# OUTCOME OF TRIAL OF LABOUR IN MOTHERS WITH ONE PREVIOUS CAESAREAN SECTION SCAR AT PUMWANI MATERNITY HOSPITAL.

A RETROSPECTIVE COHORT STUDY.

*Purpose:* *RESEARCH PROJECT SUBMITTED FOR MASTERS IN MEDICINE IN OBSTETRICS AND GYNAECOLOGY.*


*Principle Investigator*

***Dr. Elizabeth W. Kimotho**, M.B.Ch.B.*
*Student, Master of Medicine in Obstetrics and Gynaecology,*
*University of Nairobi - H58/8037/06.*

*Supervisors*

1. ***Prof Koigi Kamau** –M.B.Ch.B, M.Med OBGYN,*
   *Associate Professor and Chairman of the Department of Obstetrics and Gynaecology, University of Nairobi.*
   *Consultant Obstetrician and Gynaecologist Kenyatta National Hospital.*

2. ***Dr. Kiarie** - M.B.Ch.B, M.Med OBGYN, MPH.*
   *Consultant Obstetrician and Gynaecologist Kenyatta National Hospital*
   *and Associate Professor, Epidemiology, University of Washington.*

**DECLARATION**

This is to declare that this dissertation is my original work and that it was done with the guidance of my supervisors.

**Dr. Elizabeth Wanjiru Kimotho,**

Student, Master of Medicine in Obstetrics and Gynaecology,

University of Nairobi.

Signature ……

Date ……...

**CERTIFICATION OF SUPERVISION**

This is to certify that this dissertation was developed under my guidance.

1. **Prof. Koigi Kamau,** M.B.Ch.B, M.Med. OBGYN.

   Associate Professor and Chairman of the Department of Obstetrics and Gynaecology, University of Nairobi and

   Consultant Obstetrician and Gynaecologist Kenyatta National Hospital.

   Signature ……

   Date ……...

2. **Dr. James Kiarie**, M.B.Ch.B, M.Med OBGYN, MPH.

   Consultant Obstetrician and Gynaecologist Kenyatta National Hospital

   and Associate Professor, Epidemiology, University of Washington.

   Signature ……

   Date ……...

**CERTIFICATION OF BY CHAIRMAN OF THE DEPARTMENT**

This is to certify that this dissertation was developed by a student within the department of Obstetrics and Gynaecology at the University of Nairobi.

Signature ……

Date ……...

PROF. KOIGI KAMAU
ASSOCIATE PROFESSOR OF OBSTETRICS AND GYNAECOLOGY
CONSULTANT OBSTETRICIAN AND GYNAECOLOGIST
CHAIRMAN,
DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY,
UNIVERSITY OF NAIROBI .

**CERTIFICATE OF AUTHENTICITY**

This is to certify that this dissertation is the original work of Dr. Elizabeth Kimotho, M.Med student registration number H58/8037/06 in obstetrics and gynecology department, University of Nairobi (2006-2010). The research was carried out in the department of Obstetrics and Gynaecology, School of Medicine , College of Health Sciences . It has not been presented in any other university for award of a degree.

**Sign. _____ Date_____**

PROF. KOIGI KAMAU
ASSOCIATE PROFESSOR OF OBSTETRICS AND GYNAECOLOGY
CONSULTANT OBSTETRICIAN AND GYNAECOLOGIST
CHAIRMAN,
DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY,
UNIVERSITY OF NAIROBI .

## DEDICATION

I would like to dedicate this book to my husband Ernest, our daughter Kendi, Catherine my mother and Josephine my mum in law.

## ACKNOWLEDGEMENT

I would like to thank God that He has brought me this far in pursuing my Masters degree and enabling me complete this book.

My gratitude also goes out to my sponsors Ghandi foundation for providing me with the fees to pursue my postgraduate course.

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## LIST OF ABBREVIATIONS

i. ACOG - American College of Obstetrics and Gynaecologists
ii. APGAR – Appearance, Pulse, Grimacing, Activity & Respiratory rate
iii. ANC - Antenatal Clinic
iv. CPD – Cephalo Pelvic Disproportion
v. C/S - Caesarean section
vi. CTG - Cardio Toco graph
vii. ELP - Erect lateral pelvimetry
viii. ERCS - Elective repeat caesarean section
ix. EMCS - Emergency caesarean section
x. EFW - Estimated foetal weight
xi. KNH - Kenyatta National Hospital
xii. LUSCS - Lower Uterine Segment Caesarean Section
xiii. NBU – New Born Unit
xiv. NRFS – Non Reassuring Foetal Status
xv. 1PCS - One previous caesarean section
xvi. 1PS - One Previous scar
xvii. PMH - Pumwani Maternity Hospital
xviii. TOL - Trial of labour
xix. TOS - Trial of scar
xx. TC - True Conjugate
xxi. VBAC - Vaginal birth after caesarean section

## TABLE OF CONTENTS

# ABSTRACT

**Background**

Although introduction of lower transverse uterine incision for caesarean section has remarkably reduced the risk of uterine rupture during trial of labour (TOL), a consensus has not been reached on universal TOL for women with 1 previous caesarean section delivery. There is also no objective criterion for selecting patients for TOL with high predictive value for success. Occasional severe maternal and foetal outcomes in TOL (especially when carried out in less than ideal situations) are a deterrent to practise of TOL. The lack of data that provides indubitable evidence on benefits accrued by TOL contributes towards low rates of TOL.

**Objective**

To determine the pregnancy outcomes in patients with one previous caesarean section scar undergoing trial of labour compared to those undergoing elective repeat caesarean section.

**Design**

Retrospective cohort study whereby one group of patients undergo TOL and the second group undergo ERCS.

**Outcome measures**

Maternal morbidity was assessed primarily based on postnatal hospital stay. Other maternal morbidity measures analysed included infection, birth trauma and haemorrhage. Foetal outcome was accessed based on APGAR score at five minutes and admission to the new born unit (NBU).

**Setting**

Postnatal wards in Pumwani maternity hospital (PMH).

**Materials and Methods**

The study compared maternal and foetal outcomes among women designated for trail of labour and elective repeat caesarean section.

**Results**

Success rate of TOL was low at 45.5%. There was no significant difference in socio demographic characteristics between the TOL and the ERCS groups of the study (p-value >0.05). Duration of maternal postnatal hospitalization was higher in the ERCS group with 51% of the participants staying ≥4days as compared with the TOL group where 29% had a similar stay (p-value 0.001). Foetal outcome based on the APGAR score at 5 minutes was significantly better in the ERCS group with 96.6% having a score of ≥ 8 as compared to 77.7% in the TOL group (p-value <0.001). Admission to NBU and neonatal mortality was less in the ERCS group whereby 13.5% needed admission with a mortality rate of 1% only. This is in comparison to the TOL group whereby 35% were admitted to NBU with mortality at 3.7%.

**Conclusion**

Success of TOL was low necessitating emergency caesarean delivery in more than half of the women. Among these women undergoing EMCS, both maternal and foetal complication rates are higher in comparison to those undergoing ERCS.

**Recommendations**

There is need to consider ERCS for patients with 1 previous scar in institutions which do not meet the criteria for TOL whereby there is no proper monitoring of both maternal and foetal condition during labour.

Recommend further studies to look into objective criteria which can be used in decision making for trial of labour that will have an impact in the pregnancy outcome.

## INTRODUCTION

Vaginal Birth after Caesarean section has been a subject of controversy for over 100yrs. Cragin's dictum of 1916 'once a caesarean always a caesarean' [1,2] has been challenged over the years. In 1980 the Consensus Development Conference on caesarean childbirth concluded that vaginal delivery after previous lower uterine caesarean section was a safe and acceptable option in singleton vertex presentation and not an absolute indication for caesarean section[3]. However in the 1990's this opinion begun to loose ground [2]. This was despite there being many studies which showed high success rates of trial of labour after one previous caesarean section ranging between 55-85%[5-10].

Koigi Kamau et al, studied perceptions, preference and practise of privately practising obstetricians in Kenya [4]. They found that TOL was the mode of delivery of choice. He found that 90% of obstetricians routinely suggest TOL to their patients with 1PS. In addition the perception of the obstetricians was that 83% of women prefer TOL as opposed to ERCS.

In providing antenatal care for women with 1 previous caesarean section delivery, TOL is an option that is often explored. However in those who do qualify for TOL after caesarean delivery, 25-45% of them end up having an EMCS delivery[7-10].

