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Postoperative Abdominopelvic Adhesions in Repeat Caesarean Section

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Abstract

***Background:** Postoperative abdominopelvic adhesions pose a major challenge to repeat intra-abdominal surgical procedures with increased risk of injuries to intra-abdominal organs, blood loss and mortality. Repeat abdominal delivery is frequent and the rate is increasing mostly in settings of high parity making data on epidemiology of postoperative abdominopelvic adhesion a significant priority. If underlying abdominopelvic adhesion is predictable preoperatively, appropriate measures will be put in place to reduce the attendant morbidity and mortality that may follow repeat caesarean births in less skilled surgery and preparedness.*

***Objectives:** To determine the prevalence, investigate the predictors, severity and pattern of underlying abdominopelvic adhesions among obstetric population who had repeat caesarean delivery, to explore the risk factors of abdominopelvic adhesions and estimate the associated blood loss morbidity.*

***Method:** This retrospective longitudinal study investigated 194 women who had at least a previous caesarean birth or laparotomy undergoing a repeat caesarean section. Data was collected between 2017 and 2019. Analysis was done using EPI INFO and Instat statistical packages.*

***Results:** One hundred thirty one participants had postoperative abdominopelvic adhesion; an overall prevalence of 67.5% while the values were 60.2%, 80.0% and 90.0% after the first, second and third or more repeat caesarean deliveries respectively.*

Socioeconomic status, educational level, number of prior C-section, parity, booking status, previous skin incision and scar type, cadre of primary surgeon, facility of primary surgery significantly related to the prevalence of abdominopelvic adhesions p<.05. Age, body mass index, timing of primary surgery, type of skin healing, blood group did not significantly influence the occurrence of intra-abdominal adhesions p>.05. All the indented and raised skin scars were pigmented and prevalence of underlying adhesions was 100%, 87.3 % and 58.0% for indented, raised and flat skin scars respectively. The non-pigmented and pigmented skin scars respectively had 34.2% and 90.1% underlying abdominopelvic adhesions p=0.03 Blood loss morbidity positively and significantly correlated with the severity of adhesions.

***Conclusions:** The occurrence, extent, severity and attendant morbidity of intra-abdominal adhesions increase with each additional caesarean delivery. The appearance of the presenting skin incision scar is predictive of underlying adhesions.*

Keywords: *adhesion, post-caesarean, repeat caesarean, abdominopelvic, intra-abdominal, predictors, risk factors.*

Introduction

Postoperative abdominopelvic adhesion is a leading cause of increased morbidity and mortality in repeat caesarean delivery (CD). Post operative adhesions are internal fibrous bands that form among tissues and organs as body heals from injury. It is defined

as abnormal fibrous connection between two anatomically different surfaces.[1] These are internal scars that connect tissues and organs normally unconnected. They make normally slippery internal tissues and organs stick together thereby limiting mobility thereby twisting or pulling and distorting the affected organs. The tissue plains are lost, organs are transposed, kinked and translocated by adhesions. There has been attempt at predicting abdominopelvic adhesions using the appearance of skin scar.[2-3] Pelvic adhesions create difficulties in subsequent access into the pelvic cavity and these vary in severity which influences the course and outcome of repeat surgery. The morbidity and mortality are increased in dense pelvic adhesion even in skilled hands and in less skilled in less severe adhesions. Pelvic and abdominal adhesions rarely if ever show up on x-ray or ultrasonography. They are recurrent after each abdominal incision. Some patients will not develop serious post-operative adhesions while others do develop dense adhesions. Pelvic adhesion can be extensive and asymptomatic and silent. The reason for this variation where some persons develop adhesions while others do not is poorly understood. The nature of tissue injury, cause and duration of inflammatory process, the nature of preceding surgery, operative technique of the surgeon, duration of surgery and exposure of intra-abdominal organs and unknown intrinsic healing characteristic of individual patient are likely at interplay in the final outcome. To minimize postoperative pelvic adhesion, early and adequate treatment of infection, meticulous surgical technique to minimize tissue trauma and possibly the use of adhesion barrier products to reduce the extent or severity of post-operative adhesions.

