

## Original article

# A retrospective analysis of intra-abdominal adhesions in patients underwent repeated cesarean section

**Muneera Khusrau Khan**

Assistant Professor, Department of Obstetrics And Gynaecology, Basaveshwara Medical College And Hospital, S.J.M. Campus, NH-4, Chitradurga-577502, Karnataka

Corresponding Author-Dr. Muneera Khusrau Khan

Corresponding author\*

## Abstract

**Introduction:** Cesarean section (CS) also referred to as caesarean section or C-section is one of the frequently performed operation across the globe. The option of CS as a surgical procedure has greatly enhanced the lives of both the mother and her newborn in cases of high-risk pregnancies. The present study aimed to perform a retrospective analysis of intra-abdominal adhesions in patients underwent repeated cesarean section.

**Methodology:** The study, conducted in the Department of Obstetrics and Gynecology, from January to November 2013, involved 120 pregnant patients who underwent cesarean sections and presented with abdominal distension. Demographic data, previous medical records, and ANC records were analyzed retrospectively to assess intra-abdominal adhesions, surgical details, and postoperative outcomes. Two independent surgeons evaluated the data. The study focused on the duration of surgery and maternal complications related to adhesions, providing insights into their significant impact on surgical and maternal outcomes. Patients with previous cesareans were included, while first-time cesarean patients and those with other abdominal surgeries were excluded.

**Results:** The study found that intra-abdominal adhesions were present in 41.6% of patients, with 25% having dense adhesions and 16.6% having flimsy adhesions. The mean duration of surgery was significantly longer for patients with adhesions (134.78 minutes) compared to those without (96.34 minutes), with a p-value of <0.001. Flimsy adhesions were associated with longer surgery times (142.56 minutes) compared to dense adhesions (123.45 minutes), with a p-value of 0.02. Additionally, flimsy adhesions had a larger mean dimension (5.45) than dense adhesions (4.56), with a p-value of 0.01.

**Conclusion:** The study has concluded that intra-abdominal adhesions are prevalent in a significant portion of patients undergoing surgery, particularly among those requiring emergency procedures and those at full-term gestational ages.

**Keywords:** adhesion, intra-abdominal, cesarean section, hemorrhage.

## Introduction

Cesarean section (CS) also referred to as caesarean section or C-section is one of the frequently performed operation across the globe [1–3]. It refers to the birth of an infant through a cut made in the abdominal wall and the uterus; this is usually applied when a vaginal birth is dangerous to the mother or the baby. It has been in the recent decades that the rate of CS has soared internationally and this has been anchored on the growth of primary CS. These include medical, social and economic reasons for the rise of this HCM'S market. Most notably, the option of CS as a surgical procedure has greatly enhanced the lives of both the mother and her newborn in cases of high-risk

pregnancies. Nevertheless, the augmentation of CS has also elicited a plethora of challenges especially in cases where women opt for multiple operations of CS [4–7].

Among the most fatal consequences connected with repeated CS it is opportunistic to note on the existence of intra-abdominal adhesions [8]. They are bands of scar tissue that developed between them, bodies, and tissues in effort to repair surgical wounds. These adhesions occur when the peritoneum, which is the membrane that covers the walls of the abdominal cavity and most of the organs within it, is damaged during a CS; this then triggers an inflammatory response within the peritoneal chamber. Even though scar tissues may develop after virtually any abdominal surgery, they pose a major concern in cases of multiple cesarean sections. These adhesions can tether the uterus to the nearby organs including the bladder, bowel or the anterior abdominal wall or fascia which make future surgeries harder [9–12].

A significant subject concerning intra-abdominal adhesions is the relationships between them and the subsequent surgery procedures [13]. Endometrial adhesions may hinder the surgeons to have a clear view of the uterus; thereby, requiring longer time for the surgery and exposing the patient to more dangers of post-surgical complications. For instance they may include formation of dense and extensive adhesions might hinder visualization of anatomic planes of dissection jeopardizing the safety of the procedure while dealing with tissues, and put at risk the neighboring organs. This may lead to serious operative catastrophes like injury to the bladder or bowel, massive hemorrhage and, in fact, higher incidences of PPH. Furthermore, adhesions may pose a threat to the successful feto-extraction particularly where the operation is done in an emergent basis with time as a key consideration [8, 9, 13, 14].

