College of Medicine and Health Sciences
School of Medicine

University Avenue P.O. Box 217 Butare, Huye – Rwanda
Tel: +250 252530475 Fax: +250 252530328

HOSPITAL MATERNAL MORBIDITY ASSOCIATED WITH TRIAL OF LABOR AFTER CESAREAN SECTION VS ELECTIVE REPEAT CESAREAN DELIVERY AT MUHIMA DH AND KIGALI UNIVERSITY TEACHING HOSPITAL(KUTH)

Submitted by:

DR. UMUTESI Marie Laurentine

Supervisor: Dr.Stephen RULISA.

A dissertation to be submitted in partial fulfilment of the requirements

For the award of the Degree of Master of Medicine in Obstetrics and Gynaecology of the University of Rwanda.

April, 2014

LIST OF ACRONYMS

ANC	Antenatal Care
ARM	Artificial Rupture of Membrane
CPD	Cephalo Pelvic Disproportion
DH	District Hospital
KUTH	Kigali University Teaching Hospital
MFMU	Maternal-Fetal Medicine Unit
PPH	Post Partum Hemorrhage
RCS	Repeated Caesarian Section
SAMM	Severe Acute Maternal Morbidity
SPSS	Statistical Package for Social Scientists
SVD	Spontaneous Vaginal Delivery
TOLAC	Trial Of Labor After Cesarean delivery
VBAC	Vaginal Birth After Caesarean section
WHO	World Health Organization

LIST OF TABLES

TABLE OF CONTENT

DECLARATION

I, Dr. **Marie Laurentine UMUTESI,** do hereby declare that all the work presented in this dissertation is my original work unless otherwise acknowledged. This work has never been submitted in part or in full for publication or award of a degree in any other university.

I hence forth present it for the award of the degree of Master of Gyn. & Obs. of University of Rwanda.

Author:

…..... Date……..

Marie Laurentine UMUTESI

Supervisor:

This dissertation has been submitted for examination with my approval as academic supervisor;

…… Date……

Dr. Stephen RULISA

DEDICATION

This book is dedicated to my dear spouse Jean de Dieu and my children Rita and Hubert. Thank you for your overwhelming love, patience, assurance and support during this time.

ACKNOWLEDGEMENTS

I thank God the almighty for keeping me in good health to be able to accomplish my project!

This project was made possible through the support that I received from several individuals.

My project supervisor **Dr Stephen RULISA** facilitated me with continuous technical support right from proposal development through to report writing. Throughout the entire process, he offered advice and answered my many questions. Our meetings were fruitful for discussing ideas and different approaches to study the study design and data analysis, and the dissertation benefited greatly from his input. I am grateful for his continued guidance.

My lecturers of Gyn. & Obs. department during the four years in the MMed program were also an inspiration to me and leader of all referral hospitals in Rwanda as well as different doctors, nurses and midwives who helped me. I appreciate their mentoring, and the interest and attention they paid to my research.

And a big thanks to my classmates for the encouragement and knowledge that you shared with me throughout my academic battle.

ABSTRACT

Introduction

Before the 1970s, deliveries by cesarean section were considered as indication for cesarean section in the subsequent pregnancies, reflecting a concern that uterine scar tissue might rupture during labor. Offering trial of scar and subsequent vaginal delivery can contribute to reduction of the rate of caesarean section. There are benefits and harms associated with both repeat elective caesarean birth and vaginal birth after caesarean section.

Objective: The objective of this study was to compare the hospital maternal morbidity associated with trial of labor after cesarean section and the hospital maternal morbidity associated with elective repeat cesarean delivery.

Methods: This was a prospective cohort study.

Results: Genital tract injury/urinary tract injury was 0% in group of TOL and 1 mother (1%) in group of ERCS (OR 1.010; P < 0.001).Transfusion 1.9% in TOL group and 1% in the ERCS group (OR 1.83; P < 0.001). Uterine rupture and hysterectomy each 0.9% in TOL group and none in ERCS group (OR 1.916; P < 0.001). Wound infection 0.9% in TOL group and 4.1% in ERCS group (OR 0.22; P< 0.001). The maternal morbidity occurred in 3 mothers (2.8%) in group of TOL Vs 6 mothers (6.1%) in group of ERCS (P<0.001; OR 0.438).

In group of TOL, on 5th minute, 107 neonates (99.1%) had an APGAR score between 10-8 and only one neonate (0.9%) had an APGAR score between 7-6 while in group of ERCS at the same time, 98 neonates (100%) had an APGAR score between 10-8, none have been recorded to have an APGAR score between 7-6. One neonate (0.9%) who have been admitted to neonatology unit was in group of TOL while none neonate have been recorded in group of ERCS (OR 0.991; 95%CI 0.973 to 1.009).

Conclusion of our study

- ✓ There is a high risk of maternal morbidity in group of ERCS compared to the group of TOL.
- ✓ The TOL is safer compared to ERCS regarding repercussion to maternal morbidity.
- ✓ There is no difference in both groups (TOL and ERCS) in an APGAR score of neonates at 5 minutes.
- ✓ There is no difference in both groups (TOL and ERCS) to be admitted in the neonatology unit.

Recommendations

- Medical providers of Muhima DH and KUTH should continue to encourage mothers who had prior caesarian section to try labor;
- Medical providers should early diagnose and treat maternal complications associated to chosen mode of delivery;
- Prospective study should be done on long term maternal morbidity associated with ERCS and TOL in Rwanda.

CHAPTER ONE GENERAL INTRODUCTION

1.1 Introduction

Before the 1970s, deliveries by cesarean section were considered as indication for cesarean section in the subsequent pregnancies, reflecting a concern that uterine scar tissue might rupture during labor (Blanchette H, Blanchette M, McCabe J, Vincent S, 2001). In the 1980s, the dictum "once a cesarean, always a cesarean," espoused by Craigin in 1916,(Spaans WA. at al., 2002) was revised in many countries, and a trial of labor in women with history of cesarean section was proposed as an attempt to reduce cesarean section rates (Rosen MG, Dickinson JC, Westhoff CL, 1991; Mozurkewich EL, Hutton EK, 2000). At Muhimbili National Hospital (MNH), a tertiary and university teaching hospital in Tanzania, there was steady increase in rate of caesarean section from 15.8% in 1999 to 31.8% in 2004 with nulliparous women more at risk (Muganyizi *et al.*, 2008 cited by Andrea B. Pembe and Mashavu K. Othman, 2010). However, apparent increases in the incidence of uterine rupture and concern about maternal and fetal safety have challenged the choice of vaginal delivery in women having a scarred uterus. As a consequence, clinicians are increasingly being faced in deciding the mode of delivery in pregnant women whose first delivery was by cesarean section. Over the last several years, the rate of cesarean delivery has increased in the United States. Studies have shown that 30 - 80% of women with one previous lower segment caesarean section can achieve vaginal delivery when trial of scar is done (Landon *et al.*, 2004; McMahon *et al.*, 1996). Offering trial of scar and subsequent vaginal delivery can contribute to reduction of the rate of caesarean section. However, the risk of uterine rupture and other morbidities associated with failed trial of the scar, remain the major concern for many practitioners. Most women with one previous caesarean birth with no additional risk factors are candidates for planned vaginal birth after caesarean section (VBAC).

