The Egyptian Journal of Hospital Medicine (January 2023) Vol. 90(2), Page 2753-2757

Role of Oral Antibiotic for Bowel Preparation before Gynecologic Oncology Surgery

Mahmoud Abubakr Negm, Ashraf Mohamed Nasr,
Nada Saad Abdelgelel Salem*, Mohammed Ahmed Wasfy
Department of Obstetrics and Gynecology, Faculty of Medicine, Zagazig University, Egypt
***Corresponding author:** Nada Saad Abdelgelel Salem, **Mobile:** (+20) 01024558634, **E-mail**: nada90.saad@gmail.com

ABSTRACT

Background: When used prior to a bowel injury, oral antibiotic bowel preparation (OABP) reduces intraluminal bacteria l load and, thus, the risk of surgical site infection (SSI). **Objective:** The aim of the current study was to investigate the role of preoperative oral antibiotic in gynecological oncology surgery in field visualization, reducing postoperative ileus and surgical site infection.

Patients and methods: A cohort study was conducted on a total of 130 women who underwent tumor debulking surgery for gynecological cancer (ovarian, uterine, cervical or endometrial). On the day before surgery, patients received peri-operative prophylactic oral antibiotics, and on the day of surgery, all patients were subjected to intravenous cephalosporin. **Results:** Preoperative oral antibiotic was associated with SSI incidence of 15.4%; 20 cases with surgical site infection (SSI) and 110 cases without SSI. Also favorable surgical field (reported as good or sufficient) was reported in 92.4% of cases. Return of intestinal function was early with mean duration of 19 hours.

Conclusion: Preoperative oral antibiotic was associated with low incidence of SSI. Favorable operating field and early return of Bowel function.

Keywords: Oral Antibiotic, Bowel Preparation, Gynecologic Oncology Surgery, Cohort study, Zagazig University.

INTRODUCTION

In the fields of gastrointestinal and gynaecological oncology, mechanical bowel preparation (MBP) has traditionally been recommended prior to surgery for patients at risk of colon or rectal perforation due to significant adhesion over the pelvis or for patients with advanced stages of ovarian, uterine, or cervical carcinoma [(1)].

The term "bowel preparation" (BP) is commonly used to describe the process of removing stool and other bowel contents using a series of oral or rectal mechanical methods prior to surgery. Preoperative bowel preparation has been used routinely for over 70 years, although its usage is still largely guided by opinion rather than evidence [(3)].

The goals of the bowel preparation are better vision of the surgical field, simpler bowel packing, and less pollution of the peritoneal cavity and surgical site in the event of bowel entrance [(4)].

Liu *et al.* [(5)] argued that anastomotic leakage and infection risks would be the same with or without preoperative Mechanical bowel preparation (MBP), and indicated that MBP might be skipped. Very few studies have looked at whether or not MBP is necessary for individuals following gynecological cancer surgery with concurrent colon or rectal resection.

In recent decades, a new subset of BP known as oral antibiotic bowel preparation (OABP) has arisen to meet the demand for further minimizing postoperative morbidities and mortality among patients; This is because the incidence of SSI following intestinal damage have gone down as the intraluminal bacterial burden has decreased [(6)].

The aim of the current study was to investigate the role of preoperative oral antibiotic in gynecological oncology surgery in field visualization, reducing postoperative ileus and surgical site infection.

PATIENTS AND METHODS

A cohort study was conducted at Gynecologic Oncology Unit, Obstetrics and Gynecology Department, Faculty of Medicine, Zagazig University. The study included of 130 women who underwent tumor debulking surgery for gynecological cancer (ovarian, uterine, cervical or endometrial) were enrolled.

Inclusion criteria: Any women who underwent tumor debulking surgery for gynecological cancer (ovarian, uterine, cervical or endometrial): (1) Age: any age group. (2) BMI: 18.5 to 40 kg/m^2. (3) Healthy non anemic women.

Exclusion criteria: Women with allergic sensitivity for antibiotics used in the study.

