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Evaluation of the Role of Antibiotics Following Periodontal Surgery in Chronic Periodontitis Patients in Preventing Post Operative Complications-A Relative Clinical Study

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ABSTRACT

To assess whether the administration of the antibiotics improves periodontal health and control the post operative complications and was also to evaluate the outcome of periodontal surgery after administration of amoxicillin+metronidazole and doxycycline. Thirty systemically healthy patients with moderate to severe chronic periodontitis requiring flap surgery were taken in the study. After oral prophylaxis, surgical procedures were carried out with strict sterilization protocol. Later medications were given for each subject as per the group protocol. Postoperative assessment done and changes in clinical parameters such as gingival index, plaque index, probing pocket depth and clinical attachment, gingival recession, tooth mobility level were also recorded in 1st, 4th and 8th week interval in order to know whether antibiotics improve periodontal health or not. Prescription of antibiotics namely doxycycline or amoxicillin with metronidazole combination have been found to improve the surgical outcome and prevent post operative complications following periodontal surgery in chronic periodontitis patients. Doxycycline, to top it all, has confirmed itself to be more effective in achieving these goals.

Key words: Antibiotics, complications, infections, periodontal surgery, periodontitis

INTRODUCTION

Periodontitis is multifactorial infectious disease of the supporting structures of the teeth, characterized by destruction of the bone and connective tissue¹. Bacterial plaque accumulation on the tooth surface leads to marginal tissue inflammation, known as gingivitis. If left untreated, gingivitis may progress to periodontitis, which is characterized by loss of periodontal attachment support (clinical attachment loss, [CAL]) and bone resorption, eventually resulting in tooth mobility and loss¹. Thus primary etiology of chronic periodontitis was bacterial plaque, which can initiate destruction of the gingival tissues and periodontal attachment apparatus². It was therefore, pertinent for periodontal therapy to include plaque removal³. Periodontal therapy thus, was aimed primarily at reduction of etiologic factors to reduce or eliminate inflammation, thereby allowing gingival tissues to heal and appropriate supportive periodontal maintenance that includes personal and professional care is important in preventing re-initiation of inflammation³. The treatment for periodontitis was to halt the progression

of periodontal attachment loss by removing etiologic factors therapeutically³ and to restore structures destroyed by disease through various periodontal surgical procedure by doing regenerative procedures^{4,5}. Essential to both treatment approaches was the inclusion of periodontal maintenance procedures^{3,4}.

Periodontal surgical procedures include flap surgeries, osseous correction, gingivectomy and periodontal plastic procedures, which play a vital role in the maintenance of entire dentition and restore the structures destroyed by periodontal diseases. However, there are certain factors which affect the outcome of the surgical therapy such as bleeding, pain, root hypersensitivity, swelling, trismus, bruising and taste changes that occur after periodontal surgery⁵.

Besides the above factors, infection is the significant factor that affects the periodontal therapy outcome and was major obstacle for periodontal health improvement. The sources of infection during surgery in oral cavity include: instruments, hands of surgeon and assistant, air of the operatory and patient's perioral skin, nostrils and saliva. In order to overcome that, antibiotics were used as prophylactic therapy to prevent distant site infection or to control postoperative sequelae or to treat an established infection in periodontal surgery. According to some authors, to obtain results with the antibiotic treatment, they must be administered preoperatively to act when the bacterial infection starts⁶. As postoperative infection can have a significant effect on the surgical outcome, preventive measures like strict aseptic protocol, anti-infective measures like proper sterilization, disinfection, barrier techniques and other measures should be taken. If such measures were taken, there was a very low rate of postoperative infection following periodontal surgery⁷, thereby obviating the need for using antibiotics as a prophylactic measure.

However, in present situation, it was difficult, if not impossible, for the practitioner to consistently recognize patients presenting with periodontal diseases who may require, or benefit from, the adjunctive use of an antibiotic. Even when the practitioner thinks that an antibiotic may be indicated in the control of disease, there was no ready guidance to help with the decision as to which antibiotic may be most beneficial⁸.

Well conducted studies has not supported the routine use of antibiotics after periodontal surgery and concluded that antibiotics should be used only when there was a medical indication or in case of presence of infection. On the other hand, mechanical debridement alone cannot effectively eliminate *A. actinomycetemcomitans*, *P. gingivalis*, *P. intermedia*, *B. forsythus*, *P. micros*, enterobacteria and some

other bacterial species, because they have the ability to invade gingival epithelial cells and subepithelial connective tissue and they tend to recolonise the tooth surfaces from the tongue, tonsil and buccal mucosa which act as reservoirs⁹.