Repeat caesarean section is the most common primary indication for a woman undergoing a repeat caesarean, accounting for 28% of births in the United Kingdom (Van Bogaert LJ, 2004) and over 40% of births in the United States (Stroup DF, Berlin JA, Morton SC, et al., 2000). In South Australia, the main reason (56.6%) for women having an elective caesarean is that they have had a previous caesarean section, and 13.9% of emergency caesareans performed are in women who have had a previous caesarean (Higgins JP, Thompson SG, Deeks JJ, Altman DG, 2003). Figures from the United States in 2003 indicate a repeat caesarean section rate of 89.4%. Among the 19 states that had adopted the standard certificate, approximately 92% of all women

who had a previous cesarean had a repeat cesarean for their next delivery in 2006(Cunningham FG.; at al., 2010).

However, there are benefits and harms associated with both repeat elective caesarean birth and vaginal birth after caesarean section.

Repeat elective caesarean birth is associated with an increase in the risk of complications such as bleeding, the need for blood transfusion, infection, damage to the bladder and bowel, and deep venous thrombosis. As the numbers of caesarean births for each individual woman increases, so does the difficulty in performing surgery due to adhesions, and the risk of damage to the bladder or bowel at the time of surgery. There may also be difficulties in conceiving a further pregnancy or problems where placenta praevia in subsequent pregnancy (Hemminki 1996). Occasionally placenta accrete or placenta percreta. This may cause difficulties with the placenta being delivered after birth, and sometimes excessive bleeding. Babies born by caesarean may develop some difficulties with breathing as transient tachypnea of the newborn, and may need to spend time in a special care nursery. This is usually only for a short duration, and most babies recover fully. Occasionally a baby may develop more serious problems as respiratory distress syndrome, and may need some extra oxygen, assistance with breathing and a longer stay in the nursery. The risks of developing this relate to the use of general anesthesia and the age at which the baby is born (Hook 1997; Morrison 1995).

One uncommon, but potentially serious complication associated with a prior uterine surgery is uterine rupture. This may occur prior to the onset of labor, or during labor while a woman is undergoing a planned VBAC. This complication can be life-threatening for both the woman and her baby. Any vaginal birth may be associated with a non-reassuring fetal heart rate tracing or failure to progress, both of which may require birth by emergency caesarean section. Emergency caesarean birth in labor has been associated with an increased chance of infection, bleeding, increasing the need for blood transfusion, deep venous thrombosis when compared with both vaginal birth and elective caesarean birth. Any vaginal birth may be associated with trauma to the woman's perineum.

In our study, we attempt to compare the hospital maternal morbidity associated with both a planned repeat elective caesarean section and a planned vaginal birth after caesarean section at Muhima district hospital and KUTH.

1.2 Definition of key words

1.2.1 Maternal morbidity

The WHO defines maternal morbidity as a complication or illness that arises during gestation, birth or the puerperium, which affects the woman's integrity, and physical or mental health, sometimes permanently. Causes can vary; some examples include obstetric complications, interventions, cultural practices or coercion.

The world Health Organization (WHO) has recently standardized the concept and definitions of maternal near miss. According to this definition, women with complications during pregnancy can experience potentially life threatening maternal conditions that can become actually life-threatening, and then either survive (a maternal near miss) or die (a maternal death) (WHO, 2011).

1.2.2 Trial of labor

A trial of labor after cesarean delivery (TOLAC) is the attempt to have a vaginal birth after cesarean delivery.
A woman is said to be in "labor" when painful contractions have become regular in frequency(3-4 in 10 minutes) and less than 60 seconds in duration. The now powerful contractions are accompanied by cervical effacement and dilation greater than 3cm.

The contraction will accelerate until they happen every two minutes although this is not always the case. The length of the contractions will also lengthen until full dilation of cervix.

1.2.3 Labor

Labor is a physiologic process during which the products of conception (i.e., the fetus, membranes, umbilical cord, and placenta) are expelled outside of the uterus. Labor is achieved with changes in the biochemical connective tissue and with gradual effacement and dilatation of the uterine cervix as a result of rhythmic uterine contractions of sufficient frequency, intensity, and duration. (Norwitz ER, Robinson JN, Repke JT, 2003).

Labor is a clinical diagnosis. The onset of labor is defined as regular, painful uterine contractions resulting in progressive cervical effacement and dilatation. Cervical dilatation in the absence of uterine contraction suggests cervical insufficiency, whereas uterine contraction without cervical change does not meet the definition of labor.

1.2.4 Uterine rupture

Uterine rupture, the most serious complication of labor after cesarean section is defined as: complete separation of the myometrium with or without extrusion of fetal parts into the maternal peritoneal cavity and requires emergency cesarean section or postpartum laparotomy (Bucklin BA, 2003).

The most common sign or symptom of uterine rupture is non-reassuring fetal heart rate, cessation of contractions, loss of presenting parts on vaginal examination, abdominal pain vaginal bleeding and maternal cardiovascular instability (Ibid.).

1.2.5 Cesarean section

Cesarean section, also called c-section or cesarean deliveries, are performed whenever abnormal conditions complicate labor and vaginal delivery, threatening the life or health of the mother or the baby dystocia, or difficult labor, is the other common cause of c –section. Once the patient has received anesthesia, the abdomen is washed with an antibacterial solution. The first incision opens the abdomen. Infrequently, it will be vertical from just below the navel to the top of the pubic bone or, more commonly; it will be a horizontal incision across and above the pubic bone.

