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ABBREVIATIONS

CS	Caesarean section
SPHMMC	St. Paul's Hospital millennium medical college
RDDH	Ras Desta Damtew Hospital
ML	Misgav Ladach
PB	Pfannenstiel Based
CD	Caesarean delivery
USPSTF	United States Preventive Service Task Force
NICE	National Institute for Health and Excellence
CCT	Controlled Cord Traction
FAUCS	French Cesarean Section
ESOG	Ethiopian Society of Obstetrician and Gynecologists
HSTP	Health Sector Transformation Plan
BEmONC	Basic Emergency Obstetric and Newborn Care
RCT	Randomized Controlled Trial
LUST	Lower uterine segment transverse
CME	Continuing medical education
ACOG	American college of Obstetricians and Gynecologists
PGA	Poly-glycolic acid

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SUMMARY

Background

Caesarean section is one of the most commonly performed procedures in the world. Even though there is some standard recommendation, there is a wide variation in the surgical techniques among surgeons in different countries and even in the same countries. The aim of the study was to describe the surgical techniques of caesarean section among Obstetricians and Gynecologists practicing in Ethiopia.

Methods

A cross sectional study design was employed among participants who were registered Obstetricians and Gynecologists practicing in Ethiopia willing to fill out the form through Google Form and printed questionnaire. Participants were approached through their addresses at Ethiopian Society of Obstetricians and Gynecologists. The collected data on antibiotics, pre-operative surgical preparation and surgical techniques related variables from excel spreadsheet of the Google Form and the questionnaire transferred to IBM SPSS Statistics 22 for analysis. Frequencies, percentage and chi-square and corresponding p-values were calculated. The descriptive data was then presented in the form of frequency tables, bar graphs and pie chart.

Results

There were a total of 258 participants among this 251(97.3%) responded and 6(2.7%) did not respond. The commonly used antiseptic for skin preparation was alcohol plus iodine (94%). Pfannestiel abdominal incision was the common during elective cesarean delivery. Controlled cord traction for placenta delivery (92.2%), mopping the uterine cavity (90%), double layer closure of the uterine incision (98.4%) and subcuticular closure of the skin wound (96.4%) was most commonly practiced. Large difference in practice was seen between blunt versus sharp fascia extension (43.3 versus 55.8%), cephalo-caudad versus. lateral uterine incision extension (58 versus 39%), closure and non-closure of the pelvic and parietal peritoneum (57.4 versus 42.6 and 39.8 versus 60.2%).

Conclusions

There was a major difference in pre-operative and surgical techniques among the Obstetricians practicing in Ethiopia.

Recommendation

It will be good for us to have standardized protocol at least at the institution level and at large at the country level by Ethiopian Society of Obstetricians and Gynecologists through Continuing Medical Education, training, guidelines or protocols by considering the evidence based recommendation to have a consistent practice for the most commonly practiced operation in the world. For some of the techniques which lack strong evidence for recommendation require future studies to evaluate the surgical techniques on substantive short term and long term outcomes.

INTRODUCTION

Caesarean section (C-section) is one of the most commonly undertaken procedures in the world. It is the surgical technique in which opening are made through a women's abdomen and uterus to deliver her baby (1). Its rate is progressively increasing from time to time dramatically and becoming one of the most valuable procedures to save the life of the mother and the foetus. The rise in CD rates has prompted increased interest in the indications, complications, and techniques involved with this procedure (2).

Several studies have been conducted in different parts of the world including randomized controlled trial, systematic review, and meta-analysis on the different aspects of caesarean section techniques on short term and long term outcomes, some aspects of the techniques are highly recommended by most studies whereas the others aspects of the techniques come up with different results. In the recent times beyond 2013G.C more studies were than previously done and some of the results strengthen the previous recommendation and other results with new recommendation. Some research regarding the variation in the technique among Obstetricians and Gynaecologists have been done in some part of the world like the United Kingdom (UK) (3) and Nigeria came up with variation in the technique practiced (4).

Even-though there are strong recommendations with high level of certainty for some aspect of the caesarean sections by the American College of Obstetricians and Gynaecologists (ACOG) (5) and by the National Institute of Health and Excellence (NICE) (6) there are variations in the caesarean section techniques practiced across the country and even within the same country. In Ethiopia was study done till now whether or not the Obstetricians and Gynaecologists practicing in Ethiopia has variation in the caesarean section technique.

The aim of this study was to describe the caesarean section technique used by the Obstetricians and Gynaecologists practicing in Ethiopia. The objective of the study was to describe specific caesarean section technique and to determine the commonly used techniques among the Obstetricians and Gynaecologists practicing in Ethiopia.

LITERATURE REVIEW

A systematic review on evidence based surgery for caesarean delivery by ACOG on October 2013 include 73 RCT, 10 meta-analysis/systematic review and 12 Cochrane reviews involving any aspect of cesarean technique identified from Jan. 1, 2005, to sep.1,2012 were evaluated. Recommendations with high levels of certainty as defined by the US Preventive Services Task Force favour pre-skin incision prophylactic antibiotics, cephalad-caudad blunt uterine extension, spontaneous placental removal, surgeon preference on uterine exteriorization, single-layer uterine closure when future fertility is undesired, and suture closure of the subcutaneous tissue when thickness is 2 cm or greater and do not favour manual cervical dilation, subcutaneous drains, or supplemental oxygen for the reduction of morbidity from infection (7). The technical aspect of CD with high-quality, evidence-based recommendations should be adopted. In the ACOG commentary on 2020 in addition to the 2013 systematic review, an additional 273 similar studies were done to strengthen those of the recommendation and offered evidences to recommend additional caesarean delivery techniques. Even-though it is difficult to synthesize the large amount of caesarean section, it is like seeing the forest to see the tree problems, with this difficulty the ACOG propose a comprehensive; evidence based and standardized approach to caesarean delivery technique (5).

Meta-analysis of several randomized controlled trials comparing the ML technique, PB technique and lower midline techniques by two Cochrane reviews showed that ML technique is associated with shorter operating time, shorter time from skin incision to birth of baby, less blood loss, fewer analgesic injections, shorter time to oral intake postoperatively, and less fever (8).

