

**COMPARISON BETWEEN THE OUTCOME OF TRIAL OF
LABOUR AND ELECTIVE REPEAT CAESAREAN SECTION IN
KIAMBU DISTRICT HOSPITAL**

A RETROSPECTIVE COHORT STUDY

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE DEGREE OF
MASTERS OF MEDICINE IN OBSTETRICS AND GYNAECOLOGY

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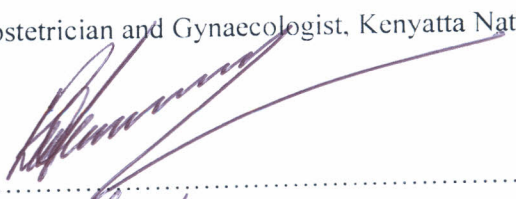
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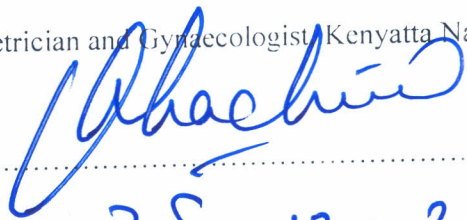
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DECLARATION

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CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr. Bonface Nzioki Musila, M.Med student registration number H58/71121/2009 in Obstetrics and Gynecology department, University of Nairobi (2008-2012). 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.

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Dedication

This book is dedicated to my daughter Leticia and my dear wife Lindacindy Kang'ethe for their unconditional love and support. To My parents too for their sincere sacrifice and continued support to ensure that I got the best education.

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I am grateful to God for giving me the strength to do this postgraduate programme. I thank the Government of Kenya through the Ministry of Medical services for sponsorship in this training.

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LIST OF ABBREVIATIONS

- i. ACOG - American College of Obstetricians and Gynecologists
- 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 Tocograph
- 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. KDH-Kiambu District Hospital
- xiii. LUSCS - Lower Uterine Segment Caesarean Section
- xiv. NBU – *New Born Unit*
- xv. NRFS – Non Reassuring Foetal Status
- xvi. IPCS - One previous caesarean section
- xvii. IPS - One Previous scar
- xviii. TOL - Trial of labour
- xix. TOS - Trial of scar
- xx. TC - True Conjugate
- xxi. VBAC - Vaginal birth after caesarean section

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 regarding TOL for women with 1 previous caesarean section delivery. There is also no single objective criteria for selecting patients for TOL which has a 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 the practice. Lack of data especially for district hospitals where majority of hospital deliveries in Kenya occur on the safety and success of TOL acts as a hindrance to this practice.

Objective

To determine the pregnancy outcomes in patients with one previous caesarean section scar who had undergone trial of labour as compared to those who had elective repeat caesarean section at Kiambu District Hospital

Design

A retrospective cohort study whereby one group of patients had undergone trial of labour and the second group had undergone elective repeat caesarean section.

Outcome measures

Maternal morbidity was assessed primarily based on postnatal hospital stay. Other maternal morbidity measures including occurrence of uterine rupture, maternal death, need for hysterectomy, maternal blood loss, presence of visceral injury (bladder or gut) and post delivery infectious morbidity were analysed. In addition, the failure rate of trial of labour was determined. Foetal outcome was assessed based on APGAR score at five minutes, need for admission to the new born unit and the occurrence of early neonatal death.

Setting

Post natal wards of Kiambu District Hospital

Materials and Methods

The study compared maternal and foetal outcome among patients who had undergone TOL to those who had undergone ERCS. A total of 142 participants were recruited of which 71 had undergone TOL and 71 had undergone ERCS. Medical records were retrieved and key information on antenatal, intrapartum and immediate postpartum events used to complete questionnaires.

Results

Clinical pelvimetry was the commonest criteria used for selection of patients for TOL since 100% of all patients in the TOL group were assessed this way as compared to 80.3% in the ERCS group. The success rate of TOL was 50.7% in this study. Successful TOL was associated with less hospital stay since 91.6% stayed for 2 days or less as compared to ERCS where 84.5% stayed for 3-4days ($P<0.001$). Similarly, blood loss was less for those who had successful TOL where 97.2% lost less than 500mls as compared to ERCS where 85.9% lost 500mls or more. Maternal outcomes were worse in the 49.7% who failed TOL since only 57.1% of them had a postnatal hospital stay of 3-4days as compared to 84.5% in the ERCS group ($p=0.029$) and 42.9% of the failed TOL group stayed in the hospital for 5 days or more as compared to only 15.5% in the ERCS group ($p=0.002$).

Foetal outcome was worse in the TOL group since 11.3% had an APGAR score of less than 8 at five minutes as compared to only 1.4% in the ERCS group ($p=0.016$). Similarly, 14.1% of newborns in the TOL group were admitted to the new born unit as compared to only 5.6% in the ERCS group ($p=0.091$). There were no early neonatal deaths reported in both groups.

Conclusion

Overall success rate for TOL was low necessitating emergency caesarean section of which the maternal outcomes were worse than in the ERCS group. The foetal outcomes were better in the ERCS group as compared to the TOL group.

Recommendations

Given the high failure rate and lack of specific criteria for TOL in patients with one previous caesarean section scar, there is a need to consider ERCS in order to prevent morbidities associated with failed TOL in level IV facilities. Further studies are however needed to validate or discount these findings.

INTRODUCTION

For many decades, a scarred uterus was believed to contraindicate trial of labour out of fear of uterine rupture. In 1916, Cragin made his famous, often quoted and now seemingly excessive pronouncement 'once a caesarean always a caesarean'. This view has been challenged over the years¹. In 1980, the consensus development conference on caesarean childbirth concluded that vaginal delivery after one previous lower uterine segment caesarean section was a safe and acceptable option in singleton vertex presentation and not an absolute indication for a caesarean section.

However in the 1990's, this opinion began to lose ground. 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%¹.

Koigi Kamau et al² studied perceptions, preference and practice of privately practicing obstetricians in Kenya. They found out that TOL was the preferred mode of delivery. The study also revealed that 90% of obstetricians routinely suggest TOL to their patients with 1PS. In addition, the perception of obstetricians was that 83% of women prefer TOL as opposed to ERCS.

It is known that in delivery of patients with 1 previous caesarean section scar, VBAC is the safer mode of delivery in comparison to caesarean section¹. However, elective is safer than emergency caesarean delivery. 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 section delivery, 15-45% of them end up having emergency caesarean delivery³. It is thus in the best patients' interest to come up with a proper selection criteria for which patients have the best chance of a successful VBAC and those with a poor chance could be recommended for ERCS. This would reduce both maternal and foetal morbidity and at the same time save on resources used in failed TOL. However, an ideal criterion has yet to be developed.

Currently, data available from western countries shows that the failed TOL rate ranges between 15-45%, with a uterine rupture rate for 1 previous scar at 1% and 2 previous scar 2%¹. A study done at KNH found that the uterine rupture rate was 3.14% in patients undergoing TOL with 1 previous scar⁴. Another study done at Pumwani maternity hospital revealed that the success rate of TOL in that institution was 45.5%³. Thus it is important to compare these figures with data generated from district (level IV) hospitals.

