COMPARATIVE STUDY BETWEEN PFANNENSTIEL 
AND MID-LINE INCISIONS IN ELECTIVE 
CAESEREAN SECTION

BY

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M.D.FRCOG
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedication</td>
<td>1</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>11</td>
</tr>
<tr>
<td>List of Abbreviation</td>
<td>111</td>
</tr>
<tr>
<td>English Abstract</td>
<td>IV</td>
</tr>
<tr>
<td>Arabic Abstract</td>
<td>V</td>
</tr>
<tr>
<td>List of Figures</td>
<td>V1</td>
</tr>
<tr>
<td>List of tables</td>
<td>V11</td>
</tr>
</tbody>
</table>

## CHAPTER ONE
Introduction and Literature Review                     | 1    |
Objectives                                               | 31   |

## CHAPTER TWO
Patients and Method                                      | 32   |

## CHAPTER THREE
Results                                                   | 67   |

## CHAPTER FOUR
Discussion                                                | 80   |
Recommendation                                            | 85   |
References                                                | 86   |
APPENDIX(Questionnaire)                                   | 93   |
| Figure (1) Distribution of Mid –Line and Pfannenstiel incisions according to age | KNTH July 1997- March 1998 | ................................................................. | 29 |
| Figure (2) Distribution of Mid –Line and Pfannenstiel incisions by residence | KNTH July 1997- March 1998 | ................................................................. | 40 |
| Figure (3) Distribution of Mid –Line and Pfannenstiel incisions by mothers education level | KNTH July 1997- March 1998 | ................................................................. | 41 |
| Figure (4) Distribution of Mid –Line and Pfannenstiel incisions by mothers occupation | KNTH July 1997- March 1998 | ................................................................. | 42 |
| Figure (5) Distribution of Mid –Line and Pfannenstiel incisions by husbands occupation | KNTH July 1997-March1998 | ................................................................. | 43 |
| Figure (6) Distribution of Mid –Line and Pfannenstiel incisions by social class KNTH July 1997- March 1998 | ................................................................. | 44 |
| Figure (7) Distribution of Mid –Line and Pfannenstiel incisions by attendance at A.N.C. | KNTH July 1997- March 1998 | ................................................................. | 45 |
| Figure (8) Distribution of Mid –Line and Pfannenstiel incisions by level at attending of A.N.C. KNTH July 1997- March 1998 | ................................................................. | 46 |
| Figure (9) Distribution of Mid –Line and Pfannenstiel incisions by level of haemoglobin (gm) | KNTH July 1997- March 1998 | ................................................................. | 47 |
| Figure (10) Distribution of Mid –Line and Pfannenstiel incisions by birth weight in (kg) | KNTH July 1997- March 1998 | ................................................................. | 48 |
| Figure (11) Distribution of Mid –Line and Pfannenstiel incisions by types of wound infection in KNTH July 1997- March 1998 | ................................................................. | 49 |
| Figure (12) Distribution of Mid –Line and Pfannenstiel incisions by duration of operation in min. in primary C.S. KNTH July 1997- March 1998 | ................................................................. | 50 |
LIST OF TABLES

Table (1) Distribution of Mid–Line and Pfannenstiel incisions according to the wards.

Table (2) Distribution of Mid–Line and Pfannenstiel incisions according to Apgar score after one min.

Table (3) Distribution of Mid–Line and Pfannenstiel incisions according to virginity of the abdomen.

Table (4) Distribution of Mid Line and Pfannenstiel incisions according to operator.

Table (5) Distribution of Mid–Line and Pfannenstiel incisions according to delivery interval (S-D1) in min.

Table (6) Distribution of Mid–Line and Pfannenstiel incisions according to Skin-delivery interval in min primary C.S.

Table (7) Distribution of Mid–Line and Pfannenstiel incisions according to skin–delivery interval in min in repeat C.S.

Table Figure (8) Distribution of Mid–Line and Pfannenstiel incisions according to duration of operation in min in repeat C.S.

Table (9) Distribution of Mid–Line and Pfannenstiel incisions according to standard of healing.

Table (10) Distribution of Mid–Line and Pfannenstiel incisions according to details of bad Healing.

Table (11) Distribution of Mid–Line and Pfannenstiel incisions according to incidence of wound infection.

Table (12) Distribution of Mid–Line and Pfannenstiel incisions according to resuming.

Table (13) Distribution of Mid–Line and Pfannenstiel incisions according to duration of hospital stay in days.

Table (14) Distribution of Mid–Line and Pfannenstiel incisions according to types & does of post operative analgesia.

Table (15) Distribution of Mid–Line and Pfannenstiel according incisions to patients request for type of incision.

Table (16) this table demonstrates the causes of request for pfannenstiel incision.
TO MY FAMILY
TEACHERS
&
COLLEAGUES

DEDICATION
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Iam Thankful to many people for their help, assistance and suggestion. It is my great pleasure to thank my supervisor professor Abd Elsalam Geries for supervising the subject of this study. Iam also indebted to him for his suggestions criticism and valuable advice throughout the period of this study. Also wish to express my appreciation to my co-supervisor Dr. Mubarak El Bashir for his remarkable encouragement and endless support. Thanks are also extended to Mr. Ibrahim El Hassan who carried out the statistical analysis. The difficult task of typing and printing was carried by Mr. Al Hadi Al Abadi. Special thanks to him for his unlimited patience. I am very much graful to my friends and colleagues who helped me to execute this piece of work and to everybody whom I didn't mention.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
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<td>Abd.</td>
<td>Abdomen</td>
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<tr>
<td>A.N.C</td>
<td>Ante-natal Care</td>
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<tr>
<td>B.O.H.</td>
<td>Bad obstetric History</td>
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<td>B.P</td>
<td>Blood pressure</td>
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<tr>
<td>C.P.D.</td>
<td>Cephalo – pelvic Disproportion</td>
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<tr>
<td>C.S</td>
<td>Caeserean Section</td>
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<tr>
<td>D.M</td>
<td>Diabetes Mellitus</td>
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<tr>
<td>E.D.D</td>
<td>Expected Date of Delivery</td>
</tr>
<tr>
<td>E.L.C.S</td>
<td>Elective Caeserean Section</td>
</tr>
<tr>
<td>E.M.C.S</td>
<td>Emergency Caeserean Section</td>
</tr>
<tr>
<td>G.EX.</td>
<td>General Examination</td>
</tr>
<tr>
<td>G.I.L.</td>
<td>Gastro- Intestinal Tract</td>
</tr>
<tr>
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<td>Gram</td>
</tr>
<tr>
<td>H.B.</td>
<td>Haemoglobin</td>
</tr>
<tr>
<td>H.I.V</td>
<td>Human – Immunodeficiency Virus</td>
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<td>H.T</td>
<td>Heart</td>
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<tr>
<td>H.W.</td>
<td>House – wife</td>
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<tr>
<td>Kg.</td>
<td>Kilo – gram</td>
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<tr>
<td>K.N.T.H</td>
<td>Khartoum north Teaching Hospital</td>
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<tr>
<td>L.L.</td>
<td>Lower limb</td>
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<td>L/S.</td>
<td>Lecithin – sphingomyelin ratio</td>
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<td>Min.</td>
<td>Minute</td>
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<tr>
<td>M.O.</td>
<td>Medical – officer</td>
</tr>
<tr>
<td>M.R.I.</td>
<td>Magnetic Resonances Image</td>
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<td>N0.</td>
<td>Number</td>
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<td>Obst.</td>
<td>Obstetric</td>
</tr>
<tr>
<td>Pfannen.</td>
<td>Pfannenstiel</td>
</tr>
</tbody>
</table>
### III

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.R</td>
<td>Pulse Rate</td>
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<tr>
<td>S-DI.</td>
<td>Skin – Delivery Interval</td>
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<tr>
<td>U.K.</td>
<td>United Kingdom</td>
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<tr>
<td>U/S.</td>
<td>Ultra –sound</td>
</tr>
<tr>
<td>V.V.F.</td>
<td>Vesico Vaginal Fistula</td>
</tr>
<tr>
<td>W.T.</td>
<td>Weight</td>
</tr>
</tbody>
</table>
ABSTRACT

Comparative study between mid-line and pfannenstiel incisions in elective caesarean section was carried out at Khartoum North Teaching Hospital in the period from July 1997 to March 1998. The study was carried out on 128 elective C.S 64 with pfannenstiel incisions compared to another 64 with mid-line incisions. The main objective is to assess the difference between the two approaches in terms of delivery interval, incidence of infection, standard of healing and duration of hospital stay.

All elective caesarean sections, term (completed 37 weeks gestational age and more), viable singleton, carried out by consultants or registrars as lower segment C.S are the subjects of this study. The criteria for exclusion from the study were emergency C.S, upper segment C.S, multiple pregnancy, intra uterine foetal death prematurity and the operations carried out by medical officers and house officers. The study is not limited by age, ethnic group, residence or the socio-economic condition. The study showed significant difference in the delivery interval which is more shorter with mid-line incisions, it is between (3-5 min) compared to (6-8 min) by pfannen incisions in most of the operations.