The extent to which intra-abdominal adhesions formed in the patients varied significantly. Some women had only slight filmy bands of adhesions that could be easily peeled off after surgery, while others had developed “white” heavy thick Corbyn cords of adhesions, which are difficult to deal with. Several factors such as previous operations, length of inter-pregnancy interval and infections as well as inflammatory processes determine the likelihood of developing an adhesion. Patients with multiple previous CS have significant adhesive disease and this complicates repeat surgery [1, 2, 6, 15].

Intra-abdominal adhesions are postsurgical complications, with intraperitoneal transport (URP) being one of the causes, as well as secondary caesarean births. These bonding can lead to longer durations of surgeries with high rates PPH, which is dangerous for the mother. Longer hospital stays, requirement for blood transfusion and post-operative infections of the surgical site have all been associated with adhesions. Moreover, rise in health costs and surgery risk owing to adhesion squeezes facilities resources of healthcare agencies. The increase in rates of cesarean section throughout the world underlines that these issues are becoming increasingly pertinent for practicing obstetricians and gynecologists [13, 16, 17].

## **Methods**

### **Study design**

A study was conducted in a hospital in the Department of Obstetrics and Gynecology , from January 2013 to November 2013. A total of 120 pregnant patients who underwent a cesarean section and reported to the hospital with abdominal distension were included in the study. The demographic data of the patients were recorded. The patient's previous medical records and ANC records were analyzed. The data collection involved reviewing patient records to gather information on demographic characteristics, gestational age, the presence and type of intra-abdominal adhesions, surgical details, and postoperative outcomes. Two surgeons blind to each other evaluated the data.

By analyzing data retrospectively, the study aimed to identify patterns and associations between intra-abdominal adhesions and various patient and surgical factors. The researchers focused on comparing the duration of surgery between patients with and without adhesions, as well as among those with different types of adhesions (fimsy versus dense). The study also explored the prevalence of adhesions in relation to patient characteristics, such as age and gestational age, and examined the impact of adhesions on maternal complications, particularly postpartum hemorrhage (PPH).

The retrospective nature of the study allowed for the inclusion of a diverse patient population, providing a broad perspective on the clinical implications of intra-abdominal adhesions. However, as with all retrospective studies, the findings are limited by the availability and accuracy of the existing records and the inability to control for all potential confounding factors that may influence the outcomes. Despite these limitations, the study provides valuable insights into the significant role that intra-abdominal adhesions play in surgical and maternal outcomes, emphasizing the need for careful preoperative assessment and management of these adhesions to improve patient care.

### **Inclusion criteria**

All pregnant patients who underwent cesarean section in the past irrespective of the type of surgery and women with a previous history of cesarian and no history of abdominal surgery are included in this study. Patients who provide informed consent are also included.

### **Exclusion criteria**

All patients who underwent cesarian for the first time irrespective of the type of surgery and patients with a previous history of abdominal surgery other than cesarian are excluded. Patients who do not provide informed consent and who do not follow up the study are excluded.

### **Statistical analysis**

The data collected from each participant was consolidated into a thorough Excel spreadsheet to facilitate easy organising and analysis. The study employed SPSS 27 for rigorous analysis and utilised MS Excel for calculations. The discrete data was represented by its frequency, while the continuous data was represented by its mean value and standard deviation.

**Results**

Table 1 represents the age and gestational age of the patients. The table presents the distribution of the study population based on age and gestational age. In terms of age, the majority of the participants were between 26-30 years old, comprising 41.6% of the population. This was followed by participants aged 31-35 years, who made up 29.16% of the group. A smaller proportion of the population fell within the 21-25 years age range, accounting for 20.8%, while only 8.3% of the participants were over 35 years old. Regarding gestational age, the majority of the pregnancies were carried to full term, with 75% of the participants delivering between 37 and 40 weeks of gestation. The remaining 25% of the population delivered preterm, between 32 and 36 weeks of gestation. This data highlights that most of the study population consisted of women in their late twenties to early thirties, with the majority delivering at full-term gestational ages.

**Table 1: Age and gestational age of the study population**

<b>Variable</b>	<b>Category</b>	<b>n</b>	<b>%</b>
<b>Age</b>	21-25 yrs	25	20.8%
	26-30 yrs	50	41.6%
	31-35 yrs	35	29.16%
	>35 yrs	10	8.3%
<b>Gestational age</b>	<b>Category</b>	<b>n</b>	<b>%</b>
	32 - 36 weeks	30	25%
	37 - 40 weeks	90	75%

Figure 1 represent the presence and the type of intra-abdominal adhesion. In 41.6% of the patients show intra-abdominal adhesions and in 58.3% of patients it is absent. In 25% of the patients dense type of adhesion is seen, 16.6% of the patients filmy type is present.