Antenatal clinic (ANC) attendance in Kenya is high although it occurs late in pregnancy³. Also, many women deliver in a different institution from where they attended ANC and this lack of proper follow up make delivery decisions difficult to make. In addition, 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 a history of ruptured uterus or any other reason to contraindicate TOL. Resources for investigations such as ultrasonographic estimation of foetal weight and uterine scar thickness are not widely available. Therefore there is a need to generate local data on maternal and fetal outcomes of patients with 1PS which will go a long way in objectively assessing if it is safe to conduct TOL in a district hospital and whether there is reduction of morbidity in either the mother or the foetus by undergoing TOL with 1 PS as opposed to having ERCS.

This retrospective cohort study was aimed at gathering information on practices and outcomes of management of patients with one previous caesarean section scar at a district hospital where majority of hospital deliveries occur in Kenya. Data collected from the study would help in determining if TOL is safe in a district hospital and whether it has benefits over ERCS. The information will act as a guide to obstetricians and other clinicians working in these hospitals in coming up with standardized practice

LITERATURE REVIEW

The term caesarean section denotes the delivery of foetus, placenta and membranes through an incision in the abdominal and anterior uterine walls^{5, 6, 7}. Since its introduction by Munro Kerr in 1921 and subsequent popularization by St George Wilson, Bailey and Havey Evers, the lower segment caesarean section has satisfactorily fulfilled its two main objectives; the immediate maternal morbidity and mortality associated with abdominal delivery has been lowered, and the incision, mainly due to its site, has proved stronger than the upper segment scar in subsequent deliveries^{4,5,6,7}. Currently, a low transverse incision is employed in more than 90% of the cesarean births.

For many decades, a uterus that had undergone previous surgery was believed to contraindicate labour out of fear of uterine rupture. Many women with IPS were dissatisfied with ERCS leading to a lot of TOL after caesarean section being done at home. This had disastrous results with women being brought to hospital in obstructed labour and often subsequent ruptured uterus⁸. This led 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 criteria that one has to meet in order to qualify for trial of labour after caesarean section. It includes no traditional contraindication 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 10.5 cm, estimated fetal weight(EFW) less than 3.5Kgs(by either ultrasound or manual calculation using measurements of symphysiofundal height and abdominal girth) no other uterine scars or uterine rupture, no other medical or obstetric complications that could put her in additional risks 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 delivery⁸. Flamm scoring system is a tool that has been developed in order to reduce the rate of failed trial of labour which is about 15-45% (appendix 3). Hashima and coworkers (2004) concluded that little high quality data is available to guide clinical decision regarding selection of women who are likely to have a successful trial of labour⁹.

Compared with vaginal delivery, caesarean birth is associated with increased risks, including anaesthesia, haemorrhage, iatrogenic injuries to the bladder and other organs, pelvic infection, scarring and other less frequent events¹. Women with a transverse scar confined to the lower uterine segment have the lowest risk of symptomatic scar separation during a subsequent pregnancy. Women who have previously sustained a uterine rupture are at an increased risk of recurrence. Those with a rupture confined to the lower segment have been reported to have a 6% recurrence risk in subsequent labour, whereas those whose prior rupture included the upper uterus have a 32% recurrence risk¹. The low transverse uterine incision is typically closed in one or two layers. Whether the risk of subsequent uterine rupture is related to the number of layers of closure is controversial⁵.

It seems logical to assume that the risk of uterine rupture would be increased if the caesarean section scar did not have sufficient time to heal. Studies of uterine scar healing using magnetic resonance imaging (MRI) techniques suggest that complete uterine involution and restoration of anatomy may require at least six months. Shipp and associates¹⁰ found that delivery intervals of 18 months or less were associated with a threefold increased risk of symptomatic uterine rupture compared with those over 18 months. Any previous vaginal delivery either before or following a caesarean birth is associated with a successful VBAC.^{11, 12} Prior vaginal delivery is also associated with a lower risk of subsequent uterine rupture¹³. Indeed, the most favourable prognostic factor for

VBAC is prior vaginal delivery. The American college of Obstetricians and Gynecologists has recently taken the position that for women with two previous low transverse caesarean deliveries, only those with a prior vaginal delivery should be considered for VBAC.

The role of radiological pelvimetry in predicting the outcome of TOL remains a controversial subject. Hofmeyr recommends that the presence or absence of cephalopelvic disproportion should be diagnosed by trial of labour using a partogram and that imaging pelvimetry by X-Ray or CT scan should be reserved for cases in which specific pelvic inadequacy is suspected¹⁴. In a randomized control trial in South Africa, X-Ray pelvimetry was found to be of little value¹⁵. According to Walton's study at the KNH⁴ radiological pelvimetry is the single most important investigation in the selection of patients for trial of labour. Fraser¹⁶ and Ogutu¹⁷ suggested that X-ray pelvimetry is important for those found to have borderline pelvis and should not necessarily be done routinely in all patients so as to avoid unnecessary irradiation of the fetus. Ogutu found out that the patients who had ruptured or impending rupture of the uterus had a true conjugate which was less than 10.5 cm and this correlated well with Walton's study. It therefore appears that radiological in combination with clinical assessment of the pelvis would be quite useful in the selection of patients for trial of scar.

The success rate for TOL depends to some extent on the indication for the previous caesarean delivery. Generally, about 55-85% of trials of labour after prior caesarean birth result in vaginal delivery. In a large series reported by Wing and Paul¹⁸ 91% of women whose first caesarean was for breech presentation had a successful VBAC. When fetal distress was the first indication the success rate was 84%. In those with dystocia as the original indication it was reported that even when the strictest criteria are used to diagnose dystocia, a VBAC rate of 68% can be achieved.

Among privately practicing obstetricians in Kenya, a study showed that estimated foetal weight (EFW) is the most commonly applied criteria for decision on which patients with IPS qualified for

TOL². However, a retrospective study that looked at effect of EFW on the outcome of attempted VBAC, found that a macrosomic foetus with estimated foetal weight greater than 4000gm could successfully be delivered by VBAC without any statistically significant maternal or neonatal adverse outcomes¹⁹. 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 rate²⁰.

In practice neither ELP²¹ nor EFW²² has acceptable predictive value on the outcome of an attempted VBAC. It thus points out to an unmet need in management of patients with IPS where an appropriate selection criterion 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 IPS. Some studies showed increased risk of rupture²³, while other studies disputed these findings²⁴. 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 and strongly discourages use of other prostaglandins as well²⁵. 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 labour²⁶.

Factors that may contribute to uterine scar disruption include mode of labour onset (spontaneous versus induced), the type of uterine incision previously performed (Low transverse versus classical), the duration and dose of oxytocin administration, and the choice of cervical ripening technique²⁷.

RISK FACTORS FOR RUPTURED UTERUS IN 1 PREVIOUS SCAR

1. Maternal age greater than 30years.
2. More than 1PS.
3. Induction or augmentation of labour.
4. Interval from last caesarean section of less than 24months²⁸.
5. Uterine scar thickness on ultrasound at 37wks gestation of less than 2mm²⁹.
6. One layer closure of the uterus on previous C/S³⁰.
7. Post partum fever or sepsis in previous C/S³¹.

Maternal and neonatal outcomes after uterine rupture in labour were studied at the University of California, San Francisco Moffett-Long hospital from 1976 to 1998. A total of 21 cases 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 if picked early. 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 baby³².

