Transabdominal versus Transvaginal 2D Ultrasound in Assessment of Lower Uterine Segment Thickness in Females with Previous Cesarean Section: A Comparative Study

Thesis

Submitted for Partial Fulfillment of Master Degree
in Obstetrics & Gynecology

By

Amr Ahmad Abo-Alyazid Ramadan
M.B.,B.CH., 2009
Resident at Police Authority Hospitals

Under Supervision of

Prof. Khaled Hassan Swidan
Professor of Obstetrics and Gynecology
Faculty of Medicine, Ain Shams University

Dr. Ahmad Khairy Makled
Assist. Professor of Obstetrics and Gynecology
Faculty of Medicine, Ain Shams University

Dr. Haitham Abd El-mohsen Sabaa
Lecturer in Obstetrics and Gynecology
Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University

2014

Acknowledgment

First, great thanks to ***ALLAH*** *Who gave me the power to complete this work. Without his care nothing could be achieved.*

I would like to express sincere gratitude to ***Prof. Dr. Khaled Hassan Swidan,*** *Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University for his wise guidance, kind encouragement and instructive supervision; I have the honor to complete this work under his supervision.*

I am deeply thankful to ***Dr. Ahmad Khairy Makled,*** *Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his valuable supervision, guidance, understanding and kind advice throughout this work.*

Also I would like to express sincere gratitude to ***Dr. Haitham Abd El-mohsen Sabaa,*** *Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, every word and every step in this work has been kindly arranged by his effort, care and continuous encouragement.*

Many thanks should be expressed to ***Dr. Mohamed Kamal Etman,*** *fellow of Fetal Care Unit, Faculty of Medicine, Ain Shams University, for his sincere effort. I learned a lot from his humanistic attitude, kind patience and thoughts.*

Finally my truthful affection and love to My Family, who were and will always be, by my side all my life.

Amr Ahmad Abo Alyazid

Contents

List of Abbreviations

Abbrev.	Full term
ACOG	: American College of Obstetrics and Gynaecology
A-V	: Arterio-venous
BMI	: Body Mass Index
CI	: Confidence Interval
CPD	: Cephalopelvic disproportion
CS	: Cesarean Section
CTG	: Cardio Tocography
ECS	: Elective Cesarean Section
ERCD	: Elective Repeat Cesarean Delivery
FHR	: Fetal Heart Rate
HAART	: High active antiretroviral therapy
HIE	: Hypoxic Ischemic Encephalopathy
HIV	: Human Immunodeffeciency Virus
HPV	: Human Papilloma Virus
IOL	: Induction Of Labour
LUS	: Lower Uterine Segment
MRI	: Magnetic Resonance Imaging
MTCT	: Mother To Child Transmission
NIH	: National Institutes of Health
NPV	: Negative Predictive Value
NS	: Non Significant
OR	: Odds Ratio
PCDS	: Previous cesarean scar defects
PGE2	: Prostaglandin E2

List of Abbreviations *(Cont...)*

Abbrev.	Full term
PPV	: Positive Predictive Value
PROM	: Premature Rupture Of Membrane
RCOG	: Royal College of Obstetricians and Gynaecologists
rs	:Spearman rank correlation coefficient values
SCSH	: Saline contrast sono-hysterography
SD	: Standard Deviation
SOGC	: Society of Obstetricians and Gynaecologists of Canada
SPSS	: Statistical Package of Social Science
SS	: Statistically significant
TAS	: Transabdominal Sonography
TOL	: Trial of Labour
TOLAC	: Trial Of Labour After Cesarean section
TTN	: Transient Tackypnea of the Newborn
TVS	: Transvaginal Sonography
TVU	: Transvaginal Ultrasound
UAE	: United Arab Emirates
USA	: United States of America
VBAC	: Vaginal Birth after Cesarean Delivery.
VLBW	: Very Low Birth Weight.
WHO	: World Health Organization.

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ABSTRACT

Background: several studies using various methods have been conducted to evaluate the correlation of lower uterine segment measurement with the risk of uterine rupture or dehiscence with relative success.

Objective: to compare the accuracy of transvaginal ultrasound versus transabdominal ultrasound to assess the lower uterine segment thickness at term.

Patients and methods: our study was conducted on 144 patients admitted for elective C.S. The patients were subjected to complete general, obstetric examination and ultrasound measurement of lower uterine segment by TAS on partially full bladder and by TVS on empty bladder, and measuring actual thickness **intra-operative.**

Results and conclusion: Data from the present study demonstrated the superiority of TVS over TAS for assessment of LUS thickness, it also found that the upper and lower bounds of the 95% limits of agreement are not clinically important, so it may be interpreted that the two methods could be used interchangeably. Ultrasonographic evaluation permits better assessment of the risk of intrapartum complications for patients attempting VBAC, and could allow for safer management of delivery.

Keywords: Transabdominal ultrasound, Transvaginal ultrasound, Lower uterine segment.

