

Antibiotic prophylaxis in oral and maxillofacial surgery: use or abuse - A retrospective study

Sanjay Pasupathy¹, Karthik Ragupathy^{2,*}

¹Professor & HOD, ²Assistant Professor, Dept. of Dentistry, Sri Manakula Vinayagar Medical College & Hospital, Puducherry

***Corresponding Author:**

Email: drsrkarthik@gmail.com

Abstract

Aim: This study evaluated the role of antibiotic prophylaxis in the field of oral and maxillofacial surgery.

Patients and Methods: A total of 111 patients included in the study. Out of which 76 patients were included in Group-I- Prophylactic antibiotic group and remaining 35 patients were included in Group-II- Non-antibiotic group. Group-I patients had been given injection crystalline penicillin 20,00,000 units half an hour before surgery. Of these 111 patients, 81 patients underwent surgery under general anesthesia and remaining 30 patients underwent surgery under local anesthesia.

Results: Fourteen patients from Group-I suffered post-surgical infection leading to an infection rate of 18.4% and in Group-II, 6 patients had post-surgical infection leading to an infection rate of 17.14%.

Conclusion: The findings in this study suggest that antibiotic prophylaxis may not alter the incidence of post-surgical infection in oral and maxillofacial surgical procedures.

Keywords: Antibiotics, Prophylaxis, Post-surgical infection, Oral and Maxillofacial surgery

Introduction

The maxillofacial region is one of the most vascular areas of the body. This can be a problem in that, wounds in this area tend to bleed profusely, but at the same time healing is thought to be much better for the same reason. Prophylactic use of antibiotics has become routine in almost every field of medicine and surgery.^(1,2) Most of the procedures in oral and maxillofacial surgery fall under the clean contaminated group^(3,4) but still the use of antibiotics seem to be increasing. The growing evidence of antibiotic resistant microorganisms is causing a great concern not only among the medical professionals but also among the public. So it was decided to study the need of prophylactic antibiotics in preventing infection in the field of oral and maxillofacial surgery.

Patients and Methods

A retrospective analysis was carried out from the records of patients who underwent major surgeries in our department during a period of 19 months. A total of 158 patients underwent various major surgeries, out of which 47 patients had pre-existing infections and so only the remaining 111 were included in the study. Of these 111 patients, 63 had traumatic injuries, 26 had cysts and tumours, 16 underwent orthognathic surgery and 6 were patients with TMJ disorders. Of the 111 patients included in the study, 76 had been given a prophylactic dose of injection Crystalline penicillin 20,00,000 units half an hour before surgery intravenously and they were included in Group - I - Prophylactic antibiotic group. The remaining 35 patients were not given any kind of antibiotics before or after surgery and they were included in Group - II - Non-antibiotic group. Eighty one out of the 111

underwent surgery under general anaesthesia and remaining underwent surgeries under local anaesthesia. The mean period of delay in treatment in trauma patients was 8 days. Miniplates were used for all the trauma cases and the number of plates in each site varied from one to two, depending upon the type of fracture and adequacy of fixation.

Results

A total of 111 patients included in this study (Table 1). The mean age of the patients in the study was 31.3 years (ranging from 9 to 79 years); males predominated by a 2: 1 ratio (108 males and 50 females). In group-I, 14 patients suffered from post-surgical infections leading to an infection rate of 18.4% and in group-II, 6 had post-surgical infections leading to an infection rate of 17.14% (Table 2). The mean day of occurrence of post-surgical infection was 4.7 days ranging from 2nd to 10th postoperative day. In group-I, out of 14 infected cases, 8 were trauma cases, 3 were orthognathic surgery cases, 2 were TMJ surgeries and one in a patient operated for tumour. Out of the 8 trauma cases that got infected, 6 were mandibular fractures and 2 were middle third fractures. All the 6 mandibular fractures were compound fractures (6 out of 22) and two of them had undergone extraction of third molars during surgery (2 of 6) for proper adequacy of reduction. Out of these 14, 7 surgeries were done extraorally, 3 were done intraorally and remaining 4 were done both intra and extraorally. The infection rate in trauma cases alone was 26.67% (Table 3). In cyst and tumour cases, only one patient with carcinoma alveolus who underwent wide excision and modified radical neck dissection had post-surgical infection. The infection rate in cyst and tumour patients was thus 4% (Table 4). In orthognathic

surgery cases, out of 16, 3 had post-surgical infection, of which 2 underwent bimaxillary anterior segmental osteotomies and the other underwent extended sliding genioplasty. The infection rate in orthognathic cases was 18.75% (Table 5). In TMJ surgery cases, two ankylosis patients out of 6 had post-surgical infection. Infection rate in TMJ surgeries was 33.33% (Table 6). In Group-II (non-antibiotic group), 6 out of 35 had post-surgical infection (17.14%) and all of them had ORIF for mandibular fractures through intraoral approach. In Group-I, out of 14 patients who had post-surgical infection, 9 patients had suture removal with evacuation of pus followed by antibiotic therapy as treatment, 2 patients underwent incision and drainage

with concomitant antibiotic therapy and in 3 patients only antibiotics were given without any surgical intervention. In Group-II, all the 6 infected patients were managed by suture removal and evacuation of pus with concomitant antibiotic therapy.