Medical legal issues are also an important aspect of TOL after caesarean section. As a matter of practice, obstetrician and patient should have a discussion about the TOL. In a Kenyan study by Koigi-Kamau et al², 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 practice. Thus, the first issue to be discussed relating to medico-legal issues is

informed consent for VBAC which is now recommended by ACOG³³. 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 30 minutes from the time of diagnosis, thus the need for physician, anaesthetist and theatre staff being immediately available for surgery³⁴. This is all the more critical in cases of ruptured uterus where the 30 minutes 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 then be recommended for patients undergoing TOL after caesarean section.

RATIONALE

In Patients with one previous caesarean section scar, delivery can be either by a repeat elective caesarean section or trial of labour. Despite reports of success rates of TOL varying from 45% to 85% there has been no objective criteria with high predictive value that has been developed. For this reason, TOL and/or ERCS have remained controversial among proponents and those against it.

An important observation has been that although severe complications are rare, when they occur, they are associated with severe morbidity and the possibility of mortality particularly in facilities with less than ideal emergency preparedness. A challenge therefore exists to rationalize the choice of mode of delivery. The challenge is even greater in women delivering in district hospitals where

both availability and competence of staff as well as ideal facilities that would enable timely intervention may be questionable.

For this reason, there exists a need to study the outcome of TOL as compared to ERCS in peripheral hospitals. Kiambu district hospital is a level IV facility and it may be deemed less ideal for TOL despite the fact that there is a resident obstetrician, medical officers and interns. Since most facility based deliveries in Kenya occur at level IV hospitals, it is important to study and document what happens in normal settings without external interference as may happen in a prospective study so as to ascertain the safety of TOL in such facilities: hence the choice of a retrospective study which also gives a time advantage as it takes a shorter time. Recommendations that will be generated can be used at policy level and other concerned parties to inform and contribute to policy development in management of patients with one previous scar. Ultimately, this study would contribute towards reducing maternal morbidity and mortality and attainment of millennium development goal no. 5.

CONCEPTUAL FRAMEWORK

Narrative

Patients with one previous caesarean scar can either have an elective repeat caesarean section or trial of labour. Among those patients who are for TOL, some will have a successful VBAC and others will end up having an emergency caesarean section. This study compared the outcomes of elective repeat caesarean section to trial of labour.

Those for ERCS will have then been without the stress of TOL but all of them will be exposed to risks of C/S associated morbidity and mortality. In either of the chosen modalities of delivery specific risks exist and outcomes may be favourable or unfavourable. Knowledge of outcomes can therefore underlie decisions more towards or against TOL or ERCS depending on which choice has more favourable outcome. This would in turn evolve into policies in terms of choice management of these mothers.

The study involved reviewing the medical records of patients with one previous caesarean section scar who had delivered in the hospital. The first group comprised of patients with one previous scar who had undergone elective repeat caesarean section. The second study group comprised of mothers with one previous caesarean section scar who had a successful VBAC or emergency caesarean section or any other complication such as uterine rupture.

An audit of the criteria used in selecting patients to any of the arms of the study was made and specifically the particular features considered by the person making the decision as to why one patient should undergo elective repeat caesarean section or trial of labour. For those undergoing trial of labour specific findings were used to determine the predictability of the success.

The specific characteristics included

Maternal age in relation to the success of TOL.

Estimated fetal weight

Inter delivery interval

Prior history of SVD in relation to the success of VBAC

Parity of the mother.

Indication for the previous caesarean section in relation to the success rate of TOL.

Whether labour was augmented with oxytocin or not

Whether labour was induced or not

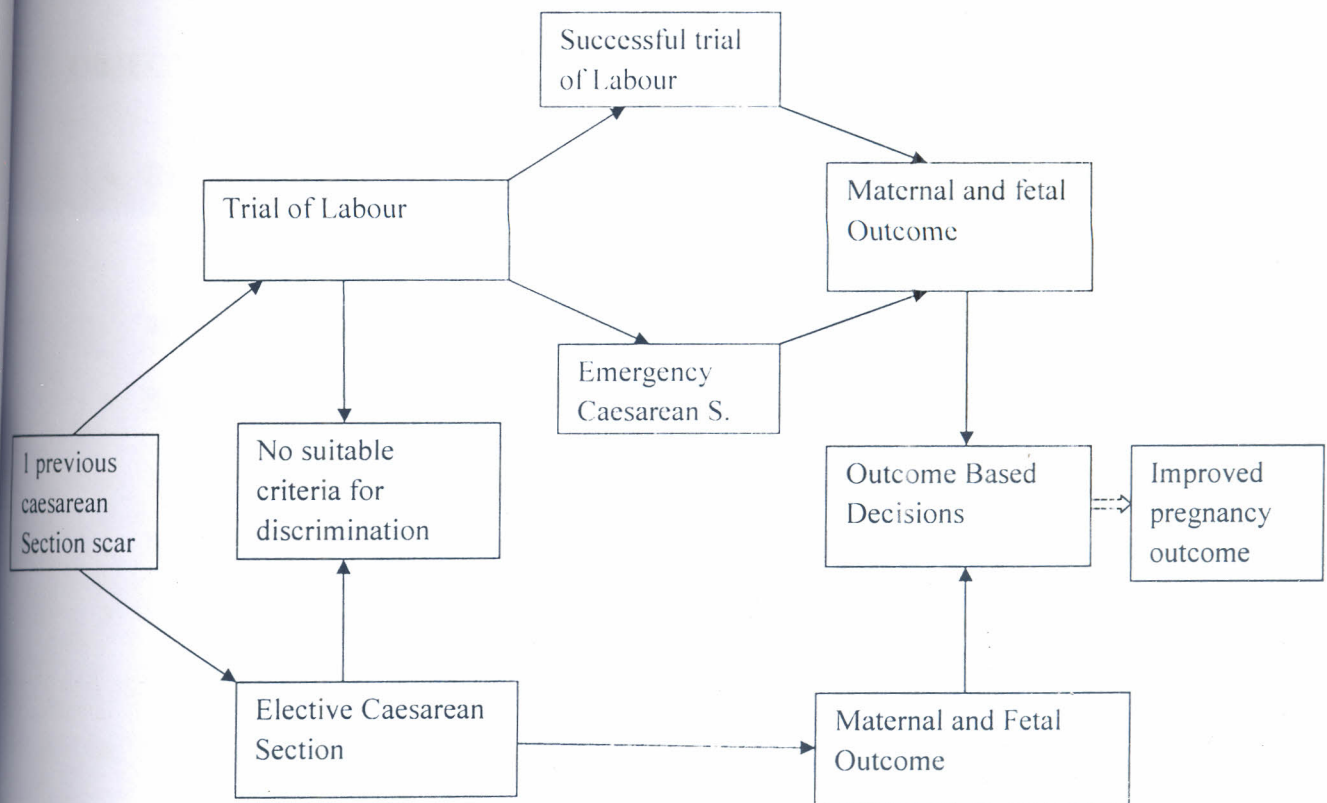
Pelvic assessment whether radiological or clinical

Monitoring of labour during TOL (whether electronic or intermittent auscultation) and proper documentation

Gestation at delivery versus the success rate of TOL.

The measures of outcome included maternal postnatal hospital stay, maternal blood loss, post delivery infectious morbidity, need for hysterectomy, uterine rupture, visceral injury and maternal death. Foetal outcome was assessed by the APGAR score at 5 minutes, admission to nursery and early neonatal death. Below is the diagrammatic representation of the conceptual framework.

