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**EVALUATION OF EFFICACY OF 5 DAYS ANTIBIOTIC REGIMEN AND 3 DAYS
ANTIBIOTIC REGIMEN IN THIRD MOLAR SURGERY**

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ABSTRACT

Third molar surgery is considered as the most frequently performed surgical procedure in the field of oral and maxillofacial surgery. The use of prophylactic antibiotics in third molar surgeries to prevent post-operative complications is common, but there is controversial evidence for the efficacy of these drugs in reducing the incidence of the post-operative complications. The aim of this study is to comparatively evaluate the efficacy of 3-days antibiotic regimen with 5-days antibiotic regimen in reducing the post-operative complications of third molar surgery. This was a double blind, randomized controlled trial. Twenty patients were randomly divided into two groups. Following surgical removal of third molar all participants received capsules of amoxicillin 500 mg thrice daily and tablets of metronidazole 400 mg thrice daily orally for the first three days. For the next two days participants received either amoxicillin and metronidazole or placebo. Subjects were assessed postoperatively on the 1st, 2nd, 5th and 7th days by the same observer for post-operative mouth opening (interincisal distance), presence of a purulent discharge at the site of surgery, pain and swelling. No statistically significant difference was seen

between both the treatment groups when pain, swelling and purulent discharge were considered. We recommend the three-days course of antibiotics for symptomatic third molar surgeries as this is equally as effective as a five-days course but is cheaper with possibly decreased emergence of antimicrobial resistance.

Keywords: Antibiotics, extraction, impaction, third molar, wisdom tooth

INTRODUCTION

Third molar surgery is considered as the most frequently performed surgical procedure in the field of oral and maxillofacial surgery. It represents a standard operation which is carried out with local anesthesia on an outpatient basis [1]. The rate of wound infection seen after surgical removal of third molar is higher than that seen in the routine tooth extraction, while the exact incidence of infection is difficult to assess [2]. The use of prophylactic antibiotics in third molar surgeries to prevent post-operative complications is common, but there is controversial evidence for the efficacy of these drugs in reducing the incidence of the post-operative complications [3].

Pain, trismus, and swelling are the most common post-operative complication associated with surgical removal of third molars and they affect the patient's quality of life in the first few days postoperatively. Third molar surgeries are classified under "clean-contaminated" group of surgeries with the infectious complications ranging from 1%-15% [4]. Some authors have discussed

that post-surgery complications are due to the trauma of the procedure itself and not due to the infectious events. Hence, they recommend the use of anti-inflammatory drugs alone and consider use of antibiotics futile [2]. While some authors recommend the use of antibiotic prophylaxis for considerable reduction in postsurgical complications whenever the symptoms are infection related [5]. However, in addition to preventing infection general postoperative morbidity is reduced with antibiotic prophylaxis [6].

Professional publications are dedicatedly attempting to provide a guidance in the administration of antibiotics, as antibiotic influenced bacterial resistance has become a major crisis in healthcare. The studies that have proven the efficacy of antibiotics in reducing the incidence of postoperative sequelae after third molar extraction advocate either a five days antibiotic course or a three days antibiotic course [5].

The aim of this study is to comparatively evaluate the efficacy of three days antibiotic regimen with five days antibiotic regimen in reducing the post-operative complications of third molar surgery.

MATERIALS AND METHODS

This double blinded, placebo controlled, randomized trial was conducted in the outpatient department of oral and maxillofacial surgery at our institution in Chennai. This prospective study was approved by the institutional ethical committee, after which 20 healthy adult patients between the age of 18–50 years, gave their written consents to participate in it. These patients were among patients who needed surgical removal of their mandibular third molars under local anesthesia. This study was conducted from February 2019 to August 2019.

Inclusion criteria:

1. Patients willing to participate in the study.
2. Patients without any systemic complications.

Exclusion criteria:

1. Patients above age of 50 years
2. Patients with systemic diseases that contraindicated the surgical removal of third molars under local anesthesia

Patients were randomly divided into two groups of 10 each by using a simple, random sampling technique. Both the treatment groups underwent surgical removals of mandibular third molars under local anesthesia by using strict aseptic techniques, with only minimal trauma being caused to the surrounding tissues. Our primary objective of the study was to comparatively evaluate the incidence of the postoperative complications after third molar surgery with three days' treatment and five days' treatment with antibiotics. All participants received capsules of amoxicillin 500 mg thrice daily and tablets of metronidazole 400 mg thrice daily orally for the first three days. For the next two days participants of **Group 1** received amoxicillin and metronidazole while **Group 2** received placebo.. However, both the groups were prescribed anti-inflammatory drugs and analgesics. Both the groups were assessed postoperatively on the 1st, 3rd, 5th and 7th and 10th days by the same observer for post-operative mouth opening (interincisal distance), presence of a pus discharge at the site of surgery, pain and swelling at the site of surgery. Post-operative mouth opening was recorded in millimeters by using Vernier caliper. A four point Visual Analogue Scale (VAS) was used to assess postoperative pain where 0 = no pain, 1 =

mild pain (pain being reported only in response to questioning and without any behavioral signs), 2 = moderate pain (pain being reported in response to questioning and accompanied by behavioral signs, or pain being reported spontaneously without questioning), and 3 = severe pain (a strong vocal response or a response which was accompanied by grimaces or tears). Purulent discharge and swelling at the site of surgery were recorded in terms of present or absent.

