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Original Research Article

Prevalence of intra-abdominal adhesions in patients undergoing repeat cesarean section: An observational retrospective study

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ABSTRACT

Aim and Objectives: To study the prevalence of intraabdominal adhesion in repeat CS and evaluate the maternal and fetal outcome.

Background: CS is a lifesaving procedure for the mother and fetus, but have multiple complications like adhesions, abdominal pain, prolonged duration of surgery, postoperative bleeding, and identification of these can help improve maternal and fetal outcome and care.

Materials and Methods: This retrospective study reviewed 70 pregnant women undergoing repeat CS. Data was tabulated and analyzed and adhesions were scored based on a system into dense and flimsy, and its dimensions. Chi Square test was used to observe association. P-value<0.05 was taken as significant.

Results: Adhesions were noted in 30(42.9%) of the subjects and 40(57.1%) patients had no adhesions. Dense adhesions were noted in 19(27.1%) and flimsy in 11(15.7%) patients. Among those with adhesions – 6(20%) had atonic postpartum hemorrhage (PPH). No association was noted with fetal outcome. There was a statistically significant increase in duration of surgery in those with adhesions – 126.83 minutes +/- 19.85 than in those without adhesions – 82.35 minutes +/-12.82. Those patients with dense adhesions, the duration of surgery was – 132.63 minutes +/-21.88 and with flimsy adhesions – 116.82 minutes +/-82.

Conclusion: Repeat CS with adhesions increased the duration of surgery, increased the chances of PPH and had no statistically significant effect on neonatal outcome. Furthermore, duration of surgery was prolonged with dense adhesions. Further research can be done including post operative complications, details of prior CS and interpregnancy interval and thereby adhesion prevalence.

1. Introduction

CS (CS) is defined as the delivery of the infant, alive or dead, after the period of viability, through an abdominal uterine incision.[1] CS can be potentially lifesaving for the mother and fetus.[2] Modern obstetrics practice, for medical, social, economic reasons has witnessed an increase in primary CS rates everywhere.[3] The CS rate in India has increased from 17.2% to 21.5% from 2015-16 to 2019-20.[4]

Increasing rate of CS worldwide is concerning for public health and obstetricians as they can increase financial burden and can affect the maternal health when compared to vaginal delivery.[5]

CS have multiple complications like adhesions, abdominal pain, bladder damage, prolonged duration of surgery, postoperative bleeding, bowel obstruction, wound dehiscence, rupture, placenta accreta.[2,6] These complications make the procedure and foetal extraction more challenging, increasing the time to delivery, and increases the chances of bowel or bladder injury.[7]

Adhesions are one of the complications of CS that complicates future CS.[3] Adhesions are defined as fibrous attachments developing between tissues and intra-abdominal organs following an inflammatory reaction of the

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peritoneum.[3]

This study aims to study the prevalence of intraabdominal adhesions in repeat CS and to evaluate the association between intraabdominal adhesions and maternal and fetal outcome.

2. Materials and Methods

2.1. Source of data

This study was performed among those pregnant women admitted at KIMS hospital in the Department of Obstetrics and Gynecology, and have had at least one CS in the past irrespective of the outcome/parity of the patient.

This observational study was conducted between January 2023 to June 2023 over 6 months in the department of Obstetrics and Gynecology, KIMS Hospital, Bangalore. The sampling method used was convenience sampling. Sample size of 70 was obtained as below.

2.2. Sample size estimation

$$\frac{N=Z^2_{(1-\alpha)}\ X\ PQ}{\delta^2}$$

$Z_{(1-\alpha)}$ = 1.65 (For 90% Confidence Interval)

P=0.62 [Based on the probability, that the most common type of complications in repeat CS patients were adhesions (62%) as per the findings from previous literature by Mercy A. Nuamah et al (2)]

Q=1-P

δ (Margin of Error) =0.10

N = 64.14, rounded off to 70

2.3. Inclusion criteria

1. All previous one CS irrespective of their type.
2. Women with previous CS with no history of any other abdominal surgery.