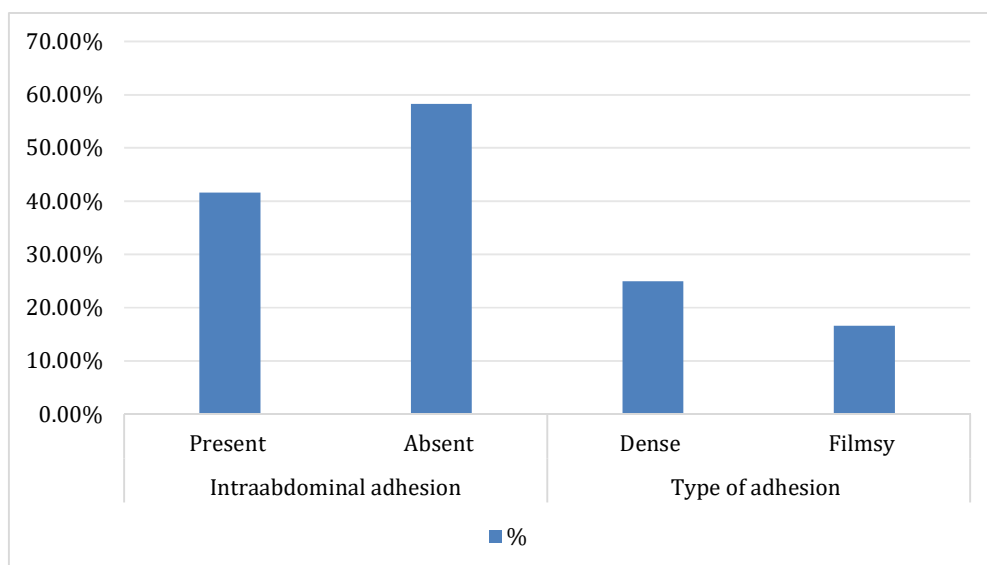


Figure 1 : Presence of intraabdominal adhesions among the patients

Table 2 represents the prevalence of intra-abdominal adhesions with characteristics of patients and maternal complications. The intra-abdominal adhesions are present in patients aged  $\leq 30$  yrs (58%) and  $> 30$  years (42%) and mostly seen in 37-40 weeks of gestational age (76%). Emergency surgery is needed in 66% of the patients with intra-abdominal adhesions. 20% of the patients with intra-abdominal adhesions have post-partum complications like atonic PPH which has a significant association with intra-abdominal adhesions with a p-value of 0.01. The comorbidities are seen in 47.1% of the patients.

**Table 2: prevalence of intra-abdominal adhesions with patient characteristics and maternal characteristics using chi-square test**

	Category	Present	Absent	P-value
Age	$\leq 30$ yrs	29 (58%)	45 (64.3%)	0.37
	$> 30$ yrs	21 (42%)	25 (35.7%)	
Gestational age	32-36 weeks	12 (24%)	18 (25.7%)	0.89
	37-40 weeks	38 (76%)	52 (74.3%)	
Postpartum complication	Atonic PPH	10 (20%)	0 (0%)	0.01*

	None	40 (80%)	70 (100%)	
Elective/emergency type	Emergency surgery	33 (66%)	43 (61.4%)	0.74
	Elective surgery	17 (34%)	27 (38.6%)	
Comorbidity	Present	21 (42%)	33 (47.1%)	0.75
	Absent	29 (58%)	37 (52.9%)	

Table 3 compares the duration of surgery with the intra-abdominal adhesions and its type. The table compares the mean duration of surgery in patients with and without intra-abdominal adhesions, as well as among those with different types of adhesions (flimsy or dense). The results indicate that the mean duration of surgery was significantly longer in patients with adhesions, averaging 134.78 minutes with a standard deviation of 21.67, compared to 96.34 minutes (SD = 13.45) in those without adhesions. The mean difference in surgery duration between these two groups was 45.78 minutes, with a statistically significant p-value of less than 0.001. Furthermore, when examining the type of adhesions, surgeries involving flimsy adhesions had a mean duration of 142.56 minutes (SD = 23.78), which was longer than those involving dense adhesions, with a mean duration of 123.45 minutes (SD = 14.56). The mean difference here was 21.78 minutes, also statistically significant with a p-value of 0.02. In terms of the dimension of adhesions, patients with flimsy adhesions had a mean adhesion dimension of 5.45 (SD = 2.1), compared to 4.56 (SD = 2.0) in those with dense adhesions. This difference in dimension was 1.76, with a p-value of 0.01, indicating a statistically significant difference between the two types of adhesions.

