Subcutaneous Fusidic Acid Instillation for Prophylaxis Against Surgical Site Infection in Elective Cesarean Section: A Randomized Controlled Trial

Thesis

Submitted For Partial Fulfillment of Master Degree In Obstetrics and Gynecology

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Abb.	Full term
ADP	Adenosine diphosphate
CDC	Centers for Disease Control and Prevention
CHG	Chlorhexidine gluconate
FGF	Fibroblast growth factor
GAGs	Glycosaminoglycans
GNB	Gram-negative bacteria
GPB	Gram-positive bacteria
ID	Insufficient data
IL-1	Interleukin 1
MRSA	Methicillin-resistant S aureus
Mtb	Myobacterium tuberculosis
NICE	National Institute for Health and Care Excellence
PDGF	Platelet-derived growth factor
PMNs	Polymorphonuclear leukocytes
SSIs	Surgical site infections
TGF–β	Transforming growth factor– β
TNF	Tumor necrosis factor
VEGF	Vascular endothelial growth factor

PROTOCOL OF A THESIS FOR PARTIAL FULFILLMENT OF MASTER DEGREE IN OBSTETRICS AND GYNECOLOGY

Title of the protocol: Subcutaneous fusidic acid instillation for prophylaxis against surgical site infection in elective cesarean section. A randomized controlled trial.

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What is already known on this subject ?AND What does this study add?

Surgical site infections (SSI) in cesarean section can delay wound healing, impair cosmetic outcome and increase healthcare costs. Topical antibiotics are sometimes used to reduce microbial contaminant exposure following cesarean section.

The current study will investigate the role of subcutaneous Fusidic acid instillation for prophylaxis against surgical site infection in cesarean section.

1.INTRODUCTION/REVIEW

Many cesarean sections are conducted each year. The majority of these cesarean sections result in wounds that heal by primary intention, which means that the wound edges are brought together (approximated) using sutures, staples, clips or glue. Wounds can also heal by secondary intention, then the edges are not approximated and the wound heals by granulation, re-epithelialization and contraction. Most wounds heal without complications but surgical site infections (SSIs) can occur after surgery in the site where the surgery took place. Most wound infections are caused by contamination during surgery with the patient's own micro-organisms ***(Kulaylat et al., 2007).*** They may be superficial and self-limiting, involving the skin only, or they may be deeper and life-threatening. SSIs are classified by the Centers for Disease Control and Prevention (CDC) as superficial incisional in which skin or subcutaneous is involved occurs within 30 days post operatively characterized by localized pain , edema , erythema or purulent discharge from incision , deep incisional involves deep soft

tissues such as fascia or muscle within incision and organ/space infections involves any part of the anatomy other than the incision characterized by purulence from drain that was placed into the organ/space , abscess or infection involving the deep incision **(CDC, 2014; Mangram et al., 1999**).

SSIs account for up to 20% of all of healthcare-associated infections **(Magill et al., 2014)**. At least 5% of patients who have a surgical procedure will go on to develop a SSI, highlighting the importance of good prevention, detection and management **(NICE, 2008*).*** SSI results in failure of wound healing with subsequent increased treatment costs, a greater likelihood of admission to the intensive care unit, prolonged hospital stay and higher post-operative mortality ***(Bowler et al., 2001)***. In particular, studies have demonstrated an extra 7–10 days inpatient stay in those with SSI. Therefore, there is interest in SSI and its prevention amongst surgeons and amongst many other healthcare professionals, because of the increased patient morbidity and the associated financial burden ***(Kirkland et al., 1999).***

There are many interventions advocated to reduce SSI, including preoperative assessment to optimize underlying disease such as diabetes mellitus, aseptic techniques in the operating theatre and the use of systemic prophylactic antibiotics ***(Humphreys, 2009).*** Amongst the many interventions advocated to prevent SSI, the effectiveness of pre-operative intravenous administration of antibiotic prophylaxis has been extensively studied and has been shown to be effective ***(Nelson et al., 2009).***

Surgical practice often includes the use of topical or local antimicrobial agents applied to the operative site to minimize post-operative surgical infections, especially SSI. Compared with

systemic antibiotic therapy, topical or local delivery of an antibiotic has many potential advantages, as well as some disadvantages ***(Lipsky et al., 2009).*** The benefits of local application include high and sustained concentrations at the site of infection where local physiological changes may hinder the efficacy of systemic antibiotics **.**Other benefits include the limited potential for systemic absorption and toxicity, reduced volumes of antibiotic use, and, possibly, less potential for the development of antibiotic resistance ***(Lipsky et al., 2009).***

2. **Hypothesis**

In women undergoing elective C.S subcutaneous fusidic acid instillation may not prevent SSI.