Table 1: Group distribution

Type	Group I	Group II
Trauma	31	33
Cyst and Tumours	24	1
Orthognathic Surgeries	15	1
TMJ Surgeries	6	0
Total	76	35

Table 2: Post-surgical infection in different groups

Groups	Trauma	Cyst and Tumours	Orthognathic Surgeries	TMJ Surgeries	Total	No. of PSI	%
Group I	31	24	15	6	76	14	18.4
Group II	33	1	1	0	35	6	17.1

PSI- Post surgical infection

Table 3: Post-surgical infection in Trauma patients

	Mandibular	Middle third	Total
Group I	23	7	30
PSI	6	2	8
%	26.08%	28.57%	26.67%
Group II	33	0	33
PSI	6	0	6
%	18.8%	0%	18.18%

PSI- Post surgical infection

Table 4: Post-surgical infection in Cyst and Tumours patients

	Cyst	Odontogenic Tumours	Malignant Tumours	Misc	Total
Group I	5	3	7	9	24
PSI	0	0	1	0	1
%	0	0	14.28	0	4.16%
Group II	1	0	0	0	1
PSI	0	0	0	0	0
%	0	0	0	0	0

PSI- Post surgical infection

Table 5: Post-surgical infection in Orthognathic surgery patients

	ASO	Lefort I Osteotomy	Genioplasty	Misc	Total
Group I	7	1	3	5	16
PSI	2	0	1	0	3
%	28.57%	0%	33.33%	5%	18.75%
Group II	0	0	0	1	1
PSI	0	0	0	0	0
%	0%	0%	0%	0%	0%

PSI – Post Surgical Infection

ASO – Anterior Segmental Osteotomy

Table 6: Post-surgical infection in Temporomandibular joint surgery patients

	Ankylosis	TMD	Total
Group I	5	1	6
PSI	2	0	2
%	40%	0%	33.33%
Group II	0	0	0
PSI	0	0	0
%	0%	0%	0%

PSI – Post Surgical Infection

TMD – Temporomandibular disorders

Discussion

Ever since the advent of antibiotics, they have been used as the main weapon against infections by surgeons and physicians alike. The same is certainly justified to a large extent, but its use to prevent infection (prophylactic use) has come under a lot of scrutiny in recent times, especially against the background of the threat of the emergence of resistant microorganisms.⁽⁵⁾ The use of postoperative antibiotics alone actually violates the basic tenets of prophylaxis, as there is no antibiotic either in the systemic circulation or at the site of surgery when the microorganisms invade the wound. The landmark animal study by Burke (1961)⁽⁶⁾ first defined the scientific basis for the perioperative use of antimicrobial agents in the prophylaxis of surgical wound infections. In that study, he clearly stated that “the risk of infection can be decreased, and, in specific cases, infection prevented by supplementing the host antibacterial resistance, but only if the supplement is delivered before bacterial contamination of the tissues occur so that it is available to supplement the patient’s intrinsic efforts during the early decisive period”. Hence, use of postoperative antibiotics has no role in the prophylaxis of surgical wound infection. In our study, we haven’t used postoperative antibiotics for any of our patients.

The use of prophylactic antibiotics for various oral surgical procedures is well documented in literature.^(1,2,7-9) But the real question to be answered is “whether the prophylactic antibiotic itself is needed for oral surgeries or not?”. Most of the maxillofacial procedures come under class – I (clean) or class – II (clean-contaminated) varieties. It is well documented that Class I cases do not need any kind of prophylactic antibiotics as the infection rate is very low (1-2%). In class –II cases under which most elective oral surgery cases fall, the use of prophylactic antibiotics is controversial. In recent literature, there is enough evidence that no antibiotics are needed for most of the intraoral minor surgeries like third molar surgeries.⁽⁷⁻⁹⁾ But there is not much evidence available for major surgeries without antibiotics. In our study, the infection rates obtained in Groups – I and II are almost similar (I – 18.4% & II – 17.14%), which suggests that the need for routine prophylactic antibiotics in major oral

surgeries also might be controversial. The infection rates obtained in our study are relatively higher when compared to some studies, but there are other studies which had similar infection rates even though they were using prophylactic antibiotics. In our study, out of 14 people who had post-surgical infection, 8 were trauma cases especially mandibular fractures. The post-surgical infection in trauma patients depends on numerous factors like the patient’s physical characteristics, the type of fractures and the delay in treatment. The most important factors among these seem to be the type of fractures i.e., whether it is compound or not and the period of delay in the treatment.