**Table 3: Comparison of the mean duration of surgery and the presence or absence and type of intra-abdominal adhesion**

Variable	Adhesion	N	Mean	SD	Mean difference	P-value
Duration of surgery	Present	50	134.78	21.67	45.78	<0.001*
	Absent	70	96.34	13.45		
Duration of surgery	Filmsy	20	142.56	23.78	21.78	0.02*
	Dense	30	123.45	14.56		
Dimension of adhesion	Filmsy	20	5.45	2.1	1.76	0.01*
	Dense	30	4.56	2.0		

### Discussion

Intra-abdominal adhesions that occur as a result of CS are frequent and complex, and their impact on both the surgery and the mother's condition is significant, especially with regards to the reoperation[18]. Given the fact that the global rate of CS is steadily increasing due to factors related to patient choice and medical necessity, the role of adhesions in complicating subsequent obstetric care cannot be underestimated. These bands of scar tissues that develop between organs and tissues are a result of the healing mechanisms that occur in the body following abdominal surgery. Despite the fact that adhesions may develop after virtually any abdominal surgery, they represent a major issue in the case of multiple cesarean deliveries[4, 6, 19].

The formation of the intraabdominal adhesions alters the subsequent surgeries in the following ways. Speaking about the most significant obstacles, one can point to the problem of gaining access to the surgical area. This problem is worsened when there are thick and widespread post-surgery adhesions; this hinders the identification and dissection of the different planes. This not only increases the time it takes to complete the surgery but also increases the danger of harming other organs in the neighborhood, including the bladder or bowel. Such complications can yield severe intraoperative problems like those concerning excessive bleeding and escalated incidents of PPH, which is a major cause of maternal morbidity and mortality. Adhesions are complex structures, and the surgeries of which are complicated further with their presence; it requires a high level of surgical expertise and results in the prolonged healing of patients[4, 8, 9, 11].

However, it is important to acknowledge the fact that intra-abdominal adhesions among patients form differently complicating the management of 'multiple' CS. Nonetheless, the scars that may form in some women are only thin, filmy adhesions that should not take surgeons much time to remove. There will be those who will develop thick and leathery adhesions which could be more problematic. Other things that determines formation of adhesions include the previous surgeries, the interval between pregnancies, and existence of inflammatory diseases or infections. The most vulnerable to severe adhesions are the women, who have had multiple prior cesarean sections, as such scars make subsequent surgeries much more difficult[1, 2, 12].

Abdominal adhesions don't affect only people who are getting operated on and those directly involved. This has been associated with a prolonged hospital stay, greater need for blood trans- fusion and increased susceptibility to post-operative infection etc. It also takes longer to work with and is more severe, leading not only to higher healthcare costs but placing greater pres- sure on health systems. These are issues, considering the continuously increasing global rate of cesarean sections on our specialty, which should matter to obstetricians. The treatment of ad- hesions, in this view, should influence not only the health care system but surgery outcomes.[3, 7, 13, 15, 17].

This is very important since intra-abdominal adhesions have undesirable effects that may be experienced if they occur. It can be done by efficient dissection during the first cesarean section, the usage of preventive adhesion barriers, proper timing of further pregnancies, and pre-surgery imaging to evaluate the risk, increasing the pregnant woman's chances of multiple cesarean sections.[3, 4, 12, 14].

### **Conclusion**

The conclusion of the study is that intra-abdominal adhesions are prevalent in a significant portion of patients undergoing surgery, particularly among those requiring emergency procedures and those at full-term gestational ages. These adhesions are associated with longer durations of surgery, with flimsy adhesions leading to even longer operative times compared to dense adhesions. Additionally, the presence of intra-abdominal adhesions is significantly correlated with postpartum complications, such as atonic postpartum hemorrhage (PPH), highlighting the clinical importance of managing and addressing adhesions to improve surgical outcomes and reduce complications. Intra-abdominal adhesions that are a result of ceserian section is the most intricate problem globally. It is mostly seen in 37-40 weeks of gestational age. They cause difficulty while performing surgery, that increase the duration of the surgery. The duration of surgery is longer in flimsy adhesions. The flimsy adhesions are significantly have arger dimensions. The clinical contribution of this study lies in its identification of the significant impact that intra-abdominal adhesions have on surgical outcomes and maternal complications. By highlighting that intra-abdominal adhesions are associated with longer surgical durations and a higher incidence of postpartum complications such as atonic postpartum hemorrhage (PPH), the study provides valuable insights for healthcare providers.

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