OSTEOPOROSE

Lasers Med Sci. 2016 Aug;31(6):1261-72. doi: 10.1007/s10103-016-1929-4. Epub 2016 Mar 30.

Efficacy of laser therapy in the management of bisphosphonate-related osteonecrosis of the jaw (BRONJ): a systematic review.

Weber JB[1], Camilotti RS[2], Ponte ME[2].

Author information

- [1]School of Dentistry, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Av. Ipiranga, 6681-Building 6, Partenon, Porto Alegre, RS, 90619-900, Brazil. jbbweber@terra.com.br.
- [2]School of Dentistry, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Av. Ipiranga, 6681-Building 6, Partenon, Porto Alegre, RS, 90619-900, Brazil.

Abstract

Bisphosphonate-related osteonecrosis of the jaw is a well-known potential side effect of long-term bisphosphonate therapy; the primary objective of the treatment should be to improve patient quality of life through pain and infection management, to prevent the development of new lesions, and to slow disease progression. In recent years, the use of laser for bisphosphonate-related osteonecrosis of the jaw has become more widespread, due to its use of administration and widely reported beneficial effects on tissue healing. The present systematic review of the literature sought to elucidate whether low-level laser therapy has positive effects on the treatment of bisphosphonate-related osteonecrosis of the jaw. We conducted a systematic search of the PubMed, EMBASE, and Cochrane Library electronic databases, with no restrictions on language or year of publication. Search strategies were formulated using keywords and Boolean operators. The electronic search strategy retrieved 55 records. From 55 articles, 16 were selected for full-text review, and of these, 10 were ultimately included for data analysis in this review. Our findings show that treatment modalities including laser were associated with superior outcomes in terms of cure or improvement of bisphosphonate-related osteonecrosis of the jaw lesions as compared with conventional surgical and/or conservative drug therapy. It can be concluded that combined treatment with antibiotics, minimally invasive surgery (including Er:YAG laser surgery), and low-level laser therapy in the early stages of the disease should be the gold standard for bisphosphonate-related osteonecrosis of the jaw management.

KEYWORDS:

Bisphosphonate-related osteonecrosis of the jaw; Laser therapy; Neoplasm; Neoplasm metastasis; Osteoporosis

Med Oral Patol Oral Cir Bucal. 2013 Jul 1;18(4):e680-5.

Case series of 589 tooth extractions in patients under bisphosphonates therapy. Proposal of a clinical protocol supported by Nd:YAG low-level laser therapy.

Vescovi P[1], Meleti M, Merigo E, Manfredi M, Fornaini C, Guidotti R, Nammour S.

Author information

- [1]Department of Biomedical, Biotechnological and Translational Sciences - S.Bi.Bi.T, University of Parma, Italy. elisabetta.merigo@unipr.it

Abstract

OBJECTIVE:

Trauma during dental surgery is a predisposing factor for bisphosphonates (BP)-related osteonecrosis of the jaws (BRONJ). However, about 40% of cases of BRONJ are not related to dental invasive procedures, being probably associated to endodontic or periodontal infections. Extraction of non-treatable teeth is considered a reliable choice, to improve symptoms and to reduce the risk of BRONJ. Here we report our experience of tooth extractions in patients under oral or intravenous BP therapy.

STUDY DESIGN:

Two-hundred and seventeen patients (38 males, 179 females; mean age 68.72 ± 11.26 years, range 30 to 83 years) under BP therapy received 589 tooth extractions at the Unit of Oral Medicine, Pathology and Laser-assisted Surgery of the University of Parma, Italy, between June 2006 and December 2010. Ninety five patients were under BP therapy for oncological disease (multiple myeloma (MM): 23; bone metastases (BM): 72) and 122 patients for non oncological diseases: 119 osteoporosis (OP), 2 rheumatoid arthritis (RA) and 1 Paget's disease (PD). The mean duration of BP was of 35 months. Antibiotic treatment was administered three days before and 2 weeks after tooth extractions. Patients were additionally treated with low level laser therapy (LLLT) through Nd:YAG laser (1064 nm--power 1.25 W; frequency 15 Hz; fibre diameter: 320 μm), 5 application of 1 minute each. Patients were evaluated 3 days and once a week for 2 months after the extractions and every time they received LLLT. Mean follow-up was 15 months (ranging from 4 to 31 months).

RESULTS:

In a total of 589 extractions (285 mandibular, 304 maxillary) performed, a minimal bone exposure was observed in 5 cases, treated with Er:YAG laser vaporization and than healed.

CONCLUSIONS:

Our experience supports the hypothesis that the association of antibiotic treatment and LLLT can be effective in preventing ONJ after tooth extractions in patients under BPT.