The second incision opens the uterus. In most cases, a transverse incision is made. This is the favored type because it heals well and makes it possible for a woman to attempt a vaginal delivery in the future. The classical incision is vertical. Because it provides a larger opening than a low transverse incision, it is used in the most critical situations such as placenta previa. However, the classic incision causes more bleeding, a greater risk of abdominal infection, and a weaker scar.

Once the uterus is opened, the amniotic sac is ruptured and the baby is delivered. The time from the initial incision to birth is typically five minutes. The umbilical cord is clamped and cut and the newborn is evaluated. The placenta is removed from the mother, and her uterus and abdomen are stitched closed (surgical staples may be used instead in closing the outermost layer of the abdominal incision). From birth through suturing may take 30-40 minutes; the entire surgical procedure may be performed in less than one hour (Encyclopedia.com).

1.2.6 Elective repeat cesarean delivery

Elective repeat cesarean delivery is planned cesarean delivery by a woman who has had one or more prior cesarean deliveries. The delivery may or may not be scheduled (Cunningham FG at al., 2010).

1.3 Problem statement

In 2012, a study by Erez et al. in Department of Obstetrics and Gynecology, Soroka University Medical Center on Remote prognosis after primary cesarean delivery: the association of VBACs and recurrent cesarean deliveries with maternal morbidity in Israel shows that there is a insufficiency of information concerning maternal morbidity associated with either repeated VBAC or repeated CS (RCS) (Erez et al., 2012). The same situation is noticed in Rwanda where there is no recent study carried out to compare maternal morbidity associated with trial of labor after cesarean section vs elective repeat cesarean delivery.

We therefore, decided to carry out the study in two hospitals in Rwanda, to compare hospital maternal morbidity associated with a trial of labor after prior cesarean section and elective repeat c/section.

1.4 Interest of the study

a**)** Personal interest: this piece of work en lighted my knowledge on scientific research.

b) Scientific interest: to improve medical obstetrical care by providing evidence-based guideline for the provision of morbidity associated with a trial of labor after cesarean and repeat cesarean section.

1.5 Hypothesis

- There is no difference between hospital maternal morbidity associated with trial of labor after c/section and hospital maternal morbidity associated with elective repeat cesarean delivery.
- Elective repeat cesarean delivery is associated with higher rate of hospital maternal morbidity than a trial of labor by women with a history of cesarean section.

1.6 Objectives

1.6.1 General objective

The general objective of this study was to compare the hospital maternal morbidity associated with trial of labor after cesarean section and the hospital maternal morbidity associated with elective repeat cesarean delivery.

1.6.2 Specific objectives

- To assess the hospital maternal morbidity associated with trial of labor after c/section compare to elective repeat cesarean delivery.
- To evaluate the safety of trial of labor after c/section compared to elective repeat cesarean delivery. .
- To evaluate hospital neonatal outcome associated to trial of labor after c/section comparing to elective repeat cesarean delivery.

CHAPTER TWO METHODOLOGY

2.1 Materials

- Data collection form
- Medical patients records
- Birth registers

2.2 Study population

In our study "*Hospital maternal morbidity associated with trial of labor after caesarian section vs elective repeat caesarian section*" was included all mother with singleton term pregnancy in vertex presentation on one previous c/section who delivered at Muhima district hospital and KIGALI University Teaching Hospital(KUTH), they had been identified at admission.

2.3 Study design

This was a prospective cohort study.

2.4 Place and period of the study

The study was conducted in the department of Obstetrics and Gynecology of Muhima district hospital and KUTH located in Nyarugenge District in Kigali city. The duration of the study was 6 months starting from 1st august 2013 to 31st January 2014.

2.5 Inclusion and exclusion criteria

Inclusion criteria

- All pregnant women with singleton term pregnancy in cephalic presentation with a history of one caesarian delivery that has undergone a trial of labor from 1st August 2013 to 31st January 2014 (1stgroup).
- All pregnant women with singleton term pregnancy in cephalic presentation with a history of one caesarian delivery who has undergone an elective repeat caesarian delivery from 1st August 2013 to 31st January 2014(2ndgroup).

Exclusion criteria

- Were excluded all mothers with obstetrical indication of c/section(malpresantation, total placenta preavia)

- All pregnant women with other associated pathology which could increase maternal morbidity (preeclampsia, chronic anemia HIV positive, etc).
- Mother with induction of labor

2.6 Sample size

All eligible cases during the period of our study were included.

2.7 Data collection and analysis

Data was collected at Muhima DH and KUTH using a pre-established questionnaire. Maternal and neonatal data were obtained using medical files and birth records. After getting the consent of the patient, the questionnaire was filled at admission, during labor or elective c/section, and after delivery of the baby. Patients were followed during hospitalization period or any other time she came back to hospital with complication related to mode of delivery as surgical site infection, endometritis, peritonitis, DVT and infection of episiotomy.

Data was analyzed using SPSS version 16.0 and Microsoft Excel.

Relevant description statistics, frequencies and percentage were computed for presentation of qualitative outcomes like parity, age, weight, maternal morbidity (Genital or urinary tract injury, retained placenta, transfusion, uterine rupture, hysterectomy, post C-S peritonitis, endometritis, uterine dehiscence, DVT, infection of episiotomy, surgical site infection) and neonatal outcome (APGAR at the 1^{st}, 5^{th} and 10^{th} minute, admission to neonatology, etc).

The student t-test was used to compare two groups (TOL and ERCS) depending on maternal morbidity and neonatal outcome identified.

Odds Ratio was used to compare proportions (maternal morbidity, and neonatal outcome) in groups of ERCS and TOL.

P-value<0.05 was considered as statistically significant, that<0.01 taken as highly significant; and p<0.001 taken as very highly significant.

2.8 Study limitations

This study was conducted only within the mentioned hospitals.

2.9 Ethical considerations:

Privacy was ensured throughout the study;

The mothers were explained about the study and signed a consent form.

The permission of conducting the study was obtained from the Directors of Muhima DH and KUTH.

Ethical approval was obtained from the department of OBS/GYN., the faculty of Medicine/Research and ethics committees.

CHAPTER THREE : RESULTS

3.1 Distribution of mothers according to groups

Table1: Number of mothers according to their group

Groups			
		Frequency	%
Valid	TOL	108	52.4
	Elective CS	98	47.6
	Total	206	100.0

Source: Primary data

The population of our study was composed of 206 mothers divided into two groups; the first group with trial of labor was composed of 108 mothers (52.4%), while the second group with elective repeat caesarian-section was composed of 98 mothers (47.6%).