Targeted antimicrobial therapy could perhaps, suppress or eliminate residual periodontal pathogens and thus serve as an adjunct to conventional mechanical therapy¹⁰ and also a few studies supported the concept of rapid healing and less discomfort when antibiotics are used and also antibiotic prophylaxis to be effective in reducing post operative complications¹¹. In India, dentists have been known to prescribe antibiotics more than any other medical personnel, which were based totally on empiricism without any protocol or rationale. Improper use of antibiotics also causes side effects like gastrointestinal tract problem, antibiotic resistance, drugs interaction, hypersensitivity and increased cost of treatment¹².

Antibiotics in vogue, in periodontal field over time have been penicillins, tetracyclines, ciprofloxacin, azithromycin, clindamycin, metronidazole. Amongst them, various studies have so far evaluated doxycycline, amoxicillin, metronidazole and the combination of amox+metro in preventing post operative complications and their efficacy in maintaining the periodontal health⁴.

Presently, guidelines for the selection and administration of antibiotics after surgery were inadequate. Hence, this present study was undertaken to evaluate the role of antibiotics especially amoxicillin+metronidazole and doxycycline in patients undergoing routine periodontal surgery and their influence on the surgical outcome.

MATERIAL AND METHODS

This study was conducted on 30 patients in the Department of Periodontology and Oral Implantology at Maharaja Ganga Singh Dental College and Research Centre, Sriganga Nagar. A Proforma was prepared for the study, to note down all details of the study. Further, clinical examinations were done with the help of Williams periodontal probe. Periodontal evaluation was carried out. After having motivated and educating the patients, oral hygiene instructions were given. Antibiotic prophylaxis amox 250 mg+metro 200 mg for group I and doxycycline 200 mg for group II were given 1 h prior to surgery. Thereafter, Scaling and Root Planing followed by periodontal surgery was carried out for all subjects. Later medications were given for each subject as per the group protocol. They were given appointments to return at 1, 4, 8 weeks interval and the clinical parameters were assessed at each interval.

These are the clinical parameters that were assessed,

- Plaque index (Turesky-Gilmore-Glickman modification of the Quigley-Hein)
- Loe and Sillness Gingival Index
- Probing Periodontal Depth
- Clinical Attachment Level
- Gingival Recession
- Tooth Mobility

Inclusion criteria:

- Patients aged between 30-55 years with moderate to severe chronic periodontitis
- Systemically healthy patient
- They should not have undergone periodontal therapy during the past 3 months
- They should be non smokers and non alcoholic

Exclusion criteria:

- Patients who are allergic to drug
- Patients under medication of any type
- Pregnant and lactating females
- Patients who have already undergone periodontal treatment in previous 6 months

Antibiotic protocol

Group-A: It consisted of 10 individuals who were prescribed Amoxicillin (250 mg) and Metronidazole (200 mg) twice a day for 5 days.

Group-B: It consisted of 10 individuals who were prescribed Doxycycline (200 mg stat) and thereafter 100 mg once a day for 7 days.

Group-C: It consisted of 10 individuals as control group who will not be prescribed any antibiotics.

Surgical aseptic protocol and infection control measures: All the periodontal surgical procedures were carried out in a fumigated enclosed surgical room with restricted entry and proper drainage and water supply system in place. Presurgical procedures which included autoclaved surgical gowns, head caps, masks and separate in-house footwear were followed. Dental operatory tools, including dental chair, were cleaned daily with a disinfectant (surgical spirit). Exposed areas were covered with aluminum foils. Disposable glasses and

autoclaved disposable suction tips were used along with distilled water as water source. High-volume evacuation suctions were used for decreasing the aerosol production. Spittoon and tumbler water lines were flushed for at least 5 min before and after the surgical procedure. All instruments to be used were pre-cleaned, segregated and packed in autoclavable sealed pouches and then autoclaved.

Presurgical scrub with a germicidal soap was done before the surgery. Patient preparation was done with povidone-iodine presurgical facial scrub and 10 mL of 0.2% chlorhexidine mouth rinse was done before the surgery. Proper barrier methods were used.

Surgical procedure: Surgical procedure was performed under local anesthesia with 2% lignocaine containing adrenaline (1:80,000). Buccal and lingual (palatal) surgical incisions were made and mucoperiosteal flaps were elevated. Complete debridement of the surgical site and scaling and root planing were done with ultrasonic device and hand curettes. Flaps were approximated with 30 silk sutures. Periodontal dressing was placed and postoperative instructions were given. Application of cold pack was not advised for patients belonging to any of the three groups post surgically.