Photomed Laser Surg. 2012 Jan;30(1):5-13. doi: 10.1089/pho.2010.2955. Epub 2011 Nov 4.

Early surgical laser-assisted management of bisphosphonate-related osteonecrosis of the jaws (BRONJ): a retrospective analysis of 101 treated sites with long-term follow-up.

Vescovi P[1], Manfredi M, Merigo E, Guidotti R, Meleti M, Pedrazzi G, Fornaini C, Bonanini M, Ferri T, Nammour S.

Author information

- [1]Oral Medicine, Pathology and Laser-Assisted Surgery Unit, University of Parma, Parma, Italy.

Abstract

BACKGROUND DATA:

The management of bisphosphonate-related osteonecrosis of the jaws (BRONJ) is still controversial.

OBJECTIVE:

The purpose of this study was to compare surgical and nonsurgical approaches to the treatment of BRONJ and the possible usefulness of Nd:YAG and Er:YAG lasers.

METHODS:

One hundred and twenty-eight patients (33 males, 95 females; 52 with diagnosis of multiple myeloma, 53 with diagnosis of bone metastasis, and 23 with diagnosis of osteoporosis) affected by BRONJ were evaluated at the Unit of Oral Pathology and Medicine and Laser-Assisted Surgery of the University of Parma, Italy, between January 2004 and July 2009. Overall number of BRONJ sites was 151, and number of treated sites was 101. In order to assess the efficacy of different treatments, sites were subclassified as follows: Group 1 (G1): 12 sites treated with medical therapy; Group 2 (G2): 27 sites treated with medical therapy associated with low level laser therapy (LLLT); Group 3 (G3): 17 sites treated with a combination of medical and surgical therapy; Group 4 (G4): 45 sites treated with a combination of medical therapy, surgical (including laser-assisted) therapy, and LLLT. Outcome of treatment was assessed using the staging system proposed by Ruggiero et al. Transition from a higher stage to a lower one for at least 6 months was considered as clinical improvement and suggestive of a successful treatment.

RESULTS:

Clinical improvement was achieved in 3 out of 12 (25%) BRONJ sites in G1. Sites if G2 with an improvement were 18 out of 27 (66%). Nine out 17 BRONJ sites (53%) in G3 had a transition to a lower stage after treatment. For sites in G4, a clinical improvement was recorded in 40 out of 45 cases (89%).

CONCLUSIONS:

In our experience, the percentage of success obtained with a combined approach based on medical therapy, surgical (including laser-assisted) therapy, and LLLT (G4) is significantly higher than the percentage of improvement obtained in G1, G2, and G3.

J Oral Pathol Med. 2012 Mar;41(3):214-21. doi: 10.1111/j.1600-0714.2011.01091.x. Epub 2011 Sep 30.

Bisphosphonates-related osteonecrosis of the jaws: a concise review of the literature and a report of a single-centre experience with 151 patients.

Vescovi P[1], Merigo E, Meleti M, Manfredi M, Guidotti R, Nammour S.

Author information

- [1]Department of Otolaryngological/Dental/Ophthalmological and Cervico-Facial Sciences, University of Parma, Parma, Italy.

Abstract

The osteonecrosis of the jaws (ONJ) is an adverse side effect of long-term bisphosphonate therapy (BPT) firstly described in 2003. The aetiology of BRONJ remains unknown, and the pathogenesis seems multifactorial and related to several local or general factors. Many expert panel developed preventive protocols to facilitate specialists involved in the multidisciplinary management of BRONJ patients. In this paper, we present a concise review of the literature, and we report the experience of the University of Parma with 151 patients that assumed BPT for both oncological (121 patients) and non-oncological (30 patients) diseases. One hundred and thirty-nine BRONJ sites were treated with different approaches (surgical and non-surgical, laser-assisted and non-laser-assisted): in terms of clinical improvement, a statistically significant difference was found between the group treated with the only medical therapy; in terms of complete healing, the introduction in the treatment protocols of both laser-assisted approach and surgical approach improves the therapeutical results.

Lasers Med Sci. 2011 Nov;26(6):815-23. doi: 10.1007/s10103-011-0974-2. Epub 2011 Aug 2.

Bisphosphonate-related osteonecrosis: laser-assisted surgical treatment or conventional surgery?

Atalay B[1], Yalcin S, Emes Y, Aktas I, Aybar B, Issever H, Mandel NM, Cetin O, Oncu B.