Pelvic adhesions cause tubal obstruction and consequent tubal pregnancy and infertility, dyspareunia, bowel obstruction and chronic abdominal and pelvic pain.[1] Other morbidity associated with adhesions include increased operation time, delivery time, blood transfusion rate, intensive care admission, hysterectomy, placenta increta and hospital stay.[4-6] Evidence in the literature indicates that gynecological surgery generates intra-peritoneal adhesions in 55% to 100% of the patients.[1] In second caesarean delivery the adhesion is 24-46%, this increases to 43-75% in the third and up to 83% of the patients at the forth CS.[1,7-8] It is in the literature that the rate of adhesion formation and severity of the consequences of postoperative intra-abdominal adhesion are less in second CS relative to gynecological indicated surgery.[1] In the formation of adhesion, there is an interplay of increased extracellular matrix production, reduced matrix degradation and fibrinolytic activity.[1,9-10] Again the type of anterior abdominal incision influences the adhesion formation.[1,11] Evidence in the literature indicates that small bowel obstruction is less in repeat caesarean deliveries compared with adnexal surgery, total abdominal hysterectomy (TAH) or myomectomy.[1] Pregnancy is naturally adhesiogenic as the physiological changes in pregnancy favor adhesiogenesis and this can not account for the decrease in adhesion formation observed in caesarean delivery.[1,12-13] There is a marked increase in maternal procoagulant activity characterized by elevation of procoagulation factors VII, VIII, IX, fibrinogen and VonWillebrand factor.[1,12] The physiological anticoagulant activity is impaired with impaired fibrinolytic activity in pregnancy.[1,14]

Ischemia is considered central to adhesion development while a deficient,suppressed or hyperactive natural immune system has been proposed as the underlying mechanism in adhesion formation.[15] This study explored postoperative abdominopelvic adhesion as a disorder and its related factors.

Materials and Methods

Niger Delta University Teaching Hospital (NDUTH) the study center, is a tertiary hospital located at Okolobiri; Bayelsa state in the South-south geopolitical region of Nigeria. Bayelsa state is one of the rich oil producing states of Niger delta region.Her dominant ethnic groups are Izon, Ogbia, Nembe and residents from other states and other parts of the globe. Fishing and farming are the main traditional occupations of the people. Niger Delta University Teaching Hospital is a referral center to facilities within the state and neighboring states.

A retrospective longitudinal study involving participants who had a repeat abdominal delivery following at least a previous abdominal delivery or surgery (laparotomy or and caesarean delivery) were prospectively consecutively recruited between February 2017 and August 2019. All that gave informed consented to participate were included as the details of their previous surgical history were required. More than a previous non obstetric or unexplained laparotomy prior to the primary CD and prior major general surgical laparotomy were excluded from the study mostly for lack of surgical details. The participants' case files were supplemented with the information from one on one interview after

informed verbal consent and ensuring confidentiality. Predictor variables were relevant participants details (age, parity, height in meter (m), weight kilogram (kg), calculated body mass index (BMI) kg/m^2, educational status, husband occupation, previous surgical details; facility, cadre of surgeon, number previous surgeries, complications, and relevant investigation findings. The anterior abdominal skin was assessed preoperatively for type of previous skin incision, wound healing, color and thickness of the abdominal skin scar in relation to the surrounding normal skin. The main outcome variables measured intra operative (findings) were pattern (occurrence: present or absent, extent: area covered, consistency: filmy or dense and severity: vascular/avascular) of abdominopelvic adhesions. For this study adhesion disorder was graded as: no adhesion/clean, mild (filmy/avascular easy to separate by blunt dissection irrespective of extent), moderate (dense/ minimal or no vascularity, required some cutting to separate) and severe (dense/high vascularity majorly separated by cutting). At the end of each surgery, the blood loss was independently estimated in milliliters by the attending anesthetists thereby removing the bias in clinical blood loss estimation.

