

Factors Correlated with Postoperative Hospital Stay after Prophylactic Use of Metronidazole during Major Gynaecological Operation

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[Reviewed: 30 July 2016; Accepted on: 1 October 2016; Published on: 1 January 2017]

Abstract

Background: Prophylactic use of metronidazole prevents infection among the women undergone major gynaecological operations. **Objectives:** The purpose of the present study was to correlate post operative hospital stay with age, weight and duration of operation among the women with prophylactic use of metronidazole during the major gynaecological operation. **Methodology:** This comparative cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Bangabandhu Sheikh Mujib Medical University, Dhaka from August 2002 to January 2003 for a period of six (6) months. All the women who were undergone major gynaecological operation at any age were selected as study population. Minor gynaecological operation cases were excluded from this study. The data were collected by face to face interview. The age, weight and duration of operation as well as type of operation were recorded. **Result:** The mean \pm SD postoperative hospital stay for wound healing of group A and B patients were 8.24 ± 2.44 (range 5 to 17) and 8.83 ± 3.21 (range 5 to 20) days, respectively ($p=0.226$). It shows a positive correlation that is increasing age is significantly related ($P<0.001$) to increase in hospital stay for wound healing in both group A and B patients. The correlation between weights of the patients with postoperative hospital stay for wound healing shows a positive correlation, that is, increasing weight is significantly related to increase in hospital stay for wound healing in both group A and B patients ($p=0.0001$). **Conclusion:** In conclusion age and weight of the patients as well as the duration of operation is positively correlated with the wound healing among the women who are under metronidazole prophylactic therapy. [Journal of Science Foundation 2017;15(1):3-8]

Keywords: Major gynaecological operation; correlation; hospital stay; abdominal hysterectomy; vaginal hysterectomy; metronidazole

Introduction

Bacterial contamination at the operative site may occur during operation (Ulualp and Condon 1992); therefore, the effect of antimicrobial prophylaxis ideally should cover the entire preoperative period of risk (Esposito 1999; Tracy and Webster 1996). The period of risk for postoperative infection might substantially longer than the actual surgical procedure. The duration of risk period may also vary based on a number of other factors, such as age, general condition of the patient, presence of concomitant disease, amount of blood loss during surgery and number of blood transfusion (Larsson et al., 1992; Penney et al., 1998; Pendlan et al., 2002). Antimicrobial prophylaxis that provides coverage throughout the entire preoperative period of risk will reduce not only the risk of wound infections but may also reduce the danger of other types of infectious complication (Water and Talbot 1996).

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Sepsis following gynecological surgery still causes considerable morbidity prolonged hospital stay (Naz 2001; Levinson and Jawetz 2000). There has been increasing awareness of the importance of anaerobes as a major cause of sepsis after gynecological surgery. Metronidazole has been studied as a prophylactic agent after hysterectomy (Brooks 2001). The antimicrobial activity of metronidazole lies by inhibiting of anaerobic microorganism. The drug metronidazole is virtually nontoxic and free from side effects. The advantage in prophylactic use of metronidazole is that direct adverse effect on normal population of aerobic and bacteria in the body (Mycek et al., 2002). Moreover, any reduction of rate in patients receiving metronidazole may be confidently attributed specific reduction in the infection rates due to anaerobes. In this regards this present study was undertaken to correlate of metronidazole prophylactic treatment in gynecological surgery or in a conventional therapy and also to compare effectiveness of only ampicillin prophylaxis.