3.2 Social demographic characteristics of mothers

3.2.1 Age of mothers according to groups

Table2: Age of mothers according to groups

		Age in years				Total	%
		20-35	%	>35	%		
Groups	TOL	85	78.7	23	21.3	108	100
	Elective CS	84	85.7	14	14.3	98	100

Source: Primary data

The table 2 above shows that the majority of TOL's group mothers 85 (78.7%) was recorded in 20-35 years, the rest mothers 23 (21.3%) in the same group was recorded in the age above 35 years. In the group of elective repeat caesarian-section, the majority of mothers 84 (85.7%) was recorded in 20-35 years, 14(14, 3%) in this group were recorded in the age above 35years.

3.2.2 Origin of mothers according to groups

Table3: Origin of mothers according to groups

		Address				Total	%
		Rural	%	Urban	%		
Groups	TOL	34	31.5	74	68.5	108	100
	Elective CS	33	33.7	65	66.3	98	100

Source: Primary data

Out of one hundred and eight mothers who underwent a trial of labor, 74(68.5%) came from urban region and 34(31.5%) came from rural region. Out of ninety eight mothers with elective caesarian-section, 65(66.3%) came from urban region while 33(33.7%) came from rural region.

3.2.3 Education of mothers according to groups

Table4: Education of mothers according to groups

		Education						Total	%
		University level	%	Secondary school level	%	Primary school	%		
Groups	TOL	17	15.7	29	26.9	62	57.4	108	100
	Elective CS	17	17.3	36	36.7	45	45.9	98	100

Source: Primary data

The table 4 above indicates that in the group of TOL the majority of mothers 62(57.4%) had a primary level, 29(26.9%) had a secondary level and 17(15.7) had a university level. In the group o.of Elective CS, the majority of mothers 45(45.9%) had a primary level, 36 mothers (36.7%) had a secondary level while 17 mothers (17.3%) had a university level.

3.3 Obstetrical history of mothers

Table5: Parity of mothers according to groups

		Parity						Total	%
		1-4	%	5-7	%	>7	%		
Groups	TOL	92	85.2	12	11.1	4	3.7	108	100
	Elective CS	90	91.8	6	6.1	2	2.0	98	100

Source: Primary data

The table 5 above shows the parity of mothers according to groups (TOL and ERCS). In the group of TOL, the parity of 92 mothers (85.2%) was between1-4; 12 mothers (11.1%) their parity was between 5-7, while 4 mothers (3.7%) their parity was greater than 7.
In the group of ERCS, a good number of 90 mothers (91.8%) had a parity of 1-4; six mothers (6.1%) their parity was between 5-7 while 2 mothers (2%) their parity was greater than 7.

3.4 Prior vaginal birth of mothers according to groups

Table6: Prior vaginal birth of mothers according to groups

		Prior vaginal birth				Total	%
		Yes	%	No	%		
Groups	TOL	52	48.1	56	51.9	108	100
	Elective CS	8	8.2	90	91.8	98	100

Source: Primary data

The table 6 indicates prior vaginal birth of mothers according g to groups. Fifty two mothers (48.1%) in the group of TOL had a prior vaginal birth, while in the group of ERCS only 8 mothers (8.2%) had a prior vaginal birth.

3.5 Inter-pregnancy period of mothers according to groups

Table7: Inter-pregnancy period of mothers according to groups

		Inter-pregnancy period						Total	%
		18-24 months	%	25-36 months	%	> 36 months	%		
Groups	TOL	9	8.3	79	73.1	20	18.5	108	100
	Elective CS	13	13.3	65	66.3	20	20.4	98	100

Source: Primary data

The table 7 shows us the inter-pregnancy period of mothers according to groups. In the group of TOL, 79 mothers (73.1%) had an inter-pregnancy period between 18-24 months, 20m mothers (20.4%) had an inter-pregnancy period over 36 months and only 9 mothers (13.3%) their inter-pregnancy period was between 18-24 months.

In the group of ERCS, 65 mothers (66.3%) had an inter-pregnancy period between 25-36 months, 20 mothers 20.4%) their inter-pregnancy period was greater than 36 months while 13 mothers (13.3%) their inter-pregnancy period was between 18-24 months.

3.6 Analytical results for mothers

3.6.1 Mode of delivery in group of trial of labor

Table8: Mode of delivery in group of trial of labor after CS

	Mode of delivery				Total	%
	SVD	%	C-Section	%		
TOL	84	77.8	24	22.2	108	100

Source: Primary data

The table 8 above reveals that 84 mothers (77.8%) succeeded to the vaginal delivery while 24 mothers (22.2%) failed to the vaginal birth and had an emergency caesarian-section.

3.6.2 Details of maternal morbidity in two groups

Table9: Details of maternal morbidity in two groups

Maternal morbidity		**Groups**				**Total**	**Odds Ratio**	**P-value**
		TOL		**Elective CS**				
		Number	%	Number	%			
Genital tract injury/ Urinary tract injury	Yes	0	0	1	1.0	1	1.010	0.000
	No	108	100	97	99.0	205		
Transfusion	Yes	2	1.9	1	1.0	3	1.83	0.000
	No	106	98.1	97	99.0	203		
Uterine rupture	Yes	1	0.9	0	0	1	1.916	0.000
	No	107	99.1	98	100	205		
Hysterectomy	Yes	1	0.9	0	0	1	1.916	0.000
	No	107	99.1	98	100	205		
Post CS peritonitis	No	108	100	98	100	206	-	-
Infection of episiotomy	No	108	100	98	100	206		
Retained placenta	No	108	100	98	100	206	-	-
Endometritis	No	108	100	98	100	206		
Uterine dehiscence	No	108	100	98	100	206	-	-
DVT	No	108	100	98	100	206		
Surgical site wound infection	Yes	1	0.9	4	4.1	5	0.22	0.000
	No	107	99.1	94	95.9	201		

Source: Primary data

The table 9 indicates maternal morbidity in to groups.

Genital tract injury/urinary tract injury didn't occur in group of TOL but it occurred on 1 mother (1%) in group of ERCS (OR 1.010; P <0.001).

Transfusion occurred on 2 mothers (1.9%) in TOL group while it occurred on 1 mother (1%) in the ERCS group (OR 1.83; P< 0.001).

Uterine rupture and hysterectomy both occurred on 1 mother (0.9%) in TOL group and none in ERCS group (OR 1.916; P< 0.001).

Parietal wound infection occurred on 1 mother (0.9%) in TOL group while it occurred on 4 mothers (4.1%) in ERCS group (OR 0.22; P< 0.001).