Author information

- [1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Istanbul University, 34390, Capa-Istanbul, Turkey. batalay@istanbul.edu.tr

Abstract

Bisphosphonates (BSPs) are used for the treatment of multiple myeloma, metastatic breast and lung cancer, Paget's disease, osteoporosis, hypercalcemia due to malignancy, and many other skeletal diseases. BSPs reduce osteoclastic functions, which result in

bone resorption. Bisphosphonates-related osteonecrosis of jaws (BRONJ) is a newly developed term that is used to describe the significant complication in patients receiving bisphosphonates. BSPs are known to exhibit an anti-angiogenetic effect that initiates tissue necrosis of the hard tissue. There is currently no consensus on the correct approach to this issue. The aim of this retrospective study is to compare the effects of laser surgery with biostimulation to conventional surgery in the treatment of BSP-induced avascular bone necrosis on 20 patients who have been treated in our clinic. BRONJ was evaluated in patients with lung, prostate, and breast cancer under intravenous BSP treatment. Twenty patients in this study developed mandibular or maxillary avascular necrosis after a minor tooth extraction surgery or spontaneously. Bone turnover rates were evaluated by serum terminal C-telopeptide levels (CTX) using the electrochemiluminescence immunoassay technique and patients were treated with laser or conventional surgical treatments and medical therapy. Ten patients were treated with laser surgery and biostimulation. An Er:YAG laser (Fotona Fidelis Plus II® Combine laser equipment, Slovenia) very long pulse (VLP) mode (200 mJ, 20 Hz) using a fiber tip 1.3 mm in diameter and 12 mm in length was used to remove the necrotic and granulation tissues from the area of avascular necrosis. Biostimulation was applied postoperatively using an Nd:YAG laser. Low-level laser therapy (LLLT) was applied to the tissues for 1 min from 4 cm distance using an Nd:YAG laser (Fotona-Slovenia) with a R24 950-μm fiber handpiece long-pulse (LP) mode, 0.25-W, 10 Hz power/cm(2) from the mentioned distance the spot size was 0.4 cm(2), and power output was 2.5 J. Energy density from the mentioned distance was calculated to be 6.25 J/cm(2). The other ten patients were treated with conventional surgery. Treatment outcomes were noted as either complete healing or incomplete healing. There were no statistically significant differences between laser surgery and conventional surgery ($p > 0.05$). CTX values also did not affect the prognosis of the patients. Treatment outcomes were significantly better in patients with stage II osteonecrosis than in patients with stage I osteonecrosis. Our findings suggest that dental evaluation of the patients prior to medication is an important factor in the prevention of BRONJ. Laser surgery is a beneficial alternative in the treatment of patients with this situation. Further randomized studies with larger patient numbers may also improve our understanding of treatment protocols for this situation.

Med Hypotheses. 2011 Apr;76(4):479-81. doi: 10.1016/j.mehy.2010.11.025. Epub 2010 Dec 30.

Low level laser can be a novel adjuvant method for orthodontic tooth movement on postmenopausal women.

Chen Y[1], Cao Z, Zhang L, Xu X, Chen Y, Chen Y.

Author information

- [1]Department of Orthodontics, West China Hospital of Stomatology, State Key Laboratory of Oral Diseases, Sichuan University, Chengdu 610041, Sichuan, PR China.

Abstract

Osteoporosis, a pathological state commonly saw on postmenopausal women, has shown to affect jaw bone and the periodontium. While more and more adult patients seeking orthodontic treatment for a beautiful smile, the current strategy has not work well for extraction space closure in postmenopausal women with osteoporosis and concurrent bisphosphates taken. A new and non-invasive method is hoped to make a beginning. There are ample evidences showing low level laser has favorable effects on pain relief

and wound healing procedure of hard and soft tissue. These effects are due to its ability to stimulate cell metabolism, angiogenesis, bone formation and osteoclastogenesis. The hypothesis we proposed herein is that low level laser may be a valuable adjuvant method for protecting and facilitating orthodontic tooth movement on this kind of patients.

Int J Oral Maxillofac Surg. 2011 Mar;40(3):277-84. doi: 10.1016/j.ijom.2010.11.002. Epub 2010 Dec 15.

Bisphosphonate-related osteonecrosis of the jaws: a case series of 25 patients affected by osteoporosis.

Manfredi M[1], Merigo E, Guidotti R, Meleti M, Vescovi P.