Methodology

This analytic type of cross-sectional study was carried out in the Department of Obstetrics and Gynaecology at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from the during of August 2002 to January 2003 for a period of six (6) months. Bangabandhu Sheikh Mujib Medical University, Dhaka is only medical university of Bangladesh. This is a referral tertiary care hospital. All the women who were undergone major gynaecological operation at any were selected as study population. Minor gynaecological operation cases were excluded from this study. The data were collected by face to face interview. The points taken into consideration were age, weight, socioeconomic condition, anaemic status, duration of operation, wound infection and length of postoperative hospital stay. The study population was divided into two group which had been designated as group A and group B. The study group was the group A who were given ampicillin or amoxicillin with metronidazole drug for 7 days with the dose of injection ampicillin or injection amoxicillin 500 mg intravenously 6 hourly. The dose of inj. metronidazole was 100 mL in 500 mg intravenously just before operation and after that 8 hourly for two days. These were followed by cap. Amoxicillin 250 mg 1 capsule 6 hourly plus metronidazole 400 mg 8 hourly for five days. The control group was the group B who were treated with amoxicillin or ampicillin without metronidazole drug for 7 days. The dose of inj. Ampicillin was 500 mg intravenously 8 hourly for 2 days. These were followed by cap. Amoxicillin 250 mg capsule 6 hourly for 5 days. The results were presented in detail in tabulated form. The statistical analysis was performed by Statistical Packages for Social Science (SPSS version 20.0, USA). The p value less than 0.05 was taken as level of significance. Pearson's correlation co-efficient test was performed to see the r value with the age, weight and duration of operation with the post-operative hospital stay among the women undergone major gynaecological surgery with metronidazole prophylactic use. The qualitative data were expressed as frequency and percentage and the quantitative data were expressed as mean with standard deviation. Student t Test was performed to see the level of significance between quantitative data.

Results

One hundred fifty cases were selected for the present study. The points taken into consideration are: age, weight, socioeconomic condition, anaemic status, duration of operation, wound infection, length of postoperative hospital stay, risk factors for infection. On statistical analysis, it was shown that there was no significant difference in postoperative wound infection between the two groups.

Table 1: Type of Operations Performed

Operation Type	Group A	Group B
Abd. Hyster.	41(58.6%)	39 (55.7%)
Vag. Hyster.	17 (24.3%)	17 (24.3%)
SO/OC	7 (10.0%)	6 (8.6%)
Others	5 (7.1%)	8 (11.4%)
Total	70(100.0%)	70(100.0%)

Chi-square test was performed to see the level of significance; p value=0.845; NS=Not significant; Abd. Hyster.=Abdominal hysterectomy; Vag. Hyster.=Vaginal Hyterectomy; Sal-oophore.=Salpingo- oophorectomy; OC=ovarian cystectomy

Table 1 shows that in both the groups, group A and B, maximum number of patients underwent abdominal hysterectomy (58.6 and 55.7%). Percentage of vaginal hysterectomy in both the groups is 24.3.

Table 2: Postoperative Hospital Stay among the Study Population

Hospital Stay	Group A	Group B
5 to 9 Days	54(77.1%)	44(62.9%)
10 to 14 Days	12(17.1%)	21(30.0%)
15 to 20 Days	4(5.7%)	5(7.1%)
Total	70(100.0%)	70(100.0%)
Mean±SD	8.24±2.44	8.83±3.21

Student t Test was performed to see the level of significance; $p=0.226$

Table 2 shows that patients stayed in hospital postoperatively for 5 to 9 days in 77.1% cases and 62.9% cases, 10 to 14 days in 17.1% cases and 30.0% cases and 15 to 20 days in 5.7% cases and 7.1% cases in group A and B respectively. The mean \pm SD postoperative hospital stay for wound healing of group A and B patients were 8.24 \pm 2.44 (range 5 to 17) and 8.83 \pm 3.21 (range 5 to 20) days, respectively. The mean difference between the groups was not statistically significant ($p=0.226$).

Table 3: Correlation-coefficient (r) test of postoperative Hospital stay with age of the patients

Study group	r value	P value
Group A	0.629	0.0001
Group B	0.669	0.0001

Table 3 shows the relationship of age of the patients with postoperative hospital stay for wound healing. It shows a positive correlation that is increasing age is significantly related ($P<0.001$) to increase in hospital stay for wound healing in both group A and B patients.

Table 4: Correlation-coefficient (r) test of postoperative Hospital stay with weight of the patients

Study group	r value	P value
Group A	0.591	0.0001
Group B	0.529	0.0001

Table 4 shows the correlation between weights of the patients with postoperative hospital stay for wound healing. It shows a positive correlation, that is, increasing weight is significantly related to increase in hospital stay for wound healing in both group A and B patients ($p=0.0001$).

