Bell stated that from the analysis of the one prospective and the three retrospective series (217 patients), the placement of an implant may be considered a safe procedure in patient taking oral bisphosphonate [9].

Objective

The purpose of this study is to determine whether patients who take oral bisphosphonate are at risk of implant failure or not by comparison done with healthy females.

Patients and Methods

Fifteen Female patients (50-71 years) prepared to underwent two steps dental implant surgery with Dentium Superline System. Patients were previously diagnosed to be in risk of osteoporosis and managed with oral bisphosphonate pre- and postoperatively. Each patient have its own case sheet with ethical approval signed by them. Seventy two fixtures were placed in upper jaw. Table 1 showed detailed clinical description concerning
site and number of fixtures placed and failed. All fixtures loaded completely within 4 months. Patients took Alendronate tablet 10 mg once daily for 8 months, 2 months preoperatively and 6 months postoperatively. Patients informed to take on an empty stomach, stay in upright position for half an hour. In addition to therapeutic treatment with bisphosphonate, patients advised to increase and concentrate the dietary intake of food containing calcium and vitamin D substitutes to compensate postmenopausal osteoporosis. On the contrary healthy female also underwent implant surgery with 100 fixtures distributed in both jaws. Fixtures distribution to sites for both osteoporotic and healthy cases has been shown in tables (Tables 2-4) (Figures 1 & 2).

The patients recalled for periodic follow-up appointment to examine their jaw and fixture. During examination, periodontal probing performed and pocket depths recorded. Panoramic and peri-apical radiographs taken to ensure that patients were not suffering from bone loss or jaw necrosis.

Result

Six dental implants (8.33%) from total 72 implants (Table 5) were failed (Figure 3) at the time of second step surgery (Gingival Former Step), with no other complication faced by the patients whether related to bisphosphonate (necrosis of the jaw) or to surgery.

Periodic follow up within five years, indicate stable, sound Implants in clinical examination, with normal physiologic resorbed marginal bone surrounding the fixtures in radio graphical investigation, indicate a success rate of 91.7%. We compare failure rate in bisphosphonate females with those healthy females underwent implant surgery in same situation only differ in bisphosphonate use. Healthy females showed failure in three fixtures (3%) from total 100 fixtures (Table 5).

Statistical comparison (Table 6) done by using Mann-Whitney Test (Table 7), showed that no significance in Z value (-1.940).

Discussion

Bisphosphonate is a class of drug commonly used to decrease osteoclast activity and bone turnover, typically giving higher bone density. Postmenopausal period considered as one of the risk factors that indicate the use of oral Bisphosphonate.

There has been a long discussion regarding the risks associated with the performance of oral surgical procedures, particularly implant placement, on patients who are taking oral bisphosphonate.

Hewitt and Farah came to similar conclusions, recommending surgical treatment to be completed before the patient begins to take bisphosphonate, and preventative measures be taken afterward.
Table 3: Clinical description of Healthy cases

| No | Implant no. | Site     | Failure |
|----|-------------|----------|---------|
| 1  | 4           | Max side |         |
| 2  | 3           | Ant      |         |
| 3  | 7           | Max full | 1       |
| 4  | 6           | Max full |         |
| 5  | 7           | Max full | 1       |
| 6  | 3           | Ant      |         |
| 7  | 5           | Max side |         |
| 8  | 3           | Ant      |         |
| 9  | 8           | Max full |         |
| 10 | 7           | Max full |         |
| 11 | 4           | Max side |         |
| 12 | 6           | Max full |         |
| 13 | 4           | Ant      | 1       |
| 14 | 9           | Max full |         |
| 15 | 7           | Max full |         |
| 16 | 3           | Ant      |         |
| 17 | 4           | Max side |         |
| 18 | 3           | Ant      |         |
| 19 | 3           | Max side |         |
| 20 | 4           | Ant      |         |
|    | 100         |          |         |

Table 4: Site distribution in Healthy patients

| Site      | Fixture number in Healthy patients |
|-----------|-----------------------------------|
| Ant. Maxilla | 23                                |
| Side of Maxilla | 20                              |
| Full Maxilla   | 57                                |
| Total            | 100                               |