The French AmbUlatory Cesarean Section (FAUCS) technique includes a paramedian vertical opening of the aponeurosis, left paravesical extraperitoneal approach of the uterus, Of the 3441 procedures performed by 6 physicians between 1997 and 2017, 544 cases (16.28%) could be discharged within 24 hours. The FAUCS procedure may issue in a significant diminution of morbidity, with a mean hospital stay duration of 3.1 days while the mean estimation of ability to be discharged was 1.3 days. A purse string suture of the uterine wall and a glue skin closure (9).

In a prospective, randomized, controlled study, 200 pregnant women with indication for caesarean section delivery were randomized as 100 patients each in the exteriorization group and

in the in-situ group. A statistically significant trend towards lesser mean time taken for the uterine wound repair was observed in the exteriorization group. However significantly more number of patients had increased post-operative pain and need for additional analgesia in exteriorization group. There was no significant difference with respect to intra-operative blood loss and incidence of nausea and vomiting; incidence of post-operative endomyometritis, febrile morbidity, wound infection, time taken for return of bowel function and length of hospital stay among the groups (10).

The CORONIS trial is a registered current controlled trial which is a fractional, factorial, unmasked, randomized controlled trial done in 19 sites in Argentina, Chile, Ghana, India, Kenya, and Pakistan and Sudan between May 20, 2007, and Dec 31, 2010, 15935 women were recruited. The aim of the study is to assess whether any surgical techniques were associated with improved outcomes for women and babies. The trial examined five elements of the CSs include blunt versus sharp abdominal entry; exteriorization of the uterus for repair versus intra-abdominal repair; single-layer versus double layer closure of the uterus; closure versus non closure of the peritoneum (pelvic and parietal) and chromic cutgut versus polyglactin-910 for uterine repair. There were no statistically significant differences within any of the intervention pairs for the primary outcomes (composite of death, maternal infectious morbidity, further operative procedures or blood transfusion (>1 unit) up to 6 weeks of follow-up). The finding suggests that any of the technique is acceptable. However, longer-term follow-up is needed to assess whether the absence of evidence of short-term effects will translate into an absence of long-term effects (11).

The CAESAR study collaborative group undergoes a pragmatic randomized factorial controlled trial to evaluate whether alternative surgical technique affects the risk of adverse outcomes: single versus double layer closure of the uterine incision; closure versus non closure of the pelvic peritoneum; liberal versus restricted use of a sub-rectus sheath drain? The main outcome measures were maternal infectious morbidity. A total of 3033 women recruited. Overall, the risk of maternal infectious morbidity was 17%. For each pair of the interventions, there were no differences between the arms of the trial for the primary outcomes: single versus double layer closure of the uterine incision [relative risk (RR) = 1.00, 95 confidence interval (95%CI) = 0.85 - 1.18]; closure versus non-closure of the pelvic peritoneum (RR = 0.92, 95% CI = 0.78-1.08);

liberal versus restricted use of a sub-rectus sheath drain (RR =0.92, 95%CI =0.78-1.09). There were no differences in any of the secondary morbidity outcomes and no significant adverse effects of any of the techniques used (12).

In a study done in Singapore tertiary hospital regarding caesarean section techniques and postoperative thromboprophylaxis, 490 CSs performed between 1 August 2013 and 30 June 2014 was collected and reviewed. The technique reviewed were closure of the pelvic and parietal peritoneum, closure of the uterine layer, use of surgical drains and use of postoperative thromboprophylaxis. Most of the fetal head deliveries were manual. The majority of surgeons did not close the peritoneum; most of those who did were senior surgeons. Double layer uterine closures were done for all cases and drain usage was rare. 2% of the patients received grossly inadequate thromboprophylaxis (13).

To determine what surgical techniques are used by obstetricians in the UK for elective and emergency caesarean section operations. A postal questionnaire to all members and fellows of the Royal College of Obstetricians and Gynaecologists (RCOG) resident in the UK, requesting information about the use of surgical techniques and antibiotic and anticoagulant prophylaxis for elective and emergency caesarean sections. The response rate was 78.7%. A range of techniques was used for all procedures in caesarean section operations. Only a few techniques were used by more than 80% of obstetricians, including double layer closure of the uterus, use of prophylactic antibiotics and Pfannenstiel abdominal entry (for elective caesarean sections). There were few large differences in practice between elective and emergency caesarean sections. In emergency operations, more obstetricians use the Joel-Cohen method of abdominal entry (32.7 versus 16%) and more usually use prophylactic antibiotics and heparin (93.2 versus 85.4% and 45.8 versus 32.9%, respectively). There was wide variation in the surgical techniques used by obstetricians for caesarean section operations. There is an urgent need for future research to evaluate many aspects of caesarean section operations on substantive short- and long-term outcomes (3).

The “Stark (Misgav Ladach) method” is recommended to become a standard procedure across China and this is following a 3-year study process, a modified, evidence-based method has been developed, which is now in use in many countries. The abdomen incision is based on the Joel-Cohen incision, the peritoneum is opened by repeated stretching, and the uterus is opened transversely after pushing the bladder down. After delivery the uterus is sutured with one layer

using a large needle, and the abdomen is closed with only two layers, fascia and skin. This method was subject to scores of studies, with all upholding its superiority over traditional methods(14).

According to the publication in European Journal of Obstetrics & Gynecology and Reproductive Biology by Ahmed Samy El-agwany on 17 June 2019 in the title of Considerations and variations in cesarean delivery techniques: A surgeon's view the recommendations are closure of both layers of the peritoneum and the subcutaneous tissue in cesarean section, Suture approximation of muscles, regarding exteriorization vs interiorization depends mainly on the associated factors during cesarean section and interiorization is mainly doctor preference and a double layer uterine closure is proposed (15).