Post CS peritonitis, DVT, infection of episiotomy, retained placenta, endometritis and uterine dehiscence didn't occurred on any mother in both groups.

3.6.3 Summary of maternal morbidity compared in two groups

Table10: Summary of maternal morbidity compared in two groups

		Groups				Total	**Odds Ratio**	**P-value**
		TOL	%	Elective CS	%			
Maternal morbidity	Yes	3	2.8	6	6.1	9	0.438	0.000
	No	105	97.2	92	93.9	195		
Total		108	100	98	100	206		

Source: Primary data

This table indicates the number of mothers who presented any type of maternal morbidity in each group though one mother could present more than one type of maternal morbidity. The maternal morbidity occurred in 3 mothers (2.8%) in group of TOL Vs 6 mothers (6.1%) in group of ERCS (P < 0.001; OR 0.438).

3.6.4 Maternal morbidity in group of trial of labor

Table 11: Maternal complications in group of trial of labor

		TOL				Total
		SVD	%	Caesarian section	%	
Transfusion	Yes	1	1.2	1	4.2	2
	No	83	98.8	23	95.8	106
Total		84	100	24	100	108
Uterine rupture	Yes	1	1.2	0	0	1
	No	83	98.8	24	100	107
Total		84	100	24	100	108
Hysterectomy	Yes	1	1.2	0	0	1
	No	83	98.8	24	100	107
Total		84	100	24	100	108
Surgical site wound infection	Yes	0	0	1	4.2	1
	No	84	100	23	95.8	107
Total		84		24	100	108

Source: Primary data

The table 11 above shows that one mother (1.2%) and one mother (4.2%) who have been transfused respectively were respectively in groups of SVD and unplanned caesarian section; one mother (1.2%) who had respectively uterine rupture and hysterectomy were in the group of SVD while none have been recorded in group of unplanned caesarian section; one mother (4.2%) who had a parietal wound infection was in group of unplanned caesarian section while none have been recorded in a group of SVD.

3.7 Outcome of neonate

3.7.1 Sex of neonate in groups of trial of labor and elective repeat caesarian- section

Table12: Sex of neonate in groups

		Sex of a new born				Total	%
		Male	%	Female	%		
Groups	TOL	44	40.7	64	59.3	108	100
	Elective CS	61	62.2	37	37.8	98	100

Source: Primary data

The table 12 above shows that in the group of TOL, 44 neonates (40.7%) were males while 64 neonates (59.3%) were females.

In the group of ERCS, 61neonates (62.2%) were males while 37 neonates (37.8%) were females.

3.7.2 Weight of neonate in groups of trial of labor and elective repeat caesarian- section

Table13: Weight of neonate in groups

		Weight of a new born						Total	%
		< 2500g	%	2600-4000g	%	> 4000g	%		
Groups	TOL	2	1.9	104	96.3	2	1.9	108	100
	Elective CS	4	4.1	85	86.7	9	9.2	98	100

Source: Primary data

In the group of TOL, 104 neonates (96.3%) weighted between 2600-4000g, 2 neonates (1.9%) weighted under 2500g, and 2 neonates (1.9%) weighted over 4000g. In the group of ERCS, 85 neonates (86.7%) weighted 2600-4000g, 9 neonates (9.2%) weighted over 4000g, and 4 neonates (4.1%) weighted under 2500g.

3.7.3 APGAR of neonate in groups of trial of labor and elective repeat caesarian- section

Table14: APGAR of neonate in groups

		Groups			
		TOL	%	Elective CS	%
Apgar score at 1minute	8-10	89	82.4	93	95
	6-7	18	16.7	5	5
	3-5	1	0.9	0	0
Apgar score at 5 minutes	8-10	107	99.1	98	100
	6-7	1	0.9	0	0
Apgar score at 10 minutes	8-10	108	100	98	100

Source: Primary data

The table 14 above indicates that in the group of TOL, 89 neonates (82.4%), 18 neonates (16.7%), and 1 neonate (0.9%) had respectively APGAR score of 8-10, 6-7, and 3-5 at the first minute. One hundred and seven neonates (99.1%), 1neonate (0.9%) had respectively APGAR score of 8-10, and 6-7 at the 5^{th} minutes. One hundred and eight neonates (100%) had an APGAR of 8-10 at the 10^{th} minutes.

In the group of ERCS, 93 neonates (95%) and 5 neonates (5%) had respectively an APGAR score of 8-10 and 6-7 at the first minute; at the 5th and 10th minutes the all the neonates had an APGAR score of 8-10.

The difference in an APGAR score of neonates at 5 minutes for both groups (Trial of labor and Elective repeat CS) is not significant, since (OR=0.991; 95% CI 0.973 to1.009). It means that there is no difference in both groups in an APGAR score of neonates at 5 minutes.

3.7.4 Comparative test of TOL and ERCS according to APGAR score at 5 minutes

Table 15: Comparative test of TOL and ERCS according to APGAR score at 5 minutes

		Apgar score at 5 minutes				Total	Odds Ratio	95% Confidence Interval	
		10-8	%	7-6	%			Lower	Upper
Groups	TOL	107	99.1	1	0.9	108	0.991	0.973	1.009
	Elective CS	98	100	0	0	98			

Source: Primary data

The table 15 above indicates that in group of TOL, on 5th minute, 107 neonates (99.1%) had an APGAR score between 10-8 and only one neonate (0.9%) had an APGAR score between 7-6 while in group of ERCS at the same time, 98 neonates (100%) had an APGAR score between 10-8, none have been recorded to have an APGAR score between 7-6.

3.7.5 Admission to neonatology for groups of trial of labor and elective repeat CS

Table16: Admission to neonatology for groups

		Admission to neonatology unit				**Total**		**Odds Ratio**	**95% CI**	
		Yes	**%**	**No**	**%**		**%**		**Lower**	**Upper**
Groups	TOL	1	0.9	107	99.1	108	100	0.991	0.973	1.009
	Elective CS	0	0	98	100	98	100			

Source: Primary data

The table 16 above indicates that only one neonate (0.9%) who have been admitted to neonatology unit was in group of TOL while none neonate have been recorded in group of ERCS (OR 0.991; 95%CI 0.973 to 1.009).

CHAPTER FOUR DISCUSSION, CONCLUSION AND RECOMMANDATION

4.1 Discussion

4.1.1 Distribution of mothers according to groups

This study was composed of 206 mothers with one previous caesarian section. These mothers were divided into two groups, TOL with 108 mothers (52.4%) and ERCS with 98 mothers (47.6%).