The collected data was subjected to statistical analysis. Statistical analysis of the clinical variables was done using Statistical Package of Social Science (SPSS) version 23 (IBM Corporation, USA, 2012). Data for post-operative mouth opening were analyzed by using Student's t-test. Data for pain, swelling and presence of a purulent discharge were analyzed by using Chi square test. P value of less than 0.05 were accepted as statistically significant.

RESULT AND DISCUSSION

In our current study, no statistically significant difference was seen in swelling (**Table 1**), pain (**Table 2**), purulent discharge (**Table 3**) and interincisal distance (**Table 4**) between the both treatment groups on the 1st, 3rd, 5th, 7th and 10th postoperative days.

Following surgical removal of third molar, infection of the surgical site is caused

frequently due to Streptococci, anaerobic Gram-positive cocci, and anaerobic Gram-negative rods. The antibiotic agent used for active prophylaxis should be widely distributed in the body fluids, must have an adequate bone penetration, as well as be effective against the microorganisms [7]. It is common practice in third molar surgery to use antibiotics as a prophylactic therapy against the potential infection caused by susceptible microorganisms, although the timing and protocol vary widely [8]. The most widely preferred form of antibiotic prophylaxis which is still being used is systemic administration of antibiotics, [2, 9] although the use of antiseptic mouthwashes and antibiotic placement in extraction socket have been shown to be partially potent in prevention of postoperative infections. In the recent past, attention has turned to usage of drugs which are narrow spectrum and active only against causative pathogens. An unambiguous anaerobicidal, metronidazole, has been delineated to be effective in impeding complications which followed third molar surgeries [10, 11]. Antibiotic administration was done through oral route in our current study. Cap Amoxicillin 500 mg thrice daily for 5 days and Tab Metronidazole 400 mg thrice daily for 5 days were prescribed for treatment group 1.

Inflammation always follows any surgical procedure. Inflammation is a protective response which is expected to eliminate the initial cause of cell injury as well as necrotic cells and tissues which result from the original insult [12]. It was found in most of the studies that the antibiotics that were used did not differ in their effects on the decrease of maximal mouth opening, as was calculated from preoperative and postoperative interincisal distance measurements [13].

The antibiotic prophylaxis outlined by Peterson [14] elicits five principles. First, there is a significant risk of infection in a surgical procedure. Second, an appropriate antibiotic for that surgical procedure should be selected. Third, the level of antibiotic must be high. Fourth, administration of the antibiotic should be properly timed. Fifth, emphasizing the usage of shortest effective antibiotic exposure. The principles 2 through 5 depict the correct choice and administration protocol of antibiotics while the first principle determines the need for antibiotic prophylaxis. Third molar surgery is usually considered clean-contaminated surgery, and therefore the use of routine antibiotic prophylaxis is a controversial topic [3].

Several reviews of post-operative complications after third molar surgery show

an incidence of 1% to 5.8% of minor postoperative infections [15-17].

A very imperative point in the controversy about prophylactic antibiotics in third molar surgery is the timing and duration of administration. Usually the antibiotics are prescribed post-surgery as an oral medication and therefore high serum levels are reached only few hours after the removal of the tooth. The antibiotics are usually prescribed for a standard five days course for surgical removal of third molars. But pertaining to principles of antibiotic prophylaxis by Peterson, [14] it is crucial to reduce the duration of exposure to antibiotics for the shortest effective time period.

Another crucial point is the possible side effects occurring from antibiotic administration. Some of the risks of indiscriminate antibiotic therapy include the toxicity of the substance itself, allergic reactions, secondary infections, and of course the development of resistant organisms. There is a tendency to overprescribe antibiotics as well as other medication in general [18]. The impulse of a surgeon for using routine prophylactic antibiotics usually is the prevention of infection, but once the decision for the administration of an antibiotic is made, it is still important to comply with principles 2 to 5 of Peterson

[14]. The optimal antibiotic agent for a particular clinical application should be nontoxic and easy to administer and have as narrow a spectrum as imperative to eliminate possible infections. Broad-spectrum antibiotics like amoxicillin with clavulanic acid or clindamycin are the most commonly prescribed antibiotic in our university hospital, and of course they are very popular because of their broad bactericidal activity. However, surgeons have to be receptive of the possible negative side effects and evaluate their prescribing routine, which often results from an inadequacy of detailed information. Every surgeon wants to be on the “safer side” [19]. This circumstance may be another reason for overprescribing antibiotics both quantitatively and qualitatively as pointed out by Knolle in 1968 [20] and emphasized by McHenry and Weinstein in 1983 [18] and Zeitler in 1995 [21].