Randomised controlled open label study of 323 women undergoing primary caesarean section in Lagos Nigeria. The women were randomized to either ML method or Pfannenstiel based (PB) caesarean section technique using computer generated random numbers. The mean duration of surgery ($P < 0.001$), time to first bowel motion ($P = 0.01$) and ambulation ($P < 0.001$) were significantly shorter in the ML group compared to PB group. Postoperative anemia ($P < 0.01$), analgesic needs ($P = 0.02$), extra suture use, estimated blood loss ($P < 0.01$) and post-operative complications ($P = 0.001$) were significantly lower in the ML group compared to PB group. Though the mean hospital stay was shorter (5.8 days) in the ML group as against 6.0 days, the difference was not significant statistically ($P = 0.17$). Of the fetal outcome measures compared, it was only in the fetal extraction time that there was significant difference between the two groups ($P = 0.001$). The mean fetal extraction time was 162 sec in ML group compared to 273 sec in the PB group (16).

In a review of practice of cesarean section in Nigeria, the most commonly used abdominal incision is vertical midline and suprapubic transverse (Pfannenstiel), the traditional double layer closure of the uterus is advised, the polyglycolic acid suture material are being increasingly used due to superiority over cut-gut sutures but the problem is cost and availability and interrupted mattress sutures on the skin is highly recommended in our environment as it is associated with good wound apposition, less infection and early discharge from the hospital (4).

- In the NICE (National Institute for Health and Excellence) clinical guidelines produced by the National Collaborating Centre for Women's and Children's Health (NCC-WCH) on behalf of the National Institute of Health and Care Excellence (NICE). The guideline provides evidence-based information for healthcare professionals and women about: the risks and benefits of planned CS compared with planned vaginal birth, specific indications for CS, effective management strategies to avoid CS, anesthetic and surgical aspects of care, interventions to reduce morbidity from CS and organizational and environmental factors that affect CS rates (6).
- In the recently updated NICE guidelines the recommendation regarding the cesarean delivery technique and other components puts after consideration of the available evidence. They obliged the recommendation to be implemented fully taking in to account the individual needs, patient preferences values of their patients or peoples using this service. The guidelines did not override the responsibility to make decision depending on the circumstances. There was some updated information on technical part of cesarean section(17).

OBJECTIVES

GENERAL OBJECTIVES

- The general objective of the study was to describe the techniques of caesarean section among Obstetricians and Gynecologists practicing in Ethiopia.

SPECIFIC OBJECTIVES

- To describe the specific caesarean section technique practiced among the Obstetrician and Gynecologists in Ethiopia.
- To determine the commonly practiced technique among the Obstetrician and Gynecologists in Ethiopia.

METHODS AND MATERIALS

STUDY AREA AND PERIOD (STUDY SETTING)

The study was conducted in Ethiopia. There are 144 hospitals found in Ethiopia and majority of them were located in the major cities and towns. Among the hospitals majority of them were governmental (62.5%) and the rest (37.5%) were run by private investors and NGOs. According to EmONC in 2016 the caesarean delivery rate was 4% (21). Currently there are 13 teaching institution giving residency programs and 557 Obstetrician and Gynecologists registered at ESOG. The study was conducted from May 2020 to August 2021.

STUDY DESIGN

Cross-Sectional study design.

DATA COLLECTION

Data was collected using an online Google Form web-based questionnaire and printed version as alternative which comprises all the necessary information including socio-demographic data, pre-operative and surgical site preparation, techniques of abdominal entry, intra-operative and post-operative.

STUDY POPULATION

The study population was the Obstetricians and Gynecologists practicing in Ethiopia.

STUDY PARTICIPANTS

Obstetricians and Gynecologists currently practicing in Ethiopia and willing to provide information about their practice of cesarean section.

INCLUSION AND EXCLUSION CRITERIA

INCLUSION CRITERIA

- ✓ Those Obstetrician and Gynecologists currently practicing in Ethiopian and who had registered and had address in ESOG and willing to participate in the study.

EXCLUSION CRITERIA

- ✓ Obstetricians and Gynecologists currently practicing in Ethiopia but not registered.

SAMPLE SIZE AND SAMPLING TECHNIQUE /SAMPLING PROCEDURES

All Ethiopian Obstetrician and Gynecologists who were practicing in Ethiopia was included in the assessment. Hence, sample.

DATA COLLECTION PROCEDURES

The data was collected by structured survey questionnaire using online Google Form and distributed via email to all ESOG member Obstetrician and Gynecologists and printed option as alternative to collect in person.

DATA QUALITY MANAGEMENT

To assure the quality of the data, properly designed data collection instrument was used. Everyday all of the collected data was reviewed and checked for completeness and relevance by the supervisors and principal investigator. We collected the required data from obstetricians and Gynecologists throughout the country by continuous contact through e-mail and ESOG Telegram page or in person to make the data more representative. Participants were made to give a true answer through explaining the purpose and importance of the study and assuring the confidentiality of the data they were going to provide.

STUDY VARIABLE

Independent variable: - age, sex, address, place of post graduate study, year of experience, professional qualification and institution practicing.

Dependent variables: - antiseptic use, vaginal canal preparation, prophylactic antibiotic, thrombophylaxis, skin incision type, subcutaneous incision type, fascia incision type, peritoneum opening, bladder flap creation, uterine incision, placenta removal, uterine wound closure, peritoneal closure, subcutaneous approximation, skin closure.

DATA ANALYSIS PROCEDURES

The returned survey forms was checked for completeness and consistency by the principal investigator. The data on excel spreadsheet of the Goggle form and filled questionnaire transferred to IBM SPSS Statistics 22 for analysis. Frequencies, percentage and chi-square and corresponding p-values were calculated. The data was then presented in the form of frequency tables, bar graphs and pie chart.

OPERATIONAL DEFINITION

Senior Obstetricians: were those working more than 5 years.

ETHICAL CONSIDERATION

Ethical clearance was secured from the ethical committee of SPHMMC medical faculty research and publication committee before the study was launched. All concerned bodies were officially contacted through letters and permission was obtained at all level. Confidentiality of the responses was assured to the respondents by anonymity of the self- administered questionnaire, by keeping the privacy of the respondent while filling the questionnaire.

