



Prophylactic Use of Metronidazole during Major Gynaecological Operation to Prevent Wound Infection: A Randomized Control Trial

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Abstract

Background: Prophylactic medication of major gynaecological operations is very important for the reduction of bad surgical outcomes. **Objective:** This randomized control trial was conducted to determine whether the metronidazole prophylaxis in conventional therapy was effective in controlling postoperative wound infection in major gynaecological infection. **Methodology:** The study was carried out at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, during the period from August 2002 to January 2003. One hundred and fifty consecutively admitted patients for gynecological operation were randomly assigned to receive either metronidazole and ampicillin/amoxicillin (group A) or only ampicillin/amoxicillin (group B) just after operation and continued for 7 days. After operation, daily follow-up with observation of the wound was done till their discharge. All the outcome data were collected, compiled and statistically analyzed using SPSS programme with the consultation of the statistician. **Result:** A total number of one hundred and forty patients were referred of which 70 patients from group A and 70 from group B. Wound infection was observed in 4(5.7%) patients of group A and 6(8.6%) patients of group B. There was no significant difference ($P>0.747$) in only considering abdominal wound infection and also in including vaginal wound infections ($P>0.747$). **Conclusion:** The study findings show that metronidazole prophylaxis in conventional therapy is an extremely effective agent in controlling anaerobic wound infection after gynaecological surgery. [Bangladesh Journal of Infectious Diseases 2017;4(1):10-14]

Keywords: Major Gynaecological Operation; abdominal hysterectomy; vaginal hysterectomy; metronidazole

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Introduction

Metronidazole was developed for clinical use nearly 40 years ago¹. During initial use, investigators observed that patients treated with metronidazole were simultaneously cured of both the trichomonal infections and Vincent's anaerobic gingivitis². Subsequently, intravenous metronidazole as approved by the USA Food and Drug Administration (FDA) for the treatment of serious anaerobic bacterial infections including those of the central nervous system, intra-abdominal sepsis, female genital tract or pelvic infections and anaerobic endocarditis³⁻⁴.

From different study models organized to assess the organisms listed in the microbiology section of the Metronidazole PI, it has been concluded that in general, anaerobic species having 29.0% of isolates are susceptible to Metronidazole⁵. The use of prophylactic antibiotic Metronidazole in conventional therapy reduces the incidence of postoperative infections and complications. However, 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 transfusion⁶. In this context the present study was undertaken to see the efficacy of metronidazole for the prophylactic use during the major gynaecological operation.

Methodology

Study Population and Setting: This single centered, parallel, single blinded randomized control trial 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.

Randomization and Blinding: The patients were recruited non-random purposive sampling method. Single blinding was done. This was performed regarding unaware of the medication to the patients before the operation.

Allocation and Intervention: 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.

The dose of injection ampicillin or injection amoxicillin was 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 capsule Amoxicillin 250mg 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 capsule amoxicillin 250 mg capsule 6 hourly for 5 days.

Follow up and Outcomes Measure: Follow up was done for 7 days. The outcomes variables were rate of wound infection and length of hospital stay. Wound swab was taken from every infected wound and by culture, the bacteria were isolated and antibiotic sensitivity pattern was examined and antibiotic was given accordingly.

Results

One hundred fifty cases were selected for the present study. The results were presented in detail in tabulated form. 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.

Table 1: Type of operations performed

| Type of Operation | Group A (n=70) | Group B (n=70) | P value |
|-------------------|----------------|----------------|---------|
| Abdo. Hystere. | 41(58.6) | 39 (55.7) | 0.845 |
| Vaginal 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; Abdo. Hystere.=Abdominal hysterectomy; Vaginal Hyster=Vaginal hysterectomy; SO=Salpingo- oophorectomy; OC=ovarian cystectomy

On statistical analysis, it was shown that there was no significant difference in postoperative wound infection between the two groups. 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%.

Most of the patients were belonged to age 36 to 45 and 46 to 55 years in group A which were 37.1% and 35.7% respectively; again 40.0% and 37.1% in group B respectively. Statistically the distribution is

not significant. The mean (\pm SD) age of the patients in group A and B were 43.91 ± 10.25 (range 20 to 65) and 43.01 ± 8.45 (range 25 to 60) years respectively. The mean difference is not statistically significant (Table 2).

Table 2: Age distribution of the Study population undergone Major Gynaecological Operation (n=140)

| Age Group | Group A | Group B |
|----------------|-------------------|-------------------|
| <25 Years | 6(8.6%) | 2(2.9%) |
| 26 to 35 Years | 8(11.4%) | 11(15.7%) |
| 36 to 45 Years | 26(37.1%) | 28(40.0%) |
| 46 to 55 Years | 25(35.7%) | 26(37.1%) |
| >55 Years | 5(7.1%) | 3(4.3%) |
| Total | 70(100.0%) | 70(100.0%) |
| Mean \pm SD | 43.9 \pm 10.25 | 43.0 \pm 8.45 |

* Chi-square test was performed to see the level of significance; p value=0.54

Only a negligible number of patients had infected wound at the time of their discharge from hospital which was 5.7% and 8.6% in group A and B respectively (Table 3). There were 3(75%) abdominal wound infection in group A of which 2 were grade II and 1 was grade III. There were 5(83.3%) abdominal wound infection in group B, 2 were grade II and 3 were grade III. One patient (25%) of group A and 1(16.7%) patient of group B developed wound infection after vaginal hysterectomy (Table 4).

