



The Prognosis for Dental Implants Placed in Patients Taking Oral Bisphosphonates

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ABSTRACT The success rate of dental implants placed in female patients taking oral bisphosphonates, before the risks became known in 2003, were compared with a control group of females receiving implants and not taking bisphosphonates. The bisphosphonate group had an overall success rate of 86 percent versus a success rate of 95 percent in the control group. This suggests that the failure rate of implants placed in patients taking oral bisphosphonates may be higher unless suggested safeguards are taken.

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Purpose: To monitor the outcome of patients who had osseointegrated implants inserted, without any special precautions while taking oral bisphosphonates.

Materials and Methods: A retrospective chart review was carried out in the Department of Oral and Maxillofacial Surgery at the University of California, San Francisco. This covered all female patients over the age of 36 who were having dental implants inserted between 1994 and Dec. 31, 2006. The charts and radiographs were reviewed for any complications.

Results: A retrospective chart review identified 65 female patients over the age of 36 who had dental implants inserted. Review of the medical history

revealed that 15 of the patients identified themselves as having osteoporosis and 11 identified themselves as being treated with oral bisphosphonates. In three of the 11 patients osseointegration did not occur. In the other 54 patients who were not receiving oral bisphosphonates, there were seven implant failures. When implants were placed in patients taking oral bisphosphonates (in all cases alendronate, or Fosamax) the success rate for these implants was 86 percent. In the similar group of patients not taking bisphosphonates, the success rate for the implants was more than 95 percent. However, none of the patients in either group developed osteonecrosis.

Conclusions: Oral bisphosphonates may decrease integration of dental implants

and increase their failure rate, but this does not appear to lead to osteonecrosis.

Bisphosphonates are a group of medications that essentially inhibit bone resorption and secondarily inhibit bone deposition, and therefore have the overall effect of decreasing bone turnover. Intravenous forms of the medications are utilized as part of a chemotherapeutic protocol to treat bone pain in patients with metastatic bone disease, particularly from multiple myeloma, carcinoma of the breast, and carcinoma of the prostate. Oral forms are used to treat osteoporosis (most often postmenopausal) and also to treat Paget's disease (usually non-nitrogen containing bisphosphonates taken for periods of six months).

In the United States, there are three oral bisphosphonates approved for use in osteoporosis. Once patients start taking these medications, it is envisioned that their use may be lifelong. Alendronate (Fosamax) was released in 1994, risedronate (Actonel) was released in 1996, and ibandronate (Boniva) was released in 2005. The first two are taken as a tablet once per week, while ibandronate is taken once monthly. In 2003, reports started to appear in the literature of osteonecrosis of the jaws associated with bisphosphonate use.¹ Since that time, numerous reports have appeared of the widening of the periodontal ligament, tooth loss, and osteonecrosis.²

Although these problems normally occur following dental treatment (most often extractions), about 25 percent of the cases appear to be spontaneous.³

These complications have been reported most often with the intravenous forms of the medication, but more recently similar complications have been reported with oral medication.^{4,5} At the present time, recommendations for the prevention and management of these

complications for patients taking the oral form of bisphosphonates are controversial. There may be some evidence that when elective treatment is being carried out, discontinuing the oral bisphosphonates for three to six months may allow bone turnover in the jaws to return to a more physiological state and then elective treatment can be carried out. However, prior to the recognition of these complications of bisphosphonates (in 2003

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and 2004), most practitioners took no special precautions in carrying out any form of dental treatment in patients taking bisphosphonates. In fact, in many ways, they were felt to be ideal patients for certain forms of elective treatment since the bisphosphonates were treating osteoporosis, which can be a complicating factor in some dental treatments.

Of particular interest is the insertion of osseointegrated implants in patients taking bisphosphonates, since again before the complications were noted, patients taking oral bisphosphonates were felt to be very suitable implant candidates. Therefore, it is felt that many patients received osseointegrated implants in the mid-to late 1990s and in the early 2000s without any special precautions. The purpose of this study was to monitor the outcome of these patients and see if any adverse incidents were noted.

Materials and Methods

A retrospective chart review was carried out in the Department of Oral and Maxillofacial Surgery at the University of California, San Francisco. This covered all female patients over the age of 36 who were having dental implants inserted between 1994 and Dec. 31, 2006. The charts and radiographs were reviewed for any complications, and where the records were incomplete patients were contacted to supply the necessary information. Where complications were noted, an effort was made to identify any factors that might have contributed to these complications.

All patients having implants inserted received prophylactic antibiotics (usually penicillin VK or amoxicillin) commencing preoperatively and continuing for three to five days postoperatively (depending on clinician preference). The study received IRB approval from the Committee on Human Research.