RESULT

General characteristics of the respondents

From 258 obstetrician and gynecologists who were willing to participate 251 completed the survey questionnaire while 7 of them returned incomplete form. With regard to sex distribution 88% were male. The mean age group and year of experience of the participants were 36.74yrs and 5.5yrs. Majority of participants were general Obstetricians and Gynecologists (96%) and the rest MFM (1.6%), Oncologist and Reproductive Endocrinology and Infertility (1.2% each) and post graduate in Ethiopia (97.2 vs.2.8%). One third of the participants were from Addis Ababa (39%), one fourth from Oromia region (20/3%) and 12.7% from Amhara region and the rest from different regions of the country, SNNPR (9.6%), Harari and Sidama (4.8%). Almost equal numbers of participants were from government teaching and non-teaching hospital (38.6 vs.35.5%) and the rest 25.9% were from private hospital/MCH center. Almost two-third of the participants was in the experience group of 1-5yrs (70.1%), between 6-10yrs, 11-15yrs and 16-20yrs were 16.3%, 6.4% and 6.0% respectively.

Practice of cesarean section

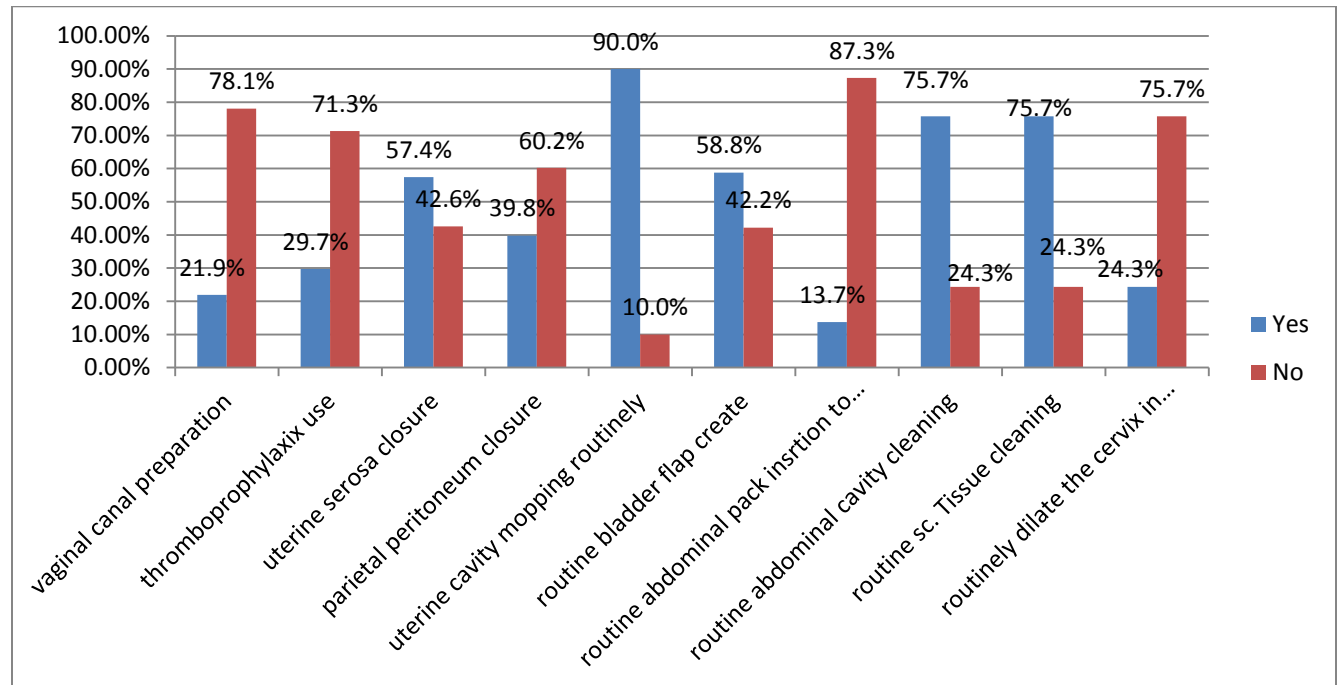


Figure 1: Proportion of practice of cesarean section among Obstetricians practicing in Ethiopia

Surgical site preparation and pre-op technique among Obstetrician and Gynecologists practicing in Ethiopia

The most commonly used antiseptics for the preparation of skin is alcohol plus iodine (94%) followed by povidone iodine only (3.2%) and iodine plus savlone (2.4%). Among those who prepare the vaginal canal n= 55, 61.8% prepared both during emergency and elective CD, 32.7% only during emergency CD and the rest 5.5% during elective CD. Nearly all Obstetricians use prophylactic antibiotics (96.4%) routinely for both emergency and elective CD (97.9%) and the commonly used antibiotics were ceftriaxone (47.1%) and ampicillin (51.1%) and regarding the time of administration 78.1% administered 1hr before the procedure, 11.2% at the time of skin incision and the rest 10.7% 30min before and by the time the patient transferred to the OR.

Abdominal entry technique among Obstetrician and Gynecologists practicing in Ethiopia

The most commonly practiced skin incision during elective CD is Pfannestiel (94.8%) followed by Joel-Cohen (4.4%). For skin incision for women with significant obesity or panniculus around 39% used a higher incision above the panniculus, 13.9% used midline incision, 7.2% incised below the panniculus whereas 27.4% did not have any modification. Almost half of Obstetricians did not separate the median raphe of the rectus abdominis muscle routinely (52.8%).

Regarding the choice of midline over Pfannestiel skin incision most of the Obstetricians used Pfannestiel over midline in case of emergency CD (88 versus 12%), severe fetal bradycardia (58.6 versus 41.4%), in active vaginal bleeding (51 versus 49%) but in case of chorioamnionitis most preferred midline over Pfannestiel skin incision (69.7 versus 30.3%).

All of the Obstetricians use surgical blade for skin incision. Only 11.2% wanted to use cautery for skin incision if it's available but the rest (88.8%) did not want to use even if it's available.

Most of the Obstetricians extend the subcutaneous tissue bluntly with fingers (58.2%) followed by the use of surgical blade and scissors (20.7 and 18.7%). Sharp extension of the fascia more practiced than blunt extension (55.8 versus 43.8%). Commonly used technique to open the peritoneum is by using index fingers bluntly (74.9%) followed by with scissors and by repeated stretching (20.3 and 3.6%).