2.4. Exclusion criteria

1. All first-time CS, irrespective of their parity.
2. Any previous abdominal surgery except CS.

3. Materials and Methods

After obtaining approval and clearance from the Institutional Ethics Committee, the data of the pregnant women fulfilling the inclusion criteria was enrolled for the study.

1. Basic data like age, gravidity, inter pregnancy interval, history of past surgeries was recorded.
2. ANC records and previous medical records were analysed.
3. Adhesions intraoperatively were assessed by a grading system according to Tulandi and Lyell as mentioned by Mercy A. Nuamah et al.[2] in their prospective cohort study.
4. In their grading system (Table 1), adhesions were graded by their location, size and consistency. Flimsy adhesions are those that are transparent and easily dehisced. Flimsy adhesions more than 6 cm wide were allotted maximum of 4 points whereas dense adhesions which are difficult to separate were allotted 4 (if <3cm wide) and maximum of 16 (if >6cm wide) if adhesions present between uterus and bladder, abdominal fascia or omentum. Flimsy adhesion between omentum and abdominal fascia was allotted 2 points irrespective of size, and a dense adhesion was allotted 8 points. Similarly, a score was allotted for adhesions to other pelvic structures that interfere with the delivery as per the grading system.

Table 1: Annexure: Grading system

Adhesions	Consistency of adhesions	<3 cm	3-6 cm	>6 cm
Between uterus and bladder	Flimsy	1	2	4
	Dense	4	8	16
Between uterus and abdominal fascia	Flimsy	1	2	4
	Dense	4	8	16
Between uterus and omentum	Flimsy	1	2	4
	Dense	4	8	16
Between omentum and abdominal fascia	Flimsy		2	
	Dense		8	
Adhesions to other pelvic structures that interfere with the delivery	Flimsy		4	
	Dense		8	

The duration of surgery was taken to be from the first skin incision till the placement of last skin suture.[8]

Outcomes measured were:

1. Adhesions
2. Duration of operation
3. Intra operative findings
4. Neonatal outcome
5. Maternal outcome

Data was entered in MS Excel and Statistical Analysis was done using Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp.

Descriptive analysis of all the explanatory and outcome parameters will be done using mean and standard deviation for quantitative variables, frequency and proportions for categorical variables.

Chi Square Test was used to observe for the association between patient characteristics, maternal & foetal complications based on the presence of Intra-abdominal adhesions and also based on the type of adhesion.

Mann Whitney Test was used to compare the mean duration of surgery and baby's birth weight based on the presence of Intra-abdominal adhesions and also based on the type of adhesion. The level of significance was set at P<0.05.

4. Results

The study included 70 pregnant patients admitted in KIMS hospital in Department of OBG, who underwent repeat CS at KIMS hospital.

The mean age distribution noted in the study subjects were 29.40±4.36 (21-41 years). (Table 2) The mean gestational age of the patients was 37-40 weeks period of gestation. The repeat CS were elective – 25 patients (35.7%) and emergency - 45 patients (64.3%).

Table 2: Distribution of age & gestational age among study subjects

Variable	Category	n	%
Age	21-25 yrs.	14	20.0%
	26-30 yrs.	30	42.9%
	31-35 yrs.	19	27.1%
	> 35 yrs.	7	10.0%
		Mean	SD
	Mean	29.40	4.36
	Range	21 - 41	
Gestational Age	32-36 weeks	17	24.3%
	37-40 weeks	53	75.7%

Among those who underwent repeat CS, adhesions were noted in 30 patients (42.9%) and no adhesions were there in 40 cases (57.1%). (Table 3)

Table 3: Prevalence of intra-abdominal adhesions among study subjects

Variable	Category	n	%
Intra-Abdominal Adhesion	Present	30	42.9%
	Absent	40	57.1%
Types of Adhesion	Dense	19	27.1%
	Flimsy	11	15.7%

Study subjects were compared based on the presence or absence of adhesions and patient characteristics and results were noted. In the age group </=30 years, adhesions were present in 17 patients (56.7%) and absent in 27 patients (67.5%). In the age group >30 years, adhesions were present in 13 patients (43.3%) and absent in 13 patients (32.5%). (Table 4)