Study interventions and procedures:

1. According to inclusion and exclusion criteria; patients were subjected to:

a) Complete history taking of clinical importance including:

- Personal history: age, residence, occupation, marital status and special habits as smoking, alcohol, etc.
- Present history: of current complain (onset, coarse, duration, previous workups).
- Menstrual history: day of last menstrual period and regularity.
- Obstetric history: gravidity, parity, previous miscarriages or obstetric complications.
- Contraceptive history: type, duration of use before pregnancy.

Received: 22/09/2022
Accepted: 23/11/2022

 Medical history: medical comorbidities with pregnancy as hepatic, renal, cardiac, endocrinal.
 Surgical history: Previous operations.
 Family history of maternal complications with pregnancy.

b) General and local examinations with special emphasis on: vital data, BMI, signs of associated medical disorders.

c) Investigation: Complete blood count, liver and kidney function tests, coagulation profile (prothrombin time, partial thromboplastin time, and international normalised ratio), viral hepatitis markers for hepatitis B and C, blood type (ABO) and Rh blood type testing are all examples of common diagnostic procedures.

d) Imaging: Ultrasound, computerized tomography (CT) or magnetic resonance imaging (MRI) examinations for assessment of pathological condition using.

2. On the day before surgery, patients were receive peri-operative prophylactic oral antibiotics, including neomycin (Neomycin®, 500 mg, tablet, Memphis, Egypt) 1g every 6 hours for 3 doses and secindazole (Fladazole®, 500 mg, capsules, Amoun, Egypt) 2 grams one time.

3. On the day of surgery, all patients received intravenous cephalosporin (Ceftriaxone, 1g, vial, SANDOZ, Egypt) 30 minutes before incision.

4. Patients' demographics: Age and BMI were recorded, as were their pre- and post-operative diagnoses, procedures, and the occurrence of surgical and nonsurgical complications, as well as the size of any remaining tumour, the level of their primary surgeons, the type of skin incision used, the operative procedure used, the amount of intra-abdominal adipose tissue removed, and the number of previous surgeries they had undergone. The quality of the surgical field was rated by surgeons as bad, sufficient, or good. How Long Should Antibiotic Treatment Last?

Study outcomes:

1. Primary outcome: Incidence of surgical site infection (SSI).
2. Secondary outcome parameters:
3. Degree of surgeons' satisfaction about surgical field visualization.
4. Incidence of postoperative ileus.

Ethical Approval:

This study was ethically approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University (ZU-IRB #9663/20-7-2022). Patients who agreed to take part in the study did so after receiving an in-depth explanation of the study's aims and procedures. At any point, patients could choose to stop participating in the trial without having their treatment changed in any way. The following ensured the privacy of the data: Using cyphers in place of personally identifying data (e.g., using ticket numbers instead of names to identify participants). Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS) version 20 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean, median, standard deviation (SD), and confidence interval, and independent sample t-test was used for comparison between groups. P value ≤ 0.05 was considered to be statistically significant.

RESULTS

Preoperative oral antibiotic was associated with SSI incidence of 15.4%; 20 cases with surgical site infection (SSI) and 110 cases without SSI. There was a highly significant difference between patients with SSI and those without SSI as regard BMI. Mean BMI in patients who developed SSI was 36 kg/m^2 and ranged from 31.3 to 40 kg/m^2 (Table 1)

Table (1): Demographic data of the studied patients.

Variable	All Patients (n=130)	Patients with SSI (n=20)	Patients without SSI (n=110)	t-test	P-value
Age(years) Mean ± SD (range)	56.08 ± 3.4 (50 - 63)	56 ± 2.55 (52 - 59)	56.11 ± 3.65 (50 - 63)	0.060	0.592
BMI (kg/m^2) Mean ± SD (range)	32.23 ± 2.89 (29 - 40)	36.06 ± 3.28 (31.3 - 40)	31.22 ± 1.77 (29 - 35)	**4.525**	**<0.001****

Ovarian cancer cases were the most operated cases followed by endometrial cancer cases (Table 2).

Table (2): Types and staging of gynecological cancer in the studied population.