Diagrammatic



Research question

Can TOL be safely used as a management option in a district (level IV) hospital for patients with one previous caesarean section scar?

Null hypothesis

Pregnancy outcome among women with one previous caesarean section scar undergoing trial of labour in a district hospital is not different from those undergoing elective repeat caesarean section.

Alternative hypothesis

Trial of labour among patients with one previous caesarean section scar in a district hospital is associated with a poor outcome as compared to elective repeat caesarean section.

OBJECTIVES

- **Broad objective**

To compare the outcome of pregnancy in patients with one previous caesarean section scar who have undergone TOL to those delivered by ERCS in Kiambu District Hospital

- **Specific objectives**

1. To describe the criteria used for decision making on trial of labour
2. To determine the outcome of trial of labour in terms of eventual mode of delivery
3. To determine maternal outcome in patients with one previous caesarean scar who underwent TOL as compared to ERCS
4. To determine the fetal outcome in patients with one previous caesarean section scar who underwent TOL as compared to ERCS

METHODOLOGY

Study site

The study was conducted in Kiambu district hospital which is located in a peri urban centre in Kiambu County, Kenya. It serves mainly low and middle socioeconomic populations. It is a prototype of a level IV hospital which has a full obstetric management team-obstetricians, midwives, medical officers and interns with 24 hour coverage. Therefore emergency response is expected to be close to the ideal situation. Other amenities include a 24hour operation theatre, availability of blood transfusion facilities and a functional new born unit with a consultant paediatrician available whenever needed. The maternity unit is busy with an average of 800 deliveries per month.

Study population

The study population consisted of sequentially selected mothers with one previous caesarean section for their last delivery. On one arm were those who had been allowed TOL while on the other were those who had ERCS. Since the study was retrospective the researchers were not involved in decision making as to who underwent TOL or ERCS. Thus the decisions on mode of delivery reflected what happens on the ground without any external influence.

Study design

This was a retrospective cohort study. The cohort consisted of women with one previous caesarean section who had delivered at the hospital sequentially extracted. On one hand there were those who had TOL and on the other those who had elective repeat caesarean section. The records of events and eventual outcome were tracked and compared. Any decision making processes that were documented were also considered. Below were the main outcome measures

Maternal outcome

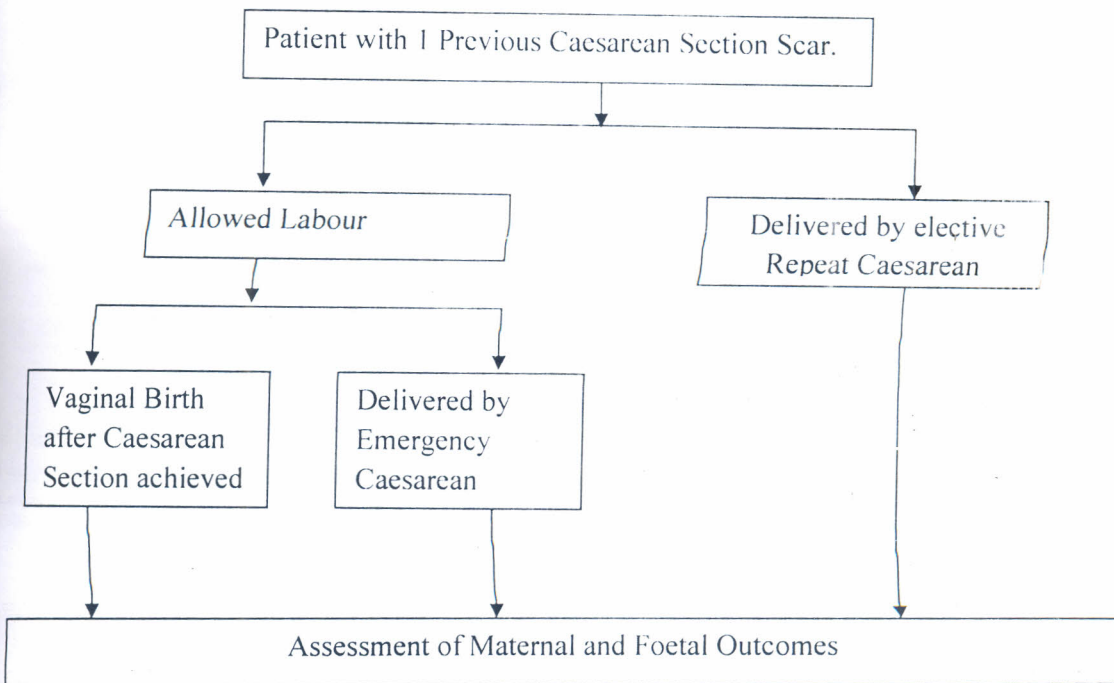
1. Maternal postnatal hospital stay
2. Uterine rupture
3. Maternal blood loss/need for blood transfusion
4. Need for hysterectomy
5. Maternal death
6. Visceral injuries-bladder or gut.
7. Post delivery infectious morbidity

Foetal outcome

1. Early neonatal death
2. Admission to nursery
3. APGAR score at 5 minutes

The overall study design is depicted diagrammatically in the figure below.

Overall study design



DATA COLLECTION

After the study was cleared by the ethical review committee of the Kenyatta National Hospital/University of Nairobi and the administration of Kiambu District Hospital data collection started. The mainstay of identifying the mothers was the labour ward delivery register. The inpatient numbers of all the mothers with one previous caesarean section who had been admitted to labour ward for delivery from the beginning of the study (11th July 2011) were noted. The files were retrieved from the records department with the assistance of medical records officer. The admission events and events while in the hospital were studied and information retrieved. This information was recorded retrospectively and sequentially until the sample size was obtained. This data was divided into two arms i.e. those who had attempted VBAC and either had successful TOL or ended up having an emergency caesarean section were in one arm and those who had delivered via elective repeat caesarean section were in the other arm.

A questionnaire was used to extract relevant information from the patients' files. The areas of interest mainly covered the antenatal, intrapartum and postpartum events, maternal and fetal outcome.

Inclusion criteria

- All patients with one previous scar delivered by elective caesarean section
- All patients with one previous scar who were allowed trial of labour.
- Gestation by dates of more than 34weeks
- Those destined for elective caesarean section should not have been in labour

Exclusion criteria

- Those patients with 1 previous scar who had been laboring elsewhere and referred to the study site for emergency caesarean section.
- Mothers with a gestation less than 34 weeks

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

$$n = 2 * \sigma^2 [z_{\alpha} + z_{\beta}]^2 / (\Delta)^2 \quad \dots \dots \dots (1)$$

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_{α} value is the desired significance criterion (95% = 1.96).

z_{β} 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_{α} and z_{β} 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:

$$n = 2 \times 3^2 \times (1.96 + 0.842)^2 / 1^2$$

$$n = 2 \times 9 \times (2.802)^2 / 1$$

$$n = 141$$

≈ 142 Participants

Therefore, a total of 71 sequential mothers who had undergone TOL and 71 mothers who were to be re operated.

Data Management

After data collection the questionnaires were coded and entered in an MS access database. Data cleaning was thereafter done with assistance of a biostatistician.