Intra-operative techniques among Obstetrician and Gynecologists practicing in Ethiopia

Among those who did not create bladder flap routinely n=106, 41.4% created during repeat CD, more than two-third created when there was adhesion (76.6%) and more than half during the second stage of labor (62.2%). Among those who did not dilate the cervix routinely n=190, 42.3% did not dilate the cervix at any circumstance but 18.7% dilate when the cervix was closed, 3.3% dilate when they suspected uterine atony and the rest for other reasons. The most commonly practiced uterine incision extension was cephalo-caudad both using left index finger and thumb for right hand individual (11.6%) and with index finger of both hands (46.6%)

followed by extension laterally with left index and right thumb fingers for right hand individuals (9.2%) and with index fingers of both hands (29.9%).

Table 1: Intra-operative techniques among Obstetrician and Gynecologists practicing in Ethiopia

Items	Responses	Number	Percentage
Uterine incision in anterior placenta previa	LUST	201	80.1
	Low vertical	27	10.8
	Classical	23	8.8
Placenta delivery	Continuous cord traction	233	92.8
	manually	18	7.2
Uterine incision in anterior transverse lie	LUST	125	49.8
	Low vertical	95	37.8
	Classical	31	11.2
Uterine incision closure	Double layer	247	98.4
	Single layer	4	1.6
What technique of closure do you prefer for uterine wound?	Running locking	28	11.2
	Running non-locking	222	88.4
	Interrupted	1	0.4

Abdominal wall closure among Obstetrician and Gynecologists practicing in Ethiopia

Among those who did not close the peritoneum n=151 more than one third (44.4%) did not close in any circumstance but the rest 15.5% closed if the bowel interferes during fascia closure, 13.9% closed if there is bleeding from the serosa edge, 2.6% in DIC patients and the rest 15.2% for different reasons. Majority of the Obstetricians 66.9% did not suture the rectus sheath muscle whereas 33.1% sutured the rectus sheath. Most did not approximate the subcutaneous tissue routinely (65.7%) and from those who did not approximate routinely 94.5% were approximate only when the subcutaneous tissue thickness is greater than 2cm and 3% when there were a failure of securing hemostasis. The most commonly used skin wound closure technique is subcuticular (96.4%) with running non-locking suture (88.4%), running locking (11.2%) and followed by interrupted suture technique (2.8%).

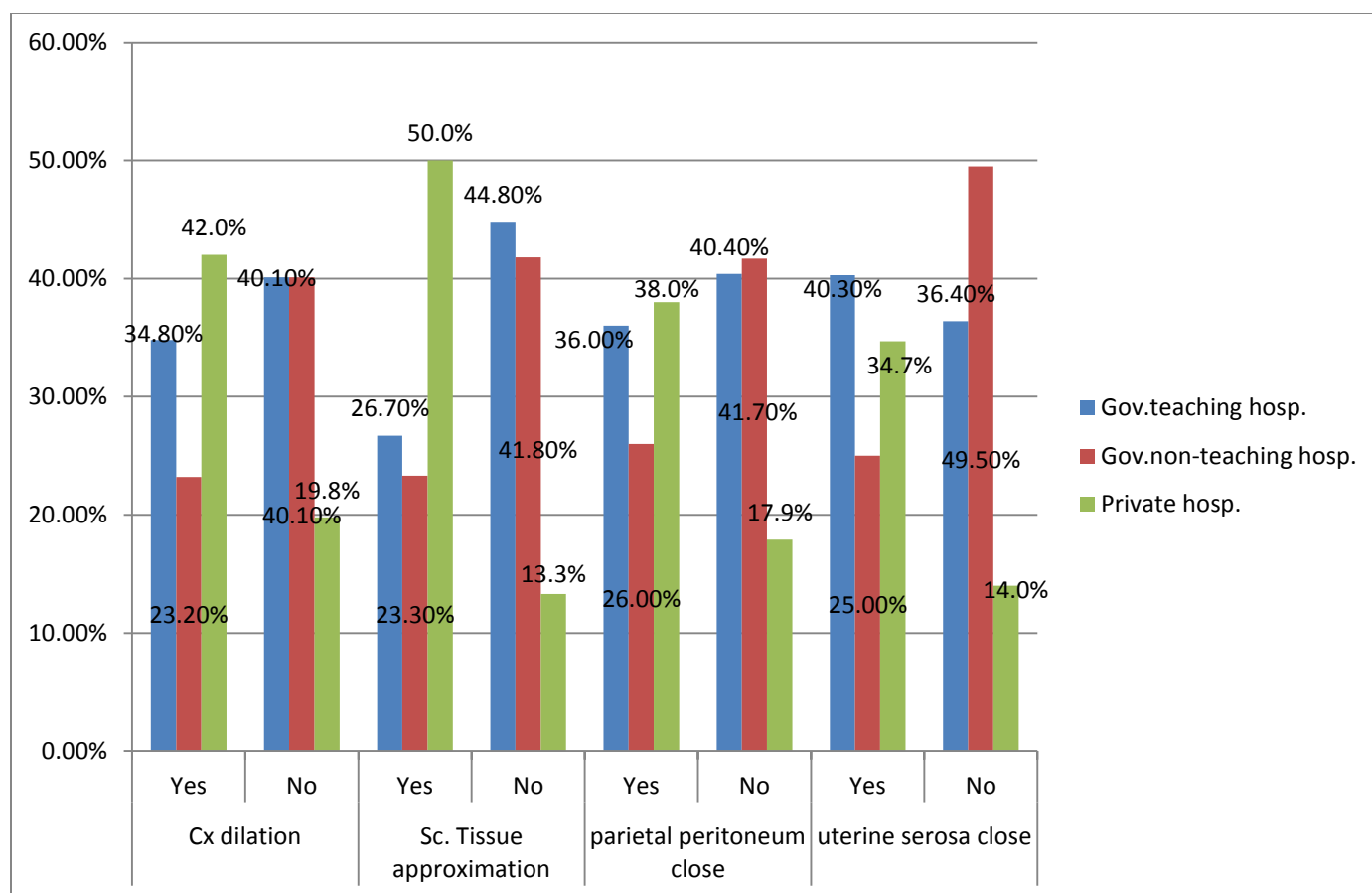


Figure 2: Techniques of cesarean section according to the institution

Table 2: Proportion of obstetricians using different surgical techniques bases on the institution they are working.