4.1.2 Age of mothers according to groups

In our study, the most frequent age group was between 20-35 years (78.7%) in the group of TOL and 85.7% in the group of ERCS.

This was similar to the study on maternal and perinatal outcome associated with a trial of labor after prior cesarean delivery found that the age group of 18-34 years occupied 81.5% in TOL and 77.2% in ERCS (Marc B. Landon et al., 2004).

4.1.3 Mode of delivery in group of trial of labor

Out of 108 mothers, 84 (77.8%) succeeded to the vaginal birth after C-section (VBAC) while 24 (22.2%) failed to the vaginal birth after C-section and had caesarian-section.

Our results are similar to the study conducted by Blanchette on "Is vaginal birth after cesarean safe? Experience at community hospital" where he found that the success to the vaginal birth was 76% and the failure to the VBAC was 24% (Blanchette et al., 2001). The same results 73% of success to VBAC were found by A. Cristina Rossi in the study on "Maternal morbidity following a trial of labor after cesarean section vs elective repeat caesarian delivery" (A. Cristina Rossi et al., 2008).

4.1.4 Maternal morbidity compared in two groups

Genital tract injury/urinary tract injury didn't occur in group of TOL but it occurred on 1 mother (1%) in group of ERCS (OR 1.010; 95%CI 0.990 to 1.031).

Transfusion occurred on 2 mothers (1.9%) in TOL group while it occurred on 1 mother (1%) in the ERCS group (OR 1.83; 95% CI 0.163 to 20.504). For that reason the TOL increases the risk of anemia/transfusion.

This is similar to results from the study done by A. Cristina Rossi in the study on "Maternal morbidity following a trial of labor after cesarean section vs elective repeat caesarian delivery" (A. Cristina Rossi et al., 2008) where she found 1.7% in TOL and 1.2% in ERCS.
Spong Y. Catherine (2007), in her study on risk of uterine rupture and adverse perinatal outcome at term after cesarean delivery, found 1.5% in TOL and 0.9% in ERCS.
Another study similar to ours is "Maternal and perinatal outcomes associated with trial of labor after prior Cesarean delivery" done by Mark B. London, who showed that the morbidity in TOL was 1.7% and 1% in the ERCS group (OR 1.71; P <0.001) (Mark B. London et al; 2004).

Uterine rupture and hysterectomy were both occurred at 0.9% in the group of TOL whereas they didn't occur in the group of ERCS (OR 1.916; P <0.001); therefore TOL increases the risk uterine rupture and hysterectomy.
Our results are similar to those found in the study on vaginal birth after one previous caesarian section in tertiary institution in Nigeria, where the incidence of uterine rupture was between 0.2% and 1.5% (Aisien &Oronsaye, 2004).
Another study done by Mark B. London on "Maternal and perinatal outcomes associated with trial of labor after prior Cesarean delivery" showed the results of maternal morbidity in group of TOL (0.7%) and (0%) in group of ERCS (P-value <0.001) (Mark B. London et al; 2004).

Surgical site wound infection occurred at 0.9% in the group of TOL while it occurred at 4.1% in the group of ERCS (OR 0.22; 95%CI 0.024 to 2).

Shi Wu Wen (2004) in his study on "comparison of maternal mortality and morbidity between trial of labor and elective repeat cesarean section among women with previous cesarean delivery"in Canada found that the wound infection was 0.38% in group of TOL and 0.49% in group of ERCS (OR 0.78; CI 0.69 to 0.87).
Offer Erez (2012) in the study on "Remote prognosis after primary cesarean delivery: the association of VBAC and recurrent caesarian deliveries with maternal morbidity" in Italy found that the parietal wound infection was 2% in group of TOL and 8% in group of ERCS (P 0.192).

Post CS peritonitis, DVT, infection of episiotomy, retained placenta, endometritis and uterine dehiscence didn't occurred on any mother in both groups.

The maternal morbidity occurred in 3 mothers (2.8%) in group of TOL Vs 6 mothers (6.1%) in group of ERCS (P < 0.001; OR 0.438). Means that the difference between maternal morbidity associated with ERCS and maternal morbidity associated with TOL is highly significant. Therefore there is a high risk of maternal morbidity in group of ERCS compared to the group of TOL, this imply also that the TOL (97.2%) is more safe compared to ERCS (93.9%) regarding implication to maternal morbidity.

Our results are similar to those found in the study done by Blanchette on "Is vaginal birth after cesarean safe? Experience at a community hospital" where he found that maternal morbidity in ERCS group was 4.5% and 3% for a TOL group (Blanchette et al; 2001).

4.1.5 Outcome of neonate

4.1.5.1 Admission to neonatology for groups of trial of labor and elective repeat CS

The difference in admission to neonatology unit for both groups (Trial of labor 0.9% and Elective repeat CS 0%) is not significant, since (OR=0.991 and 95% CI between 0.973 and 1.009). These figures are similar to those from American College of Obstetricians and Gynecologists which showed that the difference between ERC S (6%) and TOL (6.6%) regarding admission to the neonatology was not significant (ACOG, 2010) but their figures are high and this may resulted to the uterine rupture whereas in our study no one of neonates was admitted to the neonatology after uterine rupture.

4.2 Conclusion of our study

- ✓ There is a high risk of maternal morbidity in group of ERCS compared to the group of TOL.
- ✓ The TOL is safer compared to ERCS regarding repercussion to maternal morbidity.
- ✓ Genital tract injury/urinary tract injury was only present in the ERCS group and wasn't in TOL group.
- ✓ Transfusion was more frequent in TOL group than in the ERCS group.
- ✓ Uterine rupture and hysterectomy both were only present in TOL group and weren't in the ERCS group.
- ✓ Wound infection more frequent in the ERCS group than in TOL group.
- ✓ Post CS peritonitis, DVT, infection of episiotomy, retained placenta, endometritis and uterine dehiscence didn't occurred in any group.
- ✓ There is no difference in both groups (TOL and ERCS) to be admitted in the neonatology unit.

4.3 Recommendations

- Medical providers of Muhima DH and KUTH should continue to encourage mothers who had prior caesarian section to try labor;
- Medical providers should early diagnose and treat maternal complications associated to chosen mode of delivery;
- Prospective study should be done on long term maternal morbidity associated with ERCS and TOL in Rwanda.