It is known that in delivery of patients with 1PS, VBAC is the safer mode of delivery in comparison to caesarean section[8, 9, and 29]. However in comparing caesarean section delivery, elective is safer than emergency surgery[23]. It is thus in the best patients' interest to come up with a proper selection criteria for which patients have the best chance of successful VBAC and those with a poor chance should be encouraged to have ERCS. This would reduce both maternal and foetal morbidity and at the same time save on resources used in failed TOL after caesarean section. However, an ideal universal criterion has yet to be developed.

This retrospective cohort study thus aimed at gathering local information on our practises and outcomes when we manage women with 1PS. Data collected from the study can help us determine if, in our local setting, TOL has benefits over ERCS. This data can guide our obstetricians in coming up with a standardized practise locally.

Data currently available is from western countries [7-9] on the outcomes of patients with 1PS. From the data their failed trial of labour rate is at 20-45%, TOL with 1PS uterine rupture rate is at 1% and TOL with 2PS uterine rupture rate 2%[5-10].

However, a study done in Kenyatta national hospital (KNH) in 1975 found that uterine rupture rate was 3.14% in patient undergoing TOL with 1PS[17]. Therefore there are several factors which may not hold constant in our local setting such as;

The pelvis of African and Caucasian women is significantly different, with engagement of the foetal head occurring later in an African pelvis due to a smaller pelvic inlet in comparison to one of a Caucasian.

In our setting attendance of antenatal clinic if any is late. In addition some women deliver in a different institution from where they attend clinic and this lack of proper follow-up may make delivery decisions difficult to make.

In our setting medical records of previous delivery may not be available, making it difficult to know the type of uterine scar a woman had or whether there is history of ruptured uterus.

Resources for investigations such as erect lateral pelvimetry (ELP), ultrasonographic estimated foetal weight (EFW) and uterine scar thickness are not widely available.

There is therefore need to generate local data on maternal and foetal outcomes of patients with 1PS. This will go a long way in objectively accessing if there is reduction of morbidity in either mother or foetus by undergoing TOL with 1PS as opposed to having ERCS.

## LITRATURE REVIEW

In the days of Cragin's dictum 'once a caesarean always a caesarean' [1,2], many women with 1PS were dissatisfied with ERCS leading to a lot of TOL after caesarean section (C/S) being done at home. This had disastrous results with women being brought to hospital in obstructed labour and often subsequent ruptured uterus. This lead to a lot of maternal and foetal morbidity and mortality. This principle was later reconsidered to allow VBAC, but only after meeting certain patient and hospital criteria. This change was especially important to African women who attach a lot of importance to achieving a vaginal delivery as opposed to having a caesarean delivery.

In order to perform VBAC in a safe manner, the patients have to be selected. There is a criterion that one needs to fulfil in order to qualify for trial of labour after caesarean section [19]. It includes; no traditional contraindications to labour or vaginal birth, one previous low transverse uterine incision, a clinically adequate pelvis or true conjugate on erect lateral pelvimetry (ELP) greater than 10.5cm, estimated foetal weight (EFW) less than 3.5kg (by either ultrasound or manual calculation using measurements of fundal height and abdominal girth), no other uterine scars or previous rupture, no other medical or obstetric complication that could put her in additional risk in an already precarious situation, a physician immediately available throughout active labour who is capable of making the decision for and performing an emergency caesarean delivery, availability of anaesthesia and theatre personnel for emergency caesarean delivery [17].

Flamm scoring system is a tool that has been developed in order to reduce the rate of failed trial of labour which is about 20-45%[5-10] (appendix III – table 1).

Positive predictive factors for VBAC include previous vaginal delivery[11,12], previous successful VBAC, previous C/S due to breech (80% success rate), maternal age less than 35 - 40yrs, favourable bishop score at admission, spontaneous onset of labour and birth weight less than 4000gms[13].

Negative predictive values include history of dystocia, multiple prior caesarean deliveries, alcohol and cigarette use[14], having gone upto full dilatation at previous C/S delivery, use of oxytocin to induce or augment the labour, cephalo-pelvic dispropotion[15], EFW of greater than 4000gms, inter delivery interval less than 24months, gestation greater than 40wks and obesity[16].

In the new millennium, a lot of stride has been made in research doing away with a lot of fears regarding VBAC[2]. It has been proven that VBAC success rate is fairly high and uterine rupture is fairly low even with very short inter-delivery intervals of less than 24months[30,36]. Secondly, in twin gestation undergoing VBAC comparison has been made to ERCS and no significant difference in outcomes or uterine rupture has been found[37]. These were however small studies of 28patients for TOL and 90patients for ERCS due to twins. Lastly, VBAC after 2previous caesarean sections has been found to be successful with only 2% rate of ruptured uterus[38]. It is thus the consensus that women should be offered TOL with 2previous lower uterine caesarean section scars.

There are also risks which have been identified in the new millennium which one should keep in mind when dealing with previous scars[2]. Placenta previa is more common in scarred uteri. Compared to patients with no scar, 1PS increases the risk of placenta previa three times. In cases of four previous scars, the risk of previa increases nine fold[39]. It was also found in another study that if a placenta previa was diagnosed by ultrasound in second trimester, it was five times more likely to persist upto delivery in patients with history of previous caesarean section. Placenta previa carries the risk of repeat caesarean section from both ante partum haemorrhage and post partum haemorrhage there after.

Placenta accreta is more common in a scarred uterus with a risk of 1-5% in unscarred uterus, 11-25% in 1PS, 35-47% in 2PS and 50-67% in 4PS [2]. Accreta has thus replaced uterine atony and rupture as the leading cause of emergency peripartum hysterectomy[40]. This is thought to be due to better management of uterine atony and an increase in number of patients with previous scars[40].

Ruptured uterus is a known complication of trying scars. In 1PS the risk is 1% and in 2PS the risk of ruptured uterus is 2%. At Kenyatta National Hospital, Nairobi, Walton[17] reported 3.14% uterine scar rupture in women with previous caesarean section in 1975. In a francophone study 36 women with one classical caesarean section scars undergoing trail of labour had 12(33%) uterine rupture[18]. It is no longer good clinical practise to subject classical caesarean section scars to TOL. A large study in Scotland found that perinatal death was 1.3 per 1000 TOL, which was almost identical to the rate of nulliparous women in labour[41].

This shows that neither VBAC nor ERCS is completely risk free. Both ERCS and TOL carry the risk due to the presence of previous uterus scarring. So in management of these patients one needs to be on high alert for the risk of placenta previa and accreta.

Failed VBAC occurs at considerable rate ranging from 20-45%[7-10] in observational studies. A 10 year review was done at University hospital in Chicago on risks of failed VBAC (1989- 1998). It was found out that rate of chorioamnionitis was significantly higher post C/S in patients who had attempted labour. Secondly, there is a 9 fold increase in uterine disruption rate among those who had failed TOL compared to those with VBAC. This translated into 4 fold greater risk of hysterectomy in the former group. However the actual percentages for these results were very low (0.8% and 0.5% respectively of all VBACs) and the actual numbers of women with these outcomes was small[23].

In Kenya Githiru et al[6] studied the value of erect lateral pelvimetry (ELP) in predicting the outcome of TOL, vaginal birth was achieved in 50% of women with True conjugate (TC) <10.5cm compared to 60% of women with TC≥10.5cm. Among the group of women varying in their TC either way by 0.5cm did not drastically alter the success rate of TOL.

A prospective randomized controlled trial done in South Africa[20], had women who under went TOL after one previous caesarean section. First group had ELP done prior to trial and a second -

control group - underwent trail of labour, then had the ELP in the postpartum period. The study found that in the control group, among those who had successful VBAC 55% of them had inadequate post partum ELP and would have been planned for ERCS. The other finding was that 74% of the failed TOL patients in the control group had adequate postpartum ELPs. It was thus concluded that antepartum ELP is not necessary prior to a trial labour in women with 1PCS. It increases the caesarean section rate and is a poor predictor of the outcome of labour.