Postoperative care and evaluation: Test and control group patients were instructed to continue the medication and were asked to abstain from brushing on the surgical site for at least 2 weeks. Here was advised 0.2% chlorhexidine gluconate for 1 month. Periodontal dressing and sutures were removed 1 week postoperatively and the operated area was evaluated.

Statistical analysis: Analysis of variance (ANOVA-two way analysis) was used to find the significance ($p \geq 0.05$) of the study parameters between three or more groups of patients by entering the data in Microsoft Excel and later analysed using IBM SPSS 15.0. ANOVA followed by Tukey HSD, LSD and Dunnett C were employed for the multiple comparison between the groups.

RESULTS

Age and gender of the patient: None of the patients belonging to Groups A, B or C developed any allergy or unfavorable response to the drug, requiring discontinuation. The age of the patients ranged between 30 and 55 years, with a mean age of 41.3 years in Group A, 36.7 years in Group B and 37.7 years in Group C. A total of 15 male patients and 15 female patients participated in this study.

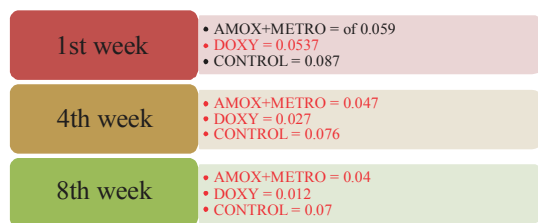


Fig. 1: Plaque index

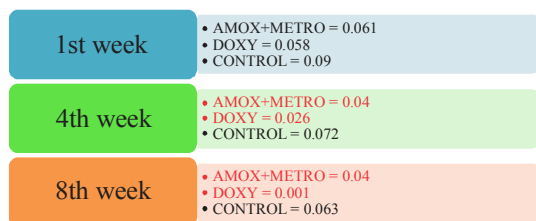


Fig. 2: Gingival index

Plaque index: All the three groups were statistically significant in 4th and 8th week, among them doxycycline group is highly significant as shown in Fig. 1.

Gingival index: All the three groups were not significant in 1st week, whereas amox+metro group and doxycycline group became significant in 4th and 8th week. Among three groups, doxycycline group is highly significant (p-value = 0.001) as shown in Fig. 2.

Clinical attachment level: The mean difference for Clinical attachment loss was found to be highly significant for doxycycline when compared to both Amox+metro and control group. The mean difference of doxycycline with both amox+metro and control groups was -1.000 and -1.3778, respectively, which clearly indicates that doxycycline more effective in reducing clinical attachment loss.

Periodontal probing depth: The mean PPD in the Amox+metro group was 5 ± 0.58 mm preoperatively, which reduced to 3 ± 0.25 mm postoperatively, whereas in Doxycycline group, the probing depth reduced from 6 ± 0.47 mm preoperatively to 1 ± 0.28 mm postoperatively. In the control group, the probing depth was 6 ± 0.51 mm preoperatively, which reduced to 3 ± 0.69 mm postoperatively. The reduction in probing depth in all the three groups was statistically highly significant and also doxycycline group showed highly significant results when compare to other two groups (Fig. 3).

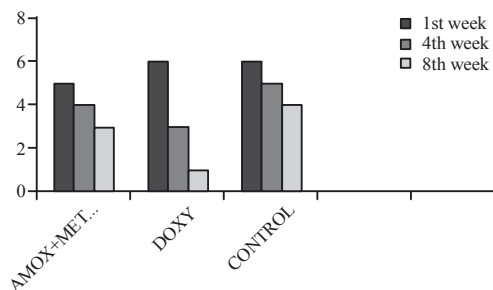


Fig. 3: Periodontal probing depth

Gingival recession: No significant changes were seen in gingival recession in all the three groups.

Tooth mobility: No significant changes were seen in tooth mobility in all the three groups.

Post operative complications: Under strict aseptic condition all the three groups (amox+metro, doxycycline and control group) were effective in controlling post operative complications after routine periodontal surgeries.