Type and Stages		All Patients (n=130)	
		No.	%
	Total	30	23.1
Cervical	**IA_1**	23	17.6
	IA_2	7	5.3
Ovarian	**Total**	55	42.3
	IA	35	26.9
	IB	15	11.5
	IC	5	3.8
Endometrial	**Total**	45	34.6
	I	40	30.7
	II	5	3.8

Respiratory co-morbidities included chronic obstructive pulmonary disease, bronchial asthma and pneumonia. Cardiac co-morbidities included history of ischemic heart diseases coronary angio-catheterization, previous cardiac surgery, and history of congestive heart failure (Table 3).

Table (3): Pre-operative risk factors& Co-morbidities in the studied population.

Variable		All Patients (n=130)
Hypertension		65 (50%)
Diabetes Mellitus		35 (26.9%)
Cardiac risk factor		20 (15.4%)
Respiratory risk factor		10 (7.7%)
History of Pervious operations	**Appendectomy**	20 (50%)
	Hernia	15 (37.5%)
	CS	5 (12.5%)

** Statistically highly significant difference ($P \leq 0.001$)

Table (4): Pre-operative laboratory parameters of the studied population.

Variable	All Patients (n=130)
Hematocrit (34-37%) Mean ± SD	33.21 ± 1.85
TLC (4-11 $10^3/cm^3$) Mean ± SD	9.46 ± 2.21
Platelets (150-450 $10^3/cm^3$) Mean ± SD	220.71 ± 51.81
S. Albumin (3.5-5.5 g/dl) Mean ± SD	3.27 ± 0.44
S. Creatinine (0.8-1.2 mg/dl) Mean ± SD	0.97 ± 0.184
R. Blood glucose (<180 mg/dl) Mean ± SD	155.88 ± 36.65

Table (5): Type of operation in the studied population.

Type of Operation	All Patients (n=130)
Type I hysterectomy	20 (15.4%)
Type II hysterectomy	75 (57.7%)
Type III hysterectomy	35 (26.9%)
Lymphadenectomy	
Pelvic	85 (65.4%)
Para-aortic	20 (15.4%)
Lymph node sampling	25 (19.2%)

The overall surgeons' evaluation of operating field was reported to be sufficient or good in 92.3% of patients; there were significant differences in operating field that was more favorable in patients without SSI (Table 6).

Table (6): Surgeon evaluation of operating field

Variable	All Patients (n=130)	Patients with SSI (n=20)	Patients without SSI (n=110)	P-value
Overall evaluation				
Poor	10 (7.7%)	7 (35%)	3 (2.7%)	0.034*
Sufficient	35 (26.9%)	3 (15%)	32 (29.01%)	
Good	85 (65.4%)	10 (50%)	75 (68.1%)	

Table (7): Operative time and duration of hospital stay of the studied population.

Variable	All Patients (n=130)
Operative time(hours) Mean ± SD	1.92 ± 0 .381
<2	9 (37.5%)
≥2	15 (62.5%)
Hospital stay (days) Mean ± SD	12 ± 4.758

Table (8): Intra/Postoperative complications of the studied population.

Variable	All Patients (n=130)
Blood loss requiring blood transfusion	20 (15.3%)
Postoperative Pain >72 hours requiring analgesia	60 (46.1%)
Postoperative Pyrexia	15 (11.5%)
Postoperative nausea	40 (36.36%)
Postoperative abdominal bloating	15 (11.5%)

The mean time passed before the first return of intestinal movement was about 19 hours.

Table (9): Postoperative return of intestinal functions of the studied population.

Variable	All Patients (n=130)	Patients with SSI (n=20)	Patients without SSI (n=110)	P-value
Day of first passage of flatus (days)	0.92±0.54	0.80 ± 0.54	0.91 ± 0.65	0.372
Day of first passage of stool (days)	1.96±0.60	1.82 ± 0.67	1.94 ± 0.73	0.173
First return of intestinal movement (days)	0.81±0.69	0.82 ± 0.59	0.80 ± 0.54	0.289

DISCUSSION

In recent decades, a new subset of BP known as oral antibiotic bowel preparation (OABP) has arisen to meet the demand for further minimizing postoperative morbidities and mortality among patients. This is because the number of germs inside the body decreases after a bowel damage, which in turn reduces the number of infections at the surgical site [(7)].