In the group with gestational age between 32-36+6 weeks, 7 patients had adhesions (23.3%) and 10 patients (25%) did not have any adhesions. In term patients with gestational age between 37 – 40 weeks, 23 patients (76.7%) had adhesions and 30 patients (75%) had no adhesions. With respect to indication for surgery, in elective cases, 10 patients (33.3%) had adhesions and 15 patients (37.5%) had no adhesions. In emergency cases, 20 patients (66.7%) had adhesions and 25 patients (62.5%) had no adhesions. No statistically significant association was noted between patient characteristics like age, gestational age, indication of surgery and intra-abdominal adhesions prevalence. (Table 4)

Adhesions were categorized as flimsy and dense based on the Table 1 (annexure 1). Dense adhesions were noted intraoperatively between various structures in 19 patients (27.1%). Flimsy adhesions were noted in 11 patients (15.7%) intraoperatively. Around 40 patients (57.1%) did not have any adhesions. (Table 2)

On comparing the presence of adhesions and maternal outcome, atonic PPH (postpartum hemorrhage) was noted in 6 patients (20%) with adhesions and was managed medically. The subjects with adhesions showed significantly higher proportion of PPH in comparison to those without adhesions – 24 patients (80%). The difference in proportion between the subjects were statistically significant at p-value = 0.01. (Table 5) There was no statistically significant association noted between type of adhesion and maternal complications.

In this study, adhesion prevalence and their association with neonatal outcomes was compared. One neonate had low APGAR at 1 minute due to delay in extraction secondary to adhesiolysis. APGAR at 5 minutes was normal for all neonates. No statistically significant association was found between neonatal outcome and presence of adhesion.

The duration of surgery varied depending on the presence of adhesions during the repeat CS. The mean duration of surgery if adhesions were present was 126.83 minutes +/- 19.85 and was significantly higher in comparison to those without adhesions where it took 82.35 minutes +/- 12.82 for the CS. The mean difference in duration of surgery was statistically significant at p-value <0.001. (Table 6)

The mean duration of surgery also varied depending on the type of adhesion. In the group with dense adhesion, it took an average of 132.63 minutes +/- 21.88 for the repeat section, which was significantly higher than those with flimsy adhesions where it took an average of 116.82 minutes +/- 10.31 for the surgery. The mean difference in the surgery duration was statistically significant at p-value = 0.02. (Table 7)

The mean adhesion dimension noted in the group with dense adhesions intra operatively was 4.89 cm +/- 1.63

Table 4: Association between prevalence of intra-abdominal adhesions and patients' characteristics using Chi square Test

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Age	≤ 30 yrs.	17	56.7%	27	67.5%	0.35
	> 30 yrs.	13	43.3%	13	32.5%	
Gestational Age	32-36 weeks	7	23.3%	10	25.0%	0.87
	37-40 weeks	23	76.7%	30	75.0%	
Comorbidity	Present	13	43.3%	19	47.5%	0.73
	Absent	17	56.7%	21	52.5%	
Elective/Emergency Type	Elective Surgery	10	33.3%	15	37.5%	0.72
	Emergency Surgery	20	66.7%	25	62.5%	

Table 5: Association between prevalence of intra-abdominal adhesions and maternal complications using Chi square Test

Variable	Category	Present		Absent		p-value
		n	%	n	%	
Postpartum Complication	Atonic PPH	6	20.0%	0	0.0%	0.01*
	None	24	80.0%	40	100.0%	

Table 6: Comparison of mean duration of surgery (in mins) based on the presence of Intra-abdominal adhesion using Mann Whitney Test

Variable	Adhesion	N	Mean	SD	Mean Diff	p-value
Surgery Duration	Present	30	126.83	19.85	44.48	<0.001*
	Absent	40	82.35	12.82		

Table 7: Comparison of mean duration of surgery (in mins) based on the type of intra-abdominal adhesion using Mann Whitney Test

Variable	Adhesion	N	Mean	SD	Mean Diff	p-value
Surgery Duration	Dense	19	132.63	21.88	15.81	0.02*
	Flimsy	11	116.82	10.31		