DISCUSSION

In this study, in the first week the plaque index for amox + metro group under Tukey HSD multiple comparison showed no significant values when compared to Doxycycline and control group. However both amox+metro and doxycycline showed significant difference when compared with control group. Similar results were found in the study conducted by Wilke *et al.*¹³. In the 8th week, both amox+metro and doxycycline showed significant mean difference in the plaque index score when compared with control group. Among them, doxycycline showed lower results in the reduction of plaque index when compared to control with significant value of 0.037 and the mean difference of -0.27000 indicates reduced plaque scores when compared to control group and amox. Similar findings were seen in the study given by Spasovski *et al.*¹⁴ in which they evaluated the therapeutic effects of the application of doxycycline-full dose (100 mg) and demonstrated that it has positive therapeutic effects on gingival inflammation and bleeding. Further, Akincibay *et al.*¹⁵ stated that doxycycline has been effective in reducing plaque levels.

For Gingival index in the first week, amox+metro and doxycycline did not show any significant difference in its mean values, but significant difference was seen when compared to control group. In the 8th week, mean difference between amox+metro and Doxycycline showed significant results.

The mean difference between amox+metro and doxycycline is 0.2800, which showed that doxycycline was showing lower mean score for gingival index when compared with Amox+metro. In a six month study conducted by Emingil *et al.*¹⁶ doxycycline showed significant results on reducing clinical parameters like Probing Depth (PD), clinical attachment level, Gingival Index (GI) and plaque index in chronic periodontitis patients. Results of the present study were in conformity with the study mentioned above.

Clinical attachment level showed no significant difference in the mean values in the first week, but contrary to that studies conducted by Sgolastra *et al.*¹⁷ noted that amox+metro is effective in reducing clinical attachment loss, bleeding on probing, plaque index and gingival index in the first week. However, in the 8th week, the mean difference for Clinical attachment level was found to be highly significant for doxycycline when compared to both amox+metro and control group, which clearly indicates that doxycycline was more effective in reducing clinical attachment loss, but on the contrary Tu *et al.*¹⁸ found no significant results between the test and placebo.

The mean PPD (periodontal probing depth) in the Amox+metro group was 5 ± 0.58 mm preoperatively, which reduced to 3 ± 0.25 mm postoperatively, whereas in Doxycycline group, the probing depth reduced from 6 ± 0.47 mm preoperatively to 1 ± 0.28 mm postoperatively. In the control group, the probing depth was 6 ± 0.51 mm preoperatively, which reduced to 3 ± 0.69 mm post operatively. The reduction in probing depth in all the three groups was statistically highly significant in the present study and also doxycycline group showed highly significant results when compared to the other two groups. Similarly results were found in the study conducted by Genco *et al.*¹⁹ in which patients treated with doxycycline showed a statistically significant decrease in PPD and CAL values compared to the PPD and CAL values of Amoxicillin plus metronidazole treated patients at days 10, 30 and 90. Results of a study by Guerrero *et al.*²⁰ were also in conformity with the results in the study at hand.

No significant changes were seen in tooth mobility and gingival recession in all the three groups. Similar findings were seen in the study conducted by Mohan *et al.*²¹.

No post operative complications such as delayed healing, pain, ulceration, swelling, hemorrhage were seen in all the three groups. Similar results were found in a study conducted by Mohan *et al.*²¹ after the periodontal surgery in which patients were randomly allocated to amoxicillin, doxycycline and control groups.

On the basis of the foregoing discussion, doxycycline has been seen to be extremely effective than combination therapy of amox+metro as well as the control group in the parameters like PI, GI and in CAL, PPD. However, results were insignificant for all the three groups for gingival recession and tooth mobility. Further, in view of strict aseptic conditions having been followed in this study, there were no post-operative complications in any of the groups.

CONCLUSION

Prescription of antibiotics namely doxycycline or amoxicillin with metronidazole combination have been found to improve the surgical outcome and prevent post operative complications following periodontal surgery in chronic periodontitis patients. Doxycycline, to top it all, has confirmed itself to be more effective in achieving these goals. Periodontists/dental practioners may have confidence in prescribing above medications to the patients thus helping in predictive decision making in clinical practice and it may also be useful for further research.