Table 5: Success and Failure rate

| Cases            | Number | Percent of Frequency | 0’ | 1” |
|------------------|--------|----------------------|----|----|
| Healthy          | 100    | 35.0                 | 0.7|    |
| Osteoporotic     | 72     | 23.6                 | 2.1|    |

0’: No Mobility of Fixture (Success); 1”: Mobility of Fixture (Failed)

Table 6: Percent of frequency of both group

| Cases            | Number | Mean Std. Deviation | Z-Value | p-Value |
|------------------|--------|---------------------|---------|---------|
| Healthy          | 100    | 0.0200              | -1.94   | 0.052   |
| Osteoporotic     | 72     | 0.0833              |         |         |

No significant difference (p ≤ 0.05)

Table 7: Comparison of Healthy versus Osteoporotic cases by Mann-Whitney Test
no implant was lost. Walter et al. [23], in their systematic literature review about dental implants in patients treated with antiresorptive medication conclude that successful implant therapy is feasible in patients receiving antiresorptive therapy. The risk of osteonecrosis development needs to be explained to the patient. In 2016 Sotiros et al. [24], conclude that the longer duration of the drugs’ use and the intravenous administration could be considered as negative factors based on their current data. The placement of dental implants in posterior jaw regions could also be considered as negative factor, for the success of the implant treatment. The history of bisphosphonate use orally [25], cannot be considered as an absolute contraindication to implant placement therapy.

In March 2017 Dental Clinical guidance of Scotland perform that the risk of bisphosphonate osteonecrosis of the jaw following the placement of dental implants in patients being treated with antiresorptive is currently unknown. The risk of bisphosphonate osteonecrosis of the jaw in patients being treated with bisphosphonate drugs is thought to increase as the cumulative dose of the drug increases, as a consequence of the long half-life of this drug class.

Julie and her colleague [26], in their article describe the Association between oral bisphosphonate use and dental implant failure among middle-aged women stated that no significant interaction was observed (p=0.41), and they suggest that dental practitioners should be aware of the increased risk of implant failure associated with oral bisphosphonate use in the population. American college of prosthodontists ACP [27] agreed on that patients who have received oral bisphosphonates for osteoporosis for less than 4 years and have no additional clinical risk factors may receive surgical procedures without delay or alteration of the procedure. In this group of patients, implant placement has not been shown to have an increased risk of bisphosphonate osteonecrosis of the jaw development; 8-10 however, it is recommended that the patient be given a specific informed consent that highlights the possibility of delayed implant failure coupled with the low risk of bisphosphonate osteonecrosis of the jaw development secondary to the continued use of oral bisphosphonates.

Osteoporosis is very common [28], particularly in postmenopausal women; it is characterized by decreases in bone mass and strength. Osteoporosis also affects the jawbone and is considered a potential contraindication in the placement of dental implants. However, studies in subjects with osteoporosis have shown no differences regarding implant survival when compared with healthy individuals. Therefore, osteoporosis cannot be considered a contraindication for implant placement if oral bisphosphonate are used.

Conclusion

Nowadays, dental implants have become more common treatment for replacing missing teeth and aim to improve quality of life for each patient by improving chewing efficiency, physical health, and esthetics. The clinical outcome of implant treatment is challenged in compromised (bone) conditions, as are frequently present in osteoporotic females. Most of menopause female are treated with bisphosphonate weather oral or intravenous route in severe cases or in tumor cases, patients on oral bisphosphonate are no more contraindicated for dental implantation if good assessment done for each case before decide to underwent surgery, concerning period and severity of disease, drug type, dose, period of use, route of administration.

All complication can face both surgeon and patient showed be entirely discussed in details with the patient and their families. Close follow up is mandatory for at least 4 years after dental implant placement, check clinically and radiographically for urgent intervention in case of occurrence of bisphosphonate osteonecrosis of the jaw in the site.

We recommend that implantology can be performed as a safe treatment modality in patients use oral bisphosphonate.

Physician has a great role hand to hand with the dentist to help such patients with bisphosphonate use in good health and away from such serious complication as bisphosphonate osteonecrosis of the jaw.

Finally most importantly, make sure to keep up good oral hygiene practices if you’re on bisphosphonate medication.

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