Data analysis was performed using SPSS 17.0. The data was summarized using means and medians for continuous variables. Proportions were used for categorical variables. Comparison between the two groups was done using T tests for continuous variables and Chi square for categorical variables. Outcome variables that were independently associated with ERCS were identified using logistic regression analysis. All statistical tests were performed at a 5% level of significance (95% CI).

Limitations

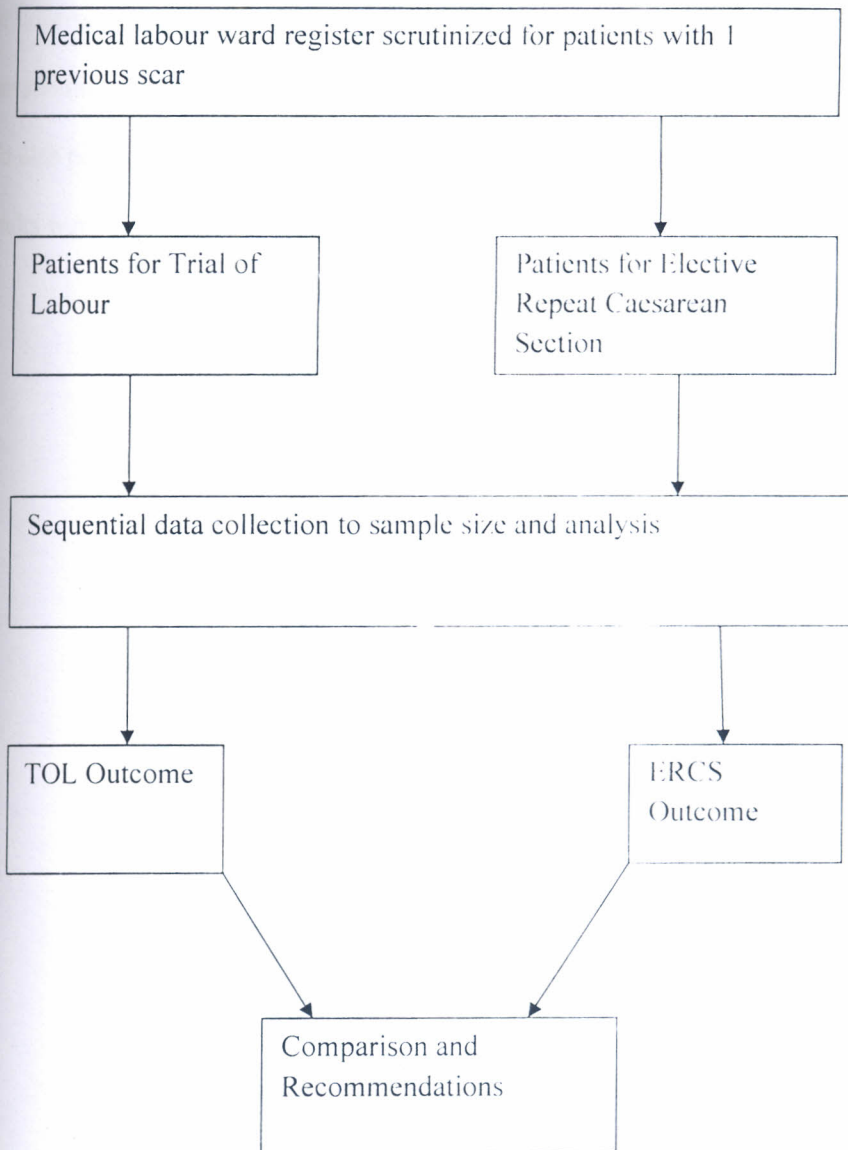
- Incompleteness of the records
- Lack of clarity and illegibility of entries in the records which was randomly distributed in both groups.
- Missing files

Mechanisms of minimizing the limitations

- Thoroughly checking for all the information present including the nursing cardex, the clinical notes and ANC cards.

- At least 2 people who have worked for a long time in maternity and are familiar with the handwriting of the clinicians were utilized
- Patients with incomplete files were excluded from the study.

Sequence of event



Ethical issues

Since this study was retrospective it involved documentation of existing practices without changing the clinical practice; hence no serious ethical issues were encountered. Confidentiality was maintained on information regarding the patient since names of clients were not sought and the information was not traceable to medical personnel or the patients themselves. The proposal was submitted to the ethical review board of the Kenyatta National hospital/University of Nairobi and also presented to the medical superintendent of Kiambu District Hospital for clearance. The results were shared with all concerned parties.

RESULTS

A total of 142 participants were included in the study. 71 of them had undergone trial of labour and the other 71 had undergone elective repeat caesarean section. Since this was a retrospective study there were no non responders.

Table 1: Socio-demographic and reproductive characteristics

Characteristic	TOL N=71	ERCS N=71	OR	p-value
<i>Sociodemographic</i>	No. (%)	No. (%)		
Age				
≤ 20	8 (11.2)	5 (7.0)	Ref.	0.492
21-25	22 (31.0)	25 (35.3)	1.8	
26-30	21 (30.0)	28 (39.4)	2.1	
31-35	13 (18.3)	8 (11.3)	1.0	
36+	7 (9.8)	5 (7.0)	1.1	
Marital Status				
Single	0	1 (1.5)	-	0.368
Married	70 (98.5)	70 (98.5)	-	
Separated	1 (1.5)	0	-	
Education level				
None	3 (4.2)	1 (1.4)	Ref.	0.500
Primary	39 (55.0)	38 (53.5)	2.9	
Secondary	25 (35.2)	24 (33.8)	5.3	
Tertiary	4 (5.6)	8 (11.3)	6.0	
Occupation				
Unemployed	49 (69.0)	33 (46.5)	Ref.	0.048
Casual	3 (4.2)	8 (11.3)	4.0	
Formal	4 (5.7)	7 (9.9)	2.6	
Self employed	15 (21.1)	23 (32.3)	2.3	
Reproductive				
ANC Attendance				
Centre attended				
Kiambu DH	22 (31.0)	33 (46.5)	Ref.	0.003
Dispensary	17 (23.8)	6 (8.5)	0.4	
Private Hospital	1 (1.4)	9 (12.6)	6.0	
Health Centre	30 (42.4)	20 (28.2)	0.4	
None	1 (1.4)	3 (4.2)	2.0	
Parity Grouped				
1	47 (66.2)	48 (67.6)	Ref.	0.841
2	13 (18.3)	12 (16.9)	0.9	
3+	11 (15.5)	11 (15.5)	1.0	

Table 1 shows the distribution of sociodemographic and reproductive characteristics. The most

frequent age group among patients who underwent TOL was 21-25 years (30%) compared to 26-

30 years (39.4%) among those who had ERCS. Those who were 21-30 years constituted 61% among TOL group compared to 74.7% among those who underwent ERCS. However, these differences were not statistically significant ($P=0.492$).

Regarding marital status 98.5% of the participants in both groups were married. Only 1 participant in the TOL group was separated and 1 in the ERCS was single. On the level of education 55% of the participants in the TOL group had primary level of education compared to 53.5% in the ERCS group. Among the TOL group, 40.8% had secondary and tertiary education compared to 45.1% hence there was no statistically significant difference between the two groups regarding education level. Concerning employment, there were significantly more unemployed participants in the TOL group as compared to the ERCS with the level being 69% and 46.5% respectively ($p = 0.048$).