Questions	Institution practiced				p-value
		Gov.teaching hosp.	Gov.non teaching	Private	
Do you prepare vaginal canal before CD?	Yes	32.7%	32.7%	34.5%	0.244
	No	40.3%	36.2%	23.5%	
Do you practice thromboprophylaxis for CDs?	Yes	51.4%	25.0%	23.6%	0.023
	No	33.5%	39.7%	26.8%	
How do you prefer to extend fascial incisions	Blunt	36.4%	36.4%	27.3%	0.685
	Sharp	40.0%	35.0%	25.0%	
Do you routinely create bladder flap?	Yes	36.4%	32.9%	30.7%	0.142
	No	41.4%	38.7%	19.8%	

Do you routinely mop the uterine cavity?	Yes	39.4%	34.5%	26.1%	0.629
	No	32.0%	44.0%	24.0%	
	No	40.1%	40.1%	19.8%	
	No	44.8%	41.8%	13.3%	
Do you routinely clean subcutaneous space with saline?	Yes	37.8%	34.2%	28.1%	0.331
	No	41.8%	40.0%	18.2%	

Table 3: Proportion of obstetricians using different surgical techniques based on the level of the experience

Items		Experience level		p-value
		1-5yr	6-40yr	
Do you prepare vaginal canal before CD?	yes	21	79	0.193
	no	24	76	
Do you routinely create bladder flap?	yes	47.2	52.8	0.000
	no	76	24	
Do you routinely mop the uterine cavity?	yes	91.5	8.5	0.156
	no	86.7	13.3	
Do you dilate the cervix routinely in elective CD?	yes	15.9	81.4	0.000
	no	54.7	43.3	
Do you close uterine serosa?	yes	48.3	51.7	0.000
	no	78.7	21.3	
Do you close parietal peritoneum routinely?	yes	33	67	0.015
	no	56	44	
Do you practice thromboprophylaxis for CDs?	yes	24.4	75.6	0.017
	no	38.7	61.3	

Type of stitch used for uterine incision and skin wound closure among Obstetricians practicing in Ethiopia

The most commonly used stitch for closure of the uterine serosa is cut gut #0(36.8%) followed by Polyglycolic acid #0 (11.8%), for parietal peritoneum closure is cut gut #0(55%) followed by cut gut #1 (12%) and for subcutaneous tissue approximation is cut gut #0 (55%) followed by Polyglycolic acid #1 (12%). The commonly used stitch for uterine incision closure were PGA #1

(44.2%) followed by cut gut #2 (15.1%), PGA #2 (14.7%), cut-gut#0 (13.9%), cut-gut #1 (8.8%) and cut-gut # 0 (3.2%) and for skin closure PGA #3 (64.3%) followed by PGA #2 (26.7%).

DISCUSSION

There was variation in the surgical techniques and pre-operative preparation among the Obstetricians practicing in Ethiopia. For some aspects of the operation, virtually all obstetricians used the same technique, but for others substantial variation in practice exists.

The significant variation in practice among the Obstetricians were seen in the type of antibiotics given, use of thromboprophylaxis, in the preference between midline and Pfannestiel skin incision in case of severe fetal bradycardia, when there was active vaginal bleeding or in chorioaminonitis, in the way how the subcutaneous tissue is extended, the preference of uterine incision in case of anterior transverse lie, in the routine bladder flap creation during elective CD, the way how the uterine incision is extended, in the routine dilation of the cervix during elective CD, in closure of the uterine and parietal serosa and routine approximation of the subcutaneous tissue. In contrast to the variation in some aspect of the technique wide similarities like the type of pre-operative antiseptic used for skin reparation, in the routine of prophylactic antibiotics, the Pfannestiel method of skin incision, use of surgical blade for skin incision, controlled cord traction for placental delivery, the double layer closure of the uterine incision, in the routine mopping of the uterine cavity and subcuticular closure of the skin wound was seen among Obstetricians practicing in Ethiopia.

As the level of experience was increasing some of the techniques were more likely practiced like routine create bladder flap ($p= 0.000$), routine dilation of the cervix during elective CD ($P= 0.000$), closure of the uterine serosa and parietal peritoneum ($p= 0.000$ and 0.015) and use thromboprophylaxis ($p= 0.017$) in contrast no significant difference was seen in preparing vaginal canal before CD and mopping the uterine cavity ($p= 0.193$ and 0.156). Similarly with the institution they were practicing significant difference were seen in some techniques like the use of thromboprophylaxis and closure of the uterine serosa was more practiced in government teaching hospitals ($p=0.023$ and 0.000), whereas dilating the cervix routinely during elective CD

($p=0.000$), the routine approximation of the subcutaneous tissue ($p=0.000$) and closure of the parietal peritoneum ($p=0.000$) were more practiced in private hospitals.

In this study more than two-third of the participants gave prophylactic antibiotics 1hr before the procedure, more than one third did not extend the subcutaneous tissue and the fascia bluntly, more than one third extended the uterine incision laterally, nearly all of the Obstetricians mop the uterine cavity routinely, around one third routinely dilated the cervix in elective CD, more than half and more than one third routinely closed uterine and parietal serosa, one third routinely sutured and approximate the rectus muscle and the subcutaneous tissue, but the recommendations for some cesarean sections with benefits with high certainty and high level of evidence to adapt in to the clinical practice by the NICE guideline (17) and ACOG (5) were a routine use of prophylactic antibiotics either ampicillin or first generation cephalosporin prior to skin incision, a transverse skin incision 2-3cm above the pubic symphysis, sharp subcutaneous and fascia dissection then blunt subcutaneous and fascia extension and blunt peritoneal entry, avoid routine cervical dilatation, blunt cephalo-caudad extension of the uterine incision, spontaneous removal of the placenta, avoid routine intra-abdominal irrigation, omit closure of pelvic and parietal peritoneum, omit rectus muscle approximation and subcutaneous tissue closure only if the thickness is greater than 2cm, Some of the possible explanation for this difference can be the difference in training, lack of clearly accepted procedures at present which clinicians may feel obliged to conform and to teach students in the institution, difficulties in unlearning long used surgical techniques, physician preference and judgment and experience as well.