There have been a number of retrospective studies, and their results have varied. Oral antibiotic (OA) use alone was observed to reduce SSI rate by **Toh *et al.*** [(8)], although the results were not statistically significant.

The current study reported that preoperative oral antibiotic was associated with SSI incidence of 15.3%.

Moukarzel *et al.* [(9)] reported that OABP alone was protective against SSI in patients who had Gynecologic Oncology Surgery, with an OR of 0.23 (95% CI: 0.06-0.87) compared to no bowel preparation. Contrasted with the 33% incidence of SSI in patients who did not undergo any bowel preparation, the occurrence of SSI dropped to 8% in cases where OABP was used.

Another study found that the risk of deep/organ-space surgical infections was considerably lower in women who underwent ovarian cancer surgery after undergoing mechanical and oral antibiotic bowel preparation (MOABP) as opposed to no preparation. There was a 6.7%-9.9% SSI prevalence rate [(10)].

Toh *et al.* [(8)] found that using oral antibiotics during mechanical bowel preparation (MBP) resulted in a lower risk of surgical site infection (SSI) and fewer intraoperative adhesions compared to using MBP alone. However, they found no evidence that SSI rates dropped much when MBP was added to the oral antibiotics (OR 0.13).

On the contrary, a study involved 38,539 patients had hysterectomy for malignant pathology compared no bowel preparation with MBP, OABP and MOABP and found that bowel preparation does not protect against surgical site infections. The SSI incidence was 7.9% in patients without bowel preparation and 8.6% in patients who receive any form of bowel preparation [(11)].

Fry [(12)] stated that there was no evidence that using a mechanical bowel preparation alone can lower SSI rates, however there is evidence that using both oral antibiotic preparation and systemic preoperative antibiotics does. Surgical literature spanning seventy years demonstrates that mechanical bowel preparation alone does not lower SSI rates. Many studies have shown that oral antibiotic bowel preparation is more effective than a placebo at preventing SSI. Clinical researches suggest that SSI rates are at their lowest when the oral antibiotic bowel preparation is used in conjunction with suitable systemic preoperative preventative antibiotics.

Also, **Morris *et al.*** [(13)] study conducted on 8415 people who had colorectal surgery, including those who underwent minimally invasive procedures. Their findings corroborated ours, showing that preparing the intestine with antibiotics orally leads to fewer SSIs, a shorter length of stay, and fewer readmissions.

Current study reported that preoperative oral antibiotic was associated with favorable operating field, which was reported in 92.4% of patients (reported as sufficient or good operating field). The overall evaluation of operating field was more favorable in cases without SSI. The difference was statistically significant (P values 0.034, 0.013 and 0.013).

Muzii *et al.* [(14)] plan a randomised controlled trial to evaluate these characteristics in laparoscopic surgery. Surgeons were blinded to whether or not a patient received bowel preparation (oral Fleet Phospho-soda the day before the procedure) or did not receive bowel preparation (day of surgery). Measured on a 5-point scale from poor to outstanding, the primary outcome was the quality of the surgical field (both overall and for the small and large intestines separately). The primary outcome was the same for both groups.

In another study, 333 women who had gynecological procedures were included. Overall surgeon satisfaction, operating perspective, and bowel packing efficacy were not significantly different between the two bowel preparation methods in this study [(15)].

The current study reported that preoperative antibiotic was associated with early return of intestinal movement. The mean duration for return of intestinal movements was 19 hours.

Suadee and Suprasert [(15)] conducted a study on patients underwent gynecologic surgery and compared no bowel preparation with MBP. The study found no significant differences among each group regarding the

return to bowel function. More than 98% of patients had return of their bowel function one day after surgery.

The current study's strengths may be traced back to the thoroughness with which all follow-up data were recorded, all relevant data were included in the analysis, and all clinical evaluations and analyses of study outcomes were performed by the same group of experts.

The lack of a control group that did not use OABP and the relatively modest size of the current study's sample are two of its major limitations.