Author information

- [1]Oral Medicine, Oral Pathology and Laser Assisted Surgery Unit, University of Parma, Italy. maddalena.manfredi@unipr.it

Abstract

Bisphosphonates (BPs) are used to treat metabolic bone diseases, such as osteoporosis. In this study the occurrence of bisphosphonates-related osteonecrosis of the jaws (BRONJ) is reported in 25 patients who received BP therapy for osteoporosis with different drug schedules. From June 2005 to May 2009, 25 patients affected by BRONJ were observed. A history of oral surgery was reported for 18 patients (72%). Of the 22 patients treated by the authors, 20 (91%) recorded healing improvement with a mean follow-up of 16.6 months, with particular regard for those treated with oral surgery and laser applications (10/22, 45%) who were all characterised by complete mucosal healing over time. The risk of developing BRONJ in patients treated with BP for osteoporosis is lower than in cancer patients, but is not negligible. It is advisable for the prescribing physician to recommend a dental check-up prior to treatment, at least for patients who have not been to the dentist in the last 12 months. An early surgical and possible laser-assisted approach for patients who develop BRONJ is recommended.

Minerva Stomatol. 2010 Apr;59(4):181-203, 204-13.

Bisphosphonate-Related Osteonecrosis of the Jaw (BRONJ) therapy. A critical review.

[Article in English, Italian]
Vescovi P[1], Nammour S.

Author information

- [1]Unit of Oral Pathology and Medicine and laser-assisted Oral Surgery, Section of Dentistry, Department of ENT/Dental/Ophthalmological and Cervico-Facial Sciences, University of Parma, Italy. paolo.vescovi@unipr.it

Abstract

Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is an area of uncovered bone in the maxillo-facial region that did not heal within 8 weeks after identification by health care provider, in a patient who was receiving or had been exposed to Bisphosphonate Therapy (BPT) without previous radiation therapy to the craniofacial region. Low-grade risk of ONJ is connected with oral BPT used in the treatment of osteopenia, osteoporosis and Paget's disease (from 0.01% to 0.04%) while higher-grade risk is associated with intravenous (IV) administration in the treatment of multiple myeloma and bone metastases (from 0.8% to 12%). The management of BRONJ currently is a dilemma. No effective treatment has yet been developed and interrupting BPT does not seem to be beneficial. Temporary suspension of BPs offers no short-term benefit, whilst long term discontinuation (if systemic conditions permit it) may be beneficial in stabilizing sites of ONJ and reducing clinical symptoms. The use of oral antimicrobial rinses in combination with oral systemic antibiotic therapy -penicillin, metronidazole, quinolones, clindamycin, doxycycline, erythromycin- is indicated for Stages I and II of Ruggiero's Staging. The role of hyperbaric oxygen therapy is still unclear but some benefits of this treatment have recently been described in association with discontinuation of BPT and conventional therapy (medical or/and surgical). Surgical treatment, in accordance to the AAOMS Position Paper, is reserved to patients affected by Stage III of BRONJ even if in the last version (2009) a superficial debridement is indicated to relieve soft tissue irritation also in the stage II (lesions being unresponsive to antibiotic treatment). Aggressive surgical treatment may occasionally results in even larger areas of exposed and painful infected bone. Surgical debridement or resection in combination with antibiotic therapy may offer long-term palliation with resolution of acute infection and pain. Mobile segments of bony sequestrum should be removed without exposing unaffected bone. If pathological fractures or complete mandibular involvement are observed, if the medical condition of the patients allows it the affected bone portion may be resected and primary bone reconstruction or revascularization graft may be carried out. Ozone therapy in the management of bone necrosis or in extractive sites during and after oral surgery in patients treated with BPs may stimulate cell proliferation and soft tissue healing. Laser applications at low intensity (Low Level Laser Therapy - LLLT) have been reported in the literature for the treatment of BRONJ. Biostimulant effects of laser improve reparative process, increase inorganic matrix of bone and osteoblast mitotic index and stimulate lymphatic and blood capillaries growth. Laser can be used for conservative surgery, whereby necrotic bone is vaporized, until healthy bone is reached. The Er:YAG laser wavelength has a high degree of affinity for water and hydroxyapatite, hence both soft and bone tissues can be easily treated. An additional advantage of the Er:YAG laser is its bactericidal and possible biostimulatory action, accelerating the healing of both soft and bone tissues, in comparison to conventional treatments. Long-term, prospective studies are required to establish the efficacy of drug holidays in reducing the risk of BRONJ for patients receiving oral BPs even if it has been suggested that BPT may be discontinued for three months before the surgical procedures and bone turnover markers (CTx, NTx, PTH, 1,25-dihydroxy vitamin D) may be checked. However it must be recognized that interindividual variability, gender, age, physical activity, and seasonal and circadian variation exist that can result in difficulty in interpreting these assays and more research is needed. Laser application (LLLT and laser surgery) nowadays appears to be a promising modality of BRONJ treatment, being safe and well tolerated, and it permits the minimally invasive treatment of early stages of the disease.