

The Role of Antimicrobials in the Success Rate of Dental Implants

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Abstract



Aim: To observe role of antibiotics in the success of 860 implant cases .

Materials and Methods: Single tooth replacement implants were placed following two-staged implant placement protocol under aseptic conditions. In the test group, 430 patients were randomly prescribed with an antibiotic, whereas in the control group 430 patients were randomly prescribed with a non-steroidal anti-inflammatory drug after implant procedure. Patients were scheduled for a regular check-up every 6 months. At the end of three years, 8 implants were lost from test group and 11 implants from the control group.

Results: Both the test and control groups showed the same results during healing and implant success.

Conclusion: Prescribing antibiotics does not affect or assure implant success
Clinical Significance: The use of antibiotics has been largely mishandled by dental professionals, creating resistant strains and complicating the situation, which can be checked upon, as every procedure does not require an antibiotic dosage.

KEY WORDS: Antibiotics, drug resistance, implants, implant success, NSAID

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INTRODUCTION

Successful implant therapy constitutes all the aspects of a surgical procedure defining the process of osseointegration which implies “cell-friendly” materials to provide long lasting esthetic and functional reliability.¹ However, due to various reasons, implants fail and infection is one of the main reasons causing peri-implantitis and ultimately failure of the implant. According to the consensus report of the sixth European workshop on periodontology there is limited data providing prevalence on Peri-implantitis.² The authors stated that there are only three cross-sectional reports available, presenting information on only one implant system including six hundred and sixty-two subjects (3,413 implants) in one publication and 216 (987 implants) in another one. In two reports on the basis of bleeding upon probing and bone loss (after 1 year in function) representing only one implant system, peri-implantitis was identified in between 28% - 56% of subjects and in 12% to 43% of implant sites.²

In general, to prevent any infection, antibiotics are prescribed to the patient following dental implant surgery. Selman Waksman first used the word antibiotics as a noun in 1941 to describe any small molecule made by a microbe that antagonizes the growth of other microbes.³ But in the oral cavity with more than 700 microbes,⁴ will any antibiotic, if not specific will work in preventing any infection? When these should be prescribed? Usually peri-implantitis sets in after 1 year of implant placement but the process of destruction starts much earlier than the actual clinical presentation. The proper dose of a drug is the amount that produces the maximum benefit with the least attendant harm.^{5,6}

The correct dose should be sufficient enough in eliminating the infecting pathogens with minimal adverse effects. Blood concentration of the antibiotic should exceed the minimal inhibitory concentration by a factor of 2-8 times to offset tissue barriers that restrict the access of the drug to the infected site.⁷ Currently, antimicrobial therapy is given by a vigorous dosage for a short time till the clinical situation permits.⁵ Such a regimen is desirable since a major factor in the success of most antimicrobial agents is the height of the serum concentration of the drug and, by inference, the concentration in the infected tissue,⁸ reducing the patient risk for antibiotic-induced toxicity, allergy and selection of resistant microorganisms.

But will placing an implant in aseptic conditions will create infection? Important thing to understand here is that when an implant is placed in the alveolar bone, the body recognizes it as a foreign body and inflammation is initiated as a protective response, characterized by vascular dilatation, enhanced permeability of capillaries and leukocyte recruitment.⁹ In the late 19th century, Robert Koch and Louis Pasteur proposed the germ theory, which identified microorganisms as major inducers of the acute inflammatory response.⁹ Even a small oral activity such as tooth brushing/flossing/chewing is capable of inducing transient bacteremia so a wound and implant placement stands a stronger chance of causing it.¹⁰ More recently, acute inflammation has been accepted being as a physiological response that occurs in vascularized tissues to defend the host and to maintain homeostasis.⁹ It is only when this inflammatory mechanism fails to remove noxious materials, chronic disease and fibrosis develops.¹¹ Recent

Table 1: Non-significant difference (p-value >0.05) between failed and successful implants at the end of three years.

| | Failed | Success | Pearson Chi-square Value | p-value |
|----------------------|---------------|----------------|---------------------------------|----------------|
| Test Group | 8 | 422 | 4.84 | 0.486 |
| Control Group | 11 | 419 | | |

advances show that this defense mechanism is an active and highly regulated biochemical process that comprises a genus of endogenous molecules, including resolvins, lipoxins, protectins and maresins, which actively drive the termination of inflammation.⁹ However the question still remains unanswered, that is if the body is capable enough of fighting an infection then do antibiotics play a role or no role at all in implant dentistry. For the same reason authors conducted a study with a sample size of 860 patients, where 430 patients were included in test group and 430 patients in control group.

SETTINGS AND DESIGN

This was a multi-centre study and the patients chosen were healthy without any signs and symptoms of systemic condition and/or undergoing bone grafting and other ancillary procedures. 860 patients were enrolled for the study where 430 were randomly prescribed with an antibiotic after the implant therapy and considered as test group whereas in control group 430 patients were randomly prescribed with a non-steroidal anti-inflammatory drug.