3. **Research question**

In women undergoing elective C.S, does subcutaneous fusidic acid instillation prevent SSI?

4.**AIM/OBJECTIVES**

To see the infection rate and type of wound infection following elective caesarean section with and without the use of subcutaneous fusidic acid and assess the role of subcutaneous fusidic acid for prophylaxis against surgical site infection.

5.METHODOLOGY:
Subjects and Methods

- **Type of study:**

Randomized controlled trial.

- **Study setting:**

The study will be conducted at Ain Shams University Maternity Hospital, Obstetrics and Gynecology Department, Faculty of medicine.

- **Study population:**

Women attending for elective cesarean section at Ain Shams University Maternity Hospital, Obstetrics and Gynecology Department, Faculty of medicine.

✓ **Sample size justification:**

Depending on (***Pradhan and Agrawal, 2009***) who found the infection rates of groups with and without fusidic acid 2.8% and 17.1% respectively, and assuming the power= 0.80 and α=0.05, and by using PASS 11th release the minimal sample size for an equal size controlled study is 61 women in each group. We will recruit 75 women in each for possible attrition.

✓ **Inclusion criteria:**

1. Pregnant women who will undergo elective caesarean section either with no previous C.S or with previous C.S (2 cesarean sections at most).
2. Pfannenstiel incision with subcuticular absorbable stitches.
3. Age of female patients ranges from 19 to 35 years.
4. Body mass index from 18 to 29.9 kg/m2.

✓ **Exclusion criteria:**

Women with one of the following conditions:

1. Midline caesarean section.
2. Any risk factors increasing incidence of wound infection: anaemia with hemoglobin < 10gm/dl, diabetes mellitus, prolonged rupture of membranes, patients on steroid therapy.
3. Complicated wound in previous cesarean sections.

✓ **Randomization and allocation**

The 150 patients who will be included in our study will be

randomized through computer generated system into 2 groups; group F(fuscidic acid) & group N(No intervention). Each group will include 75 patients. Allocation and concealment will be done by sequentially sealed opaque envelopes. One hundred and fifty envelopes will be numbered serially from 1 to 150, 75 envelopes will contain the letter F and the other 75 will contain the letter N. In each envelope, the corresponding letter which denotes the allocated group will be put according to the randomization table and then all envelopes will be closed and put in one box. When the first patient arrives, the first envelope will be opened and the patient will be allocated according to the letter inside.

- **Study procedure:**

This is a prospective study which will be carried out at Ain Shams University Maternity Hospital. A total of 150 pregnant women who will undergo elective caesarean sections will be included in our study. All the patients will be operated

under full aseptic measures first by surgical hand scrub using standard 5 minutes surgical scrub using iodophor, hair at operative site clipped short with scissors if interfering with the operative procedure then cleaning the operative site with povidone-iodine scrub solution 7% , blotted with dry sterile towels then painted with an aqueous povidone-iodine solution 10%. All of them will be given pre-operative antibiotics prophylaxis. Cefazolin is a first-generation cephalosporin and is a Pregnancy Category B drug. When given intravenously, its half-life is 1.8 hours. It provides good coverage for gram positive organisms and has modest gram negative coverage. In a 1999 guideline, the US Centers for Disease Control and Prevention recommended its use at Caesarean section. It is recommended that 1 to 2 grams should be administered intravenously not more than 30 minutes before the skin is cut. An additional dose can be considered if blood loss exceeds 1500 mL or at 4 hours if the procedure lasts more than 4 hours (i.e., up to 2 half-lives of the drug)*(van Schalkwyk et al.,2010*). Out of the 150 patients, 75 patients will not have subcutaneous fusidic acid instilled before closing the skin followed by dry dressing (group N)while the other 75 patients (group F) will have 5 drops of subcutaneous fusidic acid 10 mg instilled before closing the skin followed by dry dressing. The dressings of all the patients will be opened up on the third post-operative day and regularly followed up every week for 4 weeks for any wound infection. Any surgical site infection within the 30 days following surgery will be documented and classified according to Southampton wound grading system.

	Grade	Appearance
0	Normal healing	
I	Normal healing with mild bruising or erythema	A—some bruising
		B—considerable bruising
		C—mild erythema
II	Erythema plus other signs of inflammation	A—at one point
		B—around sutures
		C—along wound
		D—around wound
III	Clear or haemoserous discharge	A—at one point only (<2 cm)
		B—along wound (>2 cm)
		C—large volume
		D—prolonged (>3 days)
IV	Pus/purulent discharge	A—at one point only (<2 cm)
		B—along wound (>2 cm)
V	Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration	

Southampton wound grading system