

Factors contributed to dehiscence of uterine scar in women with previous one cesarean section

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ABSTRACT

A caesarean section is often done when vaginal birth might jeopardize the baby's or mother's life or health, however it has been performed on request in recent years. The rate has grown to at least 25%. One of the serious complications after cesarean section is development of uterine dehiscence scar. To assess the possible causes of dehiscence scar in pregnant ladies with previous one cesarean section. Observational cross-sectional prospective study, carried out from the beginning of January 2020 to December 2020, at Elwiya Maternity Teaching Hospital - Baghdad. Two hundred fifty patients were enrolled in the study, full history was taken regarding their previous scar, and they were fully assessed regarding current pregnancy and all patients were followed up during cesarean section and afterwards. The rate of dehiscence scar was (12%). It is found that the rate was significantly inversely related to the time space between pregnancies; higher incidence of dehiscence scar in those women whose interpregnancy interval was 6 months or less while the lowest incidence in those whose interpregnancy interval was ≥ 12 months. Significant relationship has been found with the type of hospital, as women whose previous cesarean section was performed at the general hospitals were less likely to have dehiscence scar than those at private hospital, with gestational age of ≤ 36 completed weeks in both the previous and the current cesarean section and with the trial of labor before performing cesarean section. Failure of progress is an important risk factor associated with uterine scar dehiscence. Cesarean sections performed at or before 36 completed weeks gestation in the previous pregnancy were associated with higher rate of uterine scar dehiscence in the current pregnancy. Previous cesarean sections performed in private hospitals were associated with higher rate of uterine scar dehiscence in the current pregnancy.



1. Introduction

Cesarean delivery has increased in popularity over the last several decades, generating a variety of contentious questions, including the optimal pace, what constitutes a sufficient indication, and what is the ideal procedure. Transverse incisions with a typical low-segment accounts for most of all uterine incisions [1]. A double layer approach is the most effective method for sealing the uterus after cesarean procedure. The National Institute of Clinical Excellence (NICE) endorses this approach [2], citing evidence demonstrating a four- to sixfold increase in the risk of uterine rupture in women who previously had a single layer closure during pregnancy [3]. Regardless of whether a single- or double-layer closure is used, the suture material should be a short-term absorbable type [4] (such as polyglycolic acid or polyglactin) to avoid thread loops staying in the pelvis longer than necessary when the uterus involutes postnatally and sutures loosen. Both uterine angles should be properly identified and sutured.

To ensure effective hemostasis of the incision in a single layer during single-layer repair of the low-transverse uterine incision, the surgeon must ensure that all layers of incised myometrium are included while avoiding excess decidua and serosa [5]. The first layer of a two-layer closure incorporates the deep myometrial margin with little decidua. Suturing the uterus continuously, which is more hemostatic, may result in a reduction in blood supply [6]. Tissue healing (or tissue repair) is the process by which the body replaces injured tissue with healthy tissue [7]. It is comprised of two critical components: regeneration and repair. The two are distinguished by the resulting tissue. In regeneration, damaged specialized tissues are replaced by the growth of unharmed specialized cells in the surrounding area. When damaged tissue is repaired, it is replaced with granulation tissue that grows to produce scar tissue. The simplest method to explain the healing process (REPAIR) is to break it down into major phases that are not mutually exclusive and overlap significantly. While there are other methods to 'split up' the complete process, the typical division into four stages is bleeding, inflammation, proliferation, and remodeling [8]. The difficulty of obtaining serial samples of the hysterotomy scar significantly limits our understanding of what occurs during postpartum remodeling of the uterine incision after cesarean delivery. As a consequence, nothing is known about the regeneration of uterine scar tissue after surgery. For example, nothing is known about whether the mammalian myometrium includes reserve cells that develop into myometrial myocytes to permit scarless uterine regeneration [9]. The injured tissue is patched rather than restored to its original structure in the majority of mammals (i.e. repair). Even when complete healing occurs, the fibro-proliferative response dominates wound repair, and thus a fibrotic scar persists [10]. The process by which a human cesarean scar heals continues to be a source of contention and intense speculation. In 1921, Williams asserted that the uterus heals through muscular cell regeneration and that scarring occurs only in cases of secondary repair [11]. The majority of fenestrations or incomplete uterine ruptures are asymptomatic and may appear quite subtle at first. They may be observed during subsequent cesarean sections or laparotomies [12]. Inadequate scarring during a cesarean section has become one of the prominent problems of this procedure. It is uncertain what causes and how partial scar healing occurs, as well as the degree to which this leads in functional uterine insufficiency. As more women receive transvaginal ultrasonography, the shape of section scars has come under close study [13]. The purpose of this study was to determine the factors that contribute to dehiscent scar formation in pregnant women who have already had one cesarean section.