Although the delivery interval is significantly difference between the two groups, The study showed no difference in apger score (between 7-10).

The duration of operation is also shorter with mid-line incisions compared with pfannen incisions.
There is no difference in standard of healing between the two groups.

The incidence of infection is equal (4.69%), but more severe following pfannen. incisions.

Duration of hospital stay is shorter with pfannen. incisions (5 days) compared to (8 days) with mid-line incisions.
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CHAPTER ONE
INTRODUCTION AND LITERATURE REVIEW

Definition of Caesarean Section :-
C.S denotes the delivery of foetus, placenta and membranes through an incision in the abdominal and uterine walls (1).

Incidence :
Since the mid seventies the incidence of C.S increased steadily in the western world (2).
In United States it is now considered to be the tenth most common surgical procedure (3), the rate increased from 4.5% in 1965 to 23% in 1985 to almost 25% in 1988. In 1990 the rate was 22.7% for the 4.19 million live birth (4).
In U.K the rate increased from 4.9% in 1964 – 1966 to 8.9% in (1979-1981) (5). In most of the centers the figure varies between 8-9% (6). This increased rat due to liberal use of C.S. for prematurity, abruption placenta, more reliance on monitoring (7) and the request of women who believe that C.S allows to maintain their anatomy and physiology, avoid pain, no need for support during labor and the infant at less risk than vaginal delivery (8).

Indication of C.S:
It is influenced by the facilities available and the general policies pertaining in a unit or community, with special consideration of the relative risks for mother and foetus.

Faults in the birth canal:
- Cephalo - pelvic disproportion or fibromyoma.
- Cervical or vaginal stenosis.
- Double uterus: obstruction may occur because

the un impregnated horn lies below the presenting part.
Successful repair of fistula specially V.V.F and stress incontinence.
Ca Cervix.

**Foetel Mal Presentation:**
- Brow presentation.
- Impacted mento - posterior face presentation.
- Shoulder presentation.
- Breech presentation - It is now performed in 30% of cases, it should be advised if the mother has been infertile or has an adverse obstetric history, has small pelvis, large foetus or indeed has any additional complication.

**Abnormal Uterine Action:**
In many cases of abnormal uterine action there may also be some mechanical difficulty, and the precise diagnosis of the cause of delay may be uncertain.
- A.P.H: C.S is indicated in certain cases.
- Fulminating P.I.H: in other cases of hypertension and renal disease, section is performed in the foetal interest.
- Foetal indication:
- Cord prolapse: When there is no chance for immediate vaginal delivery.
- Foetal distress especially in first stage of labour.
- B.O.H
- Placental insufficiency.
- Postmortem: to save the live of the baby.
- Repeat C.S.: If the Previous scar was done for permanent cause, classical, weak scar or more.
than one scar or the present pregnancy associated with twins, marked polyhydramnoise, big baby, breech, severe hypertension or sign of threatened rupture. The leading indications for C.S. in Jimma Hospital Ethiopia were C.P.D, mal presentation and mal position, repeat C.S., A.P.H. and foetal distress. These indications accounting for 95% of the causes of C.S. (8). These were the same indication at Yakutat hospital in Addis Ababa (9). And in Prince of Wales Hospital in Hong-Kong (10).

The changing trend of indication of C.S is related mainly to the change in the departmental management rather than to any change in patients characteristics (11).

**Contraindication of C.S. :-**
There is no absolute contraindication for caesarean section. The major contraindication is absence of an appropriate indication (1).

**Timing of EL C.S. :-**
It depends on two main factors :-
- Foetal condition.
- Foetal maturity (by calculation E.D.D. examination and investigation such as U/S, plain X-ray for ossification centers and amniocentesis for L/S ratio phosphatidylglycerol, creatinin level and Nile blue Test) (12). If EL.C.S. performed in the week 39 +0 to 39+6, a significant reduction in neonatal respiratory morbidity is obtained (13).
Preparation for C.S.:

When EL. C.S. is decided upon, full explanation and discussion with patient enables her to resolve her worries and doubts as well as to plan her domestic arrangements. In some cases sterilization also will need to be considered and as far as possible the patient should be informed of the likely course of any future pregnancy to help her in her decision.

Haematological investigation include haemoglobin estimation and blood grouping as well as haemoglobin typing in whose ethnic origins make them more susceptible to haemoglobinopathy. Whenever possible donor blood should be crossed matched and immediately available. Advice on pre-operative breathing exercises and avoidance of smoking should also be given.

Anaesthesia:-

Problems of anaesthesia with C.S.:-

• C.S. may have to be done either as elective or emergency procedure.
• The gastric emptying is delayed specially if the patient in labour, so proper measures should always be taken to prevent aspiration of stomach contents.
• There may be un-expected haemorrhage as ante-partum or post-partum haemorrhage for various reasons.

• Respiratory, cardiovascular or metabolic
• derangement of the mother badly affects the baby.
• Many drugs pass through the placental barrier and influence the physiology of the baby. Good muscular relaxation is needed (Relaxation of voluntary muscle but not the uterine muscle)
  • Absolute safety of the mother and baby needed.
  • Psychic trauma to the mother should always be avoided.
- Hypoxia, hypercarbia and hypotension should be avoided.
- Position of the pregnant patients greatly influences cardiac output by augmenting vena caval occlusion. Patient in supine position may cause a sharp fall in cardiac output as much as 50% ultimately leading to sudden hypotension. This condition known as supine hypotension syndrome due to aortic compression by the gravid uterus. This may aggravate foetal distress by further reduction of blood flow. As a safety precaution such patients should left lying in the lateral position tilted with 15 wedge before induction of general anaesthesia or following regional analgesia.

**Type of Anaesthesia:**
Pre-anaesthetic preparation include fasting at least 6 hours, antacids, $H_2$ antagonist as needed and diazepam if required.

### (1) General (endotrachial) Anaesthesia:
**Advantage :-**
- Adequate relaxation can be provided.
- Aspiration of food, vomitus, blood and mucous are prevented.
- Resuscitation can be better performed.

**Disadvantage :-**

**Operative Complication :-**
- Wrong intubation.
- Breathing holding apnea.
- Cardiac arrhythmia and cardiac arrest

**Post-operative complication :-**
- Sore throat.
- Infection: Laryngitis, tracheitis, trachiobronchitis, pneumonia aspiration pneumonitis, broncho pneumonitis, atelectasis and lung abscess.
- Oedema of the glottis.
- Surgical emphsema.

**(11) Regional Anaesthesia :-**

It is increasing in popularity as the mother feels that she is involving in the birth of her child, can be applied to patient with respiratory, liver, heart and kidney diseases in addition the uterine tong is not affected. but it may cause sever fall in blood pressure. Gas embolism may occur during C.S. and it is more common in regional anaesthesia than...
general anaesthesia and it is found that it occurs between incision and delivery. Both rupture of membranes and protracted uterine incision to delivery interval predispose to embolism (15).

**(111) Local Infiltration Anaesthesia :-**  
Indicated if the patient is medically unfit for general anaesthesia or the facilities for regional anaesthesia are not available.

**Apgar Scoring System :-**  
It is a numerical index of the viability of the new-born after completion of child – birth.

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<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
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<tbody>
<tr>
<td>Heart Rate</td>
<td>Absent</td>
<td>&lt; 100 /min</td>
<td>&gt; 100 /min</td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>Absent</td>
<td>Weak crying</td>
<td>Good crying</td>
</tr>
<tr>
<td>Muscle</td>
<td>Flaccid</td>
<td>Some flexion of limbs</td>
<td>Well flexed</td>
</tr>
<tr>
<td>Reflexes</td>
<td>no response</td>
<td>grimacing</td>
<td>Cough or sneeze</td>
</tr>
<tr>
<td>Colour</td>
<td>Blue Pale</td>
<td>Pink body, blue Extremities</td>
<td>Pink</td>
</tr>
</tbody>
</table>

The baby should be evaluated through this score after one and Five minute. A baby with an apgar score of 7-10 usually require No assistance except prevention of airway obstruction, but a baby with score less than 7 will require varying degrees of assistance. (5)(12)(16).
Operative Technique :-

Abdominal incision:

There are two main abdominal incisions:

A Transverse incision of Pfannenstiel:

It is about 12-15 cm in the natural fold of skin that is found just above the hair-bearing area of the mons veneris. The rectus sheath is incised transversely and parietal peritoneum is incised vertically.

Advantage:

- Cosmetic: The cosmetic result is incomparably superior and the scar may be so nearly invisible as to baffle the eye of the most discerning (17)(18)(19). The mean scar width is narrower in Pfannenstiel than in midline incision (20).
- Heals better because it has good blood supply (5),(6).
- You can easily palpate the fundus of the uterus during the first few post-operative hours (6).
- Stronger with less likelihood for dehiscence (4).
- Long term complications such as endometriosis and hernias are rare (21).