Concerning the reproductive characteristics of the two groups a significant majority of the participants in the ERCS group attended ANC either at Kiambu district hospital or were followed up by a private practitioner which represented 59.1% as compared to 32.4% in the TOL group ($p = 0.003$). In the TOL group, 66.2% attended ANC at a dispensary or health center as compared to 36.7% in the ERCS. Majority of the participants were para 1+0 in both groups representing 66.2% and 67.6% in the TOL and ERCS arms respectively. There was no significant difference among the two groups regarding this parameter.

Table 2 shows selected information on the first caesarean section. On type of previous caesarean section, a great majority were emergency (95.8% and 87.4% for TOL and ERCS groups respectively). The reason for the first caesarean section was considered non recurrent in 88.7% of the TOL group as compared to 76.1% in the ERCS group. There was no statistically significant difference between the two groups regarding this parameter. Only 12.6% of the first caesarean sections in the TOL group were associated with complications as compared to 16.9% in the ERCS group. A majority of the participants in both groups had an inter delivery interval of more than 24 months (73.2% and 66.2% for TOL and ERCS respectively).

Table 2: Selected information on first caesarean section

Information	TOL (N=71) No. (%)	ERCS (N = 71) No. (%)	OR	p-value
Type of Caesarean				
Elective	3 (4.2)	9 (12.6)	Ref.	0.07
Emergency	68 (95.8)	62 (87.4)	0.3	
Reasons for Caesarean				
'Recurrent'	8 (11.3)	17 (23.9)	Ref.	0.047
Non-recurrent	63 (88.7)	54 (76.1)	0.4	
Complications				
Yes	9 (12.6)	12 (16.9)	Ref	0.478
No	62 (87.4)	59 (83.1)	0.7	
Length of time since the last Caesarean(months)				
12 - 24	19 (26.8)	24 (33.8)	Ref	0.378
25 - 36	16 (22.5)	15 (21.1)	0.7	
37 - 48	4 (5.6)	8 (11.3)	1.6	
49+	32 (45.1)	24 (33.8)	0.6	

Table 3 shows use of criteria by instituted mode of delivery. Clinical pelvimetry was done in all mothers who underwent TOL. In contrast only 80.3% in the ERCS had some form of assessment before deciding on the mode of delivery. Clinical pelvimetry combined with clinical estimation of foetal weight was the second most common form of assessment constituting 12.7% and 30.9% in the TOL and ERCS groups respectively. None of the mothers in the TOL group had ultrasonographic estimation of foetal weight as compared to 4.2% in the ERCS group.

Regarding the eventual mode of delivery, it is worth noting that 20% of those mothers in the TOL group who had clinical pelvimetry combined with clinical estimation of foetal weight eventually failed TOL as compared with 5.5% in the same group who had successful TOL.

Table 3: Use of criteria by instituted mode of delivery

Criteria used	TOL (N=71)	ERCS (N=71)
	No. (%)	No. (%)
Yes	71 (100)	57 (80.3)
No	0 (0)	14 (19.7)
Specific criteria documented	N=71	N=57
Clinical pelvimetry	71 (100)	32 (45.0)
Clinical pelvimetry and clinical EFW	9 (12.70)	22 (30.9)
Ultrasonographic EFW Only	0	3 (4.2)
Criteria by eventual mode of delivery for TOL	Successful TOL N=36	Failed TOL N=35
Clinical pelvimetry alone	36	35
Clinical pelvimetry and clinical EFW	2	7

As can be seen in the table 3 there was no standard criteria applied to all pregnant mothers with one previous scar to aid in decision making on the mode of delivery.

Table 4 shows the outcome of TOL in terms of eventual mode of delivery and reason for failed TOL. Among those who had TOL, 50.7% were successful in achieving vaginal birth while 49.3% failed TOL and underwent emergency caesarean section. The main reason for failed trial of labour was poor progress constituting 42.9%. When this was combined with cephalopelvic disproportion, it represented 54.3% of all the mothers in the failed TOL group. Impending rupture of the uterus, a potential cause of maternal and neonatal morbidity was cited as a reason for emergency caesarean section in 5.7% of those who failed TOL.

Table 4: Outcome of TOL in terms of eventual mode of delivery and reason for failed TOL

Outcome/Reason	No.	(%)
<i>Outcome N=71</i>		
<i>TOL successful</i>	36	(50.7)
<i>TOL failed</i>	35	(49.3)
<i>Reason for failure N=35</i>		
<i>Non reassuring fetal status</i>	2	(5.7)
<i>Cephalopelvic disproportion</i>	4	(11.4)
<i>Impending uterine rupture</i>	2	(5.7)
<i>Fetal malpositioning</i>	3	(8.6)
<i>Poor progress of labour</i>	15	(42.9)
<i>Others</i>	9	(25.7)

Table 5 depicts the reason for elective repeat caesarean section. The main reason for elective repeat caesarean section was inadequate clinical pelvimetry representing 40.8% of all the mothers in the ERCS group. This was closely followed by big babies by clinical estimation (33.8%) and ultrasound estimation (8.5%)

Table 5: Reasons ERCS

Reasons for ERCS N =71	No.	(%)
<i>Own Choice</i>	1	(1.4)
<i>Inadequate Erect lateral pelvimetry</i>	0	(0.0)
<i>Inadequate clinical pelvimetry</i>	29	(40.8)
<i>Estimate foetal weight(US) > 3.5 kgs</i>	6	(8.5)
<i>Clinical Estimate of foetal weight > 3.5</i>	24	(33.8)
<i>Other</i>	11	(15.5)

Only one mother (1.4) had an elective repeat caesarean section out of her choice. Table 6 depicts the pregnancy outcome among TOL patients.

Table 6: Pregnancy Outcome among TOL patients

Outcome parameter	TOL N =35		OR	p-value
	Successful ToL N=36	Failed ToL N=35		
Hospital Stay (days)	No. (%)	No. (%)		
≤2	33 (91.6)	0 (0.0)	-	
3 - 4	2 (5.5)	20 (57.1)	<i>Ref</i>	<0.001
≥5	1 (2.9)	15 (42.9)	1.5	
Blood Loss				
< 500	35 (97.2)	10 (28.6)	<i>Ref</i>	
≥ 500	1 (2.8)	25 (71.4)	86*	<0.001
Maternal Status				
well	35 (97.2)	21 (60.0)	<i>Ref</i>	
Discharged on treatment	1 (2.8)	14 (40.0)	23.0	<0.001
Fetal				
Birth Weight				
<2,500	3 (8.3)	3 (8.5)	<i>Ref.</i>	
≥ 2500	33 (91.7)	32 (91.4)	1.0	0.971
Apgar score				
8-10	32 (88.8)	31 (88.5)	<i>Ref</i>	
<8	4 (11.2)	4 (11.5)	1.0	0.966
Fetal status				
Well	33 (91.7)	28 (80.0)	<i>Ref</i>	
Adm. NBU	3 (8.3)	7 (20.0)	2.8	0.158

As shown on table 6 the mothers who had successful TOL had less morbidity. In the postnatal hospital stay 91.6% stayed for less than 2 days as compared to none in the failed TOL group.

Similarly, only 2.9% stayed for 5 days and above as compared to 42.9% in the failed TOL group.

Failure of TOL was associated with more blood loss since 71.4% lost above 500mls as compared to successful TOL where 97.2% lost less than 500mls. There was no significant difference in the fetal outcome between the two groups. Table 7 shows Outcomes by successful TOL and ERCS.

