Antibiotics in dental implants: A review of literature

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ABSTRACT

The routine use of antibiotics in oral implant treatment seems to be widespread. The pre- or post-operative use of antibiotics in conjunction with implant surgery and its correlation with failure and success rates are poorly documented in the literature. The debate regarding overprescription of antibiotics raises the need for a critical evaluation of proper antibiotic coverage in association with implant treatment. The benefits of prophylactic antibiotics are well-recognized in dentistry. However, their routine use in the placement of endosseous dental implants remains controversial. The purpose of this review is to know the efficacy of antibiotic prophylaxis in implant dentistry.

KEY WORDS: Antibiotic prophylaxis, dental implants, microbiology
foreign materials are implanted. Various prophylactic systemic antibiotics have been suggested to minimize infections after dental implant placement. The recent protocols suggest short-term antibiotic prophylaxis if antibiotics have to be used. Adverse events may occur with the usage of antibiotics, which range from diarrhea to life-threatening allergic reactions. Another major concern associated with the usage of antibiotics is the development of antibiotic-resistant bacteria. The use of antibiotics prophylactically in implant dentistry is controversial.

The placement of dental implants with the use of a mucoperiosteal flap does not represent a significant risk for developing bacteraemia and therefore casts doubt on whether antibiotic prophylaxis is essential for patients considered “at-risk” for bacterial endocarditis or other focal infections.[1] A 0.2% chlorhexidine rinse before treatment may be a relevant clinical option with little iatrogenic risk.[2] If a dental implant becomes infected, there are more chances for implant failure. Hence, to prevent the onset of infection at the site of implant placement prophylactic antibiotics are prescribed to elevate the antibiotic concentration in blood to reduce the chance of bacterial proliferation and dissemination. Even though the use of oral implants in dentistry is increasing now a day, still there are no clear cut guidelines for antibiotic prophylaxis. Studies have shown that antibiotic prophylaxis will not have any added advantage to prevent postsurgery infections or affecting the outcomes of endosseous implants.[3] The rate of postperiodontal surgery infections, if no antibiotics were used, ranged from <1% compared to 4.4% for periodontal surgery and 4.5% when endosseous implants are installed.[4] The benefit or advantage of prophylactic antibiotic coverage before complex surgical procedure including implant placement had been suggested by the American Heart Association (AHA).

In 1997, the AHA recommended a protocol of antibiotics to be taken before surgery as to prevent bacterial endocarditis.[5] They recommended antimicrobial prophylaxis before any dental procedure in which bleeding can occur, including the placement of dental implants. According to the Canadian Dental Association, “all dental surgical treatments where a considerable amount of bleeding and/or exposure to potentially contaminated tissue occur typically need antibiotic prophylaxis.”[6] The AHA recommends amoxicillin and penicillin as the first line of treatment due to their superior absorption and prolonged serum levels. Due to increased level of penicillin allergies, clindamycin is used as an alternative.[5]

**Prophylactic Protocol (Misch)**

**Category 1**

Infection risk is low which includes normal extractions where grafting is not needed and second stage surgery in healthy individuals patients. Antibiotics are not needed. 0.12% chlorhexidine rinse is recommended pre- and post-operatively.

**Category 2**

Infection risk is moderate which involves extractions which are traumatic or socket preservation procedures and immediate implant placements. A recommended presurgical antibiotic loading followed by a single dose of antibiotic post-surgically. About 0.12% chlorhexidine rinse twice a day until sutures are removed.

**Category 3**

Infection risk is moderate to high risk. Multiple implants with extensive soft-tissue reflection or immediate implants placements along with bone grafting and membrane. A preoperative loading dose of antibiotics is followed by three postsurgical doses for a day to be continued for 3 days. About 0.12% of chlorhexidine rinse twice a day until suture removal is also recommended.

**Category 4**

Infection risk is high. Implant surgeries with sinus floor lifts, autogenous block bone grafts, and the same procedures as category 2 and 3 but on medically compromised patients. The suggested regime is as category three, but postoperative antibiotics are recommended for 5 days.

**Category 5**

Infection risk is high which includes all sinus augmentation procedures. Loading dose of antibiotics 1 day prior to the surgery (ensuring adequate levels in sinus tissues before surgery) and a beta-lactamase antibiotic to be used for 5 days due to the high incidence of beta-lactamase pathogens in maxillary sinus infections. Chlorhexidine rinse with a concentration of 0.12% has to be used twice daily also recommended, until suture removal.

