Original Study

ANTIBIOTIC PROPHYLAXIS FOLLOWING SIMPLE EXODONTIA: A CONTROLLED TRIAL

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ABSTRACT

Antibiotics are prescribed by dentists in various dental procedures. They are used both in therapeutic and prophylactic managements. Since oral infections are multi-microbial in origin involving gram-negative, gram-positive, facultative anaerobes, and obligate anaerobic bacteria, antibiotics serve as first line of treatment in inhibiting the growth of disease causing organisms. But reckless prescription of antibiotics has resulted in resistance, posing a serious health threat worldwide. Modifying this practice of over prescription in dentistry could significantly reduce the emergence of resistance to antibiotics and dental practitioners must show great restraint and responsibility in adhering to the same.

Aim: The aim of our study was to assess the efficacy of antibiotic prophylaxis and justification for use following simple extractions

Objective: The objective of this study was to develop a protocol for prescribing antibiotics for dental extraction procedure.

Key words: Single dose antibiotics, overprescribing antibiotics, antibiotic resistance, simple exodontia.

Introduction

Antibiotics are amongst the drugs regularly prescribed in dentistry. Orofacial infections arise from odontogenic infections and antibiotic prescription by dentists is usually required to control it [1, 2]. The extent of antibiotics use cannot be overemphasized considering the fact that out of all specialties, dentists prescribe 10% of all common antibiotics [3]. The blind prescribing of antibiotics has left us in an era where some bacterial species are resistant to full range of antibiotics presently available. Amongst these Methicillin-Resistant *Staphylococcus* Aureus (MRSA) and Vancomycin-Resistant *Staphylococcus Aureus (VRSA)* are common. The National Centre of Disease Control and Prevention found that almost one-third of all outpatient antibiotics prescriptions are unnecessary [4]. Improper use of antibiotics is associated with side-effects ranging from gastrointestinal disturbances, development of resistance to fatal anaphylactic shock compelling researchers to study the proper use of antibiotics in dentistry.

A plethora of studies advocate or disapprove the use of antibiotics following extraction; however, the topic still remains controversial. To start with, MacGregor et al [5] and Swanson et al [6] suggested, postoperative antibiotics to be effective in reduction of pain and swelling with improvement in healing rate. Goldberg et al [7], Curran et al [8] did not support the indiscriminate use of antibiotics prophylactically citing low incidence of postoperative infection. Yoshii et al suggested that single day therapy with antibiotics may, at least be recommended for extraction in medically healthy patients [9]. Though the current trend in developed world is shifting to minimal use of antibiotics following simple extraction, in developing countries general consensus among dental surgeons regarding antibiotic therapy is questionable with antibiotics considered essential to minimize postoperative complications [10]. This trend is exacerbated by patients' demand and often self-prescription of antibiotics even in circumstances where antibiotic therapy is clearly not indicated [11].

With the prevailing conflict on prescribing antibiotics for dental treatment, this study was conducted to understand the efficacy of single dose of antibiotic preoperatively and the necessity of antibiotics in preventing postoperative complications.

Aim: The aim of our study is to assess the efficacy of antibiotic prophylaxis following simple extractions.

Objective: The objective of this study is to develop a protocol for prescribing antibiotic for dental extraction procedure.

Materials and Method

Design:
The design is a controlled trial

Setting:
The setting is at Institute of Nuclear Medicine and Research, INMAS, DRDO. New Delhi

Sample Size:
The sample size is 150

Sampling method:
Sampling method is non-probability purposive sampling.

Purposive Sampling:
All patients undergoing simple tooth extractions with following inclusion and exclusion criteria from April 2018 till November 2018 were recruited for the study

Inclusion Criteria:

- Males or females in the age group of 25-65 years of age

- Absence of swelling around the diseased tooth
- Patients with good systemic health
- Patients undergoing simple single tooth extraction of permanent maxillary or mandibular teeth
- Extractions requiring minimal instrumentation

Exclusion Criteria:

- Patients with comorbidities
- Pregnant or lactating mothers
- History of recent allergic episode
- Patients with acute infection or abscess
- Patients who are currently taking antibiotics for any other health ailment
- Patients with deleterious oral habits like smoking chewing pan or tobacco
- Patients with deciduous teeth or requiring surgical extractions

Procedure:

All the extractions were carried out under local anesthesia, abiding surgical protocols and universal precautions. Sodium hypochlorite (5%) was used to disinfect each unit between patients. Patients were administered 1.8 ml of 2% lignocaine cartridges with 1: 100,000 epinephrine injected with 25/27 gauge hypodermic needles. All extractions were performed with minimal instrumentation using a mucoperisteal elevator, straight elevator and extraction forceps. The mean time for extraction was 10 minutes.