Table 5: Correlation-coefficient (r) test of postoperative Hospital stay with duration of the operation of the patients

Study group	r value	P value
Group A	0.350	0.003
Group B	0.874	0.0001

Table 5 shows the correlation between duration of operation of the patients with postoperative hospital stay for wound healing. It shows a positive correlation, that is, increasing operative time is significantly related ($P<0.01$ and $P<0.001$ respectively) to increase in hospital stay for wound healing in group A and B patients.

Discussion

Antibiotics are highly protective agent against serious infectious morbidity associated with total abdominal hysterectomy (Mycek et al., 2002). Overall, antibiotic prophylaxis can prevent more than half of the serious

infectious morbidity experienced by women who undergo this gynaecological surgical procedure (Goldsmith et al., 1998).

A wide range of antibiotics have been used prophylactically to decrease the incidence of postoperative wound sepsis following major and minor gynaecological operations (Laurence and Bennett 1987). The usefulness of the following antibiotics has been studied like cephalosporin, ampicillin and tetracycline. These antibiotics have a spectrum of activity which is directed predominantly against aerobic organisms. But as many as 70.0% healthy women have anaerobic microorganisms as part of normal vaginal flora, metronidazole prophylaxis is directed solely against anaerobes and has been found to reduce postoperative sepsis after abdominal and vaginal procedure of gynaecological surgery (Finegold 1995).