REFERENCES

1. A. Cristina Rossi et al, (2008). Maternal morbidity following a trial of labor after cesarean section vs elective repeat caesarian delivery: a systematic review with metaanalysis. Italy.
2. Aisien, A.O & Oronsaye, A.U (2004).Vaginal birth after one previous caesarian section in tertiary institution in Nigeria. Journal of Obstetrics and Gynecology.
3. American College of Obstetricians and Gynecologists, (2010). Vaginal birth after previous cesarean delivery. Practice Bulletin N^{o} 115.
4. Andrea B. Pembe and Mashavu K. Othman, (2010). Pregnancy outcome after one previous caesarean section at a tertiary university teaching hospital in Tanzania. *Department of Obstetrics and Gynecology, Muhimbili University of Health and Allied Sciences.*
5. Blanchette H, Blanchette M, McCabe J, Vincent S. Is vaginal birth after cesarean safe? Experience at a community hospital. Am J Obstet Gynecol 2001.
6. Bucklin BA. Vaginal birth after cesarean delivery. Anesthesiology 2003.
7. Cunningham FG, Bangdiwala S, Brown SS, Dean TM, Frederiksen M, Rowland Hogue CJ, King T, Spencer Lukacz E, McCullough LB, Nicholson W, Petit N, Probstfield JL, Viguera AC, Wong CA, Zimmet SC. National Institutes of Health Consensus Development Conference Statement: Vaginal Birth After Cesarean: New Insights. March 8—10, 2010. Obstetrics & Gynecology. 2010.
8. Erez et al. (2012). Remote prognosis after primary cesarean delivery: the association of VBACs and recurrent cesarean deliveries with maternal morbidity. *Department of Obstetrics and Gynecology, Soroka University Medical Center.*
9. Hemminki E, Merilainen J. Long-term effects of cesarean sections: ectopic pregnancies and placental problems. *American Journal of Obstetrics and Gynecology* 1996.
10. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta analyses. BMJ 2003.
11. Hook B, Kiwi R, Amini SB, Fanaroff A, Hack M. Neonatal morbidity after elective repeat cesarean section and trial of labor. *Pediatrics* 1997.
12. Landon MB, Leindecker S, Spong CY, et al. The MFMU Cesarean Registry: Factors affecting the success of trial of labor after previous cesarean delivery Am J Obstet Gynecol2005.

13. Mark B. London, M.D. John, C. Hauth et al. (2004). Maternal and perinatal outcomes associated with trial of labor after prior Cesarean delivery in England.
14. Mark B. London, M.D. John, C. Hauth et al. Vaginal births after cesarean and uterine rupture rates in California. Obstetrics 1999.
15. McMahon MJ, Luther ER, Bowes WA, Olshan AF. Comparison of a trial of labor with an elective second cesarean section. *New England Journal of Medicine* 1996.
16. Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. *British Journal of Obstetrics and Gynecology* 1995.
17. Mozurkewich EL, Hutton EK. Elective repeat cesarean delivery versus trial of labor: A meta analysis of the literature from 1989 to 1999. Am J Obstet Gynecol 2000.
18. Norwitz ER, Robinson JN, Repke JT. Labor and delivery. In: Gabbe SG, Niebyl JR, Simpson JL, eds. *Obstetrics: Normal and problem pregnancies*. 3rd ed. New York: Churchill Livingstone; 2003.
19. Quiñones JN, Stamilio DM, Paré E, Peipert JF, Stevens E, Macones GA. The effect of prematurity on vaginal birth after cesarean delivery: success and maternal morbidity. *Obstet Gynecol*. Mar 2005.
20. Rageth JC, Juzi C, Grossenbacher H. Delivery after previous cesarean: A risk evaluation. Swiss Working Group of Obstetric and Gynecologic Institutions. Obstet Gynecol 1999.
21. Rogers J, Wood J, McCandlish R, Ayers S, Truesdale A, Elbourne D. Active versus expectant management of third stage of labor: the Hinchingbrooke randomized controlled trial. Lancet 1998.
22. Rosen MG, Dickinson JC, Westhoff CL. Vaginal birth after cesarean: A meta-analysis of morbidity and mortality. Obstet Gynecol 1991.
23. Shi Wu Wen et al. (2004). Comparison of maternal mortality and morbidity between trial of labor and elective repeat cesarean section among women with previous cesarean delivery. Canadian Perinatal Surveillance System.
24. Spaans WA, Sluijs MB, van Roosmalen J, Bleker OP. Risk factors at caesarean section and failure of subsequent trial of labour. Eur J Obstet Gynecol Reprod Biol 2002.
25. Sponge et al, (2007). Risk of uterine rupture and adverse perinatal outcome at term after cesarean delivery.

26. Stroup DF, Berlin JA, Morton SC, et al. Meta analysis of observational studies in epidemiology: A proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) Group. JAMA 2000.
27. T. Mantel GD, Buchmann E, Rees H, Pattinson RC: Severe acute maternal morbidity: a pilot study of a definition for a near-miss. *Br J Obstet Gynaecol* 1998.
28. Van Bogaert LJ. Mode of delivery after one cesarean section. Int J Gynaecol Obstet 2004.
29. WHO, (2011). Evaluating the quality of care for severe pregnancy complications. The WHO near-miss approach for maternal health.

APPENDICES

I. Consent to participate

Topic: Hospital ***maternal morbidity associated to a trial of labor after cesarean section vs elective repeat cesarean delivery at Muhima District Hospital and KIGALI University Teaching Hospital.***

I have read (or someone has read for me) the information in this study for which I understand the purpose and procedures;

I was given sufficient time to think about it and I had the opportunity to ask questions and I received satisfactory answers; that why I give permission to the use and disclosure of my de-identified information collected for the research purposes described in this form.

I understand that by signing this document, I do not waive any of my legal rights and I will be given a copy of this consent form.

I have agreed to participate in this study:

Participant name: signature: Date:

Name of person obtaining consent: signature: Date

KWEMERA KUJYA MU BUSHAKASHATSI

Ubushakashatsi buzakorwa:

"Ibishobora guhungabanya ubuzima bw'umubyeyi bitewe n'uko ageragеje kubyara atabazwe kandi yarigeze kubagwa, tugereranyije no kubagwa adategereje ibise ku babyarira mu bitaro bya Muhima n' Ibitaro bikuru bya Kaminuza bya Kigali".

