

EVALUATION OF SURGICAL ANTIBIOTIC PROPHYLAXIS IN TERTIARY CARE HOSPITAL IN JAKARTA INDONESIA

ABSTRACT

A cross sectional study was conducted at department of surgery of Dr. Mintohardjo Navy Hospital, Jakarta, Indonesia, in order to evaluate the appropriateness of antibiotic prophylaxis administration before surgery and the occurrence of surgical site infection. The data were collected retrospectively from the medical record of all patients who underwent surgery during January to December 2012. The assessment of appropriateness of antibiotic prophylaxis was carried out based on the Scottish Intercollegiate Guidelines and The National Guidelines of Antibiotic Usage in Indonesia, including the selection, timing and duration of antibiotic prophylaxis administration. A total of 161 patients were included in the study, consisted of 40 patients (24.85%) males and 121 (75.15%) women. The age ranges of patients were less than 20 years was 3.62%; 20-39 years was 27.88%; 40-59 years was 44.72%; and more than 60 years was 13.66%. The most frequent surgeries performed was exploratory *laparotomy* 25.46%, followed by cholecystectomy 24.22%, ovarian cystectomy 21.74%, and myomectomy 20.49%. All patients (100%) received prophylactic antibiotics before surgery. The prophylactic antibiotics administered were the combination of ampicillin and gentamicin, which is 31.5%, Seftriaxon (26.08%), cefotaxime (21.11%), seftriaxon + gentamicin (10:55%), meropenem (5%) and ciprofloxacin 0.62%. Of 161 patients 34 patients were develop surgical site infections (21.11%). The adherence to guidelines of surgical antibiotic prophylaxis was still very poor. Therefore it is necessary to increase compliance with surgical antibiotic prophylaxis in order to reduce the risk of surgical site infection.

Keywords: antibiotic prophylaxis, surgery, surgical site infection, Indonesia

INTRODUCTION

Antibiotic prophylaxis for surgical procedures plays an important role in preventing surgical site infection. However, non-compliance with guidelines for the use of prophylactic antibiotics is still commonly found in various surgical procedures in some hospitals¹⁻⁴. The rate of adherence to guidelines for the use of surgical antibiotic prophylaxis varies between countries, ranging from 0% to 71.9%. However, most of the study revealed that the overall compliance rate is generally less than 50%. Most studies demonstrated that non-compliance is mainly caused by inappropriate antibiotic selection, timing of administration, and prolonged duration of prophylaxis¹. Several previous studies conducted in some countries showed that the rate of compliance with all parameters surgical antibiotic prophylaxis guidelines varies between hospital to hospital. In Iran the rate of adherence to antibiotic prophylaxis guidelines was only 0.9%², whereas in Korea 0.8%⁴, in Jordan 1.7%⁵, in Canada 5%⁶, and in Nicaragua 7%⁷. Some other studies showed that the degree of compliance with the guidelines was higher, such as in Greece overall compliance rate of surgeons to guidelines for antibiotic prophylaxis was 36.3%⁸, in Lebanon adherence to the current guidelines approximately was 32%⁹, in France, reported that the adherence to the guidelines was 40%¹⁰, in Turkey about 26%¹¹, and 29%¹², and in the Netherlands adherence to all aspects of guidelines was 28%¹³. In Indonesia research on the use of prophylactic antibiotics is still very rare. Desiana, *et al*. (2008) reported that the administration of prophylactic antibiotics in Dharmais National Cancer Hospital, Jakarta was not in accordance with the standard guidelines¹⁴.

The inappropriateness and excessive in the administration of prophylactic antibiotics can increase the treatment costs and the emergence of antimicrobial resistance.

Dr. Mintohardjo Navy Hospital is one of general tertiary referral hospital in Jakarta where emergency and elective surgeries were done in this hospital. However, the study to assess the rational use of prophylactic antibiotics has not been conducted in this hospital. Therefore, this study was carried out to evaluate the appropriateness of the use antibiotic prophylaxis for surgeries at department of surgery of Dr. Mintohardjo Navy Hospital Jakarta.