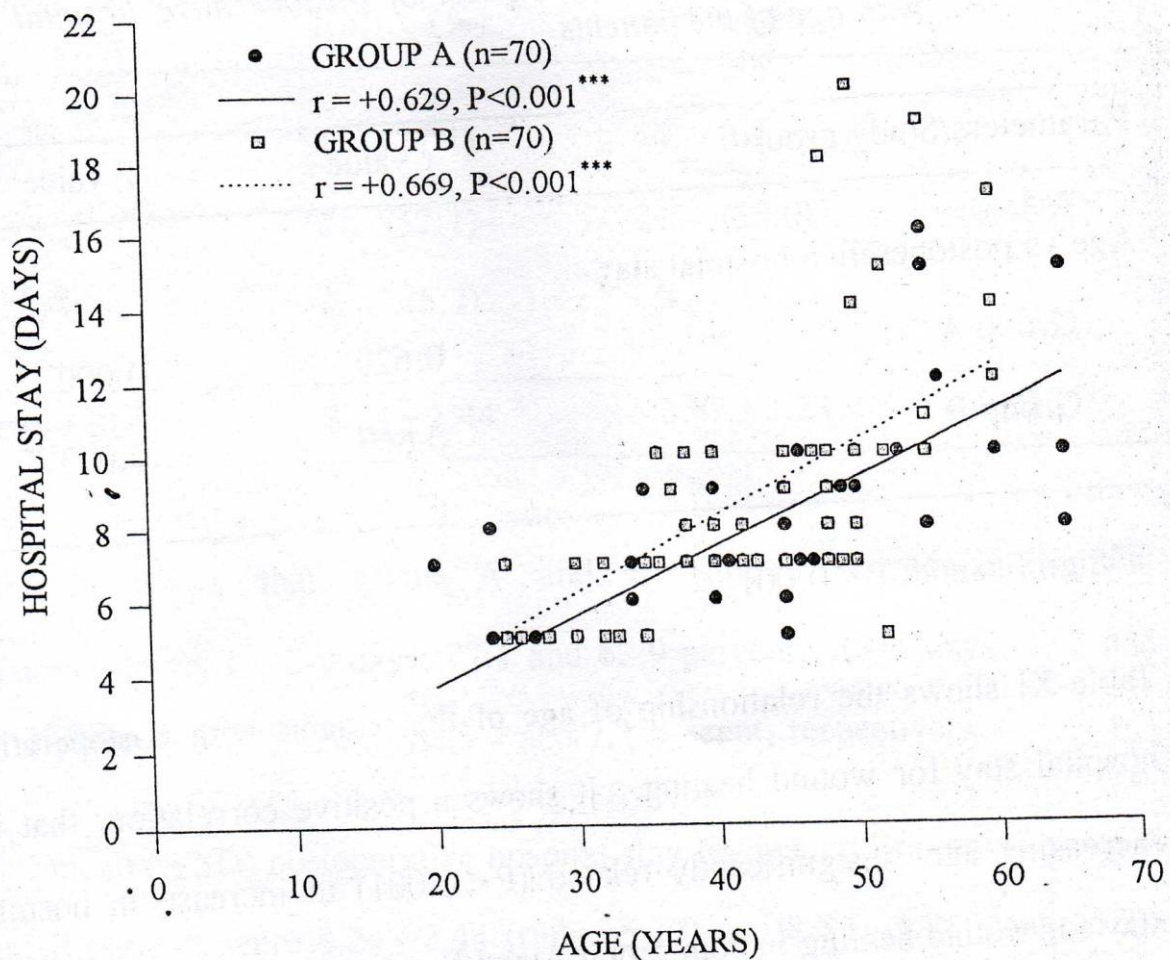


Figure I: Correlation of Age and Post-Operative Hospital Stay of Two groups

Many randomized trials were performed worldwide to find out the effectiveness of antibiotic prophylaxis in high risk patients (MacKenzie 1996). As a developing country, all patients are in high risk group; the development of an infection might be associated with catastrophic end result. Non-sporing anaerobes that make up a large portion of the normal vaginal and cervical flora are normally non-pathogenic. But they commonly cause infections at the sites that have been debilitated by surgery in high-risk group of patients. Therefore, no trial can be done without the use of metronidazole, though the use of broad-spectrum antibiotics like cephalosporin, ampicillin as prophylaxis to reduced post-operative infections after gynaecological surgery have been advocated. The role of use of metronidazole in preventing postoperative morbidity is considerably increasing day-by-day.

During the period of this study in BSMMU, the most recognized tertiary centre of Bangladesh, it has been observed that metronidazole has been used for every patient who had undergone gynaecological major and minor surgery. No patient of gynaecological surgery is considered free from risk of postoperative anaerobic

infection. So, in all patients who were treated by ampicillin or cephalosporin postoperatively, also had been administered metronidazole 500 mg intravenously for only 24 hours in conventional therapy and thereafter no metronidazole was given by mouth.

At the time of randomization, the general characteristics of the patients in both groups showed no significant difference. So, it is concluded that this comparative study was carried out in almost similar type of patients in both groups which did not influence the outcome. The hospital stay time after abdominal hysterectomy was shorter when antibiotic prophylaxis has been given (Khanam 1982). The postoperative hospital stay was significantly reduced in group A and group B patients by the use of metronidazole or ampicillin as prophylactic antibiotic.

Metronidazole is chosen for prophylactic use as because it has striking effect in anaerobic bacterial infections i.e. those due to bacteroid species. Metronidazole demonstrates a significantly higher in vitro efficacy than clindamycin reducing anaerobic infection. Metronidazole is the compound with consistent bactericidal activity against anaerobic bacteria including *Bacteroid fragilis* and the cephalosporin as well as ampicillin has limited activity against Bacteroid species, whereas metronidazole has excellent activity against anaerobic *Bacteroides* (Water and Talbot 1996). Moreover, these are expensive and it is relatively nontoxic if appropriate dose is given and not use for a long time.

Postoperative wound infectious processes occurring in the female pelvis are usually polymicrobial in aetiology. The infections caused by anaerobic organisms are dependent upon the presence of aerobic flora, the mechanisms of prophylaxis being the reduction of aerobes to preclude infections by anaerobic organisms (Jacob 1992). So, metronidazole used in conventional therapy with cephalosporin or ampicillin has excellent result in reducing infections after postoperative vaginal and abdominal hysterectomy.

Appropriate choice of prophylactic antibiotic requires an understanding of the polymicrobial nature of the endogenous microflora at each site (Erwin et al., 2001). Metronidazole have superiority over other antimicrobial agents in that it is totally inactive against aerobic and facultative bacteria, it has no direct adverse effect on normal population of aerobic and facultative bacteria in the body.