Results

A retrospective chart review in the Department of Oral and Maxillofacial Surgery at the University of California, San Francisco, between 1994 and Dec. 31, 2006, identified 65 female patients over the age of 36 who were having dental implants inserted (all implants were from only one manufacturer). Review of the medical history revealed that 15 of the patients identified themselves as having osteoporosis and 11 identified themselves as being treated with oral bisphosphonates for longer than three years. There were no current smokers. Implants were placed by faculty only (three different faculty members).

In all cases, the bisphosphonate was alendronate (Fosamax). The age range of the patients taking alendronate was between 52 and 73 years and was matched for gender, age, date of implant inser-

tion, and general number of implants to 40 patients not taking a bisphosphonate. All patients continued to take the alendronate. The number of dental implants inserted was between two and eight, and all 11 patients received implants in the mandible and three additionally received implants in the maxilla. The mean time for follow-up was 84.3 months, with a range of 64 to 146 months. In three of the 11 patients osseointegration did not occur, and implants were lost or removed.

The first patient with implant failure was a 68-year-old female who received four implants, of which two implants placed in the anterior maxilla did not integrate and required subsequent removal. The second patient requiring implant removal was a 59-year-old who received five implants in the posterior mandible and two implants failed to integrate and were removed after 33 months. In the third case, one implant in the upper right lateral incisor failed after 11 months while one implant in the mandible of the same patient was successful. However, none of these cases developed osteonecrosis, defined as exposed and nonhealing nonvital bone.

In the matched 40 patients who were not receiving an oral bisphosphonate, there were seven implant failures (the implant was lost or removed) out of a total of 161 implants inserted. The results are summarized in **TABLE 1**.

Discussion

Prior to reports first appearing in the literature of osteonecrosis of the mandible from bisphosphonates in 2003, patients taking oral bisphosphonates were actually felt to be optimal implant candidates since osteoporosis is a known risk factor for dental implantation and bisphosphonates would control the osteoporosis. Since 2003, it has been realized that bisphosphonates also reduce the rate of

TABLE 1

Summary of Results Between Bisphosphonate and Nonbisphosphonate Groups

	Patients (cases)	Implants placed	Failed implants
Bisphosphonate	11	35	5 (14.3%)
Nonbisphosphonate	40	161	7 (4.3%)

bone turnover, and particularly inhibit bone resorption. This might well be felt to interfere with the osseointegration of implants and render the patients more liable to osteonecrosis should there be any soft tissue dehiscence over the implants, or should the implants need removing.

NONE OF THESE cases developed osteonecrosis, defined as exposed and nonhealing nonvital bone.

In this particular study, when implants were placed in patients taking oral bisphosphonates (in all cases alendronate, or Fosamax) there was a 14 percent failure rate of osseointegration, meaning that the success rate for these implants was 86 percent (five implants failed in three patients). In the similar group of patients (similar gender, age, and implant numbers) not taking bisphosphonates, the success rate for the implants was more than 95 percent. Although the numbers are small and not statistically significant, and the shortcomings or a retrospective chart review are realized, this study seemed to indicate that the success rate for implants placed in the jaws of patients taking oral bisphosphonates may be reduced. However, none of the patients whose implants failed developed osteonecrosis, nor did any of the other patients taking bisphosphonates in this study.

By comparison, there are two studies suggesting there is no increase in implant failure or cases of osteonecrosis when implants were placed in patients on bisphosphonates before the risk became known. Jeffcoat, in 2006, reported on 50 patients receiving a total of 210 implants, of whom 25 had received bisphosphonate therapy and 25 were age matched controls.⁶ No cases of osteonecrosis were observed, and implant success was greater than 99 percent in both groups.

Grant et al., in 2008, reported on 115 patients who had taken oral bisphosphonates who received a total of 468 implants.⁷ There were only two implant failures and no cases of osteonecrosis resulted. In comparison, the present study, although without a statistically significant number of patients, suggests that the implant failure rate may be greater in patients taking bisphosphonates for whom no special precautions are taken.

The estimated incidence of orally administered bisphosphonate related osteonecrosis of the jaws for patients treated with weekly alendronate is 0.01 percent to 0.04 percent for spontaneous osteonecrosis, which increases to 0.09 percent to 0.34 percent following extractions, which might be felt to be equivalent to insertion of osseointegrated implants.⁸ Recent recommendations for the discontinuation of oral bisphosphonate therapy for three to six months prior to implant insertion, and also for several months following implant insertion may allow bone turnover to recover.⁸ Perioperative antibiotics and primary mucosal closure may also be indicated when placing implants in patients taking bisphosphonates.

Conclusions

The authors evaluated the outcome of patients who had osseointegrated implants inserted while taking oral bisphosphonates by means of a retrospective chart review. Oral bisphosphonates may decrease integration of dental implants and increase their failure rate but did not lead to osteonecrosis in this study. ■■■■

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