In this study techniques used by more than 80% of the Obstetricians include alcohol plus iodine for skin preparation, use of prophylactic antibiotics, and the Pfannestiel skin incision during both elective and emergency CD, routine mopping of the uterine cavity, a running non locking and double layer closure of the uterine incision, subcuticular closure of the skin wound the commonly used stitch for closure of the uterine incision, uterine and parietal serosa, subcutaneous tissue and skin were poly-glycolic#1, Cut-gut#0, Cut-gut#0 and poly-glycolic acid #3 respectively. Similar type of study was done in UK and a range of techniques was used for all procedures in caesarean section operations. Only a few techniques were used by more than 80% of obstetricians, including double layer closure of the uterus, use of prophylactic antibiotics and

Pfannenstiel abdominal entry (for elective caesarean sections). There were few large differences in practice between elective and emergency caesarean sections. In emergency operations, more obstetricians use the Joel-Cohen method of abdominal entry and more usually use prophylactic antibiotics and heparin(3). Another study which was done in Nigeria, Lagos the most commonly used technique was vertical midline and Pfannestiel abdominal incision, double layer closure of the uterus, interrupted mattress suture of the skin incision and the use of poly-glycolic acid suture material (4).In a study done at Singapore tertiary hospital regarding cesarean section and postoperative thromboprophylaxis most of the surgeons didn't close the peritoneum and close the uterine incision in double layer and only 2% grossly received inadequate thromboprophylaxis (13).

In the CORONIS trial (11)and the CAESAR study group (12)were studied some specific aspects of the technique for the primary outcomes and they didn't come up with difference, so they suggested any of the technique is acceptable.

According to the publication in European Journal of Obstetrics & Gynecology and Reproductive Biology by Ahmed Samy El-agwany on 17 June 2019 in the title of Considerations and variations in cesarean delivery techniques:(15) most of the techniques which didn't show any benefit in the other study were recommended.

The major limitation in the study was survey of practice in general may be difficult to interpret because respondents may provide answers which are not a true reflection of their practice. However in this survey we considered clinicians a reliable source of information about their own approach to caesarean section operations since this is something which is individual to them and since currently lack of clearly accepted procedures on which to rely. The other limitations were lack of clearly accepted procedures at present which clinicians may feel obliged to conform to, representativeness of the collected sample to made generalization at the country level because majority of the sample was collected from three regions and the lack of analytical measures if there was any associated factors. Regarding the prophylactic antibiotic use the data might not reflect the actual practice because most of the time antibiotics were given by other health personnel. The strength of the study was since there was no any research done previously it will be an eye opener for future researchers and can be used as a baseline date for future studies.

Currently efforts were made to standardize the surgical techniques especially those with high level of recommendation by the ACOG at the surgeon level and at the institution level. This is important because an evidence-based, standardized approach would benefit institutions by improving safety and efficiency, benefit resident training by providing consistency and improved teaching, and strengthen future trials of cesarean delivery technique. Even-tough surgeon preference is one factor but in the presence of high quality evidence for recommendation accounting for each individual surgeon's preference is both unnecessary and outdated (5). So it will be good for us to have standardized protocol at least at the institution level and at large at the country level by ESOG through Continuing Medical Educations (CMEs) training, guidelines, protocols or establishing expert consensus by considering the evidence based recommendation to have a consistent practice for the most commonly practiced operation in the world. Since there was a significant difference in some of the techniques used by the Obstetricians despite the of strong recommendation by high level evidence it will be good to stick to the recommended practice, but for some of the techniques without adequate evidence for practice requires future studies to evaluate the surgical techniques on substantive short term and long term outcomes.

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research proposal and for provision of required progress reports as Per-terms and conditions of the St Paul's Hospital and Millennium Medical College in effect at the time of grant is forwarded as the result of this application.

Name of the student: _____

Date. _____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor: _____

Date. _____ Signature _____

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ANNEXE I

Questionnaire: Cesarean delivery techniques among Obstetricians and Gynecologists in Ethiopia:
Review of practice

Code

Date

Section I. Socio-demographic data

1:- Socio-demographic data

SN	Questions	Response options	Code	Skip
101	Sex	Male Female		
102	Age	_____yrs		
103	Address	1. Addis Abeba 2. Oromia region 3. Amhara region 4. Tigray region 5. Somalia region 6. Afar region 7. Benishangul - Gumuz region 8. Sidama region 9. Dire Dawa 10. Harari region 11. Southern Nations,Nationalities, and Peoples' region 12. Gambella region		

104	Professional qualification	1. General Obstetrician Gynecologist 2. MFM 3. Oncologist 4. Reproductive Endocrinology and Infertility 5. Female Pelvic Medicine and Reconstructive Surgery		
105	Institution (hospital) You are practicing?	Government teaching hospital Government non-teaching hospital Private hospital/MCH center NGOs		
106	Years of experience	_____		
107	Where do your post-graduate study?	Ethiopia Abroad		

2:- pre-op and surgical site preparation + abdominal entry

SN	Questions	Response options	Code	Skip
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201	What antiseptic (s) do you use for surgical preparation of skin?	Alcohol + Iodine Iodine + savlone Iodine + Normal saline Savlon + Normal Saline Povisone Iodine only Other specify-----		
202	Do you prepare vaginal canal before CD?	Yes No		If yes Next question if no Q 204
203	If “yes” in which type of CD do you?	1. Emergency 2. Elective 3. Both		
204	Do you order prophylactic antibiotics for CDs?	Yes No		If yes next Q If NO Q 208
205	If “yes” in what situation?	Routinely for all For emergency CD		
206	What prophylactic antibiotics do you use?	Ceftriaxone Ampicilline Cefazoline Other _____		
207.	At what time do you give the prophylactic antibiotics?	1hr before the procedure At the time of uterine incision Before clamping the cord Other _____		