After extraction, haemostasis was achieved using a cotton pressure pack. Standard postoperative instructions were given to all the patients as per department's protocol. Patients who developed complications during extraction procedure were excluded from the study.

All the patients undergoing extractions were randomly divided under 3 groups:

Group A: Patients receiving antibiotics 1 hour prior to extraction

Group B: Patients receiving antibiotics 1 day prior to extraction and to continue till 3 days post extraction

Group C: Patients receiving antibiotics 5 days post extraction.

Patients were called for a regular follow-up on 3rd and 5th postoperative day to evaluate for signs of inflammation, wound infection and dry socket, as per the criteria discussed by Waqas Yousuf et al [11].

1. Signs of persistent inflammation

- Redness
- Swelling
- Pain
- Bleeding
- Margins of wound-Rolled or everted
- Lymph Nodes

2. Signs of Dry Socket

- Presence of denuded bone at the base of socket accompanied with severe pain
- Fever

The study was approved by the Human Ethical Committee of the institute.

Results

A total of 177 patients were screened, with 27 not meeting the inclusion criteria. The patients were divided into three groups of 50 each. Of the 150 patients examined, only 10 cases reported with Dry Socket with 4 in Group A and 3 each with Group B and C, predominantly males in a ratio of 6:4.

The main etiology for extraction was grossly decayed teeth, followed by Periodontitis and Root stumps.

The result of the study was tabulated.

Gender	Group A	Group B	Group C
Males	29	26	32
Females	21	24	18

Table 1: Sex Distribution

Age Groups	Group A	Group B	Group C
25-35	5	7	5
35-45	11	13	11
45-55	22	20	25
55-65	12	10	9

Table 2: Age Groups

Jaw	Group A	Group B	Group C
Maxillary	23	19	22
Mandibular	27	31	28

Table 3: Teeth Extracted

Etiology	Group A	Group B	Group C
Grossly Carious	19	17	20
Periodontitis	13	15	10
Fracture	2	3	1
Root Caries	5	6	6
Root Stumps	11	9	13

Table 4: Etiology

Pain History	Group A	Group B	Group C
Had Pain Previously	31	36	39

Table 5: Pain History

Dry Socket Cases	Group A	Group B	Group C
Total	4	3	3
Males	3	1	2
Females	1	2	1

Table 6: Dry Socket

Findings	Group A	Group B	Group C
Redness	13	10	9
Swelling	0	0	0
Pain	19	14	15

Fever	0	0	0
Bleeding	0	0	0
Tender Lymph Nodes	0	0	0
Margins: Rolled Everted	37 13	41 9	42 8
Dry Socket	4	3	3

Table 7: Post-Operative Findings

Cases Requiring Nsaids Post-Extraction	Group A	Group B	Group C
Total	19	17	16

Table 8: Necessity of Painkiller Post-Operatively

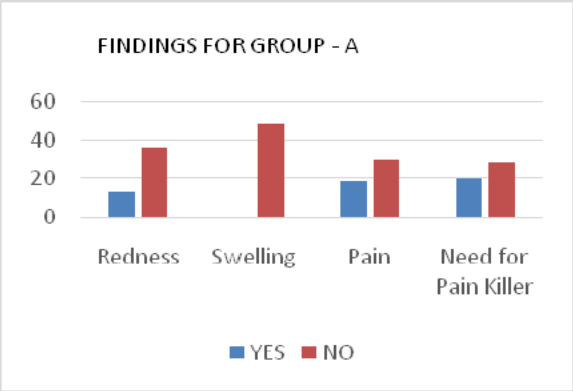

Figure 1: Group A findings

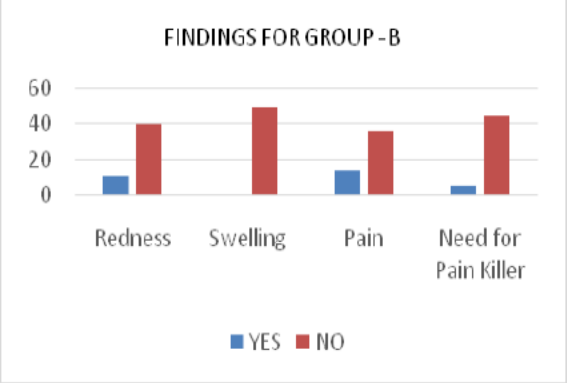

Figure 2: Group B findings

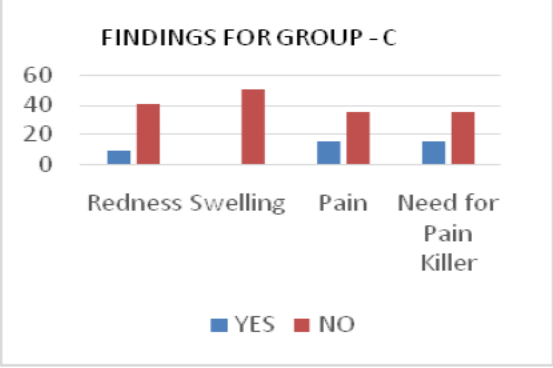

Figure 3: Group C findings

	GROUPS A and B	GROUPS A and C	GROUPS B and C
Redness	0.477	0.332	0.802
Pain	0.289	0.4009	0.8258
Rolled	0.332	0.2187	0.7872
Dry Socket	0.696	0.69	1
Pain Killer	0.675	0.529	0.833

