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Comparison of single dose prophylactic antibiotics versus five days antibiotics in cesarean section

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Abstract
A prospective randomized study was conducted on 600 women undergoing cesarean section of which 300 received only single dose antibiotic and 300 received additional antibiotic for five days. The aim of the study was to find the pattern of use antibiotic prophylaxis in cesarean section and to compare the frequency of post-operative complications in both the groups. Misuse of antibiotics has led to the development of resistant strains. Therefore periodic surveillance may be of use. It is important to monitor infection rates within each institution to determine the effectiveness of the prophylactic antibiotic used and the types of infection that develop. In our study single dose antibiotic prophylaxis was as effective as the multiple dose in terms of post-operative morbidity and was cost effective too.

Keywords: antibiotic prophylactic, prophylaxis, cesarean, antibiotics, single dose, gynecology

1. Introduction
Prophylaxis (advanced guard) refers to actions taken to prevent disease. Prophylactic antibiotics are those given briefly in absence of clinical infections but in a situation where such an infection is likely to develop. The systemic use of antibiotic prophylaxis has been common in the practice of obstetrics and gynecology. The overall aim for antibiotic prophylaxis in obstetrics is to prevent post-operative infections of surgical site and decrease post-operative mortality and morbidity, thus decreasing the duration of hospital stay and decreasing the cost of post-operative health care. The interaction between host defenses and the microorganism begins at the time of inoculation. There is a period of about 3hrs when the host defenses are not active. This is worsened during surgeries when anaesthetic agents and wound retractors further alter host defenses. During this period the bacteria proliferate with relative freedom. When antibiotics are given three hours after bacterial inoculation the beneficial effect is lost. Maximum benefit is attained if drug therapeutic levels exist in the tissues before inoculation. This is thought to result from a reduction in the number of bacteria by changing the characteristics of culture medium at the operative site during brief period where the tissue defence are impaired. Studies have led to recommendations that the therapeutic levels should precede the incision and the duration of antibiotic should not exceed this short period of decreased host defence.

Aims and Objectives
To assess if single dose antibiotic is as effective as multiple doses in terms of post-operative morbidity. To assess the cost the cost effectiveness of drugs in both the groups.

Review of Literature
The term prophylaxis is derived from the Greek word "prophylaxis" which means advanced guard. Prophylactic antibiotics are those given briefly in the absence of infection but in a situation where infection is likely to occur. The search of antibiotic began in late 1800's with the growing acceptance to the germ theory of disease. The concept of antibiotics dates back to the introduction in the mid 1940's.Richards in 1943 and Falk in 1946 utilised Sulfa compounds as prophylactic agents in gynecological operations with mixed results [1]. The prophylactic use of antibiotics fell in the disfavour in early 1950's following the emergence of resistant staphylococcal infections due to widespread use of penicillin. In 1860's louis pasteur discovered microbes that would kill certain disease causing bacteria.

Postoperative infection as a complication of surgical procedures in obstetrics and gynecology has long been a focus of clinical concern. In the last century surgical skills and procedure have markedly advanced, leading to decrease in infection rate and sepsis. One of the greatest contributions to achieve this goal has been the use of antibiotic prophylaxis. Decrease rates of postoperative infections have clearly led to decrease in the morbidity, shorter hospital stay and long term decrease in health care burden [2]. Over the succeeding years numerous antibiotics in varying regimens have been used for variety of procedures however the commonly accepted standards for gauging the suitability of a given antibiotic or regimen for the use of prophylaxis have not substantially changed. These guidelines were originally proposed by Ledger in 1975 and later modified and restated by Johnson *et al* in 1983 the guidelines include [3, 4]. Incisional SSI accounts for 2/3 of the total infections with direct increase in morbidity rates and with even greater increase in hospital stay and costs. Complications of caesarean section includes endometritis, wound infection, bacteremia, pelvic abscess, septic shock, necrotising fasciitis and septic pelvic vein thrombophlebitis. [5] The most common pathogens responsible for SSI as reported

by National Nosocomial Infections surveillance (NNIS) are Escherichia coli, Enterococci, Pseudomonas, Staphylococcus aureus, Coagulase negative staphylococci, Enterobacter species, Candida albicans, Proteus mirabilis, Streptococcal species [6]. In recent years there has been shift towards infection with antibiotic resistant strains of both gram positive and gram negative organisms [6]. Because of increased number of immuno compromised patients, infection with fungi are increasing and also SSI caused by unusual microorganisms have been recognized [7]. The objective for the use of prophylactic is to achieve a therapeutic concentration in the tissues in the vulnerable period while the wound is open [8]. If the antibiotic is administered too long before or after making the incision the antibiotic concentration in the wound tissues will be below the therapeutic range during major part of the vulnerable period and the risk of infection will be enhanced. De Palma *et al* reported the use of cefamandole for four days post operatively in patients undergoing caesarean delivery for cephalo pelvic disproportion (CPD) [9]. They then compared this to a later series of similar patients who received only three doses post operatively [10]. This was preferred over four days treatment. D Angelo and Sokol specifically compared cephalosporin prophylaxis for 24 hrs versus within the same protocol in patients with preceding labour and rupture of membranes. They found that postoperative morbidity was decreased in the longer coverage group but the difference did not reach statistical significance [11]. Harwy Lyshyn *et al* compared one dose of cefoxitin given just after cord clamping with same plus doses post operatively [12]. They found that the three dose regimen was associated with a decrease in the incidence of endometritis but the difference was not statistically significant. Elliot *et al* compared ampicillin three doses pre-operatively versus 12 doses post-operatively in 103 high risk patients [13]. They found that the 12 dose course was significantly better than the three course in decreasing febrile morbidity and the number of days in the hospital. Perhaps patients with extra risk should receive extended coverage.