Among privately practising gynaecologist in Kenya, a study showed that estimated foetal weight (EFW) is most commonly applied criteria for decision on which patients with 1PS qualified for TOL[4]. However, a retrospective study that looked at effect of EFW on the outcome of attempted VBAC, found that macrosomic foetus with estimated foetal weight greater than 4000gm could be successfully be delivered by VBAC without any statistically significant maternal or neonatal adverse outcomes [2]. The data showed that as long as a woman had a previous vaginal delivery, her success rate at VBAC with a foetus greater than 4000gm was above 63%. However, it was found that in women who had not delivered vaginally before, success rate was less than 50%. Further information from this study found that if the mother had to undergo induction of labour or if previous caesarean section was due to cephalo-pelvic disproportion or failure of labour to progress, this further lowered the VBAC success rate[34].

In practise neither ELP[6] nor EFW[33] has acceptable predictive value on the outcome of an attempted VBAC. It thus points out to an unmet need in management of patients with 1PS where appropriate selection criteria has not been established. This is therefore a challenge and deterrent to acceptance of TOL by obstetricians.

Augmentation of labour with oxytocin is a procedure one needs to approach with caution in patients with 1PS. Some studies showed increased risk of rupture[31], while other studies disputed these findings[32]. In one of the studies, the absolute risk of rupture was low: 52/6009 (0.9 %) in augmented patients versus 24/6685 (0.4 %) in spontaneous labours.

The efficacy and safety of cervical ripening and labour induction in women with a previous caesarean delivery have not been proven. Furthermore, there are no randomized, controlled trials comparing the safety and efficacy of induction of labour in women with prior caesareans to elective repeat caesarean delivery. The American College of Obstetricians and Gynaecologists (ACOG) recommends that misoprostol (prostaglandin E1) not be used for cervical ripening or labour induction in women with prior uterine incisions[19] and strongly discourages use of other prostaglandins as well[19]. They do not make a specific recommendation regarding use of oxytocin. Currently there are studies being conducted on use of ballooned foley's catheter for cervical ripening and subsequent induction of labour[35].

Factors that may contribute to uterine scar disruption include mode of labour onset (spontaneous or induced), the type of uterine incision previously performed (e.g. low transverse or classical), the duration and dose of oxytocin administration, and the choice of cervical ripening technique[42].

RISK FACTORS FOR RUPTURED UTERUS

1. Maternal age greater than 30years [24].
2. More than 1PS [2].
3. Induction or augmentation of labour [19].
4. Interval from last caesarean section of less than 24months [30].
5. Uterine scar thickness on ultrasound at 37wks gestation of less than 2mm [27].
6. One layer closure of the uterus on previous C/S [26].
7. Post partum fever or sepsis in previous C/S [25].

Maternal and neonatal outcomes after uterine rupture in labour[10] were studied in the University of California, San Francisco Moffett-Long hospital from 1976 to 1998. A total of 21cases were studied within this period and the conclusion was that uterine rupture does not result in major maternal morbidity and mortality or in neonatal mortality. However this study was carried out in an institution where there is in house obstetric, anaesthetic, surgical staff and close monitoring of maternal and foetal well being was available. There is therefore a need to identify such institutions

and recommend that VBAC should take place only in institutions which have met these strict criteria. In places where there are less than ideal conditions for attempting VBAC, an ERCS is a safer option for both the mother and baby.

Medical legal issues are also an important aspect of TOL after caesarean section. As a matter of practise, obstetrician and patient should have a discussion about the TOL. In a Kenyan study by Koigi-Kamau et al[4], the fear of litigation was a major concern in 26% of privately practicing obstetricians. This was cited as a cause for the falling trend of VBAC attempts in patients with 1PS in private practise. Thus, the first issue to be discussed relating to medical legal issues is informed consent for VBAC which is now recommended by ACOG[21]. It gives details of all the topics that should be discussed and thus serves as documentation in event of complications or subsequent legal issues. Secondly, the issue of emergency response time should the patient require an emergency caesarean section should be less than 30min from the time of diagnosis, thus the need for physician, anaesthetist and theatre staff being immediately available for surgery[22]. This is all the more critical in cases of ruptured uterus where the 30min rule from diagnosis of EMCS to theatre does not apply. The response time should be less than this to have any hope of saving the baby and indeed the mother. There is therefore need to identify the institutions in which such strict regulations are fulfilled and can be then recommended for patients undergoing TOL after caesarean section.

## NULL HYPOTHESIS

There is no statistically significant difference in maternal and neonatal outcomes between women with one previous caesarean section delivered after undergoing trial of labour and those undergoing elective repeat caesarean section.

## JUSTIFICATION

There are no objective criteria with high predictive value for TOL. The failure rate of TOL is still around 40-50%. There are indications in literature that elective caesarean section is associated with less severe morbidity than emergency caesarean section. Yet majority of physicians and patients have preference for TOL. The ultimate information required for decision making is documentation of outcomes of pregnancy (maternal and foetal) in order to be able to objectively determine which approach confers better outcomes. A retrospective cohort study was done because the incidence of complications can be ascertained as in a prospective study.

## OBJECTIVES

### Broad objective

To determine the pregnancy outcomes in patients with one previous caesarean section scar undergoing trial of labour compared to those undergoing elective repeat caesarean section.

### Specific objectives

Among patients with 1PCS planned for TOL and ERCS to:

i. Determine and compare maternal outcome.
ii. Determine and compare foetal outcome.
iii. Describe criteria used for decision making on trial of labour.
iv. Determine the relationships between criteria used and the outcomes of the pregnancy.

## MEASURES OF OUTCOME

1. *Maternal postnatal hospital stay* was the main outcome measure in this study. It was assessed in terms of the number of days the patient spent in hospital after delivery. This acted as an objective measure of the morbidity the patient had suffered as a result of the delivery and directly tied in to the resources spent on the delivery.

   Other maternal outcomes that were assessed included:

   a) *Estimated blood loss* was accessed from the delivery notes written by midwife or doctor. The need to transfuse post delivery was used as a surrogate for blood loss assessment during the delivery.

   b) *Delivery trauma* included extensive vaginal tears or cervical tear in VBAC, visceral injury during caesarean section, uterine rupture or hysterectomy.

   c) *Infection* post delivery was measured by temperature greater than 38°C occurring 24 hours after delivery, tenderness of the uterus on examination or purulent discharge from the surgical incision site.

2. *Foetal outcome* was assessed using the following measures;

   a. APGAR score at 5minutes to indicate if there is any birth asphyxia. The follow up of the baby up to discharge of the mother or death of foetus was recorded to know the outcome.

   b. Admission to New born unit (NBU) which was related to obstetric complications such as asphyxia and birth injuries.

   c. Neonatal sepsis which occurred during mothers hospital stay.

3. *Modes of delivery*

   *Group I*

   Successful TOL – vaginal delivery in a patient with one previous caesarean section scar.

   Failed TOL – emergency caesarean section delivery in patients who have one previous caesarean section scar.

*Group II*

ERCS – elective caesarean section delivery without trying labour in patients with one previous caesarean section.

## METHODOLOGY

STUDY SITE

The study site was Pumwani maternity hospital (PMH). This is the largest maternity hospital in East and Central Africa. It is located 2 kilometres east of Nairobi central business district. It is a busy institution mainly serving low and middle socioeconomic population. Daily deliveries are about seventy and annual turnover of about 30,000 clients. The hospital has five postnatal wards in which the study was conducted.

This hospital is suitable as it is a referral centres which meet the criteria for centres ideal for trial of labour in patients with one previous caesarean section scar. These conditions include patients in labour are monitored and secondly a team of in-house surgeon, anaesthetist and theatre staff are immediately available for surgery.

STUDY POPULATION

The study population included mothers with 1 previous caesarean section delivery who for the index pregnancy had been scheduled for TOL and those who had been scheduled for ERCS. The researcher was not involved in decision making as to who is for TOL or ERCS. Thus, decision on mode of delivery was made by the practitioners providing antenatal care. Patients were recruited while in the postnatal wards after delivery.

First study group in the cohort were mothers with 1PS who were delivered by VBAC or EMCS after failed in TOL.

The second study group of the cohort were mothers with 1PS who were delivered by ERCS whatever the reason for this choice of mode of delivery was.

Inclusion criteria

1. Above 18yrs of age
2. Signed informed consent
3. 1 previous lower uterine segment Caesarean Section scar

Exclusion criteria

1. Previous history of ruptured uterus
2. Patient scheduled for ERCS who came in labour.
3. 1PS for TOL who came in postdates.