The finding of this study also demonstrates that postoperative wound infection is more common in those operative patients who needed prolonged time for operation and in high risk patients. In this study, it has been shown that there is no significant difference in postoperative wound infection between group A and group B. However, in both the groups, significant number of patients is anaemic and duration of operation is within 90 to 120 minutes in most of the cases.

Conclusion

In conclusion age and weight of the patients as well as the duration of operation is positively correlated with the wound healing among the women who are under metronidazole prophylactic therapy. The use of prophylactic antibiotic metronidazole in conventional therapy reduces the incidence of postoperative infections and complications, but most postoperative wound is not only dependent on antibiotic use but also on many other factors, such as, age, nutritional status, hygienic-condition anaemic status and duration of operations, blood loss during amount of blood transfusion.

References

- Brooks GR Butel JS, Morse SA. Antimicrobial chemotherapy. In: Jawetz, Melnick and Adelberg's medical microbiology. 22nd ed. New York MacGraw-Hill Book, inc.,2001:144-75
- Erwin ME, Fix AM, Jones RN. Three independent yearly analyses of the spectrum and potency of metronidazole: a multicenter study of 1,108 contemporary anaerobic clinical isolates. *Diagn Microbiol Infect Dis* 2001; 39: 129-32
- Esposito S. Is single-dose antibiotic prophylaxis sufficient for any surgical procedure? *J Chemother* 1999;11(6):556-64
- Finegold SM. Anaerobic infections in humans: an Anaerobe 1995; 1:3-9
- Goldsmith RS. Antiprotozoal drugs. In: Katzung BG, editor. Basic and clinical pharmacology. 7th ed. New York: McGraw-Hill Book, Inc., 1998: 838-61
- Jacob LS. Anti-infected agents. In: Pharmacology. 3rd ed. Malvern: Harwal Publishing Company, 1992: 26-261-90
- Khanam M. A study of tinodazole prophylaxis in gynaecological surgery [Dissertation] Dhaka; Bangladesh College of Physicians and Surgeons, 1982

- Larsson PG, Platz-Christensen JJ, Thejls H, Forsum U, Pålsson C. Incidence of pelvic inflammatory disease after first-trimester legal abortion in women with bacterial vaginosis after treatment with metronidazole: a double-blind, randomized study. *American J Obstet Gynecol* 1992;166(1):100-3
- Levinson W, Jawetz E. Basic bacteriology: normal flora. In: *Medical microbiology and immunology: examination and board review*. 6th ed. New York: McGraw-Hill Book, Inc., 2000: 1-81
- MacKenzie IZ. Reducing hospital stay after abdominal hysterectomy. *Br J Obstet Gynaecol* 1996; 103:175-8
- Mycek MJ, Harvey RA, Champe PC. Antiprrozoal drugs. In: *Lippincott's illustrated reviews: pharmacology*. Philadelphia: Lippincott, Williams and Wilkins, 2002: 345-59
- Naz M. A comparative study between single dose cepharadine as a prophylaxis versus conventional dose antibiotic V in major gynecological procedure [Dissertation]. Dhaka: Bangladesh College of Physicians and Surgeons, 2001
- Penney GC, Thomson M, Norman J, McKenzie H, Vale L, Smith R, Imrie M. A randomised comparison of strategies for reducing infective complications of induced abortion. *BJOG*1998;105(6):599-604
- Tracy JW, Webster Jr LT. Drugs used in the chemotherapy of protozoal infections: Trypanosomiasis, Leishmaniasis, Amebiasis, Giardiasis, Trichomoniasis and other protozoal infections. *Pharmacol Basis Ther* 1996;9
- Ulualp K, Condon RE. Antibiotic prophylaxis for scheduled operative procedures. *Infect Dis Clin North America* 1992;6(3):613-25
- Water JB, Talbot IC. Wound healing. In: *Walter and Israel general pathology*. 7th ed. Edinburgh: Churchill Livingstone, 1996: 165-80