Table 8: Comparison of mean adhesion dimension (in cm) based on the type of intra-abdominal adhesion using Mann Whitney Test

Variable	Adhesion	N	Mean	SD	Mean Diff	p-value
Adhesion Dimension	Dense	19	4.89	1.63	1.62	0.01*
	Flimsy	11	3.27	1.42		

which was higher in comparison to the subjects with flimsy adhesion which was 3.27cm +/- 1.42. The mean adhesion dimension was statistically significant depending on the type of adhesion at p-value = 0.01. (Table 8)

5. Discussion

The rate of caesarean delivery has increased in the past, and the increase in primary CS and a decrease in the vaginal birth after caesarean section (VBAC) rate has led to an increase in repeat CS.[9]

The most common complication noted in repeat CS are adhesions to adjacent organs or fascia or abdominal wall most commonly between uterus and anterior abdominal wall, as noted in a study by Judith H Poole, that the uterus size prevents direct contact between incision site and intestines, causing adhesions commonly between uterus, bladder and omentum.[10]

Adhesions require surgical intervention and are thereby a significant burden to healthcare system as adhesiolysis and complications due to adhesions, require time and resources.[11]

The prevalence of adhesions noted in our study was 42.9%, which was lesser in comparison to a study done by Nuamah et al. which was 62%[2] and a study conducted by Regmi DR, 82.6%.[12]

No difference was noted in the complications based on either elective or emergency repeat CS which was similar to a study done by Sharma et al.[13]

In our study we noted that the maternal and neonatal outcome can be affected as a perioperative consequence to adhesions. The factors noted were duration of surgery and extraction time especially when the repeat CS is indicated for foetal distress.

Maternal outcome noted in our study was atonic PPH in 6 patients (20%), which was higher than in the study done by Regmi et al. which was 8.2%.[12] There was no statistically significant neonatal complication noted, but one neonate had a low one-minute APGAR due to delayed extraction secondary to adhesiolysis.

The duration of surgery was significantly increased due to the presence of adhesions and further increased in case of dense adhesions which was statistically significant. Dense adhesions were noted in 19 patients (63.3%) after one CS which was higher than that noted by R. Mooij et al. in their study, which was 56% after one CS.[14] The mean increase in the duration noted between repeat section with adhesions and those without adhesions was 44.48 minutes which was similar as noted by Nuamah et al. in their study – 39.2 minutes[2] and much higher than that noted by Manoj P et al. in their study which was approximately 24 minutes more with adhesions.[15]

Also, increased operative time even in Elective sections requires prolonged anaesthesia and can increase the chances of infection and increase blood loss as observed in other studies.[2] In our study prolonged anaesthesia was noted. Postoperative infection risk was not included and no significant blood loss was noted intraoperatively.

The limitations of the study noted were, a prospective study could help follow up the patients to conclude on postoperative period complications, outcomes and quality of life. Another limitation noted was that, the inter pregnancy interval and adhesion association and the details of the previous CS like steps of the procedure, closure of peritoneum, type of suture material used, use of unpowdered or powdered gloves, duration of previous surgery could not be obtained to evaluate association and determine outcomes. In the present study, the CS was performed by both senior and junior surgeons, and the time taken for surgery may alter to some extent.

A prospective study overcoming the above limitations may help in identifying the contributing factors and help in preventing adhesions.

6. Conclusion

In our study the prevalence of intra-abdominal adhesions was 42.9%. There was a statistically significant association noted between presence of adhesions and maternal outcome which was noted here as atonic PPH intraoperatively among 6(20%) cases which was medically managed. Though one neonate had a low one-minute APGAR secondary to adhesiolysis in the repeat CS, no statistically significant association was noted with respect to neonatal outcome and adhesions. A significant association was noted in the duration taken for the surgery due to the presence of intra-abdominal adhesions where time taken was approximately more than 40 minutes. Further research can be conducted in a larger study group and with a prospective study design to evaluate other contributing factors.

7. Availability of Data and Materials

The electronic data set are available from the corresponding author on reasonable request.