METHOD AND MATERIALS

Surgical therapy of the patients was started after complete prophylaxis. Drugs used were Cap. Amoxicillin 500 mg TDS for 5 days after meals, patients who were allergic to Cap. Amoxicillin was prescribed one Tab. Ciprofloxacin 500 mg BD, after meals for 5 days and for pain control Tab. Ibuprofen 400 mg TDS was prescribed.

Single tooth replacements Implants were placed following two-staged implant placement protocol under aseptic conditions. Patients were scheduled for a regular check-up in every 6 months. At the end of three years 8 implants were lost from test group and 11 implants from the control group.

STATISTICAL ANALYSIS

Patients were randomly assigned for the statistical analysis. Pearson Chi-square value Statistical analysis was done for the implants placed.

Chart 1: Non-significant difference between the test and control groups.



RESULTS

Implant patients to whom antibiotics were prescribed and the patients to whom non-steroidal anti-inflammatory drugs were prescribed showed the same results during healing (Figures 1 and 2). Peri-implant mucosa and implant success were the nearly same in both the test and control groups (Table 1, Chart 1). P-value >0.05 shows non-significant difference in success rate of implants in test and control groups (Table 1).

DISCUSSION

The use of antibiotics may be an integral part of implant therapy and is usually prescribed to counter the infection caused by unprofessional dental assistants/drawbacks remaining during sterilization or the operator. Even though dental surgeons often prescribe antibiotics routinely following gingivectomy,¹² osseous resorption,¹³ regenerative,¹⁴ and implant-related surgery,¹⁵ the validity of such tradition remains unsubstantiated.¹⁶ Our study is inconsistent with the above statement and shows that when any implant procedure is carried out under strict aseptic conditions, the use of antibiot-



Figure 1: Implant radiograph with antibiotic prescription.



Figure 2: Implant radiograph without antibiotic prescription.

ics gets eliminated reducing the burden on the patient of developing antibiotic-resistance.

Aforementioned Figures (1 and 2) show that there was no difference between healing of implants placed in test and control group. Statistical analysis gives a p-value of >0.05 which is non-significant in success of implants placed under antibiotic coverage.

The use of antibiotics has been largely mis-handled by dental professionals. Forty percent of dentists prescribe antibiotics to patients with

no relevant medical history as a contingency for infection.¹⁷ Some surgeons also prescribe pre-operative antibiotic prophylaxis, however many reports have shown that antibiotic prophylaxis offers no advantage in preventing post-operative infections or affecting the outcomes of periodontal surgery whether its gingivectomy or placement of endosseous implants.¹⁸⁻²⁰ In fact rate of infections was shown to be less than 1% when no antibiotics were used following periodontal surgery to 4.4% for routine

periodontal surgery and 4.5% when endosseous implants were placed.¹⁸⁻²⁰ Side-effects of antibiotics include severe anaphylaxis and development of drug resistant bacteria. Initially drug resistance was observed only in hospitals where antibiotics were used in large quantity, however, drug resistance is no more a localized entity and has extended beyond the confines of the hospital which can be traced from community to hospital and vice-versa.²¹ Resistant strains double the duration of hospital stay, double mortality and morbidity rates and also affect the cost of the treatment.²¹ Drug resistance genes can spread from one bacterium to another and is continuously evolving into new virulence toxin posing a threat on patient's health.²¹ Due to these reasons it should not be considered as a choice of drug for signs of inflammation specially pain and edema.

Canadian Dental Association states that, "All dental procedures where significant oral bleeding and/or exposure to potentially contaminated tissue occurs typically (will) require antibiotic prophylaxis."²² The American Dental Association(ADA) also suggests similar guidelines.²³ Also, the American College of Surgeons and the AmericanHeart Association (AHA) guidelines²⁴ suggests that complex oral surgeries like implant placement will benefit from prophylactic antibiotic coverage; however, as of 2007, these associations currently suggest that only high and some moderate risk category patients should receive antibiotics.²⁵ As aforementioned oral cavity inhabitants more than 700 species of bacteria, but out of these only few known cause infection and most of them have still not been isolated and cultured. Thus keeping side-effects of antimicrobials into account,

some leniency should be considered as one-stage, full mouth disinfection should be carried according to Quirynen et al.'s²⁶ protocols. To further reduce the chance of infection, peri-oral structures should be disinfected with beta-dine solution. However Abu-Ta'a et al.²⁷ stated that there is no correlation between peri-oral microbiology and post-operative infections. Uses of two independent suction tips decrease the chances of wound contamination through saliva.²⁸ During surgery a meshed nose guard can be used which prevents contact with the highly contaminated nares, however it was demonstrated that the surrounding air of the operating room contains more bacteria than the expired air.²⁸ These methods including regular check-ups will prevent chances of peri-implantitis and enhance success rate of implants.

CONCLUSION

This study shows that antibiotics do not have any role in the implant success. Also studies by various authors have shown that giving prophylactic antimicrobial treatment or perioral disinfection does not play any role in post-operative treatment success. Thus the practice of prescribing unnecessary antibiotics should be checked and other treatment options considered. ●

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