Disadvantage:

- From the neonatal standpoint; there is slight longer extraction time. In spite of that there is no bearing on the condition of the child at birth (22). Approach to abdominal cavity in Em.C.S.by Pfannenstiel incision take about
two minutes to one and half minutes (18).
- Inability to extract the incision superiorly to improve access (19).
- Post-operative pain is greater, this is probably related to forceful retraction with self ret actor (19).
- Repeat operations become increasingly difficult (19).
- More prone to collect an effusion of blood or serum at the triangular dead space under the upper flap. If this becomes infected Tho-lection is slow to discharge and clean up. Suction drainage may obviate this complication (19).
- Ilio hypo gastric nerve may be injured with reflected visceral pain in their dermatomes (22).

(A) **Vertical low mid-line incisions:**
It is vertical incision from infra - umbilicus to the supra- pubic part, the rectus sheath and the parietal peritoneum are incised vertically.

**Advantage ;**
- Simple .
- Quicker.
- Can always be extended (19).

**Disadvantage:**
- Weak scar liable to herniation, dehiscence and rupture.
- Difficulty in palpating the fundus of the uterus few hours post-operatively.
Para median incision:-
It is a vertical Para-median incision in which one third of the incision above the umbilicus and two third of it below the umbilicus. The erectus sheath and the parietal peritoneum are incised vertically. Have the same advantages and disadvantages as low mid line incision. Can be used for classical C.S. (23)

Uterine Incision:-

(1) classical C.S. :-
In which a vertical incision is done into the body of the uterus from above the lower uterine segment to the fundus of the uterus.

Disadvantage :-
- Excess blood loss.
- Promote adhesion to bowel and omentum.
It is likely to rupture during labour.

Because of these disadvantages, classical C.S. is indicated in :
- Inaccessibility of lower uterine segment as in massive adhesions and scarring from the previous C.S., presence of tumors specially fibroids and gross kyphoscoliosis when the uterus is acutely ante flexed and activated.
- Post mortem: for rapid delivery of the baby.
- Preterm: prior to 32 weeks, the lower segment is hardly formed so the access is poor. Also the foetus is very small and may be delivered with less risk of trauma.
- Impacted shoulder presentation.
Constriction ring: This is only likely to occur in neglected labour. Alongitudinal classic incision can be extended through the constriction ring. Following renal transplantation: as this kidney will be pelvic organ.

**Caesarean Hystrectomy:**
It is indicated in intra-uterine infection, a grossly defective scar, a markedly hypotonic uterus that does not respond to oxytocin, prostaglandin and massage, laceration of major uterine vessels, large myomas, severe-
cervical dysplasia or carcinoma in situ and placenta accreta or increta (4). Increased vasculavity of the lower segment and the presence of placenta praevia are not normally of themselves indication for classic section.

**(11) Lower Segment C.S:**-
In which a transverse incision is done in the lower segment which is identified by the loose fold of visceral peritoneum which is reflected from the bladder and becomes attached to the uterine wall. Both the visceral peritoneum and uterine wall incised transversely. It is easier to repair, less blood loss, least likely to rupture or promote adhesions to bowel or omentum.

**Delivery of the Foeetus:**-
In classical C.S. the baby is usually most easily delivered by the breech irrespective of the presentation. In lower segment C.S. when the head presents, a hand is passed below and behind the head to act as a vectis and guide.
it through the incision. Short forceps of the Wrigley or straight Simpson type can be applied to facilitate controlled delivery. Fundal pressure may be exerted by an assistant but is rarely necessary. All other presentations are most readily delivered by the breech.

**Delivery of the Placenta :-**
An ecbolic agent (Ergometrin 0.25 mg or syntocinon 5 units) is given I. V. when the head is delivered and the placenta is delivered by cord traction when the uterus contracts (5).

**Uterine Closure :-**
In classical C. S. as the uterine wall is thicker than that encountered in the lower segment operation, uterus closed by 3 layers of catgut sutures. The first suture layer interrupted, mattress sutures are preferable to a continuous suture. A third suture layer is required for the outer shell of myometrium and the peritoneum.

In lower segment C. S. the uterus is sutured in 2 layers, the first continuous suture incorporates the inner two thirds of myometrium, and the second suture the outer two thirds. Try to avoid incorporating any decidua in the suture line. This hampers healing by fibrosis and makes for a weak scar, also it may give rise to endometriotic deposits (5).

**Elective Procedures Coincidental to C.S :-**
- **Tubal ligation :-**
  Indicated when the repeat C.S is risky for the patient or for medical reasons. It is never done just to give an opportunity of sterilization the patient. The irreversible nature of the operation must be explained
to both the patient and her husband who should both sign consent. Because it is not possible to guarantee that any baby will survive and thrive, it may be wise to postpone it until the baby is 4-6 months old when it can be done by laparoscopy unless there are strong reasons for sterilization (1).

**Myomectomy :-**

Only the pedunculated fibroid can be removed during C.S. The sessile fibroid and the intra-mural fibroid may provoke intense haemorrhage or even uncontrollable haemorrhag.

- **Ovarian cystectomy :-**

  If this tumor obstructing labour, the best treatment is to deliver the baby by C.S. and to remove the tumor before closing the abdomen (24).

**Appendectomy :-**

Should not be performed routinely at the time of C.S., it may result in peritonitis and obstruction (1).

**Duration of the operation :-**

Most C.S. should completed in less than one hour unless significant technical problems are encountered.

The longer the operative procedure, the greater the likelihood of post-operative complication (1).

Duration of the operation can be shorter by a simple surgical procedure in which the peritoneum (visceral and parietal) is left unsutured (25).

Joel Cohen method of C.S. by suturing the uterus in one layer and non closure of the visceral and parietal peritoneum layers is not only shorter the duration of operation but has lower risk of short or later term complication (14).
Post-operative Care: -
The vital signs are evaluated every hour for the first 4 hours then every 4 hours for the rest of the day (pulse, blood pressure, urine flow, amount of bleeding and status of uterine fundus). 3 liters of fluids should prove adequate during the first 24 hours. The bladder catheter most often can be removed by 12 hours after operation. By the day after surgery the patient with assistance should get out of bed briefly at least twice. Post-operative sedation and analgesia is given. The maternal Post-operative pain is a subjective matter, and can be assessed visually, and the amount of post-operative analgesia can be reduced if uterine incision closed in one layer when compared with double layer closure (26) (27).

Role of Antibiotic Prophylaxis: -
Over the last two decades many studies have addressed the rule of antibiotic prophylaxis in pelvic surgery, including C.S. (28). The majority of these studies have shown a marked reduction in the incidence of Post-operative febrile morbidity after C.S. (29) especially in the incidence of endomyometritis and wound infection. However, the incidence of post-operative infection of the respiratory or urinary tracts is not significantly reduced by the use of antibiotic prophylaxis. There are however some points which should be borne in mind prior to recommending a policy of universal antibiotic prophylaxis: -
Only small group of women undergoing C.S. have enough risk factors to justify the use of prophylactic antibiotics, as those with prolonged labour, premature rupture of membranes, repeated vaginal examinations, those who have undergone invasive methods of monitoring, trial of forceps, suspected break in sterilization and maternal disease such as heart disease. Those women may be identified using either clinical or laboratory criteria. Most infection following C.S. are mild, and if antibiotic is given, are given only when there are clear clinical signs of infection, the morbidity suffered by the patients is minimal. Endometritis, urinary tract infection, respiratory tract infection (even including pneumonia), wound infection, especially with increasing maternal weight. They respond to antibiotic therapy promptly, with early diagnosis and treatment. However, there are unfortunately sequelae (infertility, wound dehiscence and probably increase risk of uterine ruptures in subsequent pregnancy in some cases). Antibiotic prophylaxis will probably reduce the risk of serious infections morbidity following C.S. With universal routine antibiotic prophylaxis there is increase risk of the following:

- Adverse drug reaction and even fatal anaphylaxis.
- The development of drug resistance organisms.
A bactriological shift in patients who receive antibiotic prophylaxis has occurred and enterococcous endomyomerritis is increasing in the group. If prophylaxis is initiated prior to claping of the umbilical cord these can lead to unnecessary investigations of the new born.

Many paediatricians will perform a full infection screen and some might initiate antibiotic therapy for fear of overlooking a masked infection. The routine use of antibiotic prophylaxis might give the medical staff false sense of security and lead to sloppy scrubbing and or surgical techniques.

**When prophylaxis is used, the following guide lines are recommended:**

- It should be delayed until the umbilical cord is clamped to avoid passage of the antibiotic to the foetus.
- Short course of antibiotic (33) or single dose given parent rally (34) is better because it's application is easier, safety in its administration and reduce the risk of adverse reactions.
- There is no significant differences between the narrow spectrum and broad spectrum antibiotic (35).
- The antibiotic used should be known on the basic of both laboratory and clinical evidence to be effective against some of the possible intra-operative contaminants and clinical infections. The antibiotic should be relatively safe and not expensive.
First generation Cephalosporin's, Amoxicillin,

16
Clavulanic Acid (36), or Metronidazole generally fulfill these criteria – They should be preferred to the new antibiotics. Fortum is very effective in heavy infection following C.S. (37). When prophylaxis fails, full bacteriological screening should be carried out and the laboratory should be informed of the antibiotic the patient has already received. It is preferable to wait for bacteriological results (if clinically possible) prior to starting antibiotic therapy. If this is not possible, a broad spectrum antibiotic combination should be used and the possible bacteriological shift of the patient flora should be taken into account.

