Current Trend of Antimicrobial Prescription for Oral Implant Surgery Among Dentists in India

Rahul Datta · Yasmin Grewal · J. S. Batth ·
Amandeep Singh

Received: 27 April 2013 / Accepted: 7 August 2013 / Published online: 21 August 2013
© Association of Oral and Maxillofacial Surgeons of India 2013

Abstract

Objectives The aim of our study was to evaluate antimicrobial prescription behaviour amongst dentists performing oral implant surgery in India.

Study Design Dentists performing oral implant surgery from different parts of India were personally approached during various national events such as conferences and academic meetings and information regarding their prescription habits for antimicrobial agents in routine oral implant surgery was collected using a structured questionnaire.

Results Out of a total sample of 332 dentists, 85.5 % prescribed 17 different groups or combinations of antibiotics routinely for oral implant surgery in the normal healthy patient. Majority preferred the peri-operative protocol of drug therapy (72.2 %) with variable and prolonged duration of therapy after surgery, ranging from 3 to 10 days. An antimicrobial mouthwash was routinely prescribed by all the doctors (14.5 %) not in favour of prescribing antimicrobials in a normal healthy patient.

Conclusions Our findings suggest that there is a trend of antimicrobial agent misuse by dentists performing oral implant surgery in India, both in terms of drugs used and the protocols prescribed. The majority of these dentists prescribed a variety of antimicrobial agents for prolonged durations routinely even in the normal, healthy patients.

Keywords Dental implants · Antibiotic prescription · Amoxycillin

Introduction

The use of anti-microbial agents (AMAs) in surgical patients of all specialties, including oral surgical procedures, has been well documented over the decades [1–3]. These drugs are prescribed by dental surgeons in two roles—therapeutically, to treat established infections, and as prophylactic cover for oral surgical procedures [4, 5]. Oral surgical procedures are classified as “clean-contaminated” surgery and are associated with an incidence of bacteremia [6–8]. This necessitates the use of AMAs as prophylactic cover in patients with increased risk of infectious complications, like immune-compromised patients, those at risk of infective endocarditis and prosthetic joint replacement infections [9–11]. However, recent reviews have started to question the role of prophylaxis even among these patients [12].

The indiscriminate use of AMAs, attendant additional costs, health risks and community disadvantages in the form of bacterial resistance are numerous and well documented [4, 13–15]. Antimicrobial resistance is a well recognized phenomenon and this was recently highlighted with the discovery of the New Delhi Metallo-beta-lactamase-1 molecule [16, 17]. Even the World Health Organization (WHO) has recognized this problem, with the

Dr. J. S. Batth is a Fellow of the International College of Oral Implantologists.

R. Datta (✉) · Y. Grewal
Rayat Bahra Dental College and Hospital, Mohali, Punjab, India
e-mail: docdatta@gmail.com

R. Datta
H No 416, Sector 37 A, Chandigarh 160036, India

J. S. Batth
Gian Sagar Dental College and Hospital, Rajpura, Punjab, India

A. Singh
Gian Sagar Medical College and Hospital, Rajpura, Punjab, India

South East Asia Region (SEAR) countries under the WHO acknowledging antimicrobial resistance a major global health issue [18].

Tooth replacement has always been one of the major efforts of dental science and the introduction of oral implants by Branemark was a revolution in oral health rehabilitation [19, 20]. However, as in all oral surgical procedures, implant placement is also associated with some incidence of bacteraemia. The placement of implants involves the insertion of a foreign body into the bone through the bacteria laden oral cavity, further complicating the role of antimicrobial therapy in this procedure [21, 22]. Adding to this dilemma is the fact that a majority of implants survive in the bone, with or without anti-microbial therapy [23]. There is no clear-cut evidence supporting or denying the role of antimicrobial prophylaxis in oral implant surgery and recent clinical studies and literature reviews have been inconclusive regarding the absolute recommendation or denial of antimicrobial prophylaxis for this surgical procedure [15, 24].

A comprehensive search of commonly used electronic databases such as Pubmed and Google Scholar, using the key words ‘antibiotics’, ‘oral implants’ and ‘dental’ was done. Published literature in this context related to either use of AMAs by dental practitioners in routine clinical practice or the success and failure of oral implants with or without AMAs [23–30]. Only one study from Jordan had specifically reported the use of AMAs by dentists performing oral implant surgery [31].

The aim of our study was to assess the current trend of antimicrobial prescription behaviour among dentists performing oral implant surgery in India and its implications. To our knowledge, this is the first study of its kind to be conducted in the Indian subcontinent.