The researchers and four trained research assistants (Senior Resident doctors) collected the data using semi structured questionnaire.

Notes

General hospitals in our data were manned mostly by medical officers. Mission hospital was manned by an obstetrician in charge of the maternity section assisted by medical officers while the Teaching hospital cases were managed by obstetricians and obstetrics and gynecology residents/trainees and the private facilities by a mixture of different cadres of medical doctors both the specialists and non-specialists

The study was supported by the institutional ethical approval. Data was fed into the EPI INFO spread sheet for analysis supplemented with Instat statistical software. Fisher's exact test with the aid of 2 by 2 contingency table was used to test for associations of categorical variables expressed as relative risk. Students t-test was used to compare the relevant parametric variables. Statistical significance was set at p<.05 or 95% confidence interval exclusion of nullity of one.

Results

A total of 167(86.1%) and 27(13.9%) of the participants had caesarean delivery and non-caesarean laparotomy as their primary abdominal surgery preceding caesarean deliveries respectively. The subsets were similar in age (32.0±4.3 vs. 33.3±3.9, p=0.14) and adhesions (67.7% vs. 66.7%, p=1.0)

Table 1. *Characteristics of Participants and Abdominopelvic Adhesions N=194*

Characteristic	Variable	Adhesions 131 (%)	Clean Pelvis 63 (%)	RR (CI: 95%)	p-value
Age	≤34(n=144	93(64.6)	51	0.8(0.7-1.0	0.16
	≥35(n=50	38(76.0)	12		
Parity	1-2(140	85(60.7)	55	0.7(0.6-0.8)	0.0011
	>2(54	46(85.2)	8		
Booking status	Booked(n=165)	106(64.2)	59	0.7(0.6-0.9)	0.02
	Unbooked(n=29)	25(86.2)	4		
Social class	Upper(n=96)	50(52.1)	46		
	Middle(n=73)	56(76.7)	17	1.5(1.2-1.9	0.001
	Lower(n=24)	24(100.0)	0	1.9(1.6-2.3	<0.0.001
Education	≤2°(n=62)	53(85.5	9	1.4(1.2-1.7)	0.0003
	>2°(n=132)	78(59.1	54		

Table 1 shows participants characteristics as relate to pelvic adhesions. Their age ranged 22-44 years with a mean of 32.2 ± 4.2 years. The two arms of the participants were similar in age, nonetheless the younger participants were less likely to develop postoperative pelvic adhesions (P=0.16). On the contrary, those of lower parity and those booked at the study center were significantly less likely to develop postoperative abdominopelvic adhesions p<0.01. The middle and lower socioeconomic participants were significantly almost twice more at the risk of postoperative adhesion relative to the upper class (P<0.01). The less educated participants were also significantly more prone to pelvic adhesions (P=0.0003)

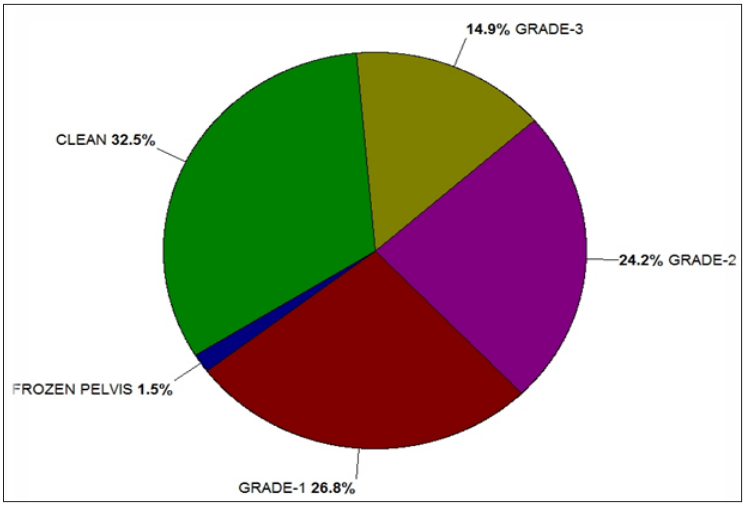

Fig 1. *Pattern of Intra-abdominal Adhesions of Participants*

Figure 1 shows the pattern of postoperative abdominopelvic adhesions of the participants. The prevalence of pelvic adhesions was 67.5% in this study and a third (32.5%) of the participants had clean pelvis. The mild adhesions was the most prevalent (26.8%) followed by the moderate adhesions constituting 24.2% and severe cases were 16.4%.