Maternal Morbidity and Mortality:-
• The maternal morbidity and mortality after C.S. is several times greater than after vaginal delivery. In the third world environment it carries a substantial risk of operative and post-operative complication (38).

The risk of mother is affected by:
• Indication for C.S.
• Skill of surgeon and anesthetist.
• Whether the operation is elective or emergency (39).
• Health of mother before and during labour.
Length of labour.
Any attempts for delivery.

Immediate risks:
• Anaesthetic Complication
• Blood losses:
The average blood loss in C.S. about one liter. The blood losses may be intra-operative or post-operative. Sever secondary post-partum haemorrhage may occur even in the 2\textsuperscript{nd}, 3\textsuperscript{rd}, or 4\textsuperscript{th} week (40).

- **Injury of Urinary System:**
  Ureters may be caught up by sutures. Bladder may be damaged when it is high by adhesion from previous operation. Fistula may result when the bladder gets caught up in the uterine suture line, which can be avoided if it is detected and repaired properly during the operation (41).

- **Injury of G.I.T.:**
  Injury of the intestine becomes uncommon by lower segment C.S. Distension and paralytic ileus may occur.

- **Hystrectomy:**
  May follow uncontrollable haemorrhage.

- **Thrombo Embolism:**
  The risk increase with maternal age, parity, obesity and blood group O (42), D.M., sickle cell haemoglobinopathy, dehydration, Blood loss, pelvic infection and delay in mobilization. Amniotic fluid embolism 90/min. following C.S. may occur (43).

- **Risks of blood Transfusion:**
  Only homologus blood group (i.e. of the same ABO and Rhesus group as the patient) should be used for transfusion. To detect rare incompatibility involving other group systems, cross matching between the donors red cells and the recipient serum must be performed by a reliable and sensitive technique.
Complications of blood transfusion occurs especially if the operation carried out as E.m C.S (44).

These risks may be :
- **Reaction of blood transfusion** :
  
  18

  - **Haemolytic reaction**.
  This follows the giving of incompatible blood or blood already partially haemolysed by freezing, heating, infection or prolonged storage.

- **Febrile reaction** :
  Due to bottle contamination.

- **Allergic Reaction** :
  Circulatory overload and pulmonary oedema
  Air – Embolism
  Transmission of diseases such as malaria, syphilis, H.I.V. and hepatitis.

**Infection** :
The risk of post-operative febrile illness due to infection is nearly ten times higher compared with vaginal delivery (45). There is an added problem of accurate diagnosis of infections. Fever alone occurs in about 20% of women delivered abdominally (46). The etiology of such pyrexia is unclear, but can be due to post-operative dehydration or to mild spontaneously resolving endometritis. A further difficulty in reaching an accurate diagnosis arises from the problem of interpreting the results of bacteriological swabs.

The normal flora of the vagina and the cervix consists of many organisms, some of which although frequently found are potentially pathogens (47)(48)(49).
The overall reported incidence of post caesarean infection varies between institutions, ranging from 13 to 15%. The most commonly diagnosed infection is endomyometritis with an incidence ranging between 6 to 10% of patients undergoing C.S. This diagnosis is usually based upon pyrexia lasting for more than 24 hours post-operatively, associated with uterine tenderness and foul smelling lochia. Some added that to make the diagnosis with confidence, no other cause of pyrexia should present.

Urinary tract infection are next communist with an incidence ranging between 3 and 8% especially if urinary catheter is left in situ after surgery (44). The definition of urinary tract infection also varies and usually includes a combination of urinary symptoms, renal angle tenderness and positive bacteriuria, although this diagnosis is sometimes reached on the basis of pyrexia and the presence of a urine bacterial count greater than 100,000 per ml, even in absence of urinary symptoms. It is however recognized that 2.6% of pregnant women exhibit significant bacteriuria (50).

The definition of wound infection is also variable and includes cellulites, wound leakage, a purulent wound and dehiscence. The incidence of wound infection following C.S. ranges between 2 and 7%.

Significant infections of the upper respiratory tract are reported in about 2% of mother delivered by C.S. Classical C.S. are reported to be associated with a higher incidence of infection than the lower segment operation with a correspondingly higher mortality rate (51). There
is a significant higher frequency of post-partum fever following classical section with no significant different with low segment transverse incision in the incidence of endomyometritis, sepsis and wound infection (52).

Microbiology :-
Endomyometritis:
Endomyometritis is usually a polymicrobial infection caused by aerobic and anaerobic bacteria of the genital tract the most common pathogens isolated from patients with endomyometritis are Escherichia coli and anaerobic streptococci. Some organisms recovered from women with endomyometritis are more virulent than others (53). While highly virulent organisms are frequently found in swabs taken from amniotic fluid, uterine cavity or wound during C.S. than are organisms of low virulence, their isolation is strongly associated with the subsequent development of endomyometritis. The role of genital mycoplasmas (Mycoplasma hominis and Ureaplasma Urealyticum) is unclear. Mycoplasma was isolated from blood culture of febrile but not from afebrile post-partum women (54). U. urealyticum isolated from the amniotic fluid, uterine cavity or wound of women undergoing C.S. was associated with febrile morbidity (55). Mycoplasma are, however, usually isolated from women with coexisting highly virulent organisms, so their presence may merely represent a co-factor or a marker in post-C.S. endomyometritis. The same can also apply to
Chlamydia trachomatis. Anti-partum cervical carriage of Chlamydia seems to predispose to endomyometritis (56).

### Organisms isolated from women with post – S.C.endometritis

<table>
<thead>
<tr>
<th></th>
<th>Gram- positive</th>
<th>Gram-Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aerobic organisms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High Virulence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A Streptococci</td>
<td>E.Coli</td>
<td>Proteus SPP</td>
</tr>
<tr>
<td>Group B Strept Viridians.</td>
<td>Klebsiella</td>
<td></td>
</tr>
<tr>
<td>Strept Pyogenes</td>
<td>Enterobacter</td>
<td></td>
</tr>
<tr>
<td>Enterococci(Strept faecalis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low Virulence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lacto bacilus spp</td>
<td>Neisseria spp</td>
<td></td>
</tr>
<tr>
<td>Diphtheriods</td>
<td>Pseudomonas</td>
<td></td>
</tr>
<tr>
<td>(Gardenlla Vaginalis of low virulence and is Gram variable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anaerobic organisms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High Virulence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaerobic streptococci</td>
<td>BACTERIODES</td>
<td></td>
</tr>
<tr>
<td>Clostridia</td>
<td>Fusobacterium</td>
<td></td>
</tr>
<tr>
<td><strong>Low Virulence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actinomyces</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Urinary Tract Infection:**
In the vast majority of cases (85-90%) the pathogen is E.Coli other organisms causing urinary tract infection are proteus mirabilis , Klebsiella . Enterobacter,Streptococcus,faecalis, staphylococcus albus and other coliforms. Occasionally urinary tract infections are due to mixed organisms.

22

Wound Infection :-
Wound Infection after C.S. are caused either by cervical or vaginal organisms , usually in association with endomyometritis or by staphlococcus aureus . S. aureus infection do not usually originate from the endometrium and are probably largely iatrogenic , arising from the patients skin flora or from exogenous sources . (Surgical personnel).

Risk Factors :-
Not all women undergoing C.S. are at equal risk of post-operative infarctions. Factors considered to be associated with an increased risk include the following :-

Duration of labour prior to operation :
This is probably the most significant risk factor (57).The increased risk is likely to be due to uterine muscle ischaemia which occurs during labour . While rupture of the membranes is undoubtedly a risk factor in the a etiology of infection , it is interesting to note that , among women delivered by C.S. when the membranes are intact , there is an increased risk of post-operative endomyometritis among those in whom labour had become established , compared with those delivered electively before the
onest of uterine contractility (58). The longer the duration of labour prior to operation, the higher is the risk of infection.

Duration of rupture of the membranes:
Rupture of the membranes is a very significant risk factor for post-C.S. infection (55). The duration of membrane rupture prior to the operation has been shown to be directly proportional to the incidence as well as to the severity of post-operative endomyometritis, wound infections and positive blood cultures (59). Studies have shown that the amniotic cavity becomes colonized with bacteria within six hours of rupture of the membranes (60). And that a positive associated with a high incidence of post-operative infectious morbidity.

Type of Anaesthesia:
Women having a general anaesthesia for C.S. have been shown to be at higher risk of post-operative infections than those receiving regional anaesthesia (30). However, this appears to be mainly due to the characteristics of the women having a general anaesthetic, the majority of whom are urgent cases, often delivered after prolonged obstructed labour with long duration of rupture of the membranes and after several vaginal examinations.