Study Design

Dental surgeons performing oral implant surgery from different parts of India were personally approached during various national events such as conferences and academic meetings, and comprised of the target population for this study. It was made clear to all dentists that participation was voluntary. Information was collected via a structured questionnaire regarding antimicrobials prescribed for routine oral implant surgery in the normal healthy patient and the protocol followed. All data was manually transferred from the survey forms to an electronic spreadsheet.

Results

A total of 350 dentists were approached with the survey form and completed data forms were returned by 94.8 %

(332) of the dentists. Overall, the average experience of the respondents in implant dentistry ranged from less than 1 year to 35 years with an average of 4 years. The data was analyzed in two groups, the first group detailing the prescription habits of the respondents and the second group analyzing the different pharmacological agents and the protocols in which they were being prescribed.

An analysis of the prescription habits of the dentists revealed that out of the total sample of 332 dentists, 85.5 % ($n = 284$) prescribed antibiotics routinely when performing oral implant surgery and they were termed as the prescriber group. The remaining respondents were referred to as the non-prescriber group (14.5 %, $n = 48$). In the prescriber group ($n = 284$), 60.5 % ($n = 172$) dentists prescribed a single drug as antimicrobial prophylaxis for oral implant surgery. The remaining 39.5 % ($n = 112$) dentists prescribed more than one drug and among these 60.7 % ($n = 68$) preferred to prescribe pre-formulated commercially available drug combinations (for example: a commercially available tablet of ciprofloxacin and tinidazole combination), while 39.3 % ($n = 44$) prescribed one or more separate drugs together (for example: capsule of amoxicillin with a tablet of metronidazole to be taken together). Additionally, 19.7 % ($n = 56$) dentists of the prescriber group prescribed more than one pharmacological agent for routine oral implant surgery and specified that they prescribed different AMAs for different patients undergoing oral implant surgery on a subjective basis.

In the prescriber group, the trade name of the drugs prescribed was used by 54.2 % ($n = 154$) and the generic name by 37.3 % ($n = 106$), while 8.5 % ($n = 24$) wrote both. Irrespective of this, only 25.7 % ($n = 73$) mentioned the drug dose in their prescriptions. The majority preferred the peri-operative protocol of drug therapy (63 %, $n = 179$). Post-operative therapy was prescribed by 34.5 % ($n = 98$), while pre-operative drug therapy was preferred by 2.5 % ($n = 7$) dentists only. Duration of therapy after surgery ranged from 1 to 10 days for both post and peri-operative therapy, with the most common being 5 days (50.3 %, $n = 143$). Some dentists (10.6 %, $n = 30$) mentioned variable days of post-operative therapy, ranging from 3 to 10 days for the same prescription, indicating that they used different protocols for different patients. The oral route of drug administration was preferred by all doctors. Parenteral therapy (6 %, $n = 17$), where indicated, was used as an adjunct to continued post-operative oral therapy.

A detailed analysis of the different pharmacological agents prescribed as antimicrobial therapy for routine implant surgery revealed the following trends (Table 1). The most commonly prescribed pharmacological group of AMAs was the penicillin's (81 %, $n = 230$) and within this group, the combination of amoxicillin with clavulanic acid

was the most frequently prescribed drug (49.5 %, $n = 114$). Other commonly prescribed AMAs included quinolones (19.4 %, $n = 55$), cephalosporins (15.8 %, $n = 45$), macrolides (4.2 %, $n = 12$), lincosamides (1.4 %, $n = 4$) and tetracycline (0.3 %, $n = 1$). A total of 32.4 % ($n = 92$) doctors added a nitroimidazole drug as an additional supplement for anaerobic cover with the AMA prescribed. The most common anaerobic agent prescribed was metronidazole (50 %, $n = 46$) followed by ornidazole (33.6 %, $n = 31$) and tinidazole (18.4 %, $n = 17$).

It is notable that only one doctor in the prescriber group mentioned the use of an antibacterial mouthwash. On the contrary, an antimicrobial mouthwash was prescribed by all the doctors in the non prescriber group i.e. 14.5 % ($n = 48$). The two agents prescribed were chlorhexidine (69.3 %) and povidone iodine (30.6 %). Approximately 8 % of the non-prescribers recommended both agents indicating a subjective variation in prescription.