Materials and Methods

A prospective randomized study was carried out from may 2011 till may 2013 on patients undergoing caesarean section. 600 cases were included in the study. 300 in the single dose group and 300 in the multiple dose group. Study was carried in the obstetric ward of Krishna hospital, Karad. Patients were allocated to single or multiple dose group on alternate day basis.

Observation and Results

In each group 300 patients were studied. Group one represents the single dose group while group two represents the multiple dose group. In single dose group 252 patients were registered at Krishna hospital while in multiple dose group 249 were registered.

Table 1: Age Wise Distribution

	Age group in years	Group 1	Group2
1.	15-19	6	9
2.	20-24	143	170
3.	25-29	125	100
4.	30 and above	26	21

In the single dose group minimum age was 19 years and maximum was 39 years. The median age in single dose group was 25 years. In the multiple dose group the minimum age was 19 years and maximum was 40 years and the median being 24 years.

Table 2: Indication of Cesarean Section

Indication	Group 1	Group2
Previous lscs	109	95
Failure of induction	13	15
Oligohydraminos	38	21
Foetal distress	32	32
Transverse/oblique lie	2	4
Cord prolapsed/presentation	1	2
Anhydraminos	4	4
Scar tendernesss	8	5
Polyhydraminos	3	4
Severe pre-eclampsia	42	40
Eclampsia	13	16
Twin pregnancy	11	9
Brow/face presentation	1	3
Infertility	18	20
IUGR	16	10
Overdue	21	25
Breech presentation	34	23
Previous two LSCS	17	20
Bad obstetric history	2	3
Cesarean delivery on demand	23	29
CPD	20	13

Since most of the patients had more than one indication for caesarean delivery there is discrepancy in the numbers in this table and the total number of patients studied. Out of 600 patients that were included in this study the commonest indication for caesarean delivery was previous caesarean section. The other frequent indications were breech presentation, foetal distress and severe pre-eclampsia. The least frequent indication were cord prolapsed and presentation and malpresentation like brow and face.

Table 3: Incidence of Febrile Morbidity

Fever	Group1	Incidence	Group2	Incidence
	11	3.6%	4	1.3%

P value - 0.1139 and the association was not significant.
Febrile morbidity was defined as temperature of 100.4F or higher on two separate occasions 6 hours apart. In the single dose group 11 patients had fever while in the multiple dose group 4 patients had fever. These patients had fever with no localizing factor and signs of genital tract sepsis like foul smelling lochia and uterine tenderness. The fever was most probably attributed to endometritis.

Table 4: Incidence of Urinary Tract Infections

UTI	Group1	incidence	Group2	Incidence
	7	2.3%	5	1.6%

These included all patients with burning micturition, increased frequency and patients whose urine microscopy showed Increased white blood cells. Only 7 patients in the single dose group and 5 in the multiple dose group had urinary tract infections.

Table 5: Incidence of Wound Infections

Wound infections	Group1	incidence	Group2	incidence
	16	5.6%	14	4.6%

The p value is 0.8578 and the association is not significant.
These included patients with disturbed healing, minor wound infections, moderate wound infections. Patients with minor wound infection were managed by dressing only while the ones with major wound infection required regular dressing and secondary re-suturing. Out of the 16 patients that had wound infection in the single dose group 12 patients required secondary re-suturing. In the multiple dose group 11 out of the 14 infected patients required resulting.

Discussion

The mean age of patients undergoing caesarean section was 25+/-4.7 years. Most of the patients included in this study underwent emergency caesarean section. Only 12% cases in single dose group and 14% in the multiple dose group had elective caesarean section. In the study, all patients received antibiotics half an hour before surgery and received additional doses in multiple doses. There is a major difference in the nature of the drugs in clinical procedure. Classen *et al* showed that antibiotic administration timing was crucial in avoiding post-operative wound infections [14]. It is desirable to pre-operatively administer a prophylactic antibiotics before tissue injury and bacterial contamination for most surgical procedures.

Conclusions

Pre-operative anti-microbial prophylaxis guarantees the helpful centralization of anti-toxin in serum, tissues and twisted during tainting. The anti-toxin picked should be dynamic against the microscopic organisms that will be experienced during the medical procedure. The medication ought to be directed for the briefest period to limit the advancement of opposition. The medication ought to be sheltered and prudent to the patient. Cautious occasional observation of anti-microbial prophylaxis is important to identify the development of medication safe strains of microscopic organisms in our organization since it takes into account the necessities of nearby populace.

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