Vaginal examination and internal electronic fetal Monitoring:
The number of vaginal examination following rupture of membranes correlates closely with risk of endomyometritis and wound infection (58).(61). Since the introduction of internal foetal heart rate monitoring and its increasing use, worries have been expressed about the risk of maternal infection as a consequence of this technique. The majority of studies addressing this question have concluded that patients with internal foetal monitoring are at no greater risk of infection than comparable patients following a similar duration of labour and rupture of the membranes but without internal monitoring (62).

Other Factors:
Other identified risk factors include maternal anaemia (30). (58). post-operative haemoglobin less than 9.5 gm is significantly associated with infections (34). This might be due to decreased host resistance and increased uterine ischemia in anaemic women. Post-operative wound infection are more common in obese women. A younger maternal age and lower social class have also been associated with increased infectious morbidity. The chances of post-operative infection are significantly increased where there is a combination of more than one risk factor.

(11)Later Risks:
• Incisional Hernia:
It occurs most often in obese patients, and a persistant post-operative cough and post-operative abdominal distention are its precursors.
Adhesive Intestinal obstruction;
Intestinal obstruction from adhesions is now exceeding rare since the upper segment operation has been given up.

Infertility: -
This may be due to post-operative infection involving the tubes.
•  Rupture of Scar: -
May occurs during pregnancy or labour. More common with classical C.S. than lower segment C.S.
•  Difficult Repeat C.S.: -
Due to adhesions from the previous C.S.

Scar Endometriosis and Carcinoma: -
Endometriosis arising in a scar of C.S. very unusual. It is rare for primary endometriod carcinoma to develop in caeserean Scar (63).

Maternal Mortality following C.S.
There is no correlation between increasing section rate and maternal mortality (64). It is more frequent in Em. C.S. than EL. C.S. (39). Major causes of maternal death following C.S. are haemorrhage, anaesthesia, pulmonary embolism, sepsis, hypertensive disorders and hepatic failure (65).(66).(67).(68).
Maternal death rate can be reduced by appropriate ante-natal care, early booking, enforcing rigid aseptic surgical techniques and providing qualified anaesthetists. (66). (65).

Perinatal Morbidity and Mortality: -
The frequency of perinatal morbidity and mortality will depend on the underlying reason for C.S., gestational age of the foetus, condition of the foetus and the procedure performed during C.S. (4).

From the main causes of foetal losses following EL. C.S. are infant weighed less than 2 kg and asphyxia brought on by prematurity (69)(70). Infants delivered by EL. C.S. are at increased risk for developing respiratory problems and transiet tackynnea (71).

C.S. prodispose to R.D.S only for babies born before 37 weeks.

The foetus affected by the induction delivery interval which will affects the p.H of the foetus (Acidosis) that will be reflected on the Apgar score (72). There is a considerable influence on the neonatal status if the U.DI (Uterine incision to delivery interval) of more than 150 seconds (73).

The type of uterine incision (Transverse or longitudinal) and whether small or large represent risk factors for the foetus.

This may result in injury of the foetal spinal cord or brain, fracture of femur, fractures of the limb bones and depressed skull fracture. The so called ping pong fracture of the foetal skull may occur when the head is being lifted out of the pelvis or pushed up from below. We must adopt the incision that creats greater space for a traumatic extraction of the foetus. (4)(74).

The Foetus may be injured by the scalpel at any part of his body if a careless uterine incision is done. (1).
If the placenta encountered beneath the uterine incision, foetal hypoxia will develop (1).

Aspiration of amniotic fluid may occur during attempt at delivery (1).
Babies delivered by C.S. have less mean thoracic gas volume than those delivered vaginally. This is due to excess of lung fluid in the babies born by C.S. (75).
Activation markers of blood coagulation and fibrinolysis are elevated following C.S. when compared with vaginal delivery (76).

Delivery by C.S. prevents neonatal herpes (77) and decrease risk for sepsis when compared with routine vaginal delivery (71).

**Stay in Hospital:**
Unless there is complication during puerperium, the mother can be safely discharged from the hospital on the 3rd or 4th post-operative day with restriction of her activities during the following week to self care and care of her baby with assistance and to be evaluated during the 3rd week after delivery rather than at the more traditional time of 6 weeks (4).

**Caeserean patients can be discharged on post-operative day when meet certain criteria:**
- Uncomplicated pregnancy.
- Uncomplicated surgery.
- Pfannenstiel incision.
- No febrile morbidity.
- Ascultation of active bowed sound.
- Stable vital signs.
- Ability to ambulate without assistance.
- Ability to urinate without assistance.(78)

The length of post-operative C.S. hospital stay can be shortened by simple surgical procedure in which the peritoneum (Visceral and Parietal) is left unsutured.(25).

Early oral hydration after EL.C.S. can shorten the hospital stay and it is associated with successful breast feeding and less side effect.(79).

• **Wound Healing** :-
  Healing of the wounds occur either by first intention or by secondary intention.

  **Healing by first intention** :-
  In which the anatomical layers of the clean wound is re-united (e.g. by sutures) which leads to rapid resurfacing of the wound.

  **Healing by secondary intention** :-
  Occur when the wound edges not brought together, become infected or there is skin lost, this leads to slow resurfacing of the wound.

  Granulation tissue is composed chiefly of firm capillary loops and fibroblast cells which produce the collagen fibres that make the scar.

  The tensile strength only approaching that of a normal tissue after 6 months and 100% completion raking as long as 2 years.

**Factors affecting healing of wounds are:-**

**Local Factors :-**

  **Technique of wound closure :-**

  - accuracy of apposition.
• amount of suture material.
• Tissue tension which affect the local blood supply.

29

• **Suture Material:**
  There is no suture material whose employment absolutely guarantees against rupture. The survival of catgut varies considerably in different patients and dissolution is accelerated in the presence of infection. Synthetic high polymer sutures are immune to proteolytic enzymes and preserve tensile strength much longer as well as provoking much less tissue reaction.
  - Local infection
  - Haematoma formation.
  - Blood supply to area
  - Local irradiation

• **General Factors:**
  - D.M.
  - Malignant disease
  - Anaemia and malnutrition
  - Uraemia
  - Jaundice
  - General infection
  - Cyotoxic drugs and steroids
  - Vitamine deficiency (Vit A for epithlization and Vit C for Collagen)(80).

Uterine incision heals by regeneration of the muscle fibers but can heals by fibroblast proliferation if its edges is un-opposed, infected or without good
haemostasis (12). The maturation time of myometrial scar tissue in uncomplicated C.S. which can be evaluated by M.R.I. is approximately 3 months were the complete involution and the recovery of the normal need at least 6 months (81).

CHAPTER TWO
OBJECTIVES

The objective of this study to assess the difference between the Two approaches (Pfannen. and mid – line incisions) in terms of :-

* Delivery interval.
  ● *Incidence of infection.
  ● *Standard of healing.
  ● *Duration of hospital stay.
Patients and Method

This is a prospective study comparing between pfannenstiel and mid-line incisions in EL C.S.

Area of study:
The study was conducted at Khartoum North Teaching Hospital K.N.T H, which is one of the four main teaching hospitals in Sudan. K.N.T.H was constructed in the year 1950 and it serves a wide area of the state of Khartoum.
The number of beds are 70. 50 beds for obstetrical cases and 20 for gynecological cases.
There are four referred A.N.C clinics. Most of the patients who attend the clinics from Khartoum North Town and from the rural area around the city. The hospital provides 24 hours emergency service receiving both booked and un-booked cases are referred from private clinics, A.N.C clinics, health centers, brought by village mid-wives or come on their own.
The hospital is staffed by resident registrars, medical officers, house officers and trained mid-wives.
The consultant on duty is called whenever needed.

Time of Study:--
The study was carried out during the period extending from July 1997 to March 1998.

Inclusion Criteria: -
The studied population included all pregnant ladies who were planned for E.L.C.S without limitation of age, ethnic group, residence or socioeconomic conditions. The studied population were selected according to the following: singleton, at term (37 weeks calculated from the first day of the last normal menstrual cycle) foetal heart heard, patient should not be in labour and the operation carried out as lower segment C.S by consultant or registrar.

Exclusion Criteria:
Certain patients were excluded from the study. These included any pregnant lady who underwent C.S with multiple pregnancy, gestational age less than 37 weeks, any lady with non viable foetus, any lady in labour, if C.S. done as classical and any C.S. done by medical officer or house officer.

Data Collection:
A detailed standardized questionnaire was designed, which was filled by the investigator. Regarding the history, identification notes are taken, name, age, residence, occupation, level of education, social class, attendance to A.N.C. and its level and the occupation
of the husband. Obstetric history namely, number of pregnancies, number of deliveries mode of deliveries and state number of abortion if any. The general examination involves, pulse rate/min, B.P., weight and temperature.