Table 7: Pregnancy outcome by successful TOL and ERCS

Outcome	Successful TOL N=36 No. (%)	ERCS N=71 No. (%)	p-value
Blood loss			
< 500	35 (97.2)	10 (14.1)	
≥ 500	1 (2.7)	61 (85.9)	<0.001
Hospital stay(days)			
≤2	33(91.6)	0(0)	
3-4	2 (5.5)	60(84.5)	<0.001
≥5	1(2.9)	11(15.5)	
Maternal			
well	35 (97.2)	6 (8.5)	
discharge on treatment	1 (2.7)	65 (91.5)	<0.001
Foetal outcome			
< 8	4 (11.1)	1 (1.4)	0.025
8 - 10	32 (88.9)	70 (98.6)	

As shown on table 7, the outcomes were better for those who had successful TOL as compared to ERCS. 91.6% of mothers in the TOL group had a postnatal hospital stay of 2 days or less as compared to none in the ERCS group ($p < 0.001$). Similarly 97.2% of the mothers in the TOL group lost less than 500mls of blood as compared to 85.9% in the ERCS group who lost more than 500mls of blood ($p < 0.001$). Foetal outcomes were slightly better in the ERCS group since 98.6% had an APGAR score at 5 minutes of 8 and above as compared to 88.9% in the successful TOL group ($p = 0.025$). This is also reflected in the number admitted to NBU since 11.1% of the neonates delivered after successful TOL were admitted as compared to only 1.4% in the ERCS group. Table 8 shows pregnancy outcome by failed TOL and ERCS

Table 8: Pregnancy outcome by failed TOL (35) and ERCS (71)

Outcome	Failed TOL N=35	ERCS N=71		p-value
	No. (%)	No. (%)	OR	
Blood loss				
< 500	0 (0)	10 (14.1)	-	
≥ 500	35 (100)	61 (85.9)	-	0.029
Hospital stay(days)				
≤ 2	0(0)	0(0)	-	
3-4	20(57.1)	60(84.5)	Ref	0.002
≥ 5	15(42.9)	11(15.5)	0.4	
Foetal outcome				
< 8	4 (11.4)	1 (1.4)	Ref	0.022
8 - 10	31 (88.6)	70 (98.6)	9.0	

As shown in table 8, failed TOL was associated with more blood loss since 100% of mothers lost more than 500mls of blood as compared to ERCS where 14.1% lost less than 500mls and 85.9% lost more than 500mls (p=0.29). Those mothers who failed TOL stayed longer in hospital since 57.1% stayed for 3-4 days as compared to 84.5% in the ERCS group (p=0.002). Similarly, 42.9% stayed for 5 days or more in the failed TOL group as compared to 15.5% in the ERCS group. The foetal outcome was poorer for those who failed TOL since 11.4% had APGAR score of less than 8 at 5 minutes compared to only 1.4% in the ERCS group (p=0.022). Table 9 depicts multiple regression analysis controlling for occupation and center of ANC attendance

Table 9: Multiple Regression controlling for occupation and ANC attendance

Hospital Stay	Coef.	Std. Err.	t	p-value	95% CI	
					lower	upper
Birth Plan	-0.36	0.12	-3.05	0.003	-0.6	-0.1
Parity	-0.02	0.03	-0.62	0.533	-0.1	0.0
Estimated Blood loss	0.00	0.00	0.51	0.609	0.0	0.0
APGAR score	0.02	0.04	0.54	0.592	-0.1	0.1
Foetal Outcome	0.63	0.16	4.04	0.000	0.3	0.9
Maternal Outcome	0.38	0.12	3.24	0.002	0.1	0.6
Constant	0.92	0.38	2.42	0.017	0.2	1.7

On running a multiple regression taking the duration of stay as the response variable and treating occupation and the centre where the mothers attended ANC as control variables, only birth plan, foetal outcome and maternal outcome were statistically significant in explaining duration of stay at p-value of 0.003, 0.000 and 0.002 respectively.

Discussion

The objective of this study was to compare the outcome of pregnancy in patients with one previous caesarean section scar who had undergone trial of labour to those delivered through elective repeat caesarean section. Maternal outcome was measured based primarily on the postnatal hospital stay, intrapartum estimated blood loss, intrapartum injuries and post partum infective complications. Foetal outcome was assessed based on the APGAR score at 5mins and need for admission to the new born unit. All the above are indicators for morbidity.

This study has established that certain sociodemographic and reproductive characteristics were associated with reduced likelihood to try labour. A significant number of those who had undergone ERCS were employed (53%) as compared to only 31% among the TOL group. It is also noted that a significant majority of those who underwent ERCS attended ANC either at Kiambu district hospital or were attended to by a private practitioner (59%) as compared to 32.4% in the TOL group ($p=0.003$). This may reflect the ability of those employed to afford a higher level of care and thus be attended to at higher facilities or by private practitioners where more assessment is likely to be done e.g. ultrasonographic estimation of foetal weight which was performed in 4.2% of the ERCS group as compared to none in the TOL group and thus increasing the likelihood that a reason for ERCS will be established. In contrast most of those mothers who underwent TOL had ANC follow up in either a health centre or dispensary (66.2%) as compared to the ERCS group (36.7%) where cost is not an issue. After controlling for the above two factors in the multiple

regression analysis (table 9) it was noted that the main outcome measures were not affected by these differences.

Although some criteria was used by and large there was no specific and comprehensive criteria applied universally to all the mothers with one previous caesarean section. Clinical pelvimetry which was the commonest criteria used for decision making was noted to be a poor predictor of outcome since the success rate of TOL was only 50.7% and poor progress of labour, combined with cephalopelvic disproportion and impending uterine rupture which could be proxy indicators of pelvic inadequacy constituted 60% of the reasons for failed TOL. Radiologic pelvimetry was not employed as a method of assessment. This practice which has previously been prevalent has been abandoned in recent times since a randomized controlled study in South Africa found that antepartum ELP was a poor predictor of success in TOL and increased the caesarean section rate¹⁵. Similarly, Koigi Kamau, Githiru and Ndavi²¹ found that a variation in the true conjugate of 10.5 cm either more or less by 5 cm did not alter the success rate of TOL. This study also documented the poor predictive value of clinical pelvimetry in the success of TOL. Documentation of criteria used for TOL was poor and arbitrary because of the desire to have one which has so far been elusive. Other modalities that were used such as clinical estimation of foetal weight was also noted to be a poor predictor of outcome since 20% of those who were assessed in this way combined with clinical pelvimetry failed TOL. Concerning the selected information on the first caesarean section it is noted that in 23.9% of the ERCS group the reason was considered 'recurrent' as compared to 11.3% in the TOL group. It should be noted that the 'recurrent' reason was mainly cephalopelvic disproportion and clinical pelvimetry and where possible estimation of foetal weight was done before allowing trial of labour. This implies that practitioners are alert on persistence of some characteristics of the 'passage' in subsequent pregnancies although the passenger may change.