Table 2. *Type of Skin Healing vs. Abdominopelvic Adhesions*

Skin Healing	Abdominopelvic Adhesions					Total
	Clean	Mild	Moderate	Severe	Frozen	
Primary	46	43	34	17	2	142
Secondary	5	5	11	10	1	32
Keloid/Hypertrophic	12	4	2	2	0	20
Total	63	52	47	29	3	194

Table 2 shows the type of skin healing as relate to the underlying abdominopelvic adhesions. Primary skin healing was associated with 67.6% underlying abdominopelvic adhesions while the values were 84.4% and 40.0% respectively for secondary skin scar and hypertrophic /keloid scar. Compared with scars that healed by primary intention,those that healed by secondary intention were 30% but not significant more, (RR 1.3, P=0.08) while the hypertrophic/keloid scars were significantly 40% less likely to harbor underlying adhesions (RR: 0.6, p=0.02)

Table 3. *Participants' Skin Incision Scar Characteristics and Intra-abdominal Adhesions*

Skin Scar	Adhesions	Clean pelvis	RR:95%CI	P-value
flat no pigmentation: n=79	27	52		
flat with pigmentation: n=59	53	6	2.6(1.9-3.6)	<0.001
Indented with pigmentation :n=17	17	0	2.9(2.2-4.0)	<0.001
Raised with pigmentation: n=39	34	5	2.6(1.8-3.5)	<0.001
Total	131	63		

Table 3 shows the characteristic appearance of skin incision scar and the risk of underlying postoperative abdominopelvic adhesions.The majority 71.1% of the participants had thin skin scar while 20.1% and 8.8% were raised and indented respectively. About 3 of every 5 thin scars 57.2% were non-pigmented while the rest 42.8% were pigmented. In this data all the indented and elevated skin scars were pigmented. The prevalence of adhesions was 34.2%, 89.8%, 87.2% and 100.0% for thin non pigmented, thin pigmented, elevated and indented skin scars respectively. With reference to thin/flat non pigmented skin scar, the flat pigmented, raised and indented skin scars were each arm close to thrice more associated with underlying postoperative abdominopelvic adhesions. They were each statistically significant (P<0.001).

Table 4. *Scar type vs. Adhesion Pattern*

Characteristics	Variables	Clean	Mild adhesions	Moderate adhesions	Severe adhesions	Frozen pelvis	Total
Type of Skin scar	Indented	0	2	3	11	1	17
	Thick and elevated	5	9	16	9	0	39
	Thin and flat	58	41	28	9	2	138
	Total	63	52	47	29	3	194
Color of Skin Scar	Same as surrounding skin	52	18	5	4	0	79
	Pigmented	11	34	42	25	3	115
	Total	63	52	47	29	3	194
Color/type combination	Dark/indented	0	2	3	11	1	17
	Dark/thick	5	9	16	9	0	39
	Dark/flat	6	23	23	5	2	59
	No pigmentation/flat	52	18	5	4	0	79
	Total	63	52	47	29	3	194

Table 4 shows the pattern of underlying adhesions with the scar type.The indented skin scars in this data were all associated with underlying postoperative abdominopelvic adhesions with over seven of every ten of them 70.6% severe adhesions. About 9 of every ten thick skin scars (87.3%) were associated with pelvic adhesion with 64.1%of them at most moderate degree. On the other hand about 3 of every five (58.0%) of the thin scars had underlying pelvic adhesions with over half 51.3% of this mild adhesions. Where the scar color appeared the same as the surrounding skin of the participant, about 3 of every ten (34.2%) had underlying pelvic adhesions with over two thirds of them 66.7% mild adhesions. Most ;90.4% of the pigmented scars had underlying postoperative abdominopelvic adhesions.