In the literature, many studies^(10,11) have shown that compound fractures involving the teeth have more chance of infection than the others. In our study, in Group I out of 22 compound fractures, 6 got post-surgical infection leading to an infection rate of 27% and in group – II 6 out of 32 compound fractures got infected leading to an infection rate of 19%. As the infection rates in both groups are similar in compound fractures, it is clear that antibiotics are not playing much of a role in the prevention of post-surgical infection in these kinds of fractures. The maximum recommended delay in treatment of mandibular fractures and type of treatment have been the subject of attention in numerous studies. The literature shows that delayed treatment of fractures is associated with a greater rate of infection. Although Champy et al⁽¹²⁾ recommended treatment within the first 12 hours of trauma, in our setup this is not practically possible always because of various factors like availability of operation theatres, cost factor associated with open reductions etc... The mean delay of treatment of fractures in our study is 8 days and there is no positive or negative correlation found between the delay and increased post-surgical wound infection.

About the surgery performed, for all the trauma cases in this study ORIF with miniplates was carried out. There were no correlation found between the type of surgeries and post-surgical infection in our study. A strong positive correlation was found between the use of catgut suture in multilayer closures and post-surgical infection in group I patients (catgut was used in 44 patients out of which 7 had post- surgical infection, leading to an infection rate 17%) but this is not statistically significant. On analyzing the management of post-surgical infection, it was found that 65% (9 out of 14) of these patients needed only removal of one or two sutures and evacuation of pus with concomitant antibiotic therapy. In 15% (2 out of 14) of these patients needed an incision and drainage followed by concomitant antibiotic therapy and in remaining 20% (3 out of 14) only antibiotics were prescribed without any surgical intervention.

Conclusion

This study suggests that prophylactic antibiotic therapy may not alter the incidence of post-surgical wound infection. But it suffers from disadvantages like being retrospective in nature, non-randomized and without a control group, a small number of patients in each group etc. A multicentric, prospective randomized controlled trial only will really answer the question as to whether routine use of prophylactic antibiotics in maxillofacial surgery is an abuse.

References

1. Conover MA, Kaban LB, Mulliken JB. Antibiotic Prophylaxis for Major Maxillocraniofacial Surgery. *J Oral Maxillofac. Surg* 1985;43:865-870.
2. Peterson LJ. Antibiotic Prophylaxis against Wound Infections in Oral and Maxillofacial Surgery. *J Oral Maxillofac. Surg* 1990;48:617-620.
3. Baqain ZH, Hyde N, Patrikidou A, Harris M. Antibiotic prophylaxis for orthognathic surgery: a prospective, randomised clinical trial. *Br J Oral Maxfac Surg* 2004;42:506-510.
4. Zijderveld SA, Smeele LE, Kostense PJ, Tuinzing DB. Preoperative Antibiotic Prophylaxis in Orthognathic Surgery: A Randomized, Double-Blind, and Placebo-Controlled Clinical Study. *J Oral Maxillofac. Surg* 1999;57:1403-1406.
5. Salmeron- Escobar JI, del Amo-Fernandez de Velasco A. Antiniotic prophylaxis in Oral and Maxillofacial Surgery. *Med Oral Patol Oral Cir Bucal* 2006;11:E292-6.
6. Burke JF. The effective period of preventive antibiotic action in experimental incisions and dermal incisions. *Surgery* 1961;50:161-168.
7. Curran et al. An assessment of the use of prophylactic antibiotics in 3 Molar Surgery. *Int J Oral Surg* 1974;3:1-6
8. Sekhar et al. Role of antimicrobials in 3rd molar surgery: prospective, double blind, randomised, placebo-controlled clinical study. *Br J Oral Maxillofac Surg* 2001 Apr; 39(2):134-7.
9. Happonen et al. Prophylactic use of Pen V and tinidazole in Mandibular 3 molar Surgery, a comparative placebo controlled clinical trial. *Br J Oral Maxillofac Surg* 1990;28:12-15.
10. Moreno et al. Complication rates associated with different treatments for mandibular fractures. *J Oral Maxillofac Surg* 2000;58:273-280.
11. Zallen RD, Black SL. Antibiotic therapy in oral and maxillofacial surgery. *J Oral Surgery* 1976;34:349-351.
12. Champy et al. Mandibular osteosynthesis by a miniature screwed plates via a buccal approach. *J Oral Maxillofac Surg* 1978;6:14.