In current scenario, although administration of a single bolus dose of Antibiotic before third molar surgery and avoiding antibiotics postoperatively are advocated, still usage of postoperative antibiotics routinely is practiced in most health centers. It is either a 3-days or 5-days regimen of antibiotics that is being followed. In our study we could not find any significant difference between the 2 groups regarding the evaluated parameters. No difference was found between patients who received three days postoperative antibiotics course and the standard five days postoperative antibiotics course, in incidence of postoperative sequelae. Prophylactic antibiotics administered beyond the immediate postoperative period did not seem to significantly provide any added protection. As health professionals, we must remain vigilant while we prescribe antibiotics.

Table 1: Comparison of swelling between the two study groups

Pre-op	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)	-	Not Significant
FDAG	0	10 (100)	-	
1 st Day	Yes (%)	No (%)	X ²	Significance
TDAG	10 (100)	0	-	Not Significant
FDAG	10 (100)	0	-	
3 rd Day	Yes (%)	No (%)	X ²	Significance
TDAG	8 (80)	2 (20)		Not Significant
FDAG	9 (90)	1 (10)		
5 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	3 (30)	7 (70)		Not Significant
FDAG	2 (20)	8 (80)		
7 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)		Not Significant
FDAG	0	10 (100)		
10 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)		Not Significant
FDAG	0	10 (100)		

TDAG - Three Days Antibiotic Regimen, FDAG - Five Days Antibiotic Regimen

Table 2: Comparison of pain between the two study groups

Pre-op	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	10 (100)	0	0		
FDAG	10 (100)	0	0		
1 st Day	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	0	6 (60)	4 (40)		
FDAG	0	7 (70)	3 (30)		
3 rd Day	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	1 (10)	7 (70)	2 (20)		Not Significant
FDAG	2 (20)	7 (70)	1 (10)		
5 th Day	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	4 (40)	5 (50)	1 (10)		Not Significant
FDAG	5 (50)	5 (50)	0		
7 th Day	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	8 (80)	2 (20)	0		
FDAG	9 (90)	1 (10)	0		
10 th Day	No (%)	Mild (%)	Moderate (%)	X ²	Significance
TDAG	9 (90)	1 (10)	0		
FDAG	10 (100)	0	0		

TDAG - Three Days Antibiotic Regimen, FDAG - Five Days Antibiotic Regimen

Table 3: Comparison of purulent discharge between the two study groups

Pre-op	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)	-	
FDAG	0	10 (100)		
1 st Day	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)	-	
FDAG	0	10 (100)		
3 rd Day	Yes (%)	No (%)	X ²	Significance
TDAG	1 (10)	9 (90)	1.05	p>0.05
FDAG	0	10 (100)		
5 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	2 (20)	8 (80)	0.39	p>0.05
FDAG	1 (10)	9 (90)		
7 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	1 (10)	9 (90)		
FDAG	0	10 (100)		
10 th Day	Yes (%)	No (%)	X ²	Significance
TDAG	0	10 (100)	-	
FDAG	0	10 (100)		

TDAG - Three Days Antibiotic Regimen, FDAG - Five Days Antibiotic Regimen

Table 4: Comparison of interincisal distance between the two study groups

Assessment Time	TDAG	FDAG	t* value	P Value
	Mean +/- SD	Mean +/- SD		
Pre-op	41.2 +/- 2.1	42.9 +/- 1.7	1.99	p>0.05
1 st Day	30.4 +/- 3.1	31.9 +/- 2.5	1.19	p>0.05
3 rd Day	34.1 +/- 2.6	35.2 +/- 1.9	1.08	p>0.05
5 th Day	36.6 +/- 2.2	37.2 +/- 1.5	0.71	p>0.05
7 th Day	38.9 +/- 2.4	39.6 +/- 1.3	0.81	p>0.05
10 th Day	40.2 +/- 2.2	41.5 +/- 1.3	1.60	p>0.05

TDAG - Three Days Antibiotic Regimen, FDAG - Five Days Antibiotic Regimen, SD - Standard Deviation

CONCLUSION

We recommend the three-days course of antibiotics for symptomatic third molar surgeries as this is equally as effective as a five-days course but is cheaper with possibly

decreased emergence of antimicrobial resistance. Our findings have local as well as global implications.

CONFLICT OF INTEREST

The authors have no conflict of interest.

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