Table 5. *Participants' Preoperative Characteristics (Risk factors)vs.Abdominopelvic Adhesions*

Characteristic	Variable	Frequency of Adhesion (%)	Frequency Clean pelvis (%)	RR CI	P-value
Type primary Intra-abdominal surgery	CS	113(67.7)	54(32.3)	1.0	1.0
	Non CS	18(66.7)	9(33.3)		
Number previous CS	1(n=128)	77(60.2)	51(39.9)		
	2(n=40)	32(80.0)	8(20.0)	1.3(1.1-1.6)	0.02
	≥3(n=19)	18(90.0)	2(10.0)	1.5(1.2-1.8)	0.01
Type skin scar healing	primary	96(68.9)	46(32.4)		
	secondary	27(82.8)	5(15.6)	1.3(1.04-1.5)	0.08
	Keloid/hypertrophic scar	8(36.8	12(	0.6{0.3-1.0)	0.02
Type previous laparotomy Incision	Pfannenstiel	106(64.2	59(35.8		
	Joel Cohen's	2(66.7	1(33.3	1.0	1.0
	Midline subumblical	23(88.5	3(11.5	1.4(1.2=1.6	0.01
HIV	Positive	2	0	1.5(1.3-1.6)	1.0
	Negative	129	63		
BMI	<18.5	6	0	1.4(1.2-1.8	0.2
	18.5-24.9	29	13		
	25-29.9	32	24	0.8(0.6-1.1	0.3
	≥30	41	17	1.002(0.8-1.3	1.0
Cadre Surgeon primary CS	Obstetrician	43(54.4)	36(45.6)		
	GP Consultant	2(40)	3(60)	0.7(0.2-2.2	0.66
	O&G Resident	30(63.8)	17(36.2)	1.2(0.9-1.6	0.35
	Medical Officer	56(88.9)	7(11.1)	1.6(1.3-2.0	<0.0001

Blood group	A	24(69.7)	11(		
	B	33(72.1)	13(	1.0(0.8-1.4	0.81
	O	64(63.3)	38(	0.9(0.7-1.2	0.68
	AB	4(100.0)	0(	1.5(1.2-1.8	0.31
Facility Primary CS	Teaching Hospital	47(72.3)	18(27.7		
	Private Clinic/Hosp	50(79.4)	13(20.6	1.1(0.9-1.3	0.41
	Mission Hospital	18(37.5)	30(62.5	0.5(0.3-0.8	0.0003
	General Hospital	16(88.9)	2(11.1)	1.2(0.98-1.5	0.22
Type of Primary CS	Elective	34(69.4)	15(30.6)	1.0(0.8-1.3	0.9
	Emergency	95(67.4	46(32.6)		

Table 5 shows underlying abdominopelvic adhesions as relate to selected participants' preoperative characteristics. Caesarean section and non-caesarean abdominal surgeries were similar in the risk of postoperative adhesions. The non-C-section primary laparotomy were for 16 appendectomy, three salpingectomy, five myomectomy and two uterine rupture repair respectively. A total 55/168 primary C-section had adhesions while all the primary myomectomy laparotomy had either moderate or severe abdominopelvic adhesions at the following C-section and this more than tripled that of C-section (RR3.1, p=0.005, 95% CI: 2.5-3.8) statistically significant. Similarly uterine rupture repair. Only 6/16 of primary appendectomy had adhesion while 1/3 of the salpingectomy had mild adhesion. Hypertrophic/keloid scars were up to 30% less likely to have underlying adhesion and this was statistically significant. On the other hand, healing by secondary intention was of the same proportion more likely but this was not significant. The risk of adhesion formation significantly increased with the number of previous C-sections. Midline subumblical incision up to 40% provoked adhesion when compared with Pfannenstiel incision.This was statistically significant. C-sections by the Medical officers were significantly 60% more prone to abdominopelvic adhesion formation relative to those done by the obstetricians. The operations at mission hospital were significantly less associated with adhesions when compared with teaching hospitals. The retroviral status,blood group and timing of C-section do not influence the risk of adhesion