Discussion

Our findings showed that the majority (85.5 %) of dentists in India were in favour of antimicrobial therapy in the normal healthy patient undergoing oral implant surgery. The only study with investigation criteria similar to our study was conducted in Jordan and found that only 49.4 % of dentists were in favour of routine antibiotic prescription

[31]. The most commonly prescribed pharmacological group of antimicrobial agents by our study sample was the penicillin group (81 %, $n = 230$) and within this group, almost 50 % ($n = 114$) prescribed amoxicillin with clavulanic acid as the drug of choice, along with 33.9 % ($n = 78$) prescribing amoxicillin. Almost 20 % ($n = 41$) of those in the penicillin group also recommend a nitroimidazole along with the penicillin agent as an adjunct for anaerobic cover. A similar trend favouring the penicillin group of drugs was found by Abukaraky et al. [31] from their survey of dentists in Jordan. Almost 82 % of their study sample also preferred a penicillin drug with amoxicillin and clavulanic acid and amoxicillin being prescribed by 61.5 and 38.5 % respectively. It is noteworthy that most other studies also recommend amoxicillin as the drug of choice in dento-alveolar surgery and oral implant surgery prophylaxis [3, 5, 7, 8, 12, 15, 30, 32].

The other major antimicrobial groups of drugs being prescribed by the doctors in our study were the quinolones (19.4 %, $n = 55$) and cephalosporins (15.8 %, $n = 45$). It is interesting to note that the role of cephalosporins has only been mentioned by Laskin et al. and Abukaraky et al. as additional AMAs in oral implant surgery [29, 31]. The quinolones have not received any mention in the reviewed literature as antimicrobial agents in oral implant surgery, and our respondents appear to be the only group of dentists extensively prescribing this group of drugs. A minority of our respondents also prescribed macrolides (4.2 %, $n = 12$).

Table 1 Antimicrobial agents and their protocol prescribed by dentists performing oral implant surgery

Pharmacological group	Drug	n	Single drug	With Nitroimidazole	Protocol			Route		
					Pre	Peri	Post	PO	IV	IM
Penicillins	Amoxicillin + clavulanic acid	114	99	15	0	70	44	114	2	1
	Amoxicillin	78	56	22	6	53	19	78	3	1
	Amoxicillin + cloxacillin	31	28	3	0	17	14	31	0	0
	Penicillin	7	6	1	0	4	3	7	0	0
Quinolones	Ofloxacin	35	2	33	0	22	13	35	0	0
	Ciprofloxacin	18	4	14	1	11	6	18	0	0
	Norfloxacin	2	2	0	0	2	0	2	0	0
Cephalosporins	Cefotaxime	9	6	3	0	3	6	9	3	0
	Cefixime	8	8	0	0	7	1	8	3	3
	Cefadroxil	14	13	1	0	11	3	14	0	1
	Cephalexin	8	8	0	0	5	3	8	0	0
	Cefuroxime	6	6	0	0	5	1	6	1	1
Macrolides	Azithromycin	7	7	0	0	6	1	7	0	0
	Erythromycin	5	5	0	0	5	0	5	0	0
Lincosamides	Clindamycin	2	2	0	0	1	1	2	0	0
	Lincomycin	2	2	0	0	2	0	2	1	1
Tetracyclines	Doxycycline	1	1	0	0	1	0	1	0	0
Nitroimidazoles	Metronidazole	2	2	0	0	0	2	2	0	0

Pre pre-operative, Peri peri-operative, Post post-operative, Route: PO per oral, IV intravenous, IM intramuscular

$n = 12$) and lincosamides (1.4 %, $n = 4$) as routine drugs. However, most reviews indicate that these are recommended only in penicillin sensitive individuals where antimicrobial therapy is indicated [3, 9–11].

Apart from the guidelines of antimicrobial use in routine oral implant surgery in the normal healthy patient and the drug of choice for the same, controversy also exists in the dose to be used and the protocol of therapy. Only 25.7 % ($n = 73$) of our respondents mentioned the dose in their prescriptions. Current recommendations suggest that a single high preoperative dose of antimicrobial agent (amoxicillin) is sufficient for uncomplicated oral implant surgery [3, 24, 32, 33]. None of our respondents specified a similar elevated dose. One study has further recommended a single post-operative dose as well [14]. The concept of prolonged antimicrobial therapy has been questioned [30, 32–37]. Out of our respondents, 96.1 % ($n = 273$) recommended continuing prolonged therapy in a range of 3–10 days after surgery, findings similar to the trend seen by Abukaraky et al. [31] in their Jordanian sample.