2. Patients and Methods

Cross-Sectional prospective study carried out during the period from the 1st of Jan. to Dec. 2014 at Elwiya

Maternity Teaching Hospital- Baghdad. The study protocol was approved by Obstetrical & Gynecological committee of Iraqi Board of Medical Specialization and hospital administration. Two hundred fifty pregnant ladies with history of previous one lower segment cesarean delivery were enrolled in the study after taking informed consent from them. Full history was taken regarding their previous scar, and they were fully assessed regarding current pregnancy and followed up during cesarean section and afterwards, as selection of cases was on Sunday, Monday, Tuesday, and Thursday each week. All patients were followed during labor and cesarean section regarding indication of cesarean section, intra operatively the patients were properly assessed for any complication like adhesion, bleeding, site and type of previous scar, extension, presence of dehiscence of scar, amount and color of liquor as well as fetal outcome and maternal outcome were all determined. And all cases were followed for 48 hours after delivery to detect any post-operative complication.

3. Results

A total of 250 pregnant lady were enrolled in the study with a mean age of 26.5 ± 5.9 (range: 16 – 49) years, 17.6% of the women aged 20 years or less, 64.8% aged 21 – 30 years and 17.6% aged 31 – 40 years and more. Regarding the gravidity, 174 women (69.6%) were gravida 2, while 47 women (18.8%) were gravida 3-4 and only 29 women (11.6%) were > 4 gravida. Majority of women; 194/250 (77.6%) were para one, 29 (11.6%) para two, and 27 (10.8%) para three and more. For the type of hospital, 105 women (42%) performed their previous cesarean sections in general hospitals while 145 women (58%) in private hospitals. History of hypertension was found in 26 women (10.4%), diabetes in 5 women (2%), anemia and DVT in 2 women (0.8%) for each. All these findings are demonstrated in table 1.

Table 1. Demographic characteristics

Variable	No.	%
Total number	250	100.0
Age (years)		
	≤ 20	17.6
	21-30	64.8
	31-40 ⁺	17.6
	<i>mean ± SD</i>	26.5 ± 5.9
	<i>range</i>	16 - 49
Gravidity	2	69.6
	3 - 4	18.8
	> 4	11.6
Parity	1	77.6
	2	11.6
	≥ 3	10.8
Hospital of previous scar	General	42.0
	Private	58.0
Previous diseases	Hypertension	10.4
	Diabetes mellitus	2.0
	Anemia	0.8
	DVT	0.8

3.1 Women characteristics in the previous cesarean section

At the previous cesarean deliveries the mean gestational age was 37.1 ± 1.6 weeks, on the other hand, 33 women (13.2%) had gestational age of ≤ 36 weeks (preterm) while 217 women (86.8%) had > 36 weeks of gestation. Additionally the order of the delivered baby at that cesarean was the first in 212 women (84.8%),

the second or third in 24 women (9.6%) and it was the fourth or more in 14 women (5.6%), (table 2).