8. Authors' Contributions

Kiruthika T was responsible for correspondences and supervised data collection. Kiruthika T and Jayanthy T, co-designed the study and study procedures, analyzed data, designed the questionnaire. All authors participated in manuscript writing, reading and approval of final manuscript.

9. Ethics Approval

Approval for this retrospective study to access records of the patient was obtained under protocol identification number KIMS/IEC/A129/M/2023.

10. Source of Funding

Not applicable.

11. Conflicts of Interest

The authors declare no conflict of interest.

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References

1. Donald I. Induced labour. In: Misra R, editor. Practical Obstetric Problems. New Delhi: Wolters Kluwer; 2020. p. 176.
2. Nuamah MA, Browne JL, Öry AV, Damale N, Klipstein-Grobusch K, Rijken MJ. Prevalence of adhesions and associated postoperative complications after CS in Ghana: a prospective cohort study. *Reprod Health*. 2017;14(1):143. Available from: http://dx.doi.org/10.1186/s12978-017-0388-0.
3. Sinha P, Gupta U, Singh J, Srivastava A, Chauhan S. Per operative findings in repeat CS. *Int J Reprod Contracept Obstet Gynecol*. 2016;5(4):1093–6.
4. National Family Health Survey (NFHS-5). Compendium of Fact Sheets. New Delhi. 116 p. Report No. 5. Available from: https://main.mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf.
5. Maskey S, Bajracharya M, Bhandari S. Prevalence of Cesarean Section and Its Indications in A Tertiary Care Hospital. *JNMA J Nepal Med Assoc*. 2019;57(216):70–3.
6. Larsson C, Djuvfelt E, Lindam A, Tunón K, Nordin P. Surgical complications after CS: A population-based cohort study. *PLoS One*. 2021;16(10):e0258222.
7. Rottenstreich M, Sela HY, Shen O, Michaelson-Cohen R, Samueloff A, Reichman O, et al. Prolonged operative time of repeat cesarean is a risk marker for post-operative maternal complications. *BMC Pregnancy Childbirth*. 2018;18(1):477.
8. Wong TC, Lau CQ, Tan EL, Kanagalingam D. Decision-to-delivery intervals and total duration of surgery for CS in a tertiary general hospital. *Singapore Med J*. 2017;58(6):332–7.
9. Awonuga AO, Fletcher NM, Saed GM, Diamond MP. Postoperative adhesion development following cesarean and open intra-abdominal gynecological operations: a review. *Reprod Sci*. 2011;18(12):1166–85.
10. Poole JH. Adhesions following cesarean delivery: a review of their occurrence, consequences and preventative management using

adhesion barriers. Womens Health (Lond). *Womens Health (Lond)*. 2013;9(5):467–77.
11. Coccolini F, Ansaloni L, Manfredi R, Campanati L, Poiasina E, Bertoli P, et al. Peritoneal adhesion index (PAI): proposal of a score for the "ignored iceberg" of medicine and surgery. *World J Emerg Surg*. 2013;8(1):6.
12. Regmi DR, Dangal G, Silwal A, Shrestha DB, Oli PR, Budhathoki P. Repeat Cesarean Section among Pregnant Women in a Tertiary Center of Nepal: A Descriptive Cross-sectional Study. *JNMA J Nepal Med Assoc*. 2022;60(245):6–11.
13. Sharma J, Tiwari S, Padhye SM, Mahato B. Prevalence of Repeat Cesarean Section in a Tertiary Care Hospital. *JNMA J Nepal Med Assoc*. 2020;58(229):650–3.
14. Mooij R, Mwampagatwa IH, Dillen JV, Stekelenburg J. Association between surgical technique, adhesions and morbidity in women with repeat CS: a retrospective study in a rural hospital in Western Tanzania. *BMC Pregnancy Childbirth*. 2020;20(1):582.
15. Pokhrel M, Sherpa LD, Thapa M, Sharma J. Intra-abdominal Adhesions among Patients Undergoing Repeat CS in Department of Obstetrics and Gynaecology of a Tertiary Care Centre: A Descriptive Cross-sectional Study. *JNMA J Nepal Med Assoc*. 2022;60(250):517–20.

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