33

Examination of sclera and conjunctiva for pallor and jaundice, breast for lumps and condition of the nipples, C.V.S, respiratory system, abdominal examination for organomegally, and demonstration of fundal height in relation to the age, lie, presentation, engagement and auscultation of fetal heart by poniard's stethoscope, amount of liquor and examination of lower limbs for edema. The routine investigation done is Hb%, urine general and blood grouping. Every patient prepares two pints of compatible blood. The patients were carefully shaved and fasting for 10-12 hours. The patients taken to the theatre room in left lateral position with fixed rubber catheter. All operations were done under general anaesthesia. The operation is carried out by two doctors. The operator disinfects the skin of abdomen, upper thigh and vulva by stavlon and spirit, then the abdomen is covered by sterile towels and only the operation field is left exposed. In pfann. incision, a transverse incision about two fingers breadth above the symphysis pubis on the natural fold of skin is made. A small cut is made in the rectus sheath which is enlarged laterly
with scissors. The two recti are splitted and retracted laterally. In low mid-line incision, a vertical incision from below the umbilical to just above the symphysis pubis is made. The rectus sheath is vertically cut along the length of the incision.

The parietal peritoneum is incised vertically, the lower uterine segment is identified, the loose visceral peritoneum is incised transversely and its upper and lower flaps are retracted. (Doyen's retractor is used for more retraction). The muscle of lower segment is incised transversely in the middle and the incision is widened by a scissors or by two fingers. The membranes are ruptured and the baby delivered by hooking of the head if cephalic but in complete breech the baby delivered by grasping the ankle joint while in frank breech is done by gentle traction on pelvic girdle. (The delivery interval from the start of the skin incision to the delivery of the baby in recorded by stop watch). The baby is kept at low level and milking of the cord is done. The cord is cut between two clamps and the baby is carried by a midwife unless there is contra-indication, ergometrine and syntocinon is given. The placenta and membranes are delivered by controlled cord traction (Brand Andrews method). The cervix is dilated by one finger and the uterus closed in two layers using continuous chromic cat-gut no 2 or 1. Any bleeding from the uterine incision is then arrested by pressure or sutures.
The visceral peritoneum is then closed by single layer of chromic o. Before closure of abdominal wall, the abdominal cavity is cleaned from clots and liquor and the adenexia are inspected for any abnormality. The parietal peritoneum is closed by continuous chromic o. Rectus muscle may be approximated by interrupted sutures. The Rectus

35

sheath is closed with dexion by continuous interlocking. The subcutaneous fat may be approximated if needed. The skin is closed by interrupted silk in mid-line incision while in pfann. incision is closed by subcuticular stitches. The wound then cleaned, covered by gauze and closed by adhesive plaster. P.V.is done to assess the dilatation of the cervix and to remove any clotted blood and to check for any vaginal bleeding. (The duration of the operation from the start of skin incision to the last stitch is recorded.)

After full recovery from the anaesthesia, the patient is taken back to the waiting room in the theatre for 30-45/ min. and then back to the ward.

Regarding the baby, after been carried by midwife, the baby is resuscitated by suction using plastic catheter or tube introduced through the mouth and nostril and sucking the upper respiratory passage, intermittent oxygen supply was also used in resuscitation applied through a mask. Apgar score at one and five min. is recorded. General examination for the baby is done including whether is alive or fresh still birth, weight, and evidence of congenital
malformation or trauma. A neonate who needs further care is referred to the paediatric section.
All patients post-operatively received 3 litres of glucose in water, ampiclox injection followed by course of capsules and pethidine 100 mg. Catheter is removed on the second day. Patients are investigated for Hb% and urine general on the third day. Any evidence of complications is recorded e.g. P.P.H, D. V.T, fever and chest infection. The wound is inspected on the 5th day in case of pfannenstiel, and on the 7th day for mid line incision. The wound is inspected for clinical evidence of infection (e.g. cellulitis, serous discharge, purulent discharge or dehiscence) standard of healing (e.g. good, gaping or overlap), and whether the patient needs for re-suturing. The duration of hospital stay is recorded.

**Sample size :-**

The sample size is calculated according to the following formula:

\[
N = \frac{z^2 (pq)^2 x d}{E^2}
\]

Where

- \( n \) = Sample size
- \( Z = 1.96 \)
- \( P \) = prevalence (incidence of wound infection following C.S.)
- \( E = Standard (0.02 \text{ - } 0.05) \)
- \( D = design\ \text{effect} \)

Since the incidence of wound infection following C.S. varies between 2 – 7% according to literature

\[
N = 1.96^2 \left(\frac{0.07 \times 0.93}{0.09}\right)^2 \times 2 = 90
\]
Therefore a sample size of 90 is satisfactory to carry the study.

Methods of Analysis: -
Data was computerized using SPSS (statistical package for social science)
Chi – square test was used for comparison between the two study groups at 95% confidence level ($p < 0.05$)
H.G (Harvard Graphics) was used for graphical presentation.
CHAPTER THREE
Table (1)

Distribution of Mid-line and Pfannenstiel incisions according to the wards:

<table>
<thead>
<tr>
<th>Ward</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>General Ward</td>
<td>58</td>
<td>(90.62%)</td>
</tr>
<tr>
<td>Special wing</td>
<td>6</td>
<td>(9.38%)</td>
</tr>
</tbody>
</table>
Table (2)  
Distribution of Mid-line and pfannenstiel incisions according to Apgar score after one min :-

<table>
<thead>
<tr>
<th>Apgar Score</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>7-10</td>
<td>64</td>
<td>10</td>
</tr>
</tbody>
</table>

P= O significant
<table>
<thead>
<tr>
<th>&lt;7</th>
<th>--</th>
<th>--</th>
<th>--</th>
<th>--</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>64</td>
<td>10</td>
<td>64</td>
<td>100</td>
</tr>
</tbody>
</table>

Table (3)
Distribution of Mid-line and Pfannenstiel incisions according to virginity of the abdomen:

<table>
<thead>
<tr>
<th>Abdominal Verginity</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Operator</td>
<td>Mid-line incision</td>
<td>Pfannenstiel incision</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Primary C.S.</td>
<td>32 (50%)</td>
<td>34 (53.13%)</td>
</tr>
<tr>
<td>Repeat C.S.</td>
<td>32 (50%)</td>
<td>30 (46.87%)</td>
</tr>
<tr>
<td>Total</td>
<td>64 (100%)</td>
<td>64 (100%)</td>
</tr>
</tbody>
</table>

P = 0.72 insignificant

Table (4)
Distribution of Mid-line and Pfannenstiel incisions according to operator:-
### Table (5)

Distribution of Mid-line and Pfannenstiel incisions according to delivery interval (S-DI) in minutes:

<table>
<thead>
<tr>
<th>S – DI</th>
<th>Mid-line</th>
<th>Pfannenstiel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P = 0.0 highly significant
<table>
<thead>
<tr>
<th>incision</th>
<th>No</th>
<th>%</th>
<th>incision</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 –5</td>
<td>49</td>
<td>(79.65 %)</td>
<td>12</td>
<td>(18.75 %)</td>
<td></td>
</tr>
<tr>
<td>6 – 8</td>
<td>11</td>
<td>(17.10 %)</td>
<td>47</td>
<td>(73.44 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;8</td>
<td>4</td>
<td>(6.25%)</td>
<td>5</td>
<td>(7.81%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100</td>
<td>64</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

P = O significant

**Table (6)**
Distribution of Mid-line and pfannenstiel incisions
according to skin - delivery interval in min. in primary C.S:

<table>
<thead>
<tr>
<th>S – DI</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>3 –5</td>
<td>31</td>
<td>(96.88%)</td>
</tr>
<tr>
<td>6 –8</td>
<td>1</td>
<td>(3.12%)</td>
</tr>
<tr>
<td>&gt;8</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

P = O significant

Table (7)
Distribution of Mid-line and Pfannenstiel incisions
according to skin – delivery interval in min . in primary C.S :-

<table>
<thead>
<tr>
<th>S – DI</th>
<th>Mid – line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>3 – 5</td>
<td>18</td>
<td>(56.25 %)</td>
</tr>
<tr>
<td>6 – 8</td>
<td>10</td>
<td>(31.25 %)</td>
</tr>
<tr>
<td>&gt;8</td>
<td>4</td>
<td>(12.50 %)</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

P = 0.0025 significant

Table (8)
Distribution of Mid-line and pfannenstiel incisions according to duration of operation in min. in repeat C.S. :-

<table>
<thead>
<tr>
<th>Duration of Operation</th>
<th>Mid-line incision</th>
<th>Pfannenstiel incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>30-45</td>
<td>19</td>
<td>(59.37%)</td>
</tr>
<tr>
<td>&gt;45-1hr</td>
<td>10</td>
<td>(31.26%)</td>
</tr>
<tr>
<td>&gt;1hr</td>
<td>3</td>
<td>(9.37%)</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

P = 0.0186 significant
Table (9)
Distribution of Mid-line and pfannenstiel incisions according to standard of healing:

<table>
<thead>
<tr>
<th>Process of Healing</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Good Healing</td>
<td>59</td>
<td>(92.19%)</td>
</tr>
<tr>
<td>Bad Healing</td>
<td>5</td>
<td>(7.81%)</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100</td>
</tr>
</tbody>
</table>

P = 0.103 in significant
Table (10)
Distribution of Mid-line and pfannenstiel incisions according to details of bad Healing C.S :-