CONCLUSION

The incidence of surgical site infections was reduced, the surgical site was more favorable, and bowel function was restored more quickly when patients were pretreated with antibiotics orally prior to surgery. Obesity and diabetes mellitus are significant risk factors (predictors) for SSI in cases undergoing gynecological oncology surgeries.

Supporting and sponsoring financially: Nil.
Competing interests: Nil.

REFERENCES

1. **Vo E, Massarweh N, Chai C *et al.* (2018):** Association of the addition of oral antibiotics to mechanical bowel preparation for left colon and rectal cancer resections with reduction of surgical site infections. JAMA Surgery, 153(2):114-21.
2. **Salani R, Diaz-Montes T, Giuntoli R *et al.* (2007):** Surgical management of mesenteric lymph node metastasis in patients undergoing rectosigmoid colectomy for locally advanced ovarian carcinoma. Ann Surg Oncol., 14:3552-7.
3. **Kiran R, Murray A, Chiuzan C *et al.* (2015):** Combined preoperative mechanical bowel preparation with oral antibiotics significantly reduces surgical site infection, anastomotic leak, and ileus after colorectal surgery. Annals of Surgery, 262(3):416-25.
4. **Suadee W, Suprasert P (2017):** Appropriate bowel preparation for laparotomy gynecologic surgery: a prospective, surgeon-blinded randomized study. Gynecologic and Obstetric Investigation, 82(3):287-93.
5. **Liu W, Hsiao C, Jao S *et al.* (2016):** Is preoperative bowel preparation necessary for gynecological oncology surgery? Taiwanese Journal of Obstetrics and Gynecology, 55(2):198-201.
6. **Diakosavvas M, Thomakos N, Psarris A *et al.* (2020):** Preoperative bowel preparation in minimally invasive and vaginal gynecologic surgery. The Scientific World Journal, 20:8546037. doi: 10.1155/2020/8546037.
7. **Kiran R, Murray A, Chiuzan C *et al.* (2015):** Combined preoperative mechanical bowel preparation with oral antibiotics significantly reduces surgical site infection, anastomotic leak, and ileus after colorectal surgery. Annals of Surgery, 262(3):416-25.
8. **Toh J, Phan K, Hitos K *et al.* (2018):** Association of mechanical bowel preparation and oral antibiotics before elective colorectal surgery with surgical site infection: a network meta-analysis. JAMA Network Open, 1(6):e183226. doi: 10.1001/jamanetworkopen.2018.3226.
9. **Moukarzel L, Nguyen N, Zhou Q *et al.* (2023):** Association of bowel preparation with surgical-site infection in gynecologic oncology surgery: Post-hoc analysis of a randomized controlled trial. Gynecologic Oncology, 168:100-6.
10. **Wang C, Al-Rubaye R, Tran V *et al.* (2022):** Mechanical and oral antibiotic bowel preparation in ovarian cancer debulking: Are we lowering or just trading surgical complications? Gynecologic Oncology, 166(1):76-84.
11. **Kalogera E, Van Houten H, Sangaralingham L *et al.* (2020):** Use of bowel preparation does not reduce postoperative infectious morbidity following minimally invasive or open hysterectomies. American Journal of Obstetrics and Gynecology, 223(2):231. doi: 10.1016/j.ajog.2020.02.035.
12. **Fry D (2011):** Colon preparation and surgical site infection. The American Journal of Surgery, 202(2):225-32. doi: 10.1016/j.amjsurg.2010.08.038.
13. **Morris M, Graham L, Chu D *et al.* (2015):** Oral Antibiotic Bowel Preparation Significantly Reduces Surgical Site Infection Rates and Readmission Rates in Elective Colorectal Surgery. Ann Surg., 261(6):1034-40.
14. **Muzii L, Bellati F, Zullo M *et al.* (2006):** Mechanical bowel preparation before gynecologic laparoscopy: a randomized, single-blind, controlled trial. Fertility and Sterility, 85(3):689-93.
15. **Suadee W, Suprasert P (2017):** Appropriate bowel preparation for laparotomy gynecologic surgery: A prospective, surgeon-blinded randomized study. Gynecologic and Obstetric Investigation, 82(3):287-93.