It is noteworthy that all those respondents who did not prescribe an antimicrobial agent for routine oral implant surgery volunteered that they recommended an antimicrobial mouthwash in a peri-operative protocol. Only one respondent in the prescriber group added this information to the prescribed antimicrobial protocol. Surgical asepsis and local measures like peri-operative antibacterial mouthwash have received due importance in literature with even those authors that were in favour of antimicrobial prophylaxis recommending the use of an antibacterial mouthwash peri-operatively [35, 38, 39].

Conclusion

The majority of dentists were in favour of prescribing antimicrobial agents for oral implant surgery. Though most were in favour of the penicillin group of drugs, a large number also prescribe drugs and combinations of drugs that are not necessarily recommended for oral and dento-alveolar surgery at a global level. The importance of local measures such as antibacterial mouthwash seems to be overlooked, possibly considering the antimicrobial as a safety net.

Our study shows that action is required in the form of education and dissemination of correct information regarding the optimum use of antimicrobial agents and the effects of misuse of these drugs. A similar larger scale study would assist in influencing the nature of this intervention and further contribute to formulation of national and global antimicrobial drug policy.

Conflict of interest None to declare.

References

1. Weed HG (2003) Antimicrobial prophylaxis in the surgical patient. *Med Clin N Am* 87:59–75
2. Munckhof W (2005) Antibiotics for surgical prophylaxis. *Aust Prescr* 28:38–40
3. Gutierrez JL, Bagán JV, Bascones A, Llamas R et al (2006) Consensus document on the use of antibiotic prophylaxis in dental surgery and procedures. *Av Odontoestomatol* 22(1):69–94
4. Sweeny LC, Dave J, Chambers PA, Heritage J (2004) Antibiotic resistance in general dental practice—a cause for concern? *J Antimicrob Chemother* 53:567–576
5. Martin MV (2010) Antimicrobials and dentistry: a rationale for their use. *Faculty Dent J* 1(1):15–19
6. Escobar JIS, de Velasco ADAF (2006) Antibiotic prophylaxis in oral and maxillofacial surgery. *Med Oral Patol Oral Cir Bucal* 11:292–296
7. Vera JRM, Centelles MLG (2007) Antimicrobial prophylaxis in oral surgery and dental procedures. *Med Oral Patol Oral Cir Bucal* 12:44–52
8. Roda RP, Jimenez Y, Carbonell E, Gavalda C, Munoz MM, Perez GS (2008) Bacteremia originating in the oral cavity. A review. *Med Oral Patol Oral Cir Bucal* 13(6):355–362
9. American Dental Association; American Academy of Orthopaedic Surgeons (2003) Advisory statement: antibiotic prophylaxis for dental patients with total joint replacements. *J Am Dent Assoc* 134:895–899
10. CDA position on antibiotic prophylaxis for dental patients at risk (2005). Canadian Dental Association http://www.cda-adc.ca/_files/position_statements/antibiotic_prophylaxis.pdf
11. Wilson W, Taubert KA, Gewitz M et al (2008) Prevention of infective endocarditis—guidelines from the American heart association. A guideline from the American heart association rheumatic fever, endocarditis and kawasaki disease committee, council in cardiovascular disease in the young and the council on clinical cardiology, council on cardiovascular surgery and anesthesia, and the quality of care and outcomes research interdisciplinary working group. *J Am Dent Assoc* 139(Suppl 1):3S–24S
12. Miller C (2010) Decisions and antibiotics use: more questions and some answers. Editorial. *Oral Surg Oral Med Oral Path Oral Rad and Endodontology* 110(1):1–3
13. Montazem A (1998) Antibiotic prophylaxis in dentistry. *Mt.Sinai J Med* 65(5–6):388–392
14. Hossein K, Dahlin C, Alse'n B (2005) Influence of different prophylactic antibiotic regimens on implant survival rate: a retrospective clinical study. *Clin Implant Dent Relat Res* 7:32–35
15. Guerrero JS (2008) Use of prophylactic antibiotic therapy in oral surgical procedures: a critical review. *J Calif Dent Assoc* 36(12):943–950
16. WHO Global Strategy for Containment of Antimicrobial Resistance (2001). World Health Organization http://www.who.int/csr/resources/publications/drugresist/WHO_CDS_CSR_DRS_2001_2_EN/en/
17. Ghafur AK (2010) An obituary—on the death of antibiotics (editorial). *J Assoc Phys India* 58:1–3
18. WHO South East Asia Region Jaipur declaration on Antimicrobial Resistance, World Health Day (2011). Available at: http://www.searo.who.int/LinkFiles/WHDamr_Jaipur_declaration_.pdf
19. Albrektsson T, Branemark PI, Hansson HA et al (1981) Osteo-integrated titanium implants. Requirements for ensuring a long lasting, direct bone-to-implant anchorage in man. *Acta Orthop Scand* 52:155–170
20. Jokstaad A, Bragger U, Brunski JB, Carr AB, Naert I, Wennerberg A (2003) Quality of dental implants. *Int Dent J* 53:409–443
21. Lawler B, Sambrook PJ, Goss AN (2005) Antibiotic prophylaxis for dentoalveolar surgery: is it indicated? *Aust Dent J* 50(Suppl 2):S54–S59