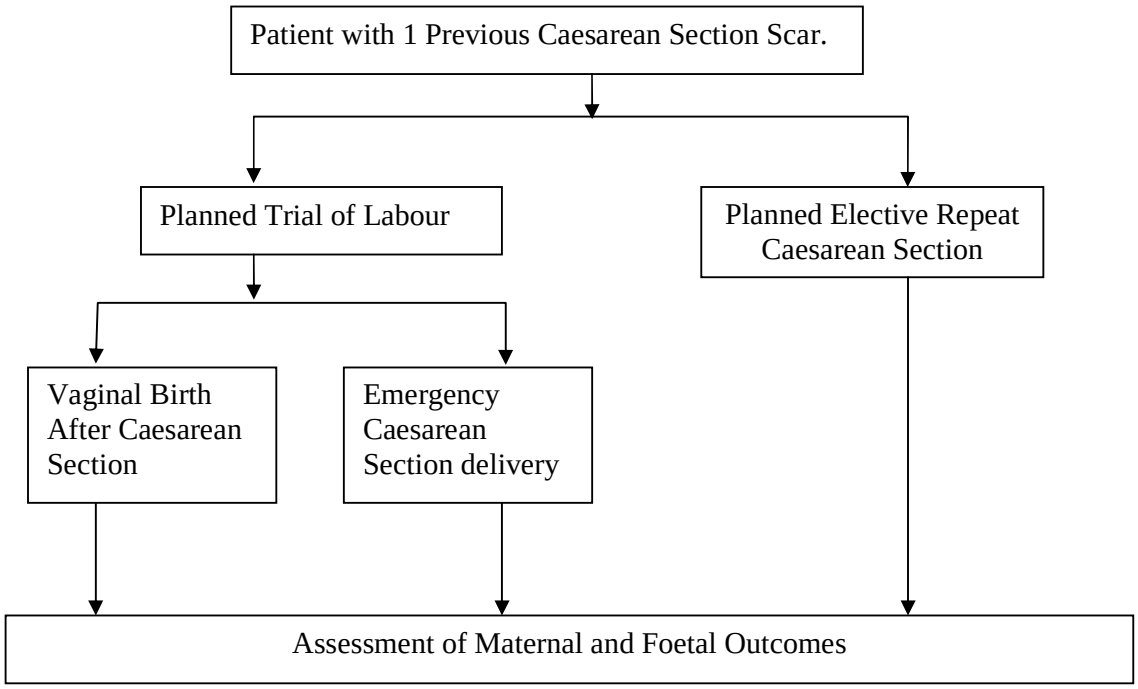
STUDY DESIGN

This was a retrospective cohort study of women with 1 previous caesarean section scar. On one hand there were mothers scheduled for ERCS while on the other there were those scheduled for TOL. After delivery, pregnancy outcomes both foetal and maternal were determined for the period the mother is admitted. The measures of outcome were as follows;

1. maternal postnatal hospital stay
2. maternal blood loss
3. post delivery infectious morbidity
4. APGAR score.

The overall study design is depicted diagrammatically in Figure1.

*Figure 1* – Overall study design




## DATA COLLECTION

Data collection was done at Pumwani maternity hospital from 3rd August 2009 to 30th October 2009. Labour ward was the entry point where patients with one previous caesarean section scar were to be identified in the delivery register. With assistance of the admitting nurse, the names and inpatient number of the patients who qualify for the study was recorded. The selection of which arm of the cohort study was be based on the plan for delivery. This plan of delivery was decided by the clinician in the ANC or in labour ward as follows;

Group 1 – constituted those patients with 1PS who were planned for TOL and were delivered by either VBAC or EMCS.

Group 2 - constituted those patients with 1PS delivery by ERCS.

The role of the research assistant was purely observational by interviewing the client and recording of the events that had already occurred with reference to the antenatal card and patient file. They had no influence on which arm of the study the patient got into.

Patients who qualified for the study while in the postnatal ward after delivery, were given information about the study after which they signed consent for participation. Recording of in patient numbers of recruits and filling in of bio data was then done. Information on perinatal events and decision on mode of delivery including the criteria for decision making was from the antenatal card. Outcomes for both the mother and baby were accessed from delivery records. Both mother and her baby were followed up until discharge. All this information was captured in an interviewer administered questionnaire.

Data collection was conducted by research assistants (nurse) under supervision of the principle investigator. They were trained on examination and questionnaire filling in a standard way. Questionnaire was pre tested so as to determine practicability and corrections were made. Confidentiality was maintained and interviews were conducted in a private room in the ward. There was no specific sampling procedure. The study involved total population sequentially recruited until sample size was reached.

## SAMPLE SIZE

This was based on assumptions regarding the average bed stay in the hospital in the two groups:

*Group I* (patients who underwent TOL) - Assuming that among those patients undergoing TOL 50% are successful VBAC and have an average hospital stay of 1day. The others undergoing EMCS have an average hospital stay of 5days. So the average hospital stay among those undergoing TOL will be 3days.

*Group II* (patients who had elective repeat caesarean delivery) - The average hospital stay for this group is 4days.

For a study comparing two means, the equation for sample size (1) is

$$n = 2*\delta^2 [z_\alpha + z_\beta]^2 / (\Delta)^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where;

*n* is the total sample size (the sum of the sizes of both comparison groups),

σ is the assumed SD of each group (assumed to be equal for both groups),

$z_\alpha$ value is the desired significance criterion (95% = 1.96),

$z_ß$ value is the desired statistical power (80% = 0.842),

Δ is the minimum expected difference between the two means = 1 day (4 – 3 days).

Both $z_\alpha$ and $z_ß$ are cut off points along the x axis of a standard normal probability distribution that demarcate probabilities matching the specified significance criterion and statistical power, respectively.

On the basis of results of preliminary studies from hospital data, the SD for hospital stay is 3 days.

Substituting the above into the equation (2) above we get;

$$n = 2*3^2 [1.96+1.842]^2 / (1)^2$$

$$n = 2*9 \ [3.802]^2 / (1)$$

$$n = \frac{18 \ [3.802]^2 / (1)}{259.92}$$

$$n = 260$$

$$\approx 260 \text{ Participants}$$

Therefore, a total of 130participants in group I and 130participants in group II were required.

## DATA MANAGEMENT AND ANALYSIS

The collected data was kept in safe place for data entry process. After cross checking the questionnaires for any missing entries, a data base was designed in MS Access which allowed the research to set controls and validation of the variables. On completion of the data entry exercise

the data was exported in a Statistical Package (SPSS – Version 15.0) for analysis and for inferential statistics.

The data was presented in tables and figures where applicable. Parametric test were used to examine whether there is any significant association between the hospital stay.

Relative Risk and its associated 95% Confidence interval (CI) were employed to assist in determining the factor that are more likely to explain the outcome variable.

P - value of less the 0.05 was considered statistically significant.

## LIMITATIONS OF THE STUDY

The following are some of the limitations:

1. There was low numbers in recruitment in the ERCS arm of the study. This was due to the fact that most mothers prefer undergoing TOL and even when informed that they were to be delivered by ERCS, they would present in labour and hope to have a vaginal delivery. However we were still able to analyze the data and achieve adequate power in the study.
2. Some patients did not know why previous caesarean section was done and are not conversant with their past medical history posing a challenge to filling the questionnaire. However indications were identified through meticulous history taking.
3. Medical records in form of the antenatal card from other institutions e.g. Health centres or private hospitals the patient may have attended ANC were sometimes not readily available at the hospital of delivery. However this was circumvented through taking a good history about previous pregnancies and antenatal follow up for index pregnancy.
4. Ascertaining the exact gestation at delivery for those who neither attended ANC, nor are they sure of last menses and have not had an ultrasound, was a challenge. However from the interview, history of quickening and onset of symptoms of early pregnancy were discussed to deduce the gestation of index pregnancy.

5. Poor documentation on the part of medical personnel in giving reason for failed trial of labour or reason for ERCS delivery. However before commencing the study training was done on proper documentation.
6. After successful VBAC, patients stay was only 24hrs in the hospital. There was therefore poor follow-up for them in terms of post partum complications e.g. haemorrhage or sepsis. However counselling was done during administration of the questionnaire. Mother were taught to lookout for these adverse signs and advised to report to the hospital should they experience them.

## ETHICAL ISSUES

There were no serious ethical issues in the study since the study involved documentation of existing practises without changing the clinical practises. The study only monitored the outcomes based on these decisions that were already made. However there was need to explain rationale of the study to the patient, and then obtain consent for participation. Confidentiality was maintained on information regarding the patient. This dissertation was presented to the Department of Obstetrics and Gynaecology University of Nairobi and was cleared by ethical review boards of both Pumwani and Kenyatta National hospital.