<table>
<thead>
<tr>
<th>Details of Bad Healing</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>GAP</td>
<td>2</td>
<td>(40%)</td>
</tr>
<tr>
<td>Overlap</td>
<td>3</td>
<td>(60%)</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (11)
Distribution of Mid-line and pfannenstiel incisions according to incidence of wound infection:

<table>
<thead>
<tr>
<th>Wound infection</th>
<th>Mid-line incision</th>
<th>Pfannen . incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>(4.69%</td>
</tr>
<tr>
<td>No</td>
<td>61</td>
<td>(95.31%</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (12)
Distribution of Mid-line and pfannenstiel incisions according to resuturing:

<table>
<thead>
<tr>
<th>Resuturing</th>
<th>Mid-line incision</th>
<th>Pfannenstiel incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>(4.69%)</td>
</tr>
<tr>
<td>No</td>
<td>61</td>
<td>(95.31%)</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100</td>
</tr>
</tbody>
</table>

P = 0.122 insignificant
Table (13)
Distribution of Mid-line and pfannenstiel incisions according to duration of hospital stay in days:

<table>
<thead>
<tr>
<th>Hospital stay</th>
<th>Mid-line incision</th>
<th>Pfannenstiel incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>5 days</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>8 days</td>
<td>62</td>
<td>(96.87%)</td>
</tr>
<tr>
<td>&gt;10 days</td>
<td>2</td>
<td>(3.13%)</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100%</td>
</tr>
</tbody>
</table>

P = 0 significant
Table (14)
Distribution of Mid-line and Pfannenstiel incisions according to type & dose of post operative analgesia:

<table>
<thead>
<tr>
<th>Analgesia</th>
<th>Mid-line incision</th>
<th>Pfannen incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Pethidine 100 mg</td>
<td>61</td>
<td>(95.31%)</td>
</tr>
<tr>
<td>Pethidine 150 mg</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Pethidine 100 mg + Diazepam 10 mg</td>
<td>3</td>
<td>(4.69%)</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100</td>
</tr>
</tbody>
</table>

P = 0.331 insignificant
Table (15)
Distribution of Mid-line and Pfannenstiel incisions according to patient's request for type of incision:

<table>
<thead>
<tr>
<th>Patient's Request</th>
<th>Mid-line incision</th>
<th>Pfannenstiel incision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>No</td>
<td>64</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100%</td>
</tr>
</tbody>
</table>

P = 0.028 significant
Table (16)
This table demonstrates the causes of request for pfannenstiel incisions:

<table>
<thead>
<tr>
<th>Cause of request</th>
<th>No.of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmotic</td>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>Cosmotic and short hospital stay</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>100%</td>
</tr>
</tbody>
</table>
RESULTS
The following are the results of this study comparing between 64 cases with pfannen incisions Vs 64 cases with mid – line incisions in EL C.S. at K.N.T.H. in the period from July 1997- March 1998.

Fig 1 :-
This fig. demonstrates the distribution of pfannen . and mid – line incisions according to age in years
- 78.13 % of patients with mid – line incisions were in age group below 30 years compared to 62.50% on pfannen. group .
- 21.87 % of patients with mid – line incisions were in age group above 30 years compared to 37.50% on pfannen . group .
This difference is statistically insignificant (P = 0 . 10 3).

Fig 2 :-
This fig. demonstrates the distribution of pfannen . and mid – line incisions according to residence .
- 57.81% of patients with mid-line incisions live in urban area compared to 92.19% on pfannen group.
- 42.19% of patients with mid-line incisions live in rural area compared to 7.81% pfannen group.

This difference is statistically significant (p = 0.0000071)

**Fig 3:**
This fig. demonstrates the distribution of pfannen and mid-line incisions according to the mother level of education.
- A majority of patients with mid-line incisions 34.38% were illiterate compared to non on pfannen group.
- 57.81% of patients with mid-line incisions received education up to primary or secondary school compared to 65.62% on pfannen group.
- 7.81% of patients with mid-line incisions were university graduated compared to 34.38% on pfannen group.

This difference is statistically significant (p=00).

**Fig 4:**
This fig. demonstrates the distribution of pfannen and mid-line incisions according to the mother's occupation.

- 86% of patients with mid-line incisions were housewives compared to 57.8% on pfannen group.
- 3% of patients with mid-line incisions were workers compared to none of pfannen group.
- 11% of patients with mid-line incisions were employees compared to 23.4% on pfannen group.

This difference is statistically highly significant (p=0.00013)

**Fig 5:**
This fig. demonstrates the distribution of pfannen and mid-line incisions according to husband occupation.

- Husbands of 12.50% of patients with mid-line incisions were off work compared to none on pfannen Group.
- Husbands of 14.06% of patients with mid-line incisions were labourer compared to none on pfannen Group.
- Husbands of 28.12% of patients with mid-line incisions were casual workers compared to 25% on pfannen Group.
- Husbands of 15.63% of patients with mid-line incisions were employee compared to 28.12% on pfannen. Group.
- Husbands of 29.69% of patients with mid-line incisions were professional compared to 46.88% on pfannen. Group.
  This difference is statistically significant (P = 0.00021).

Fig 6:-
This fig. demonstrates the distribution of pfannen. and mid-line incisions according to social class.
- 59.38% of patients with mid-line incisions were of low social class Vs 29.69% on pfannen. group.
- 32.81% of patients with mid-line incisions were of middle social class Vs 51.56% on pfannen. group.
- 7.81% of patients with mid-line incisions were of high social class Vs 18.75% on pfannen. group.
  This difference is statistically significant (P = 0.00026).

Fig 7:-
This fig. demonstrates the distribution of pfannen. and mid-line incisions according to attendance at A.N.C.
- 84.38% of patients with pfannen. incisions were regular and 15.62% were irregular Vs
70.31% and 23.44% respectively on mid–line group.
- 6.25% of patients with mid–line incisions did not attend any A.N.C. compared to non on pfannen. group.
This difference is statistically significant (P = 0.00054).

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Fig 8:-
This fig. demonstrates the distribution of pfannen. and mid-line incisions according to the level of attendance at A.N.C.clinic.
- 14.06% of patients with mid–line incisions under mid–wives Vs 9.38% on pfannen. group.
- 28.13% of patients with mid–line incisions under medical officers Vs 25% on pfannen. group.
- 51.56% of patients with mid–line incisions under consultants Vs 65.62% on pfannen. group.
- 6.25% of patients with mid–line incisions did not attend any A.N.C compared to non on pfannen. group.
This difference is statistically significant (P = 0.121).

Fig 9:-
This fig. demonstrates the distribution of pfannen and mid-line incisions according to the level of haemoglobin in gm.
- 65.63% of patients with mid-line incisions had haemoglobin > 10 gm Vs 75% on pfannen group.
- 34.37% of patients with mid-line incisions had haemoglobin < 10gm Vs 25% on pfannen group.
This difference is statistically significant (P = 0.24).

Fig 10:-
This fig. demonstrates the distribution of pfannen and mid-line incisions according to the birth weight in (kg).
- Babies weighing < 2.5kg were 4.69% on mid line compared to 6.25 on pfannen group.
  Babies weighing 2.5 – 3.5 kg were 87.50% on mid – line compared to 84.38 on pfannen group.
- Babies weighing > 3.5kg 7.81% on mid – line compared to 9.37 on pfannen group.
This difference is statistically significant (P = 0.87).

Fig 11:-
This fig. demonstrates the distribution of pfannen and mid-line incisions according to the types of wound infection.
- Serous leakage occurred equally in both groups (33.33%).
- Cellulitis was observed in 66.67% on pfannen group compared to nil on mid – line group.
- Burst abdomen occurred in 66.67% on mid-line group compared to nil on pfannen group. This difference is statistically significant (P = 0.135).

Fig 12:
This fig demonstrates the distribution of pfannen and mid-line incisions according to the duration of operation in min. in primary C.S.

72

- 43.75% of mid-line incisions took up to 30 min compared to 17.65% on pfannen group.
- Another 43.75% of mid-line incisions took up to 30 - 45 min. compared to 52.94% on pfannen group.
- 12.50% of mid-line incisions took > 45 min. compared to 29.41% on pfannen group.
This difference is statistically significant ($P = 0.44$).

**Table (1):**

This table demonstrates the distribution of pfannen and mid-line incisions according to the wards.
- 90.62% of patients with mid-line incisions, admitted to general ward Vs 14.06% on pfannen group.
- 9.38% of patients with mid-line incisions, admitted to special wing Vs 85.94% on pfannen group.
This difference is statistically significant ($P = 0$).

**Table (2):**

This table demonstrates the distribution of pfannen and mid-line incisions according Apgar score after 1 min.

All babies delivered by pfannen or mid-line incisions had equal Apgar score (between 7-10).

**Table (3):**

This table demonstrates the distribution of pfannen and mid-line incisions according the virginity of the abdomen.
- 50% of patients with mid–line incisions had primary C.S. and the other 50% had repeat C.S. compared to 53.13% for primary C.S and 46.87% for repeat C.S on pfannen. group. This difference is statistically significant (P = 0.72).