Table 6. *Abdominopelvic Adhesions and Estimated Blood Loss at the Last Caesarean Section*

Characteristic	Variable	Mean EBL(mls)	EBL Mean difference Among the rows (mls)	p-value
Type of adhesion	Clean=63	381.7 ±156.9		
	Mild=52	577.9±325.5	196.2	<0.0001
	Moderate=47	613.8±453.2	232.1	0.0003
	Severe=29	903.4±489.7	521.7	<0.0001
	Frozen=3	966.7±404.1	585.0	<0.0001
Skin scar Type	Thin=138	571.7±402.9		
	Thick=39	539.1±299.1	32	0.6
	Indented=17	835.0±519.6	263.3	0.05
Skin scar color	Non pigmented=115	622.3±415.3		
	Pigmented=79	752.9±421.7	130.6	0.03
Previous skin wound healing	Primary intention=138	571.7±402.9		
	Secondary intention=36	625.0±348.8	53.3	0.5
	Hypertrophic=19	550.0±386.6	-21.7	0.8
	Keloid=1	200.0		

Table 6 shows blood loss at the last repeat C-section as related to the severity of abdominopelvic adhesions. Blood loss morbidity was significantly related to severity of adhesion. Indented scar was unlike the raised scar associated with significant blood loss. Similarly, pigmented scar was associated with significant blood loss while type of skin wound healing were similar in blood loss. The need for blood transfusion was 4/63 (6.3%), 7/52 (13.5%), 18/47 (38.3%) and 16/29 (55.2%) for clean, mild, moderate and severe adhesions respectively.

Discussion

The prevalence of postoperative abdominopelvic adhesions in this study was 67.5%. The underlying abdominopelvic adhesions increased in presence and severity with the number of caesarean deliveries. Older women, low socioeconomic and poor education were significant predictors of adhesion formation just as the type of skin scar predicted the likelihood and severity of abdominopelvic adhesion. There was increased blood loss morbidity with severity of underlying abdominopelvic adhesion. The prevalence from our data was higher than that reported by other researchers.[16] This could be attributable to the variation in study designs with only women that had a repeat CD after at least a previous abdominal surgery or CD in this study in contrast to those older than 18 years who had elective or emergency CS with or without the history of previous CD.[16] The prevalence of intra-abdominal adhesions in our data increased with the number of previous C-sections ranging from 60.2% through 80% to 90% after primary, a repeat and three or more prior C-sections respectively. These were higher than 46%,75% and 83% after primary, third and fourth caesarean delivery respectively reported by Morales e'tal.[8] The prevalence after primary CD was comparable with 24-73% following a primary caesarean delivery (CD) from a review report.[6] Our finding differed from prevalence of 62% for two or more previous C-sections reported by Nuamah e'tal[16] The difference in pattern of postsurgical abdominopelvic adhesions were a reflection of variations in surgical technique; closure or non-closure of peritoneum[6], repair of uterine incision[6,17], surgical duration and degree of tissue desiccation, uterine and other intra-abdominal organs handling.Our data also indicated that type of laparotomy incision at C-section influenced the risk of adhesion formation with the rate higher in midline subumblical compared to Pfannenstiel incision. This corroborated another reports[1] Participants that had postoperative abdominopelvic adhesions wereolder and lower socioeconomic status similar to an other report [16], more likely to lack prenatal care, be of low education. Healing by secondary intension was found a significant predictor of underlying postoperative adhesion in most of the cases; these were moderate to severe in degree. This data was able to identify four different post laparotomy abdominal skin incision scars with associated variation in their underlying postoperative abdominopelvic adhesions. These were the thin non pigmented, thin pigmented, raised and indented scars respectively pigmented. The prevalence of adhesion were 34.2%, 89.8%, 87.2% and 100.0% for thin non-pigmented, thin pigmented, raised and indented skin scars respectively. Non pigmented thin scars have substantial proportion of the underlying adhesions mild form unlike the moderate to severe form underlying the raised and the worst the indented scars. This was in concordance to other reports [3, 18-21] Non-pigmented skin scar is less likely to have internal adhesions while an indented or raised scar with or without change in skin color is more likely to be associated with dense adhesions.