METHODS

A cross sectional study was conducted at department of surgery of Dr. Mintohardjo Navy Hospital, Jakarta, Indonesia. The data were collected retrospectively from the medical record of all patients who underwent surgery during January to December 2012. The data of patients admitted in the department of surgery including the selection, timing and duration of antibiotic prophylaxis administration, were

collected retrospectively. The assessment of appropriateness of antibiotic prophylaxis was carried out based on the Scottish Intercollegiate Guidelines¹⁵, and The National Guidelines of Antibiotic Usage in Indonesia¹⁶.

RESULTS AND DISCUSSION

Antibiotic prophylaxis in surgery is the administration of antibiotics to prevent the surgical site infection. This study was conducted in referral tertiary hospital in Jakarta to evaluate the appropriateness of administration of surgical antibiotic prophylaxis. A total of 161 patients were enrolled in this study, consisted of 40 patients (24.85%) males and 121 (75.15%) women. The age ranges of patients were less than 20 years was 3.62%; 20-39 years was 27.88%; 40-59 years was 44.72%; and more than 60 years was 13.66%. About 86% patients underwent elective surgeries and 14% were emergency surgeries. The most frequent was exploratory *laparotomy* 25.46%, followed by cholecystectomy 24.22%, ovarian cystectomy 21.74%, and myomectomy 20.49%. The classes of surgeries performed were contaminated surgeries (42.86%); clean surgeries (24.22%); clean-contaminated surgeries (23.60%); and dirty surgeries (9.31%). The rate of surgical site infection of clean surgeries was 2.56%, clean-contaminated surgeries (13.15%), contaminated (28.98%), and dirty surgery (53.33%) as shown in Table 1. These results confirmed that the risk of surgical site infection is strongly associated with the type of surgery. However, other important factors that may also affect the risk of surgical site infections are the duration of surgeries, surgical techniques, and patient co-morbidities¹⁷. The overall rate of surgical site infection was 21.11%. This result was lower than previous study conducted in tertiary and community public hospitals in Catalonia, Spain (24.9%)¹⁸. However, the risk of infection was still higher compared to other previous study conducted in India, where the surgical site infections rate was 16%¹⁹ and in Iran was 17.4%²⁰.

Surgical site infection rates varies widely worldwide, although the majority of patients receiving antimicrobial prophylaxis. A surgical site infection rate varies from 2.5% to 41.9% depending on the type of surgical procedure and the patient's clinical condition²¹. Some studies reported that the rate of infection in surgical cases was approximately 20%^{18-20,22,23}. In this study the pathogens isolated from surgical site infections were *Escherichia coli* (37.5%), *Staphylococcus sp.* (34.1%), *Pseudomonas aeruginosa* (13.63%), *Proteus sp.* (9.91%), and *Alcaligenes sp.* (4.86%).

All patients (100%) received prophylactic antibiotics before surgery. The prophylactic antibiotics administrated were the combination of ampicillin and gentamicin in 31.5%, seftriaxon in 26.08%, cefotaxime in 21.11%, seftriaxon + gentamicin in 10.55%, meropenem in 5%, and ciprofloxacin in 0.62%. In term of the selection of antibiotics, we found that all prophylactic antibiotics administration at department of surgery in Dr.Mintohardjo Navy Hospital was not in accordance with the guidelines provided by the Ministry of Health Republic of Indonesia¹⁶, and the Scottish Intercollegiate Guidelines¹⁵. However, in term of indication, 54.78% of antibiotic prophylaxis was administrated appropriately, whereas the compliance to the timing and to the dosage of prophylaxis was 62.73% and 88.7% respectively. Timing of surgical antibiotic prophylaxis is need attention because it is associated with the incidence rate of surgical site infection. Prophylactic antibiotics should be administrated within 30 minutes before incision^{15,16}.