Introduction

Vaginal birth after cesarean section (VBAC) is one of the strategies developed to control the rising rate of cesarean sections (CSs). It is a trial of vaginal delivery in selected cases of a previous CS in a well-equipped hospital ***(Bangal et al., 2013)***. Uterine rupture is an uncommon complication of vaginal birth after cesarean (VBAC), the maternal and fetal consequences of which can be serious and potentially life threatening ***(Cheung et al., 2011)***.The outcome of VBAC depends primarily on the strength of the scar, which has been shown to be related to its thickness ***(Marasinghe et al., 2009)***. Sen et al. showed that scar dehiscence is directly related to the sonographically-assessed thickness of the lower uterine segment (LUS) at between 37 and 40 weeks of pregnancy ***(Sen et al., 2004).*** Therefore, assessment of the thickness of the LUS at term has the potential to be used as a tool for predicting scar dehiscence ***(Ofili-Yebovi et al., 2008).***

Thickness of the LUS can be measured by either transabdominal (TAS) or transvaginal (TVS) ultrasound examination in the third trimester ***(Ofili-Yebovi et al., 2008).*** In general, image resolution, identification of layers, and the ease of measurement are better with TVS compared with TAS ***(Blumenfeld et al., 1991)***. The main factors that limit an increased use of TVS for assessment of LUS thickness are discomfort and difficulty in performing the procedure in

women at term. In addition, it requires greater expertiseand has a longer learning curve ***(Blumenfeld et al., 1991).***

In late pregnancy, the LUS appears sonographically as a 2-layered structure comprising the echogenic muscularis and mucosa of the bladder wall, including part of the visceral–parietal peritoneum, and the relatively hypoechoic myometrial layer. The chorioamniotic membrane and the decidualized endometrial layer cannot usually be seen separate from the myometrium ***(Cheung et al., 2011)***.

Several studies have compared preoperative ultrasound measurements with visual assessment of the thickness of the LUS at cesarean delivery ***(Kirkinen, 1990).*** However, none have measured the actual thickness of the LUS during the cesarean procedure. These studies have depended on visual classification of the thickness into various grades. Therefore, it is still unclear how well ultrasound measurements correlate with LUS thickness that has been measured objectively ***(Marasinghe et al., 2009).***

Aim of the Work

To compare the accuracy of transabdominal (TAS) versus transvaginal (TVS) ultrasound to assess the thickness of the lower uterine segment in pregnant women with one previous cesarean section at term and its agreement with the actual thickness during cesarean delivery.

Cesarean Delivery

●***Definition:***

Cesarean delivery is defined as the birth of a fetus through incision in the abdominal wall (laparotomy) and the uterine wall (hysterotomy). This definition does not include removal of the fetus from the abdominal cavity in case of rupture of the uterus or in case of an abdominal pregnancy ***(Cunninghamet al., 2007)***.

Cesarean delivery is the most common obstetric intra-peritoneal operation, and the number of cesarean deliveries is increasing worldwide ***(Malvasi et al., 2009)***.

●***Incidence of the cesarean section:***

The overall cesarean section rate increased drastically between 1997 and 2009 (19.6% to 36.5%) as did the primary cesarean rate (13.4% to 21.7%) and the repeat cesarean rate (6.25% to 14.9%). The rate of cesarean section for private patients was higher and rose more quickly than the rate for hospital service patients ***(Barberet al., 2011).*** Primary and secondary cesarean rates continue to rise as they have in recent years, by 2020 the cesarean delivery rate will be 56.2% ***(Solheim et al., 2011).***

●**Cesarean section rates in the Arab region:**

There is a large variation in the CS rates found across countries, with Egypt having the highest CS rate at 26.2% and

Mauritania had the lowest at 5.3%. Six countries (Egypt, Sudan, Jordan, Lebanon, Bahrain, and Qatar) had CS rates exceeding the WHO threshold of 15%, with the remaining 13 countries having cesarean rates ranging between 5-15%. Syria, Kuwait and Tunisia have CS rates that range between 10% and 15%. UAE, Morocco, Saudi Arabia, West Bank, Libya and Oman have CS rates that range between 7% and 9%. Finally, Algeria, Yemen, Gaza and Mauritania had the lowest rates, 5%-6% ***(Khawaja et al., 2004)*.**

- ***Cesarean section rates in Egypt:***

Regarding Egypt, a significant rise in cesarean deliveries has been occurred for all births from a low of 4.6% in 1992 to 10.3% in 2000. However, hospital-based cesarean deliveries were much higher in 1988 (13.9%), increasing to 22.0% in 2000. Although the cesarean section rate was slightly higher in private hospitals, the rate also increased consistently in public hospitals ***(Khawaja et al., 2004)*.**

- **The risk of planned elective C.S and hence, the advantages of VBAC:**

Women that have planned cesareans had an overall rate of severe morbidity of 27.3 per 1000 deliveries compared to an overall rate of severe morbidity of 9.0 per 1000 planned vaginal deliveries. The planned cesarean group had increased risks of cardiac arrest, wound haematoma, hysterectomy, major puerperal infection, anaesthetic complications, venous thromboembolism, and haemorrhage requiring hysterectomy over those suffered by the planned vaginal delivery group ***(Liu et al., 2007)*.**