Nasomye (nasomewe) amakuru kuri ubu bushakashatsi kandi numvise impamvu yabwo n'uko buzakorwa;

Nahawe umwanya uhagije wo kubitekerezaho no kubaza ibibazo kandi nanyuzwe n' ibisubizo nahawe, niyo mpamvu ntanze uburenganzira bwo kwifashisha muri ubu bushakashatsi amakuru ntanga nkuko byateganyijwe.

Numvise ko ninshyira umukono kuri uru rupapuro ko bitari bubangamire uburenganzira bwanjye, kandi nzahabwa kopi y'uru rupapuro.

Nemeye kujya mu bushakashatsi

Izina ry'ubyemeye: Umukono Itariki

Izina ry'uhawe uburenganzira: Umukono Itariki

II. Questionnaire

A questionnaire for hospital maternal morbidity associated with trial of labor after cesarean section vs elective repeat cesarean delivery at Muhima DH and KUTH.

Introduction,

My name is Dr UMUTESI M. Laurentine; I am working on "**Hospital *maternal morbidity associated with trial of labor after cesarean section vs elective repeat cesarean delivery at Muhima DH and KUTH***".

I would like to ask you some easy questions; your name will not be written in this format and will never be used in connection with any of the information you are going to tell me.

Your honest answers to these questions will help us to compare **Hospital maternal *morbidity associated with trial of labor after cesarean section vs elective repeat cesarean delivery*** in order to improve medical obstetrical care.

SECTION I: IDENTIFICATION

1. ID No: .....
2.
3. Age in years: □$_1$ 15-19 □$_2$ 20-35 □$_3$ >35
4. Address: □$_1$ Rural □$_2$ Urban
5. Contact number: ……
6. Time of admission: date…… /….. / …… hour……

SECTION II: SOCIO-ECONOMIC STATUS

6. Occupation: □$_1$ Public worker □$_2$ Private worker □$_3$ Agriculture □$_4$ House worker

7. Education: □$_1$ University level □$_2$ Secondary School level □$_3$ Primary School □$_4$ Illiterate

SECTION III: OBSTETRICAL HISTORY

8. Gestational age: □1 37-41 weeks □2 41-42weeks □3 >42 weeks
9. Parity: □1 1-4 □2 5-7 □3 >7
10. Prior vaginal birth: □1 Yes □2 No
11. ANC: □1 None □2 1-3 Visits □3 ≥4 Visits
12. Indication of previous caesarian section:
    - □1 Mal presentation
    - □2 Acute fetal distress
    - □3 Macrosomia or CPD
    - □4 Protracted labor/Descent arrest
    - □5 Failure of induction of labor
13. Inter-pregnancy period:
    - □1 <18months □2 18-24months □3 25-36months
    - □4>36months

SECTION IV: EVOLUTION OF LABOR

14. Premature rupture of membrane (PROM): □1 Yes □2 No
15. Cervical dilatation at admission: □1 0-3cm □2 4-6cm □3 >6cm
16. Augmentation of labor: □1 Yes □2 No
17. Mode of delivery: □1 SVD □2 Vacuum □3 Unplanned CS □4 Forceps □5Elective repeat c/s
18. Indication of c/s

    □1 Fetal distress □2 Hyperkinesias □3 Hypokinesias □4 Pre-rupture

    □5 Uterine rupture □6 Obstructed labor/Descent arrest □7 CPD
19. Group: □1 TOL □2 Elective CS

SECTION V: Maternal morbidity

20. Maternal morbidity: □1 Yes; □2 No

a. Genital tract injury/Urinary tract injury: □1 Yes □2 No

b. Retained placenta: □1 Yes □2 No

c. Transfusion: □1 Yes □2 No d. Endometritis: □1 Yes □2 No

e. Uterine rupture: □1 Yes □2 No f. Uterine dehiscence: □1 Yes □2 No

g. Hysterectomy: □1 Yes □2 No h. DVT: □1 Yes □2 No

i. Post CS peritonitis:□1 Yes □2 No j. Surgical site infection □1 Yes □2 No

k. Infection of episiotomy: □1 Yes □2 No

SECTION VI: FETAL OUTCOME

21. Sex: □1 Male □2 Female

22. Birth Weight: □1 < 2500g □2 2600-4000g □3 > 4000

23. Apgar score: a. At 1minute: □1 8-10 □2 6-7 □3 3-5 □4 <3

b. At 5minutes: □1 8-10 □2 6-7 □3 3-5 □4 <3

c. At 10minutes: □1 8-10 □2 6-7 □3 3-5 □4 <3

24. Congenital abnormality: □1 Yes □2 No

25. Admission to neonatology unit: □1 Yes □2 No

III. Research work plan

N°	Activity	M 013	J 013	J 013	A 013	S 013	O 013	N 013	D 013	J 014	F 014	M 014	A 014	M 014
1	Preparation of the proposal													
2	Submission and approval													
3	Data collection													
4	Data analysis													
5	Report preparation													
6	Editing													
7	Report presentation													
8	Dissemination of the findings													

IV. Budget estimation

ITEM	QUANTITY	UNIT COST	TOTAL
1. Personnel			
Principal investigator	1	450,000	450,000
Data collectors	4	150,000	600,000
Supervisors	2	500,000	1,000,000
Statistician	1	450,000	450,000
2. Data collection			
Photocopy of questionnaire	250 x 3= 750	20	15,000
Transport			100,000
3. Report production	5 copies	5,000	25,000
TOTAL			**2,740,000**

APPROVAL LETTER

CENTRE HOSPITALIER UNIVERSITAIRE

UNIVERSITY TEACHING HOSPITAL

Quality Health Care
Training & Research

Ethics Committee / Comité d'éthique

September 20th 2013 **Ref.: EC/CHUK/.123../13**

Review Approval Notice

Dear Dr. Marie Laurentine Umutesi,

Your research project: ***"Maternal morbidity associated with trial of labor after cesarean section vs elective repeat cesarean delivery at Muhima District Hospital and Kigali University Teaching Hospital"***

During the meeting of the Ethics Committee of Kigali University Teaching Hospital (KUTH) that was held on 20/09/2013 to evaluate your protocol of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your protocol.
You are required to present the results of your study to KUTH Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

ETHICS COMMITTEE CHUK

Dr. Georges Ntakiyiruta
The Vice President, Ethics Committee,
Kigali University Teaching Hospital

<<University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations>

B.P. :655 Kigali- RWANDA Tél. Fax : 00 (250) 576638E-mail : chuk.hospital@chukigali.org