All of the antibiotics used for surgical prophylaxis in our hospital were broad-spectrum antibiotics, such as third-generation of cephalosporin, ampicillin, carbapenem, or ciprofloxacin. In this study we found that a combination of ampicillin and gentamicin was the most common regimen used in 31.5%, followed by seftriaxon in 26.08%, cefotaxime in 21.11%, seftriaxon + gentamicin in 10.55%, meropenem in 5%, and ciprofloxacin in 0.62%. These results indicated that adherence to surgical antibiotic prophylaxis guidelines in our hospital was still disappointing and far from optimal. The choice of prophylactic antibiotics was contradicting with some standard guidelines that third-generation cephalosporin such as ceftriaxone and cefotaxime, should not be used as a surgical antibiotic prophylaxis to anticipate if it needed to treat patients who developed serious sepsis^{15,16,24-26}. However, ceftriaxone and cefotaxime as prophylactic antibiotics are widely used in various hospitals in the world. Ceftriaxone has been shown to be more effective in preventing surgical site infection²⁷.

Cefazolin or cefuroxime as a single antibiotic is recommended for most type of surgical procedures because this agent is active against the common skin pathogens *Staphylococcus aureus* and *Streptococcal* species. The use of cefazolin combination with ampicillin-sulbactam, or vancomycin is recommended for some cases of gynecological and gastrointestinal surgery or clean-contaminated cancer surgery, when methicillin resistant *S. aureus* is common cause of infection^{26,28}.

The use of third-generation of cephalosporin for surgical antibiotic prophylaxis in our hospital was due to the high levels of bacterial resistance to first-and second-generation of cephalosporin. Besides that, cefazolin or cefuroxime as antibiotic prophylaxis was not available in the list of logistics in Dr. Mintohardjo Navy Hospital.

In general, several constraints faced in the implementation of guidelines for surgical prophylaxis, partly due to lack of awareness of guidelines, perception that the guidelines should not be followed completely, logistical constraints of recommended antibiotics prophylaxis, and the false belief that multiple antibiotics and prolonged broad-spectrum antibiotic therapy will be more effective in preventing surgical site infection compared with narrow-spectrum antibiotic prophylaxis^{13,29-31}.

Although antibiotic prophylaxis has been believed to play an important role in reducing the rate of surgical site infection, but several other factors must be considered, such as an infection control strategies, surgeon experience and surgical technique, duration of surgery, operating room conditions, sterilization of instruments, preoperative preparation, management perioperative, and the patient's medical condition, may affect the rate of surgical site infection^{17,24,26,32}.

In order to improve adherence to guidelines for the use of surgical antibiotic prophylaxis, clinical pharmacists have an important role. Clinical pharmacists have a responsibility to ensure the appropriate use of antibiotics. Clinical pharmacists can collaborate with other health professionals to establish a local guideline based on the local sensitivity pattern, responsible for dissemination of hospital guidelines to surgeons, and monitoring the implementation of prophylactic antibiotic administration to optimize the indications, selection, timing, and duration of use surgical antibiotic prophylaxis. All of this effort is addressed to minimize the surgical site infection and to improve the clinical outcomes.

CONCLUSION

The rate of compliance with surgical antibiotic prophylaxis guidelines was still very poor. Therefore it is necessary to do some efforts to improve compliance with surgical antibiotic prophylaxis guidelines to reduce the risk of surgical site infection. Building local hospital guidelines for surgical antibiotic prophylaxis, by adopting national or international guidelines needs to be done to overcome the problem of non-compliance to guidelines for antibiotic prophylaxis.

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<i>Classification of surgery</i>	Patients		Surgical site infections	
	No.	(%)	No.	(%)
Clean (I)	39	24.22	1	2.56
Clean-contaminated (II)	38	23.60	5	13.15
Contaminated (III)	69	42.86	20	28.98
Dirty (IV)	15	9.31	8	53.33
Total	161	100	34	21.11

Table 1. Class of surgeries and surgical site infection rates.

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