208	Do you practice thromboprophylaxis for CDs?	Yes No			If Yes next Q If No Q210
209	Skin Incision you prefer during elective C/S	Pfannestiel Joel-Cohen Midline			
210	What kind of modification do you make in women with morbid obesity and significant panniculus?	Specify _____			
211	When do you prefer midline over pfannenstiel? multiple responses possible	Responses	YES	NO	
		In emergency CD			
		In severe fetal bradycardia			
		In active vaginal bleeding			
		In chorioamnionitis			
212	What do you prefer to make skin incision	Surgical blade Cautery			
213	Do you routinely use cautery for hemostasis (if it is available)	Yes No			
214	How do you prefer to incise the sub-cutaneous tissue?	With scissor With surgical blade Other specify-----			
215	How do you prefer to extend fascial incisions	Blunt Sharp Other specify-----			

216	Do you separate the median raphe of the rectus abdominis routinely?	Yes No		
217	If 'Yes' how do you do it?	Bluntly Sharp dissection		
218	How do you open the peritoneum?	With index finger bluntly With scissors With repeated stretching Other specify -----		

Part III Intraoperative

301	Do you routinely insert abdominal packs to paracolic gutters?	Yes No				
302	Do you routinely create bladder flap?	Yes No				If yes go to Q 304 If no next Q
303	If not routinely when do you do it?	Responses	yes	No		
		In repeat CD				
		When there is adhesion				
		In second stage C/S				

		Other -----				
304	How do you extend uterine incision?	With left index and right thumb finer cephalad to caudad (for right hand) With index finger of both hands cephalad to caudad With left index and right thumb finger laterally With index finger of both hands laterally Other specify -----				
305	What kind of uterine incision do you prefer in anterior PP	LUST Low vertical Classical Other specify -----				
306	What kind of uterine incision do you prefer in anterior transverse lie?	LUST Low vertical Classical Other specify -----				
307	How do you deliver the placenta (If normal circumstances)?	Spontaneously Manually Other specify -----				
308	Do you routinely mop the uterine cavity?	Yes No				
309	Do you dilate the cervix routinely in elective CD?	1. Yes 2. No				

310	If not in what condition do you do it?	Specify -----		
311	What type of stitch (with the USP #) do you prefer for Ux incision closure	Cutgut # 0 Cutgut # 1 Cutgut # 2 Polyglycolic acid 960 #0 Polyglycolic acid 960 #1 Polyglycolic acid 960 #2 Polyglycolic acid 960 #2.0 Polyglycolic acid 960 #3.0 Other specify -----		
312	In how many layers do you close uterine incision	Single Double Other specify -----		
313	What technique of closure do you prefer for uterine wound?	Running locking Running non-locking Interrupted Other specify -----		
314	Do you close uterine serosa?	Yes No		
315	If yes What stitch do you use?	Cutgut # 0 Cutgut # 1 Cutgut # 2 Polyglycolic acid 960 #0 Polyglycolic acid 960 #1 Polyglycolic acid 960 #2 Polyglycolic acid 960 #2.0 Polyglycolic acid 960 #3.0 Other specify -----		

316	Do you routinely clean abdominal cavity?	Yes No		If yes go to 401 If no next Q
317	If no, in what conditions do you do it?	Specify-----		
Part IV abdominal closure				
404	Do you close parietal peritoneum routinely?	Yes No		If yes go to Q406 if no next Q
405	If not in what condition do you do it?	Specify -----		
406	If yes what is the type of stitch you prefer?	Cutgut # 0 Cutgut # 1 Cutgut # 2 Polyglycolic acid 960 #0 Polyglycolic acid 960 #1 Polyglycolic acid 960 #2 Polyglycolic acid 960 #2.0 Polyglycolic acid 960 #3.0 Other specify -----		
407	Do you suture rectus muscle?	Yes No		
408	Do you approximate subcutaneous tissue routinely?	Yes No		If yes go to Q410 If no next
409	If not, in what circumstances do you do	Sc tissue thickness of >2cm Failure of securing hemostasis		

	it?	Others specify -----		
410	If yes what type of suture materials do you prefer?	Cutgut # 0 Cutgut # 1 Cutgut # 2 Polyglycolic acid 960 #0 Polyglycolic acid 960 #1 Polyglycolic acid 960 #2 Polyglycolic acid 960 #2.0 Polyglycolic acid 960 #3.0 Other specify -----		
411	Do you routinely clean subcutaneous space with saline?	Yes No		
412	Technique of skin wound closure (NB it might depend on the indication for CS \try to modify it)	Subcuticular Interrupted Continuous running Clips Others (specify) -----		
413	Choice of suture material?	Cutgut # 0 Cutgut # 1 Cutgut # 2 Polyglycolic acid 960 #0 Polyglycolic acid 960 #1 Polyglycolic acid 960 #2 Polyglycolic acid 960 #2.0 Polyglycolic acid 960 #3.0 Other specify -----		

ANNEXE II

Information and consent

We are a team of researchers conducting a research entitled “Cesarean Delivery Techniques among Obstetricians and Gynecologists in Ethiopia: Review of Practice” among Obstetricians and Gynecologists practicing in Ethiopia.

Cesarean Section is one of the most commonly performed procedures in the world. Even though there is some evidence based recommendation still there is a wide variation in the technique. The purpose of the study is to review the cesarean delivery practice in Ethiopia.

You are invited to take part in this research because including all residents and Obstetricians will be very expensive and there is a budget problem.

Participation in this survey is entirely voluntary however the result of this survey is essential to review cesarean delivery practice among obstetricians and gynecologists in Ethiopia for subsequent concerted actions in standardizing the practice. You need only maximum of 10-15 min to complete the questionnaire. The study has no any risk rather it has benefit to be used as a primary data for future studies. Your responses will not be associated with any information that is personally identifiable. Aggregate result will only be summarized.

Principal investigator – Dr Zekarias Taye (Ob-Gyn Resident) in collaboration with Dr. Wondimu Gudu (MD,Ob-Gyn).

You can ask me any more questions about any part of the research study, if you wish to. (Contact Address Mobile Phone: 0911176723/0901958638 or email: drzekariastaye@gmail.com.)

Thank you for in advance for your participation;

Do you want to participate?

1. Yes
2. No