**Microbiota-associated with Implant Failure**

Early implant failure is commonly associated with certain strains of bacteria. The most common bacteria involved are streptococci, anaerobic Gram-positive cocci, and anaerobic Gram-negative rods.[7] Heydemann and his colleagues conducted a study on the bacteria present in peri-implantitis showed that the inflamed implants had huge colonization by Gram-positive bacteria which are anaerobic such as fusoabacteria sprochetes, *Bacteroides forsythus*, and black pigmented bacteria such as *Prevotella intermedia*, *Prevotella nigrescens*, and *Porphyromonas gingivais*, *Actinobacillus actinomyetemcomitans* were also isolated from the samples taken indicating that the microbial flora of inflammatory lesions around implants is very similar to that present in adult periodontitis including refractory type periodontitis.[7] Thus, the antibiotic to prevent of delayed healing of wound should be bactericidal and of low toxicity.[8] In dental practice, antimicrobials are used prophylactically: For prophylaxis in immune compromised individuals, patients at risk for developing bacterial endocarditis, and for the treatment of an acute dental infection.

The accepted principles for the use of prophylactic antibiotic are:

- The procedure should have significant risk for and incidence of postoperative infection
Review of Literature

A literature review conducted on the effect of antibiotic usage on dental implants had shown a success rate of 92% when no antibiotics were used, 96% when prophylactic antibiotics were used, and 97% when postoperative antibiotics were used.\[9\]

Dent et al. 1997 presented data from a large, multicenter clinical study involving 2641 dental implants. Of these, 1448 were placed in patients who had received prophylactic preoperative antibiotics, and 1193 were placed in patients who did not receive antibiotic coverage. The patients were followed postoperatively through the stage of implant uncovering, and they found that significantly fewer failures occurred when preoperative antibiotics were used (1.5% vs. 4.0%).\[10\]

A strict aseptic condition is required at the site of implant placement to prevent infections and to preserve the osseointegration process. The prophylactic use of preoperative V-penicillin was first postulated by the Branemark for dental implant surgery. The dosage spectrum of penicillin is extremely wide (1–40 mill. U. per day), and the success rate of 95.57% was achieved.\[10\]

Binahmad in 2005 compared a single-preoperative dosage of penicillin G or 600 mg of clindamycin in comparison with a long-term prophylactic dose of 300 mg of penicillin V taken 4 times a day orally or clindamycin 150 mg taken thrice orally per day for 7 days. They concluded that long-term prophylactic antibiotic use was of no advantage or benefit over a single dose.\[13\]

Maintaining the surgical field as disinfected as possible is one of the key surgical principle to be followed which can be done in various ways: Using antiseptic mouthwashes, irrigating the wound, or presurgical surgical rinse. One of the most recommended antiseptic rinse is chlorhexidine digluconate. It has been shown that 0.12% of chlorhexidine mouthwash during immediately preoperative moment reduces the percentage of implant loss from 13.5 to 4.4% in patients with type-2 diabetes.\[14\]

Abu-Ta’a in 2008 conducted a meta-analysis of four randomized controlled trials. The results of this study suggested that short-term antibiotics like 2 g of amoxicillin given an hour prior to placement of the implant or 1 g of amoxicillin given an hour before implant placement and 500 mg 4 times a day for 2 days postoperatively significantly decreased early implant failure.\[6,15,17\]

Turkylmaz in 2010 conducted a retrospective study in type-2 diabetic patients who underwent 23 implants placement and the antibiotic regimen prescribed was amoxicillin and potassium clavulanate 500 mg twice daily for 5 days, and the success rate was 100%.\[18\]

Sharaf et al. in 2011 conducted an evidence-based review to evaluate the implant failure in those who were given perioperative antibiotic therapy as compared with those who do not. They concluded that a single dose of antibiotic therapy preoperatively may slightly decrease the failure rate of dental implants.\[19\]

Conclusion

Prophylactic antibiotic for each implant surgery is not mandatory. Antibiotics are however useful in preventing postoperative infections after implant placement. To achieve high long-term survival and success rates of dental implants, antibiotic prophylaxis is required.

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Conflicts of interest

There are no conflicts of interest.

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