## RESULTS

There were 261 participants who were recruited during the study period (3rd August 2009 to 30th October 2009). Although the sample size calculated was 130 per group, there was difficulty in recruitment of adequate numbers of participants in the ERCS group of the study due to time constraints and patient preference for trial of labour. The actual number of participants recruited for the study was 165 in the TOL group and 96 in the ERCS group of the study.

The Socio-demographic characteristics of the participants in the two groups of the study are summarized in Table 1 below.

**TABLE 1: Socio-demographic characteristics of Trial of labour and Elective repeat caesarean section groups.**

| Characteristics | Study groups | | p-value |
|---|---|---|---|
| | TOL (N=165) | ERCS (N = 96) | |
| **Age in years** | | | |
| < 20 | 2 (1.2%) | 4 (4.2%) | |
| 20-24 | 51 (30.9%) | 22 (22.9%) | |
| 25-29 | 64 (38.8%) | 32(33.3%) | 0.163 |
| 30-34 | 29 (17.6%) | 28 (29.2%) | |
| 35-39 | 16 (9.7%) | 8 (8.3%) | |
| 40+ | 3 (1.8%) | 2 (2.1%) | |
| **Marital Status** | | | |
| Single | 23 (13.9%) | 18 (18.8%) | |
| Married | 141 (89.8%) | 75 (78.1%) | 0.245 |
| Separated/Divorced | 1 (0.6%) | 3 (3.1%) | |
| **Education level** | | | |
| None | 2 (1.2%) | 1 (1.0%) | |
| Primary | 85 (51.5%) | 43 (44.8%) | 0.382 |
| Secondary | 73 (44.2%) | 45 (46.9%) | |
| Tertiary | 5 (3.0%) | 7 (7.3%) | |
| **Occupation** | | | |
| Unemployed | 86 (52.1%) | 42 (43.8%) | |
| Casual | 32 (19.4%) | 16 (16.7%) | 0.271 |
| Formal | 14 (8.5%) | 14 (14.6%) | |
| Self epmloyed | 33 (20.0%) | 24 (25.0%) | |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section.*

Table 1 shows that the study participants had a modal age of 20-34 years within which 87.3% of the TOL and 85.4% of the ERCS are included.

Most of the study participants were married with 89.8% in the TOL group and 78.1% of the ERCS group of the study. Majority of the participants had either primary or secondary level of education with 95.7% in the TOL group and 91.7% in the ERCS group. Half of the participants were unemployed 52.1% in TOL and 43.8% in the ERCS group of the study.

There was no significant difference between the TOL and the ERCS participants in socio-demographic characteristics (p-value >0.05).

## Table 2: Obstetric history by study group.

| Obstetric history | Study groups | | p-value |
|---|---|---|---|
| | TOL (N=165) | ERCS (N = 96) | |
| **Parity at delivery grouped** | | | |
| 1-2 | 110 (66.7) | 80 (83.3) | |
| 3-4 | 44 (26.7) | 15 (15.6) | ***0.008*** |
| 4+ | 11 (6.7) | 1 (1.0) | |
| **Reasons for first caesarean section** | | | |
| Recurrent | 55 (33.3) | 33 (34.4) | 0.072 |
| Non-recurrent | 89 (53.9) | 59 (53.9) | |
| Not known | 21 (12.7) | 4 (4.2) | |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section.*

Table 2 shows there was a significant difference in the parity at delivery of the two groups of women. The TOL group had higher parity than the ERCS group of the study (p-value 0.008). However there was no significant difference in the reason for the first caesarean section in the two groups of the study (p-value <0.05).

**Table 3: Outcomes of Trial of labour.**

| Outcomes | Number | Percentage % |
|---|---|---|
| Overall outcomes N=165 | | |
| Successful TOL | 75 | 45.5 |
| Failed TOL | 90 | 54.5 |
| Reasons for Failed TOL (N=90) | | |
| Non reassuring foetal status | 26 | 28.9 |
| Cephalo-pelvic dispropotion | 13 | 14.4 |
| Impending rapture | 5 | 5.6 |
| Malposition | 4 | 4.4 |
| Poor progress of labour | 17 | 18.9 |
| Other | 4 | 4.4 |
| Failed TOL (not specified) | 21 | 23.3 |

*Abbreviations: TOL- trial of labour.*

Table 3 shows that in the TOL group 45.5% succeeded and had a vaginal birth after caesarean section (VBAC), while 54.5% of them failed and were delivered by emergency caesarean section (EMCS). The indications for the failed TOL are indicated and the most common reasons were non reassuring foetal status (28.9%) and poor progress of labour (18.9%).

**Table 4: Pregnancy outcomes by planned mode of delivery.**

| Outcomes | Planned mode of delivery | | p-value |
|---|---|---|---|
| | TOL N=165 (%) | ERCS N=96 (%) | |
| *Blood loss (mls)* | | | |
| < 500 | 70 (42.4) | 25 (26.0) | **0.008** |
| ≥ 500 | 95 (57.6) | 71 (74.0) | |
| *Transfusion* | | | |
| *Yes* | 9 (5.5) | 1 (1.0) | 0.075 |
| *No* | 156 (94.5) | 95 (99.0) | |
| *Maternal status* | | | |
| Infection | 4 (2.4) | - | - |
| Ruptured uterus | 1 (0.6) | - | |
| Postnatal Hospital stay | | | |
| 1 – 3 days | 117 (70.9) | 47 (49.0) | **<0.001** |
| ≥ 4days | 48 (29.1) | 49 (51.0) | |
| *Foetal status* | | | |
| Admitted to NBU | 57 (35.0) | 13 (13.5) | **<0.001** |
| Neonatal death | 6 (3.7) | 1 (1.0) | |
| *APGAR score at 5minutes* | | | |
| 8 – 10 | 130 (78.7) | 92 (95.6) | **<0.001** |
| <8 | 35 (21.3) | 4 (4.4) | |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section, NBU- new born unit.*

Table 4 shows the overall pregnancy outcomes irrespective of the eventual mode of delivery for those scheduled for TOL and compared to those subjected to ERCS. There were significant differences in both maternal and foetal outcomes in the two groups of the study.

Blood loss was more in those planned for ERCS with 74% of participants loosing ≥ 500mls, while those in the TOL group only 57.6% lost ≥ 500mls of blood during delivery (p-value 0.008).

However, there were more participants in the TOL group receiving blood transfusions, 5.5% as compared to the ERCS group where only 1% received (p-value 0.075).

In the assessment of maternal status, postnatal hospital stay was significantly different with 51% of ERCS group having ≥4days stay as compared to 29.1% in the TOL group (p-value <0.001).

However there were more severe cases of morbidity in the TOL group where there was 1 (0.6%) case of ruptured uterus and 2.4% of participants had post delivery infection as compared to none in the ERCS group. There was no maternal death among the study participants.

Foetal outcome was significantly better in the ERCS group as compared to the TOL group (p-value <0.001) whereby 35% of the of the TOL group neonates were admitted to the NBU with 3.7% neonatal death. This is in comparison to 13.5% of neonates in ERCS group who needed admission and neonatal death was only 1%. APGAR score was also significantly better in the ERCS group where only 4.4% of the neonates had scores below 8 at 5minutes as compared to 21.3% in the TOL group.

**Table 5: Pregnancy outcomes by Failed trial of labour (TOL) and Elective repeat caesarean section (ERCS).**

| **Outcome** | **Study groups** | | **p-value** |
|---|---|---|---|
| | **Failed TOL N=90 (%)** | **ERCS N=96 (%)** | |
| *Blood Loss in ml.* | | | |
| < 500 | 1 (1.1) | 25 (26.0) | **<0.001** |
| ≥ 500 | 89 (98.9) | 71 (74.0) | |
| Transfused (yes) | 6 (6.6) | 1 (1) | **0.044** |
| *Maternal status* | | | |
| Infection | 4 (4.4) | - | |
| Ruptured uterus | 1 (1.1) | - | |
| Postnatal hospital stay | | | |
| 1-3 days | 58 (64.4) | 47 (49.0) | **0.033** |
| ≥ 4 days | 32 (35.6) | 49 (51.0) | |
| *Foetal Status* | | | |
| admitted to NBU | 32 (35.5) | 13 (13.5) | **<0.001** |
| Neonatal death | 6 (6.7) | 1 (1.0) | |
| APGAR score (<8 at 5minutes) | 21 (23.3) | 4 (4.2) | **<0.001** |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section NBU- new born unit*

Table 5 shows that there are significant differences in the two groups whereby blood loss ≥ 500mls was 98.9% in the failed TOL group as compared to the ERCS group where it was only 74% (p-

value <0.001). This is further supported by the significant difference in the rate of blood transfusion where it was 6.6% in the failed TOL group as compared to 1% in the ERCS group (p-value 0.044). Maternal postnatal stay was significantly longer in the ERCS groups with 51.0% staying ≥ 4 days as compared to 35.6% in the failed TOL group (p-value 0.033).