Unlike a report of increased risk of utero-vesical and utero-anterior abdominal adhesion underlying keloids [20], our data showed significant reduction of intra-abdominal adhesions with hypertrophic/keloid skin incisionscars. There was no significant difference in the risk of postoperative abdominopelvic adhesion by the indication of the primary laparotomy, however in the cases of prior myomectomy or repair of ruptured uterus there was a significantly higher risk of adhesion mostly severe forms relative to CD. This was attributed to the placement of incision in lower segment CD protected by the bladder and enlarged uterus coupled with the nonuse of self-retaining retractor that can bruise the pelvic and abdominal peritoneum.[1] The higher the number of repeat C-section in a participant the higher the risk and severity of underlying abdominopelvic adhesions.This finding was in agreement with other reports.[1, 3,7,16] This risk was similarly high when a midline subumblical incision was used to access intra-abdominal cavity relative to Pfannenstiel incision. The cadre of surgeon for a prior surgery was a potent determinant of postoperative abdominopelvic adhesions from our data. The medical officers were significantly most associated with postoperative adhesions in this data. It is evident in the literature that surgical technique[22], tissue ischemia and desiccation, glove talc powder and

suture foreign body reaction[17, 23] are some of the risk factors for intra-abdominal adhesion formation.

This study derived its strength from the prospective data known to be associated with completeness and the sample size. However the sample was by a non-probability sampling which was a limitation in the study. A sample by probability sampling may give some improvement on the findings. Other limitations were previous surgical history from the participants some of who were not adequately educated and the likelihood of distorted recall and loss of information.

It was evident from this data that there was increased primary blood loss at surgery with the severity of the underlying adhesions. This was in concordance with other reports[1, 16] These findings were further corroborated by similar increased blood loss morbidity with indented and pigmented skin scar each found in our data to be associated with moderate or severe adhesions.

Conclusions

Caesarean section was associated with increased risk of abdominopelvic adhesions and this increased in the rate of occurrence, extent and severity with each succeeding caesarean birth.There were a few characteristics of the participants and previous skin incision scars that point to increased likelihood of underlying abdominopelvic adhesions. Blood loss morbidity increased with the number of prior caesarean births and the severity of adhesions.

Our data indicate quality evaluation and selection of cases for primary caesarean deliveryand conscious efforts to limit the number of a voidable repeat caesarean deliveries.

References

[1] Awoniyi O. Awonuga, Nicole M Fletcher, Ghassan M Saed, Michael P. Diamond. Postoperative Adhesion Development Following Caesarean and Open Intra-Abdominal Gynaecological Operations A Review.Reprod Sci.2011; 18 (12): 1166 1185.doi: 10.1177/1933719111414206

[2] Kahyaoglu I, Kayikcioglu F, Kinay T, Molla mahmutoglu L: Abdominal scar characteristics: do they predict intra-abdominal adhesions with repeat cesarean deliveries? J ObstetGynaecol Res 2014; 40: 1643–1648.

[3] Taylan E, Akdemir A, Ergenoglu A.M, Yeniel A.O., Tekindal M.A.. Can We Predict the Presence and Severity of Intra-Abdominal Adhesions before Cesarean Delivery? GynecolObstet Invest 2017; 82: 521–526 DOI: 10.1159/000454767

[4] Souza JP, Gülmezoglu A, Lumbiganon P etal. Caesarean section without medical indicationsis associated with an increased risk of adverseshort-term maternal outcomes: the2004–2008 WHO global survey on maternaland perinatal health. BMC Med.2010; 8: 71

[5] Silver RM, Landon MB, Rouse DJ et al. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet. Gynecol.2006; 107 (6): 1226-1232 .