Table (4):-
This table demonstrates the distribution of pfannen. and mid-line incisions according to the operator.
• 18.75% of the mid–line incisions were done by consultants compared to 90.62% on pfannen group.
• 81.25% of mid–line incisions were done by registrars compared to 9.38% on pfannen group. This difference is statistically significant (P = 0.0).

Table (5):-
This table demonstrates the distribution of pfannen. and mid-line incisions according to the delivery interval (S-DI) / min.
- 76.65% of mid–line incisions took 3–5 / min compared to 18.75% on pfannen group.
- 17.10% of mid–line incisions took 6–8 /min compared to 73.44% on pfannen group.
- 6.25% of mid–line incisions took > 8 min compared to 7.81% on pfannen group. This difference is statistically significant (P = 0).

Table (6):-
This table demonstrates the distribution of pfannen and mid-line incisions according to the delivery interval (S-DI) in min. in primary C.S.:

- The biggest percentage of mid-line incisions 96.88% took 3-5 min compared to 20.95% on pfannen group.
- 6-8 min was taken by 3.12% of mid-line incisions Vs 73.53% on pfannen group.
- 5.88% of pfannen incisions took > 8 min compared to non on mid-line group.

This difference is statistically significant (P = 0).

Table (7):

This table demonstrates the distribution of pfannen and mid-line incisions according to the delivery interval (S-DI) in min. in repeat C.S.

- 56.25% of mid-line incisions took 3–5 min Vs 16.67% on pfannen group.
- 31.25% of mid-line incisions took 6–8 Vs 73.33% on pfannen group.
- 12.50% of mid-line incisions took > 8 min Vs 10% on pfannen group.

This difference is statistically significant (P = 0.0025).

Table (8):

This table demonstrates the distribution of pfannen and mid-line incisions according to the duration of operation in min in repeat C.S.

- 59.37% of mid-line incisions took 30–45 min Vs 26.67% on pfannen group.
- 31.26% of mid-line incisions took 45 min–1 hr Vs 66.67% on pfannen group.
- 9.37% of mid-line incisions took > 1 hr
  6.66% on pfannen group.
  This difference is statistically significant (P = 0.0186).

76

**Table (9):**

This table demonstrates the distribution of pfannen and mid-line incisions according to the standard of healing.

- with mid-line incisions 92.19% had good healing and 7.81% had bad healing compared to 98.44% good healing and 1.56% bad healing on pfannen group. This difference is statistically significant (P = 0.103).

**Table (10):**

This table demonstrates the distribution of pfannen and mid-line incisions according to the details of bad healing.

- Bad healing (1.56%) of pfannen incision were presented all as an overlap while in mid-line incisions the bad healing (7.81%) were presented as 40% gaping and 60 overlap.

**Table (11):**

This table demonstrates the distribution of pfannen and mid-line incisions according to the incidence of wound infection.
- 4.69% of mid-line incisions had evidence of wound infection compared to 4.69% on pfannen group.

Table (12):
This table demonstrates the distribution of pfannen and mid-line incisions according to the resuturing.
- Resuturing was needed in 4.69% of mid-line incisions compared to nil on pfannen group. This difference is statistically significant (P = 0.122).

Table (13):
This table demonstrates the distribution of pfannen and mid-line incisions according to the hospital stay in days.
- All patients (100%) with pfannen incisions stayed only 5 days.
- In patients with mid-line incisions, 96.87% stayed 8 days while 3.13% stayed >10 days. This difference is statistically significant (P = 0.).

Table (14):
This table demonstrates the distribution of pfannen and mid-line incisions according to the type and dose of post-operative analgesia.
- 95.31% with mid – line incisions received pethidine 100 mg compared to 93.74% on pfannen . group.
- 4.69% with mid – line incisions received pethidine 100 mg + diazepam 10 mg compared to 3.13% on pfannen . group. This difference is statistically significant (P = 0.133).

Table (15):
This table demonstrates the distribution of pfannen . and mid- line incisions according to the patients request for the type of incision .
- Mid – line incisions was not requested by any compared to 7.81% for pfannen incision. This difference is statistically significant (P = 0.028).

Table (16):
This table demonstrates the causes of request for pfannen incisions.
- In 40% of the patients it was requested for its cosmotic appearance while in 60% it was requested for its cosmotic appearance and short hospital stay .
CHAPTER FOUR
**DISCUSSION**

The results of this study showed that the majority of patients with pfannen incisions 92.19% came from urban area compared to 57.81% on mid-line group (p = 0.0000071) significant.

Urban areas are associated with good health services which are lacked in rural areas. The study showed higher level of education between pfannen group, 76.57% secondary school and university graduated compared to 35.93% on mid-line group (P = 00 significant).

Education is the cornerstone for changing the attitude of patients towards health services and health problems.

With regard to occupation, the bulk of patients were house-wives, 57.8% on pfannen compared to 86% on mid-line group. The rest of the patients occupying different occupations.

The occupation employed may be reflected on the health of female in general and on the pregnant state in particular.

The study also showed that, the majority on mid-line group was of low and middle social class while on pfannen group middle and high social class represents 70.31%.

The socio-economic condition affects maternal performance through general standards of living, nutrition, educational and hygienic level and awareness about the importance of available health
services, with worst performance among low social classes.
The majority on the two groups showed haemoglobin level > 10 gm, 65.63% on mid-line group compared to 75% on pfannen. group, while haemoglobin < 10 gm, was 25% and 34.37% on pfannen. and mid-line group respectively (p=0.24).
Most patients with low haemoglobin were attending the A.N.C clinic whether regular or irregular. It is difficult to explain the causes of this low haemoglobin. They either not taking or not supplied with iron supplements.
With regard to admission to the wards, 85.94% of pfannen. group admitted to special wing compared to 9.38% on mid-line group (P=0 significant).
This may reflect the well-off and the higher socio-economic condition of the patients on pfannen. group.
Apgar score after 1-min. range between 7-10 for all babies whether delivered by pfannen. or mid-line approach.
The type of approach has no effect on the condition of the child at birth. The literature supports this finding (74).
With regard to standard of healing, good healing occurred in 92.91% of mid-line group compared to 98.44% on pfannen. group while bad healing occurred in 7.81% on mid-line group Vs 1.56% on pfannen. group (P=0.103) insignificant.
This result denotes no difference in standards of healing between the two groups. This result is not consistent with what was found in the literature (3)(4), which assume that pfannen incision heals better than mid-line incisions because of its good blood supply. This difference could be explained by the difference between the developed and underdeveloped countries in the socio-economic, environmental and ethnic factors. The study showed that, wound infection occurred equally in both groups – 4.69% but differ in its severity:

- Serous leakage 33.33% Vs 33.33% on pfannem.group.
- Cellulitis 66.6% Vs non- on mid-line group.
- Burst abdomen 66.67% Vs non-on pfannen. group.

This study showed that, there is no difference in the incidence of infection but they differ in the severity, which is more towards pfannen, group. This may be explained by the fact that, the pfannen approach is more liable to collect an effusion of blood or serum at the triangular dead space under the upper flap, if become infected, it is slow to clean up. The Literature support this finding (71).

Regarding the hospital stay, the study showed that all patients on pfannen. group discharged after 5 days while 96.87% on mid-line
group discharged after 8 days and another 3.11% after >10 days (P=0 significant).
This denotes that, pfannen group has shorter hospital stay.
The study showed that, the majority of pfannen incisions were done by consultants 90.62% compared to 18.75% done by registrars. While with mid-line incisions, the majority were done by registrars 81.25% Vs 9.38% (P=00 highly significant).
So consultants are more familiar with pfannen approach than registrars, that is difficult to be explained, it may be related to skillness and the believes on this type of approach.
Regarding the delivery interval, this study showed that the delivery interval is shorter with mid-line than pfannen approach. Whether primary or secondary C.S. (Table 6)(Table7).
The study showed that 43.75% of primary C.S. with mid-line incision the duration of operation was up to 30-min compared to 17.65% by pfannen approach while 59.37% of repeat C.S. with mid-line approach took 30-45 min compared to 26.67% by pfannen approach.
This showed that, the duration of operation is longer by pfannen approach, which is related to the technique of the operation with increasing difficulties with repeat C.S.
Regarding the post-operative analgesia (table (14) there is no difference the in the post-operative pain between the two groups. This result is contradicts with what was found in literature (71) which assumes that post-operative pain is greater following pfannen approach, but this can be explained by the forceful retraction with self- retaining retractor in addition pain is subjective matter.
RECOMMENDATION

*Mid – line incision is easier to perform with less time to deliver the foetus so it is wise to used when the foetus is jeopardized or the surgeon is beginner.

*Pfannen incision is cosmotic and economic with short hospital stay.

*I recommend to train the registrars for pfannen incision and to gain experience on this type of approach as it is widely used over the world.

*This study was carried out on EL.C.S. Where the foetus nearly at optimum condition and so the mother, so I recommend to extend this study to include the emergency cases.
APPENDIX
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87


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