Foetal outcome was significantly better in the ERCS group whereby the admission to NBU was 13.5% with neonatal death occurring in 1% only. This is in comparison to 35.5% admission rate and 6.7% neonatal death rate in the failed TOL group (p-value <0.001). APGAR score at 5minutes was again better in the ERCS group where only 4.2% had scores less than 8 as compared to 23.3% in the failed TOL group (p-value <0.001).

**Table 6: Pregnancy outcomes by Successful trial of labour (TOL) and Elective repeat caesarean section (ERCS).**

| **Outcome** | **Study groups** | | **p-value** |
|---|---|---|---|
| | **Successful TOL N=75 (%)** | **ERCS N=96 (%)** | |
| *Blood Loss in ml.* | | | |
| < 500 | 69 (92.0) | 25 (26.0) | **<0.001** |
| ≥ 500 | 6 (8.0) | 71 (74.0) | |
| Transfused (yes) | 3 (4) | 1 (1) | 0.320 |
| *Maternal status* | | | |
| Infection | 0 | - | |
| Ruptured uterus | 1 (1.3) | - | |
| Postnatal hospital stay | | | |
| 1-3 days | 59 (78.7) | 47 (49.0) | **<0.001** |
| ≥ 4 days | 16 (21.3) | 49 (51.0) | |
| *Foetal Status* | | | |
| admitted to NBU | 25 (33.3) | 13 (13.5) | **<0.001** |
| Neonatal death | 0 | 1 (1.0) | |
| APGAR score (<8 at 5minutes) | 14 (18.7) | 4 (4.2) | **<0.001** |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section NBU- new born unit*

Table 6 shows that more patients in the ERCS group having blood loss ≥ 500ml, 74%, as compared to the successful TOL group where it was only 8.0% (p-value <0.001).

The maternal postnatal stay was longer in the ERCS group where 51.0% stayed ≥ 4 days as compared to 21.3% in the successful TOL (p-value <0.001).

Foetal status was significantly better in the ERCS group where admission to NBU was only 13.5% as compared to 33.3% in the successful TOL group. APGAR score at 5minutes was also better in the ERCS group where only 4.2% had a score <8 as compared to 18.7% in the successful TOL group.

**Table 7: Pregnancy outcomes among women undergoing Trial of Labour (TOL) by mode of delivery.**

| **Outcome** | **Study groups** | | **p-value** |
|---|---|---|---|
| | **Successful TOL N=75 (%)** | **Failed TOL N=90 (%)** | |
| *Blood Loss in ml.* | | | |
| < 500 | 69 (92.0) | 1 (1.1) | **<0.001** |
| ≥ 500 | 6 (8.0) | 89 (98.9) | |
| Transfused (yes) | 3 (4.0) | 6 (6.7) | 0.453 |
| *Maternal status* | | | |
| Infection | - | 4 (4.4) | |
| Ruptured uterus | - | 1 (1.1) | |
| Postnatal hospital stay | | | |
| 1-3 days | 59 (78.7) | 58 (64.4) | **0.045** |
| ≥ 4 days | 16 (21.3) | 32 (35.6) | |
| *Foetal Status* | | | |
| admitted to NBU | 25 (33.3) | 32 (35.5) | **0.070** |
| Neonatal death | 0 | 6 (6.7) | |
| APGAR score (<8 at 5minutes) | 14 (18.7) | 21 (23.3) | 0.382 |

*Abbreviations: TOL- trial of labour, ERCS- elective repeat caesarean section NBU- new born unit*

Table 7 shows that there was a significant difference blood loss where failed TOL had 98.9% of participants having ≥ 500mls lost at delivery as compared with 8.0% in the successful TOL group (p-value <0.001). However there was no significant difference in the transfusion rates.

Maternal outcomes were better in the successful TOL group where postnatal hospital stay was significantly lower with 21.3% having stayed ≥ 4 days as compared to 35.6% in the failed TOL group (p-value 0.045). Other adverse maternal outcomes such as infection and ruptured uterus were only in the failed TOL group at the rate of 4.4% and 1.1% respectively.

All 6 the neonatal deaths were in the failed TOL group and they also had more admissions to the new born unit 35.5%, as compared to 33.3% in successful TOL group. This demonstrated significantly poorer foetal outcome in the failed TOL group (p-value=0.070).

## Table 8: Criteria used for decision making on Trial of labour (TOL)

| Criteria | Frequency | Per cent |
|---|---|---|
| Erect lateral pelvimetry | 0 | 0 |
| Clinical pelvimetry | 216 | 82.7 |
| Estimate foetal weight by ultrasound | 16 | 6.1 |
| Clinical estimation of foetal weight | 13 | 5.0 |
| Others | 1 | 0.4 |

Table 8 shows that most participants had undergone clinical pelvimetry (82.7%) prior to decision on trial of labour. Other methods preferred were estimation of foetal weight by ultrasonography and clinically (6.1% and 5.0%).

## Table 9: Reason for Elective repeat caesarean section (ERCS)

| Reason | Frequency | Per cent |
|---|---|---|
| Own choice | 38 | 39.5 |
| Inadequate pelvis on ELP | 9 | 10.2 |
| Inadequate pelvis on clinical pelvimetry | 12 | 13.5 |
| Estimated foetal weight >3.5kg by ultrasound | 9 | 10.2 |
| Clinical estimation of foetal weight >3.5kg. | 5 | 5.6 |
| Others | 26 | 27.0 |

*Abbreviations: ELP- erect lateral pelvimetry*

Table 9 shows that the most common reason for elective repeat caesarean section was patient own choice in 39% of the participants. Inadequate pelvis on erect lateral pelvimetry, inadequate pelvis on clinical pelvimetry, estimated foetal weight above 3.5kg by ultrasound and clinically estimated foetal weight > 3.5kg were all used in 10.2%, 13.5%, 10.2% and 5.6% of the participants.

## Table 10: Success of TOL by criteria used.

| Criteria | Trial of labour outcome | |
|---|---|---|
| | Successful TOL Number (%) | p - value |
| Estimate foetal weight by scan | | |
| Yes (N=16) | 0 (0) | **<0.001** |
| No (N=149) | 75 (50.3) | |
| Clinical estimation of foetal weight | | |
| Yes (N=13) | 5 (38.5) | 0.812 |
| No (N=152) | 70 (46.1) | |

*Abbreviations: TOL- trial of labour.*

Table 10 shows that estimated foetal weight by scan is a significant criteria for predicting the successful outcomes of trial of labour (p-value <0.001). Clinical estimation of foetal weight on the other hand does not have a significant predictive value (p value 0.812).

There were no patients for TOL who underwent erect lateral pelvimetry. All patients for TOL underwent clinical pelvimetry on presentation in labour. So for these two parameters assessment for outcome could not be done.

## Table 11: Foetal outcome by criteria used.

| **Criteria** | **Foetal outcome** | |
|---|---|---|
| | Admission to NBU Number (%) | p- value |
| Estimate foetal weight by scan | | |
| Yes (N=16) | 1 (6.25) | **0.005** |
| No (N=149) | 69 (46.3) | |
| Clinical estimation of foetal weight | | |
| Yes (N=13) | 3(23.1) | 0.025 |
| No (N=152) | 6 (3.9) | |

*Abbreviations: NBU- Newborn unit.*

Table 11 shows that estimation of foetal weight by scan is a significant criteria for reducing admissions to NBU (p-value 0.005). Clinical estimation of foetal weight on the other hand is not significant (p-value 0.025).

There were no patients for TOL who underwent erect lateral pelvimetry. All patients for TOL underwent clinical pelvimetry on presentation in labour. So for these two parameters assessment for outcome could not be done.