22. Bolukbasi N, Ozdemir T, Oksuz L, Gurler N (2012) Bacteremia following dental implant surgery: preliminary results. *Med Oral Patol Oral Cir Bucal* 17(1):69–75
23. Ahmad N, Saad N (2012) Effects of antibiotics on dental implants: a Review. *J Clin Med Res* 4(1):1–6
24. Esposito M, Worthington HV, Loli V, Coulthard P, Grusovin MG (2010) Interventions for replacing missing teeth: antibiotics at dental implant placement to prevent complications (Review). *Cochrane Database of Systematic Reviews Issue 7*. Art. No: CD004152
25. Palmer NOA, Marin MV, Pealing R, Ireland RS (2000) An analysis of antibiotic prescriptions from general dental practitioners in England. *J Antimicrob Chemother* 46:1033–1035
26. Roy KM, Bagg J (2000) Antibiotic prescribing by general dental practitioners in the greater Glasgow health board, Scotland. *BDJ* 188:674–676
27. Sermet S, Akgun MA, Atamer-Simsek S (2011) Antibiotic prescribing profile in the management of oral diseases among dentists in Istanbul. *J Marmara Univ Inst Health Sci* 1(1):35–41
28. Kamulegeya A, William B, Rwenyonyi CM (2011) Knowledge and antibiotic prescription pattern among Ugandan oral health care providers: a cross-sectional survey. *J Dent Res Dent Clin Dent Prospects* 5(2):61–66
29. Laskin DM, Dent CD, Morris HF, Ochi S, Olson JW (2000) The influence of preoperative antibiotics on success of endosseous implants at 36 months. *Ann Periodontol* 5(1):166–174
30. Binhamed A, Stoykewych A, Peterson L (2005) Single pre-operative dose versus long-term prophylactic antibiotic regimens in dental implant surgery. *Int J Oral Maxillofac Implants* 20:115–117
31. AbuKaraky AE, Afifeh KA, Khatib AA, Khadairi NO, Habarneh HM, Ahmad WKH, Hamadan AAS, Sawair FA (2011) Antibiotics prescribing practices in oral implantology among Jordanian dentists. A cross-sectional, observational study. *BMC Res Notes* 4:266
32. Esposito et al (2010) Effectiveness of prophylactic antibiotic at placement of dental implants; a pragmatic multi-center placebo-controlled randomized clinical trial. *Eur J Oral Implantol* 3(2):1–9
33. Caiazzo A, Casavecchia P, Barone A, Brugnami F (2011) A pilot study to determine the effectiveness of different amoxicillin regimens in implant surgery. *J Oral Implantol* 37(6):691–696
34. Classen DC, Evans RS, Pestotnik SL, Horn SD, Menlove RL, Burke JP (1992) The timing of prophylactic administration of antibiotics and the risk of surgical wound infection. *N Engl J Med* 326(5):281–286
35. Gynther GW, Kondell PA, Moberg LE, Heimdahl A (1998) Dental implant installation without antibiotic prophylaxis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 85(5):509–511
36. Khoury SB, Thomas L, Walters JD, Sherridan JF, Leblebicioglu B (2008) Early wound healing following one stage dental implant placement with and without antibiotic prophylaxis: a pilot study. *J Periodontol* 79(10):1904–1912
37. Sancho Puchades M, Herraez Vilas JM, Verrini Ayetes L, Gay Escoda C (2009) Antibiotic prophylaxis to prevent local infection in oral surgery: use or abuse? *Med Oral Patol Oral Cir Bucal* 14(1):28–33
38. Lambert PM, Morris HF, Ochi S (1997) The influence of 0.12% chlorhexidine digluconate rinses on the incidence of infectious complications and implant success. *J Oral Maxillofac Surg* 55(12 Suppl 5):25–30
39. Resnik R, Misch C (2008) Prophylactic antibiotic regimens in oral implantology: rationale and protocol. *Implant Dentistry* 17(2):142–150