Table 2. Gestational age and order of babies delivered in the previous cesarean

Variable		No.	%
Gestational age (weeks)	≤ 36	33	13.2
	> 36	217	86.8
	<i>mean ± SD</i>	37.1 ± 1.6	–
	<i>range</i>	30 - 42	–
Order of baby	First	212	84.8
	Second or Third	24	9.6
	Fourth or more	14	5.6

The indications and types of the previous cesarean are shown in table 3, where cephalopelvic disproportion was the more frequent indication in 55 women (22.0%) followed by failure of progress in 46 (18.4%), postdate in 32 (12.8%), malpresentation (breech and transverse) in 31 (12.4%) while antepartum hemorrhage and infertility were the least frequent; in 5 women (2%) for each. Regarding the type of cesarean delivery, it was elective in 136 women (54.6%), emergency cesarean with trial in 72 (28.9%) and emergency cesarean without trial in 41 (16.5%).

Table 3. Indications and types of the previous cesarean delivery

Variable	No.	%
Indication		
Cephalopelvic disproportion	55	22.0
failure of progress	46	18.4
Post date	32	12.8
Malpresentation	31	12.4
Fetal distress	24	9.6
Request	22	8.8
PET	8	3.2
Twin pregnancy	7	2.8
Infertility	5	2.0
Antepartum hemorrhage	5	2.0
Others	15	6.0
Type		
Elective	136	54.6
Emergency with trial	72	28.9
Emergency without trial	41	16.5

Table 4 shows that among the 250 women of the study 210 (84%) got alive baby as an outcome of their previous cesarean sections, on the other hand 31 delivered babies (12.4%) needed admission and, unfortunately, 9 babies (3.6%) still birth.

At the same table it can be noticed that 189 women (75.6%) had no complication, while the reported complications were fever in 34 women (13.6%), infected wound in 21 (8.4%) and postpartum hemorrhage in only 6 women (2.4%).

Table 4. Fetal outcome and maternal complication in the previous cesarean

Variable	No.	%
Fetal outcome		
Alive	210	84.0
Admitted to NCU	31	12.4
Still birth	9	3.6
Maternal complication		
None	189	75.6
Fever	34	13.6
Infected wound	21	8.4
Postpartum hemorrhage	6	2.4

This study showed there is no relationship between dehiscence scar in current cesarean and fever post cesarean delivery this is inconsistent with study conducted by [14] as they found postpartum fever after cesarean delivery is associated with an increased risk of uterine rupture.

3.2 Women characteristics in the current cesarean section

As shown in table 5, gestational age of the current cesarean delivery was ≤ 36 weeks in 35 women (14.0%) and > 36 weeks in 215 (86%) with a mean of 38.2 ± 1.9 weeks (range: 29-41). Inter pregnancy interval between pregnancies was ≤ 6 months in 61 women (24.4%), $>6-12$ months in 97 women (38.8%) and more than 12 months in 92 women (36.8%).

Table 5. Gestational age and inter pregnancy interval of pregnancies at the current cesarean delivery

	No.	%
Gestational age (weeks)		
≤ 36	35	14.0
> 36	215	86.0
<i>mean \pm SD</i>	38.2 ± 1.9	–
<i>Range</i>	29 - 41	–
Interpregnancy interval (months)		
≤ 6 months	61	24.4
$>6-12$ months	97	38.8
> 12 months	92	36.8

Table 6 demonstrates the indications and types of the current cesarean delivery, fetal distress was the indication for cesarean in 57 women (22.8%), FOP in 45 (18.0%), cephalopelvic disproportion in 38 (15.2%) contractions with tender scar in 28 women (11.2%) and post date in 25 women (10%), and the least frequent indications were twin pregnancy and oligohydramnios, (2.4%) for each.

The distribution of types of the current cesarean delivery revealed that elective cesarean performed in 81 women (32.4%), while emergency in 169 women (67.6%), from other point of view, 89 (52.7%) of emergency cesarean sections were performed without trial, 15 (8.9%) with less than two hours trial, 41 (24.3%) with 2-4 hours trial and 24 (14.2%) with more than 4 hours trial, (Table 6).