## Table 12: Multivariate analysis (Duration of Hospital stay as the Response Variate)

| Logistic Regression on the Duration of Stay and the significant Factors | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter Estimates** | | | | | | | | |
| **Outcome Variable = Duration of Stay** | | **B** | **Std. Error** | **'ald** | **Sig.** | **Exp(B)** | **95% CI** | |
| **Variable** | **Levels** | | | | | | **Lower Bound** | **Upper Bound** |
| | Intercept | -11.10 | 2.33 | 22.72 | ***0.000*** | | | |
| | No of ANC | 0.22 | 0.12 | 3.55 | ***0.060*** | 1.25 | 0.99 | 1.57 |
| | Parity | -0.42 | 0.20 | 4.70 | ***0.030*** | 0.65 | 0.45 | 0.96 |
| | Birth Weight | 0.00 | 0.00 | 5.56 | ***0.018*** | 1.00 | 1.00 | 1.00 |
| **Gestation** | Term | -1.62 | 0.69 | 5.60 | ***0.018*** | 0.20 | 0.05 | 0.76 |
| | Pre-Term (reference) | 0.00. | . | . | . | . | . | |
| **Complication** | HBP | 0.47 | 0.82 | 0.33 | 0.567 | 1.60 | 0.32 | 8.02 |
| | Diabetes | 15.92 | 3527.73 | 0.00 | 0.996. | . | | |
| | Other | 2.90 | 1.17 | 6.12 | ***0.013*** | 18.18 | 1.83 | 180.69 |
| | None (reference) | 0.00. | . | . | . | . | . | |
| **Foetal Outcome** | Well | 18.37 | 0.39 | 2224.82 | ***0.000***. | . | . | |
| | Admitted to NBU | 19.69 | 0.00. | . | . | . | . | |
| | Neonatal Death (reference) | 0.00. | . | . | . | . | . | |
| **Maternal Outcome** | Well | -2.91 | 1.11 | 6.88 | ***0.009*** | 0.05 | 0.01 | 0.48 |
| | Discharged on Treatment (reference) | 0.00. | . | . | . | . | . | |

On running a logistic regression taking the duration of maternal postnatal hospital stay as the response variable (over stayed> 4days & normal stay at ≤ 4 day) the factors which were significant univariately, were subjected to a multiple binary regression. Among these factors the significant factor included number of ANC visits, parity of the patient, birth weight of the baby, gestation, foetal outcome and maternal outcome with p values 0.006, 0.030, 0.018, 0.018, 0.000 and 0.009 respectively.

These factors significantly explained the postnatal length of stay of the mother such as the probability of staying an extra day was reduced by 5% if the mother was well compared to if the mother was discharged on treatment. (OR = 1.05). When predicting the length of stay of the mothers the above significant factors need to be considered.

## DISCUSSION

The objective of this study was to determine the outcomes of trial of labour (TOL) in patients with one previous lower uterine segment caesarean section scar compared to those undergoing elective repeat caesarean section (ERCS). In this study maternal outcome was measured primarily by postnatal hospital stay and foetal outcome by APGAR score, both being indicators of morbidity.

This study has found that maternal morbidity was higher in the ERCS group where maternal hospital stay was ≥4days in 51% of the participants as compared with the TOL group where 29.1% of participants stayed ≥4days (p-value <0.001). However, there were incidents of other complications in the TOL group with 3 cases of delivery trauma and 4 cases of infection post delivery while there were none in the ERCS group. This is in keeping with findings in a meta analysis done in by Ross Cristina et al [44] which found that there was higher risk of delivery trauma in women planned for TOL as compared to ERCS. However, this risk is counter balanced by the reduction in maternal morbidity especially when VBAC success rate was high in trial of labour. A similar study done on Nova Scotia [45] had different findings that major maternal complications are twice as likely among those whose deliveries are managed with TOL as compared to ERCS. In this study success of TOL was low and this may explain the higher rate of transfusion observed in this group.

Foetal outcomes were significantly better in the ERCS group as compared to the TOL group (p-value <0.001). Of the TOL group 57 (35%) neonates were admitted to the NBU with 6 (3.7%) neonatal deaths. In comparison only 13(13.5%) of neonates in ERCS group needed admission and neonatal death was 1(1%). APGAR score was also significantly better in the ERCS group (p-value <0.001) where only 4(4.4%) of the neonates had scores below 8 at 5minutes as compared to 35(21.3%) in the TOL group. These findings differed from the Nova Scotia study [45] where there was no difference in the peri-natal outcomes in TOL and the ERCS groups. This can be attributed

to better monitoring of mothers in labour and foetus in utero, so foetal distress is diagnosed earlier and corrective measures are instituted. There are also better facilities in the new born unit (NBU) and this goes a long way to reduce the neonatal death. Lastly, 4(2.4%) mothers in this study decided to undergo TOL at home and presented to the hospital late with impending rupture. They were all delivered by EMCS and the outcomes were all fresh still birth. This significantly impacted the neonatal outcomes in the TOL group.

One of the patients in the TOL group who was being monitored within the labour ward was diagnosed to have impending rupture. However, she did go ahead and suffer a ruptured uterus and foetus was extruded into the peritoneal cavity. The outcome of her laparatomy was a fresh still birth. This is in contrast to a study which was done looking at foetal outcomes in cases of ruptured uterus at University of California, San Francisco Moffett-Long hospital [10]. The study concluded that rupture does not result in major maternal or neonatal morbidity and mortality. However this study was carried out in an institution where there are adequate numbers of in house obstetric, anaesthetic, surgical staff and close monitoring of maternal and foetal well being.

Success rate of TOL in this study at Pumwani maternity hospital was 45.5%. This is lower than that in western countries where studies quote success rates of 55 – 85% [5-10]. Our lower rate of successful TOL could be explained by differences in practise whereby we do not induce labour in patients with 1 previous scar and neither do we augment their labour with oxytocin. This could contribute to higher numbers of failed TOL due to poor progress of labour.

There was a clear preference for TOL as compared to ERCS among the patients at Pumwani maternity hospital. This was evident in the number of patients who would be counselled on ERCS delivery and would present to hospital in established labour in the hope of achieving a vaginal delivery. These finding were in keeping with a Kenyan study [4] done by Koigi Kamau et al which

found that, it was the perception of obstetricians that 83% of women with 1 previous scar prefer TOL as opposed to ERCS.

The findings of this study that foetal outcome is poorer in TOL group is a factor worth looking into as the main interest of a mother at delivery is the baby. So in situations where about a fifth (21.3%) of neonates in the TOL group are being born with some form of asphyxia (APGAR score of <8 at 5 minutes) or where admission rates to NBU is 35%, this should influence the clinician when advising the mothers on choice of mode of delivery in view of the foetal outcome expected.
Another thing that comes out clearly in this study is that even when TOL is successful, the foetal outcome is still poor with birth asphyxia rates of 18.7% and admission to NBU at 33.3%. So success in TOL may reduce maternal morbidity but had higher incidence of admissions to NBU.

Studies done on failed TOL to access the risk involved have found that the patients have a higher risk of infectious morbidity compared to patients who had ERCS [23]. This study has similar findings of higher incidence of infection in the TOL group (4 participants) as compared to none in the ERCS group. This can be attributed to the multiple number of vaginal examinations done during labour and more so if the membranes are ruptured for a significant period of time. The low TOL success rate and higher morbidity associated with EMCS compared to ERCS contributed to these increased complications in TOL group.

In selecting patients for TOL this study sought to document the criteria used in decision making. The most popular assessment used at Pumwani maternity hospital was clinical pelvimetry where 82.7% (216) of the TOL group and 13.5% (12) of the ERCS group underwent clinical pelvimetry. This is because it is done at no cost to the patient and clinician is able to make decision immediately on adequacy of the pelvis. Clinical estimation of foetal weight, ultrasonographic estimation of foetal weight and erect lateral pelvimetry (ELP) were also done on 18, 25 and 9 patients respectively. The findings of this study was that clinical estimation of foetal weight had a

significant impact on the success of trial of labour with all 5 participants (6.7%) who underwent the assessment having been successful in TOL (p-value 0.013). However none of the other assessments were found to have an impact on pregnancy outcomes. These finding are in keeping with a local study done by Githiru et al [6] where they found that among women varying in true conjugate of 10.5cm either 0.5cm more or less, this did not alter the success rate of TOL. Randomized controlled trial done in South Africa [20] found that antepartum ELP in women with 1PCS was not necessary prior to TOL. It increased caesarean section rate and is a poor predictor of the outcome of labour.