The success rate of TOL in Kiambu district hospital was 50.7% and this is similar to a study done in Pumwani maternity hospital by Kimotho³ where the success rate was 45.5%. This is lower than

the internationally quoted success rate of 55-85%³⁴. The single most common reason for failure of TOL in this study was poor progress of labour representing 42.9% of those who had emergency caesarean section. This combined with overt cephalopelvic disproportion constituted 54.3% of those who failed TOL. Considering that poor progress of labour more often than not denotes a certain degree of CPD then it can be assumed that this is a major reason for failure of TOL, and this is congruent with the Pumwani study by Kimotho³ whereby poor progress of labour combined with CPD constituted the main reason for failure of TOL. The higher failure rate could also be attributed to the practice of not augmenting labour with oxytocin. Of note is that impending uterine rupture which is a potential cause of maternal and perinatal morbidity and mortality was present in 5.7% of those who failed TOL. Given that in our setting the consequences of uterine rupture are dire this can therefore amount to unnecessary exposure of mothers with one previous scar to excessive risk.

Whereas the pregnancy outcome is good when TOL is successful when it fails and an emergency caesarean section is performed all aspects pregnancy appear to be much more adverse. In this study it was established that success of TOL is associated with a shorter hospital stay, less blood loss and generally less maternal morbidity as compared to failed TOL. Concerning the foetal outcome, there was no significant difference between those who had successful TOL and those who failed and eventually had an emergency caesarean performed. These findings are supported by a multicentre study done by Landon et al³⁶ that concluded that a trial of labour after prior caesarean delivery was associated with a greater perinatal risk than is elective repeat caesarean section without labour, although the absolute risks were low. Along the same line the maternal outcomes were better for those who had successful TOL as compared to ERCS although the foetal outcomes for those who had TOL were generally worse. This therefore means that generally, TOL in Kiambu district hospital is associated with poorer maternal and fetal outcomes since the success rate is low (Odds ratio for having a favourable foetal outcome after ERCS 9). These findings are similar to those of a study done in Pumwani maternity hospital by Kimotho³ which concluded that

maternal and foetal outcomes were poorer in mothers who underwent TOL because of low success rate in that institution.

The most important issue regarding maternal wellbeing with respect to a trial of labour after a previous caesarean section is whether a catastrophic complication such as uterine rupture will occur and lead to serious morbidity or death. In this study there were no maternal deaths, a finding similar to that reported by Kimotho³ and McMahon et al.³⁵ No uterine rupture or hysterectomies were reported in this study. However, because of the small size of the study, larger ones are suggested so as to assess these adverse outcomes. Other weaknesses of this study include the subjective nature of assessment of some of the outcome measures e.g. estimated blood loss although this applied equally to both the study groups. Similarly, no long term follow up of the babies was made to determine whether the differences in the early neonatal morbidities observed between the two groups had major long term consequences. This could be determined by conducting long term prospective studies.

Overall this study suggests that ERCS is associated with better maternal and neonatal outcomes as compared to TOL and these findings may apply to other level IV health facilities. It is believed that the outcome of this study can be used to counsel mothers with 1 prior caesarean section scar on their choice on mode of delivery and can be used as a basis for more comprehensive studies on the subject within the country.

Conclusion

1. No definite universal criteria applicable to all pregnant women with one previous caesarean section scar was used in selection of patients for TOL or ERCS in Kiambu district hospital.
2. While successful TOL in patients with one previous caesarean section scar was associated with good outcomes, failed TOL was associated with high maternal morbidity including impending rupture of the uterus.
3. ERCS had better maternal outcome as compared to TOL in this study
4. Foetal outcome was better among patients with one previous caesarean section scar who had ERCS compared to those who underwent TOL.

Recommendations

1. Given the high failure rate and the lack of specific criteria for selection of patients with one previous caesarean section for TOL, there is a need to consider ERCS in order to prevent morbidities associated with failed TOL in level IV hospitals.
2. Further studies will need to be done in order to validate or discount these findings.

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APPENDIX 1: Questionnaire

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. Kiambu D. Hospital | 4. Health Centre |
| 2. Dispensary | 5. Private doctor |
| 3. Private hospital | 6. None |

10. Number of visits

11. Parity +

Height.....

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*)
- | | <i>Results</i> |
|---|----------------|
| 1. Erect lateral pelvimetry done (inlet) <input type="checkbox"/> | cm |
| 2. Clinical pelvimetry done. <input type="checkbox"/> | |
| 3. Scan to estimate foetal weight. <input type="checkbox"/> |gms |
| 4. Clinical estimation of foetal weight. <input type="checkbox"/> |gms |
| 5. Height <input type="checkbox"/> | |
| 6. Other(specify) | |

SECTION C: DELIVERY

TOL

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 duration of Labour Hrs..... Go to Q23.

2. EMCS go to Q21.

21. In EMCS delivery

a) Indication of C/S

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

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

c) Duration of labour before decision for EMCS is made.....

22. Reason for Elective Repeat Caesarean section

1. Own choice

2. Did not qualify for TOL due to

- | | |
|---|--------------------------|
| a. Inadequate Erect lateral pelvimetry | <input type="checkbox"/> |
| b. Inadequate Clinical pelvimetry | <input type="checkbox"/> |
| c. Estimate foetal weight >3.5kg by ultrasound. | <input type="checkbox"/> |
| d. Clinical estimation of foetal weight >3.5kg. | <input type="checkbox"/> |
| e. Other (specify) | <input type="checkbox"/> |

23. Gestation at delivery weeks

SECTION D: OUTCOMES TO MEASURE

24. Estimated blood lossmls.

25. Blood transfusion requirement units

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

None

Vaginal or cervical tear Repaired
in theatre

Visceral injury

Uterine rupture

Hysterectomy

27. Infection post delivery (*tick all that apply*) Hours after delivery
- Temperature >38 °C
- Wound infection – purulent discharge
- Uterine tenderness
- Purulent lochia
- Uterine sub involution
- No sign of infection

28. Birth weight of baby kg.

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 2: Flamm scoring system tool

<i>Variable Point value</i>	<i>score</i>
▪ 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

<i>Score</i>	<i>VBAC success (%)</i>
0 to 2	49
3	60
4	67
5	77
6	89
7	93
8 to 10	95

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27th June 2011

Ref: KNH-ERC/ A/146

Dr. Boniface Nzioki Musila
Dept. of Obs/Gynae
School of Medicine
University of Nairobi

Dear Dr. Musila

**Research Proposal: "Comparison between the outcome of Trial of Labour and Elective repeat c
caesarean section in Kiambu District Hospital" (P67/02/2011)**

This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed and **approved** your above revised research proposal. The approval periods are 27th June 2011 to 26th June 2012.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimens must also be obtained from KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

PROF A N GUANTAI
SECRETARY, KNH/UON-ERC

- c. The Deputy Director CS, KNH
The Dean, School of Medicine, UON
The Chairman, Dept. of Obs/Gynae, UON
The HOD, Records, KNH
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KIAMBU DISTRICT HOSPITAL,
P. O. Box 39,
KIAMBU.

Ref No : KBU/STF. 17/VOL.XIII/25

Date: 7th July, 2011

To: All Staff,

RE: AUTHORITY TO CONDUCT RESEARCH

This is to inform you that Dr. B. N. Musila has been authorised to conduct a study titled – COMPARISON BETWEEN THE OUTCOME OF TRIAL OF LABOUR AND ELECTIVE CAESAREAN SECTION IN KIAMBU DISTRICT HOSPITAL.

Please accord him all the necessary assistance.

DR. PATRICK O. AMOTH
MEDICAL SUPERINTENDENT
KIAMBU DISTRICT HOSPITAL