REFERENCES

1. Page, R.C., S. Offenbacher, H.E. Schroeder, G.J. Seymour and K.S. Kornman, 1997. Advances in pathogenesis of periodontitis: Summary of developments, clinical implications and future directions. *Periodontology*, 14: 216-248.
2. Flemming, T.F., 1999. Periodontitis. *Ann. Periodontol.*, 4: 32-38.
3. Suomi, J.D., J.C. Green and J.R. Vermillion *et al.*, 1969. The effect of controlled oral hygiene procedure on the progression of periodontal diseases in adults: Results after two years. *J. Periodontol.*, 40: 416.
4. Caffesse, R.G., S.P. Ramfjord and C.E. Nasjleti, 1968. Reverse bevel periodontal flaps in monkeys. *J. Periodontol.*, 39: 219-235.
5. Mahira, K., H. Trivedi, A. Bey and V.K. Sharma, 2016. Post-operative complications of periodontal surgery. *Int. J. Contempor. Med. Res.*, 3: 1285-1286.
6. Van Steenberghe, D., K. Yoshida, W. Papaioannou, C.M. Bollen and G. Reybrouck *et al.*, 1997. Complete nose coverage to prevent airborne contamination via nostrils is unnecessary. *Clin. Oral. Implant. Res.*, 8: 512-516.
7. Aurido, A.A., 1969. The efficacy of antibiotics after periodontal surgery: A controlled study with Lincomycin and Placebo in 68 patients. *J. Periodontol.*, 40: 150-154.
8. Kidd, E.A. and A.B. Wade, 1974. Penicillin control of swelling and pain after periodontal osseous surgery. *J. Clin. Periodontol.*, 1: 52-57.
9. Andrej, A. and D. PlanEak, 2004. Antimicrobial Treatment of Periodontal Diseases. *Acta Stomatol Croat*, 38: 67-72.

10. Carranza, F.A. Jr, R. Saglie, M.G. Newman and P.L. Valentin, 1983. Scanning and transmission electron microscopic study of tissue-invading microorganisms in localized juvenile periodontitis. *J. Periodontol.*, 54: 598-617.
11. Arab, H.R., N. Sargolazaie, A. Moientaghavi, H. Ghanbari and Z. Abdollahi, 2006. Antibiotics to prevent complications following periodontal surgery. *Int. J. Pharmacol.*, 2: 205-208.
12. Lawler, B., P.J. Sambrook and A.N. Goss, 2005. Antibiotic prophylaxis for dentoalveolar surgery: Is it indicated? *Aust Dent. J.*, 50: 554-559.
13. Wilke, M.S., A.L. Lovering and N.C. Strynadka, 2005. Beta-lactam antibiotic resistance: A current structural perspective. *Curr. Opin. Microbiol.*, 8: 525-533.
14. Spasovski, S., Z. Belazelkoska, M. Popovska, A. Atanasovska-Stojanovska and V. Radojkova-Nikolovska *et al.*, 2016. Clinical therapeutic effects of the application of doxycycline in the treatment of periodontal diseases. *Open Access Maced. J. Med. Sci.*, 4: 152-157.
15. Akincibay, H., S. Orsal, D. Sengün and T. Tözüm, 2008. Systemic administration of doxycycline versus metronidazole plus amoxicillin in the treatment of localized aggressive periodontitis: A clinical and microbiologic study. *Quintessence Int.*, 39: e33-39.
16. Emingil, G., G. Atilla, T. Sorsa and T. Tervahartiala, 2008. The effect of adjunctive subantimicrobial dose doxycycline therapy on GCF EMMPRIN levels in chronic periodontitis. *J. Periodont.*, 79: 469-476.
17. Sgolastra, F., R. Gatto, A. Petrucci and Monaco, 2012. Effectiveness of systemic amoxicillin/metronidazole as adjunctive therapy to scaling and root planing in the treatment of chronic periodontitis: A systematic review and meta-analysis. *J. Periodontol.*, 83: 1257-1269.
18. Tu, Y.K., I.H. Maddick, G.S. Griffiths and M.S. Gilthorpe, 2004. Mathematical coupling can undermine the statistical assessment of clinical research: Illustration from the treatment of guided tissue regeneration. *J. Dentist.*, 32: 133-142.
19. Genco, R.J., L.A. Christersson and J.J. Zambon, 1986. Juvenile periodontitis. *Int. Dent. J.*, 36: 168-176.
20. Guerrero, A., G.S. Griffiths, L. Nibali, J. Suvan, D.R. Moles, L. Laurell and M.S. Tonetti, 2005. Adjunctive benefits of systemic amoxicillin and metronidazole in non surgical treatment of generalized aggressive periodontitis. *J. Clin. Periodontol.*, 35: 1096-1107.
21. Mohan, R.R., D.C. Doraswamy, A.M. Hussain, G. Gundannavar, S.K. Subbaiah and D. Jayaprakash, 2014. Evaluation of the role of antibiotics in preventing postoperative complication after routine periodontal surgery: A comparative clinical study. *J. Indian Soc. Periodontol.*, 18: 205-212.