Duration of postnatal hospital stay was taken as the response variable in regression analysis. The significant factors contributing to hospital stay were number of ANC visits, parity of the patient, birth weight of the baby, gestation, foetal outcome and maternal outcome at 0.006, 0.30, 0.018, 0.018, 0.000 and 0.009 respectively. The probability of staying an extra day was reduced by 5% if the mother was well compared to if the mother was discharged on treatment. (OR = 1.05).

## CONCLUSION

1. Success rate of TOL was low at 45.5% necessitating emergency caesarean delivery in more than half of the women.
2. Among the women undergoing emergency caesarean section after a period of TOL, overall complications rates both maternal and foetal are significantly higher than in those subjected to ERCS.

## RECOMMENDATIONS

1. There is need to consider ERCS for patients with 1 previous scar in institutions which do not meet the criteria for TOL whereby there is no proper monitoring of both maternal and foetal condition during labour.
2. Recommend further studies to look into objective criteria which can be used in decision making for trial of labour that will have an impact in the pregnancy outcome.

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# APPENDIX I

## CONSENT FORM

I am Dr. Elizabeth Kimotho, a masters student in the Department of Obstetrics and Gynaecology at the University of Nairobi. I am doing a study on women who have had previous caesarean delivery. I will be looking at how they will be delivered and the outcome after delivery, whether caesarean or vaginal delivery. This will not in any way change the treatment offered to you as a patient within this hospital. I will be asking you several questions about your pregnancies. I will also be recording information about your delivery and than follow up you and the baby until you are discharged from the ward. This information will be used to improve the future care for patients like your self.

Participation is voluntary and the information obtained will be confidential. Not giving consent or withdrawal from participation will not influence your treatment in the hospital. No special procedures will be carried out on you for this study.

**Consent**

I have been explained to about the study and accept to participate. I have not been coerced or enticed in any way.

Participant's signature/ thumbprint ……..…..... Date …….

Witness's signature ….....…….....…...…….....  Date …….

Investigator's name and signature ..... Date .....

Person responsible for research is Dr Elizabeth Kimotho , P.O Box 174 00202 Nairobi

tel no. 0722 852 077.

# APPENDIX II : QUESTIONAIRE

DATE *(dd/mm/yy)* ...../...../..... Serial Number ☐☐☐☐

Birth Plan 1. TOL ☐ 2. ERCS ☐

In Patient Number ……..

1. Date and time of admission *(dd/mm/yy. 00.00hrs)* …….
2. Date and time of delivery *(dd/mm/yy. 00.00hrs)* …….
3. Date and time of discharge *(dd/mm/yy. 00.00hrs)* …….
4. **POST DELIVERY** Hospitals stay ☐☐ running days.

## SECTION A: BIO DATA

5. Age ☐☐ (in complete years)
6. Marital status ☐

   1 .single 2.married 3.separated 4.divorced 5.widowed

7. Education level ☐

   1. none 2.primary 3.secondary 4.tertiary

8. Occupation ☐

   1. unemployed 2.casual worker 3.formal employment 4.self employed

## SECTION B: ANTENATAL CLINIC

9. Centre for ANC attendance in index pregnancy ☐

   1. Kenyatta hospital
   2. City council clinic
   3. Private hospital
   4. Pumwani maternity hospital
   5. Private doctor
   6. None

10. Number of visits ☐☐
11. Parity ☐ + ☐

12. **INFORMATION ON FIRST CAESAREAN SECTION**

a) Type of Caesarean section

i) Elective ☐ ii) Emergency ☐

b) Reason for C/S

i) Recurrent reasons
CPD ☐
Others …….

ii) Non recurrent reason
NRFS ☐
Malposition ☐
Poor progress ☐
Others ……..

c) Duration of labour prior to C/S ☐☐ hours (if applicable).

d) Gestation at C/S ☐☐ months.

e) Complications after 1st C/S ☐

1. Sepsis 2. Haemorrhage 3. others …….…….

13. Length of time since first caesarean section delivery ☐☐ completed months.

14. Number of previous vaginal births *(tick all that apply)*

1. Prior to C/S ☐ .....
2. After the C/S ☐ .....

**INFORMATION ON CURRENT PREGNANCY**

15. Complications on index pregnancy *(tick all that apply)*

1. Hypertension ☐
2. Diabetes ☐
3. Other (specify) ☐….....

16. Has assessment before attempting TOL been done ☐

a. Yes – go to Q17
b. No – go to Q 18

17. Assessment done prior to decision making *(tick all that apply)*

| | | *Results* |
|---|---|---|
| 1. Erect lateral pelvimetry done (inlet) | ☐ | ……..... cm |
| 2. Clinical pelvimetry done. | ☐ | …….. |
| 3. Scan to estimate foetal weight. | ☐ | ……...gms |
| 4. Clinical estimation of foetal weight. | ☐ | ……...gms |
| 5. Other (specify) | ☐ | …….. |

**SECTION C: DELIVERY**

18. Cervical dilatation on admission to labour ward ☐☐ cm.

19. Cervical effacement at admission ☐☐ %

1. >75% ☐ 2. 75-25% ☐ 3. <25% ☐

20. Mode of delivery after trial of labour

1. VBAC ☐ go to Q23.
2. EMCS ☐ go to Q21.

21. In EMCS delivery

a) Indication of C/S ☐

1. NRFS
2. CPD
3. Impending rupture
4. Malpositioning
5. Poor progress of labour
6. Others (specify) ……..…….

b) Cervical dilatation at time of C/S decision ☐☐ cm.

22. Reason for Elective Repeat Caesarean section

1. Own choice ☐
2. Did not qualify for TOL due to
   a. Inadequate Erect lateral pelvimetry ☐
   b. Inadequate Clinical pelvimetry ☐
   c. Estimate foetal weight >3.5kg by ultrasound. ☐
   d. Clinical estimation of foetal weight >3.5kg. ☐
   e. Other (specify) …… ☐

23. Gestation at delivery ☐☐ weeks

**SECTION D: OUTCOMES TO MEASURE**

24. Estimated blood loss …….…….mls.

25. Blood transfusion requirement …… units

26. Delivery trauma *(tick all that apply)*

- o None ☐
- o Vaginal or cervical tear Repaired in theatre ☐
- o Visceral injury ☐
- o Uterine rupture ☐
- o Hysterectomy ☐

27. Infection post delivery *(tick all that apply)* Hours after delivery

- Temperature >38°C ☐ ……..
- Wound infection – purulent discharge ☐ ……..
- Uterine tenderness ☐ ……..
- Purulent locia ☐ ……..
- Uterine sub involution ☐ ……..
- No sign of infection ☐

28. Birth weight of baby ☐☐☐☐ grams.

29. APGAR Score at 5min ☐☐

30. Foetal status post delivery (tick all that apply)

1. well ☐ go to Q33.
2. admitted to NBU ☐ go to Q31.
3. neonatal death ☐ go to Q32.

31. Reason for admission to NBU

i. Asphyxia ☐
ii. Birth trauma ☐
iii. Others (specify) ☐ …….

32. Neonatal death information

i. Post delivery ☐☐ hours / days (circle applicable units).
ii. Cause of death ……..…….

33. Maternal status on discharge

1. well. ☐
2. discharged mother on treatment ☐
3. maternal death ☐

i. Timing in relation to delivery ☐☐ hours/days (circle applicable units).
ii. Cause of death ……..……

34. Maternal Postnatal hospital stay ☐☐ day of discharge.

# APPENDIX III

Flamm scoring system tool

***Variable Point value***

- Age under 40 years 2
- Vaginal birth history
  - Before and after 1st caesarean 4
  - After 1st caesarean 2
  - Before 1st caesarean 1
  - None 0
- Reason other than poor progress for 1st C/S 1
- Cervical effacement at admission
  - >75 percent 2
  - 25 percent - 75 percent 1
  - <25 percent 0
- Cervical dilation 4 cm or more at admission 1

| ***Score*** | ***VBAC success (%)*** |
|---|---|
| 0 to 2 | 49 |
| 3 | 60 |
| 4 | 67 |
| 5 | 77 |
| 6 | 89 |
| 7 | 93 |
| 8 to 10 | 95 |