[6] Judith H Poole. Adhesions following cesarean delivery: a review of their occurrence, consequences and preventative management using adhesion barriers.Women's Health2013; 9 (5): 467–477.

[7] Tulandi T, Agdi M, Zarei A, Miner L, Sikirica V. Adhesion development and morbidity after repeat cesarean delivery. Am J Obstet Gynecol. 2009; 201 (1): 56.e51–e56.

[8] Morales KJ, Gordon MC, Bates GW, Jr . Postcesarean delivery adhesions associated with delayed delivery of infant. Am J Obstet Gynecol. 2007; 196 (5): 461.e461–e466

[9] Dunn RC, Buttram VC,, Jr Tissue-type plasminogen activator as an adjuvant for post surgical adhesions. ProgClinBiol Res. 1990; 358: 113–118.

[10] Saed GM, Diamond MP. Molecular characteri zation of postoperative adhesions: the adhesion phenotype. J Am AssocGynecolLaparosc. 2004; 11 (3): 307–314.

[11] Silver RM, Landon MB, Rouse DJ, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol. 2006; 107 (6): 1226–1232.

[12] Szecsi PB, Jorgensen M, Klajnbard A, Andersen MR, Colov NP, Stender S. Haemostatic reference intervals in pregnancy. ThrombHaemost. 2010; 103 (4): 718–727.

[13] Prochazkova J, Dhaifallah I, Mechurova A, et al. Monitoring of endothelial activation markers during physiological pregnancy]. CeskaGynekol. 2010; 75 (2): 92–100

[14] Hellgren M. Hemostasis during normal pregnancy and puerperium. SeminThrombHemost. 2003; 29 (2): 125–130.

[15] Alpay Z, Saad GM, Diamond MP. Postoperative Adhesions: From Formation to Prevention.Semin Reprod Med 2008; 26 (4): 313-21.doi:10.1055/s-0028-1082389

[16] Mercy A. Nuamah, Joyce L. Browne, Alexander V. Öry, Nelson Damale, Kerstin Klipstein-Grobusch, Marcus J. Rijken Prevalence of adhesions and associated postoperative complications after cesarean section in Ghana: a prospective cohort study. Reproductive Health 2017; 14: 143 DOI 10.1186/s12978-017-0388-0

[17] Blumenfeld YJ, Caughey AB, El-Sayed YY, Daniels K, Lyell DJ: Single- versus double-layer hysterotomy closure at primary caesarean delivery and bladder adhesions. BJOG 2010; 117: 690–694

[18] Kahyaoglu I, Kayikcioglu F, Kinay T, Molla-mahmutoglu L: Abdominal scar characteristics: do they predict intra-abdominal adhesions with repeat cesarean deliveries? J ObstetGynaecol Res 2014; 40: 1643–1648.

[19] Stocker LJ, Glazebrook JE, Cheong YC: Are skin scar characteristics associated with the degree of pelvic adhesions at laparoscopy? FertilSteril 2014; 101: 501–505.

[20] Tulandi T, Al-Sannan B, Akbar G, Ziegler C, Miner L Prospective study of intraabdominal adhesions among women of different races with or without keloids. Am J ObstetGynecol 2011; 204: 132.e1–132.e14

[21] Dogan NU, Haktankacmaz SA, Dogan S, Ozkan O, CelikH,Eryilmaz OG, Doganay M, Gulerman C . A reliable way to predict intraabdominal adhesions at repeat cesarean delivery: scar characteristics. ActaObstetGynecolScand 2011; 90: 531–534

[22] El-Mowafi DM, Diamond MP: Are pelvic adhesions preventable? SurgTechnolInt 2003; 11: 222–235.

[23] Alpay Z, Saed GM, Diamond MP: Postoperative adhesions: from formation to prevention. Semin Reprod Med 2008; 26: 313–321.

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