Table 9: Post-Operative statics

Discussion

This study was done out of growing concern on indiscriminate use of antimicrobial drugs in dental practice. Oral Amoxicillin was used for antibiotic prophylaxis, as this has long been the antibiotic of choice in odontogenic infections, being highly effective against bacterial spectrum normally found in patients [12]. Lockhart et al found that dental extractions are among the most likely procedures to cause bacteremia and Amoxicillin has a significant impact on bacteremia from a dental extraction [13, 14]. Bresco-Salinas et al noted in 64 patients with acute infections of pulp origin or pericoronitis, that germs most commonly isolated from the infection zone were *Streptococcus, Enterococcus, Bacteroides, Fusobacterium, Porphyromonas, Prevotella* and *Actinobacillus;* which were most sensitive to Amoxicillin in vitro [15]. Amoxicillin was administered in our study 2 hours prior to the surgical procedure following the protocol tested by Worall et al and Philipson et al who found that Amoxicillin after ingestion had peak serum levels at 1-5 hours with highest level at 2 hours [16, 17].

Antibiotics are prescribed in dentistry since time immemorial so, we decided to test its validity and also the efficiency of single dose of antibiotic versus extended course. For this we created three groups based on the common pattern for prescribing antimicrobials and randomly distributed patients into the groups. The findings in our study certainly indicate that there is no significant difference in patients taking single dose of antibiotic to that of multiple doses. Our findings concurred with Sekhar et al [18] and Monaco et al [19] that antimicrobial prophylaxis did not seem to reduce post extraction morbidity. According to Katie J. Suda et al [20] and Esposito et al [21] , modifying post-procedure antibiotic prescription for dental extractions to only 1 dose of 2 or 3 grams 1 hour prior to the procedure could significantly decrease overprescribing of antimicrobials in dentistry.

Postoperative antibiotics are usually prescribed based on assumptions that inflammation always follows any surgical procedure as a protective response trying to eliminate the initial cause of cell injury as well as necrotic cells and tissues which result from the original insult [22]. Cochrane Collaboration in a systematic review on the use of antibiotics for infection prophylaxis post extraction found that antibiotics reduced the risk of infection, but also suggested that due to the risk of adverse events and resistant bacteria, clinicians should carefully consider treating healthy patients with postoperative antibiotics [23].

Arteagoitia et al reported a significant rise of up to 12.9% in rate of infection in individuals who were not prescribed antibiotics [24]. However, Poeschl et al, found that antibiotic prescription postoperatively, did not contribute to a better wound healing, less pain or increased mouth opening, and therefore did not recommend its routine use [25]. Corroborating with the findings of authors, in our study the cases of dry socket were evenly distributed in all the groups with 4 cases reported in Group A compared with 3 cases each in Group B and C. This clearly signifies that postoperative dose of antibiotics has no correlation with the development of dry socket and wound healing. Surgical protocols and patients postoperative wound care are important facts in formation of blood clot after surgery. Serious infections following extractions have been rare in the past two decades with improvement in postoperative morbidity, caused more likely due to improved patient management, better instrumentation and surgical technique, and greater awareness on the importance of strict asepsis, hence indicating lack of justification for use of systemic antibiotics routinely after dental extractions [26].

Post-extraction antibiotic intake has been associated to a better response in pain management with Rohit S et al, concluding that pain was maximum immediately post-extraction possibly due to trauma which gradually reduced by 5th-7th day postoperatively; they also noted that there was no swelling after 5th postoperative day , irrespective of whether antibiotic prophylaxis was given or not [27]. Eeden et al reported the difference in pain between medicated and non-medicated patients to be non-significant; similarly Agrawal M. et al suggested that intensity of pain on 2nd,7th and 14th postoperative day was statistically not significant; hence suggesting that there is no correlation between decreasing intensity of pain and prescribing and not prescribing antibiotics [27, 29]. Corroborating the studies and our findings we are of the view that there is a serious need to exercise restraint while prescribing post-extraction antibiotics in uncomplicated extractions.

Conclusion

In this study it was observed that extractions of uncomplicated and asymptomatic teeth can be managed with a single pre-procedural dose of antibiotic in healthy patients. Steps should be taken to decrease over prescription of antibiotics in dentistry. Dental practitioners should show great responsibility in selecting and administering the dosage of antimicrobials.

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