Table 3: Condition of Wound at the time of Discharge from Hospital (n=140)

| Wound Condition | Group A | Group B |
|-----------------|-------------------|-------------------|
| Healthy | 66(94.3%) | 64(91.4%) |
| Infected | 4(5.7%) | 6(8.6%) |
| Total | 70(100.0%) | 70(100.0%) |

* Chi-square test was performed to see the level of significance; p value=0.54

Discussion

Antibiotics are highly protective agent against serious infectious morbidity associated with total abdominal hysterectomy⁷⁻¹⁰. Overall, antibiotic prophylaxis can prevent more than half of the serious infectious morbidity experienced by women who undergo this gynaecological surgical procedure¹¹.

A wide range of antibiotics have been used prophylactic to decrease the incidence of postoperative wound sepsis following major and

minor gynaecological operations⁵. 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. However 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 surgery¹².

Table 4: Comparison of wound Infection between two study groups according to type of operation (n=140)

| Wound Condition | Group A | Group B |
|-----------------|------------------|------------------|
| Abdo. Hystere. | 3(75.0%) | 5(83.3%) |
| Vaginal Hyster. | 1(25.0%) | 1(16.7%) |
| Total | 4(100.0%) | 6(100.0%) |

* Chi-square test was performed to see the level of significance; p value= 0.747; Abdo. Hystere.=Abdominal hysterectomy; Vaginal Hyster.=Vaginal hysterectomy

Many randomized trials were performed worldwide to find out the effectiveness of antibiotic prophylaxis in high risk patients¹³⁻¹⁴. As a developing country, all patients are in high risk group; the development of an infection might be associated with catastrophic end result¹³. Non-spore anaerobes that make up a large portion of the normal vaginal and cervical flora are normally non-pathogenic. However these commonly cause infections at the sites that have been debilitated by surgery in high-risk group of patients. So, no trial can be done without the use of metronidazole, though the use of broad-spectrum antibiotics like cephalosporin to reduced infections after gynaecological surgery. The role of use of metronidazole in preventing postoperative morbidity is considerably increasing day-by-day¹¹.

Postoperative wound infectious processes occurring in the female pelvis are usually polymicrobial in aetiology¹². The infections is 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. So, metronidazole used in conventional therapy with cephalosporin or ampicillin (group A in this study) 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 site⁷. 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.

There were 3(75%) cases of abdominal wound infection in group A of which 2 were grade II and 1 was grade III. There were 5(83.3%) abdominal wound infection in group B, 2 were grade II and 3 were grade III. One patient (25.0%) of group A and 1(16.7%) patient of group B developed wound infection after vaginal hysterectomy. Patients with grade II infection had purulent discharge and the swab was collected aseptically and sent for culture and sensitivity. According to report of culture and sensitivity, antibiotic was given and dressing was done for 3 days and discharged on 10th postoperative day without any problem. One patient in group A and 2 patients in group B had grade III wound infection and wound was gaping. They got dressing with eusol for 4 days and then secondary stitch was given which was removed after 7 days. Before dressing, wound swab was taken and sent for culture in both aerobic anaerobic media and sensitivity test was done. In group A, among the 4 patients, 3 patients developed *Staphylococcus* infection and treated by cephalosporin and 1 patient developed *Streptococcus* infection and treated with erythromycin. In group B, among the 6 patients, 4 patients developed anaerobic infection with *Bacteroid fragilis* and was treated by tab metronidazole and 2 patients developed *Pseudomonas* infection and were treated with ciprofloxacin.

Following hysterectomy, both in vaginal and abdominal route, the pelvic infections occur predominantly due to *Escherichia coli* and *Bacteroid* group. Metronidazole is widely used to reduce postoperative wound infection following gynaecological surgery. The drug, metronidazole, is also cost-effective for which the poor country are benefited.

The effectiveness of metronidazole as prophylactic antibiotic is well studied⁷⁻⁹. Different studies also have been shown that multiple dose prophylaxis is effective against postoperative wound infections of gynaecological surgery which are usually polymicrobial in aetiology¹⁰. Therefore by considering all of the above parameters and condition of these can reduce the postoperative infection. The following recommendations can be drawn from the present study Maintenance of strict

aseptic condition during surgery. The clean surgery has no alternative.

Conclusion

The study findings show that metronidazole prophylaxis in conventional therapy is an extremely effective agent in controlling anaerobic wound infection after gynaecological surgery. Wound infection is observed in less number of patients in group A than patients of group B. There was no significant difference in only considering abdominal wound infection and also in including vaginal wound infections.

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