Table 6. Indications and types of the current cesarean delivery

Indication	No.	%
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Fetal distress	57	22.8
Failure of progress	45	18.0
Cephalopelvic disproportion	38	15.2
Contractions with tender scar	28	11.2
post date	25	10.0
Malpresentation	19	7.6
Antepartum hemorrhage	10	4.0
Twin pregnancy	6	2.4
oligohydramnios	6	2.4
Others	16	6.4
Type		
Elective	81	32.4
Emergency	169	67.6
Emergency (n=169)		
Without trial	89	52.7
<2hours	15	8.9
2-4hours	41	24.3
>4hours	24	14.2

As it shown in table 7, no operative complications had been developed in 192 women (76.8%) in the current cesarean delivery. Dehiscent scar was observed in 30 women (12.0%), adhesions were 22 (8.8%), extensions in 4 women (1.6%), and ruptured uterus reported in 2 women (0.8%). Fortunately, none of the women had bleeding. Regarding the liquor characteristics, it was clear in majority of studied group; 217/250 (86.6%), but it was stained in 16 (6.4%) and bloody in 17 women (6.8%). Additionally, the liquor amount was normal in 191 women (76.4%), increase in 6 women (2.4%) and decreased in 53 (21.2%). The 182 babies (72.8%) delivered in the current cesarean were alive, 64 (25.6%) needed admission to NCU and, unfortunately, 4 still birth (1.6%).

Table 7. Operative complications, liquor characteristics and fetal outcome of the current cesarean delivery.

Variable		No.	%
Operative complication	None	192	76.8
	Dehiscent	30	12.0
	Adhesion	22	8.8
	Extension	4	1.6
	Rupture uterus	2	0.8
	Bleeding	0	0.0
Liquor color	Clear	217	86.8
	Stained	16	6.4
	Bloody	17	6.8
Liquor amount	Normal	191	76.4
	Increase	6	2.4
	Decrease	53	21.2
Fetal outcome	Alive	182	72.8

	Admitted to NCU	64	25.6
	Still birth	4	1.6

In the current study, rate of dehiscence scar was (12%). In a study conducted by [15] it was 0.6%. Another study conducted in Kallayanpur / Bangladesh by [16] all pregnant mothers who underwent either emergency or elective cesarean section with history of previous one cesarean sections were included in their study, the incidence of scar dehiscence was (3.33%). Our study showed that the incidence of ruptured uterus in women with previous one cesarean section is (0.8%), which is consistent with rates of national guidelines such as WHO which quote perceived risk of uterine rupture in a woman with one previous caesarean as (1.0%) at 2005, and ACOG which quote perceived risk as (0.5-0.9%) at 2010 [17]. In the setting of a large Irish maternity hospital adhering to strict guidelines for TOLAC, uterine rupture rate was 2/1000 women overall, and 1/1000 for women in spontaneous labor who haven't receive oxytocin augmentation [18]. In our study we found 33% of dehiscence had scar tenderness which was inconsistent with [16] study that showed only (2.5%) patients with scar dehiscence suffered associated complaint of scar tenderness. According to HS Gaikwad, scar tenderness has a sensitivity of 92.3 percent and a specificity of 3.8 percent as a predictor of scar problems. As a result, scar sensitivity is a sensitive indication of scar problems and should be elicited in all women having trial of labor after a prior caesarean surgery [19].

3.3 Relationship between dehiscence scar and other studied factors

For the analysis of the relationship between Dehiscence scar and other variables in the current study, the women distributed into two groups, those with Dehiscence scar and those without, according to this distribution women with Dehiscence scar were 30 women indicated an incidence of Dehiscence scar of (12%) compared to those 220 women (88%) without dehiscence scar (included women without complications at all and those with other complications rather than Dehiscence scar), (Figure 1).

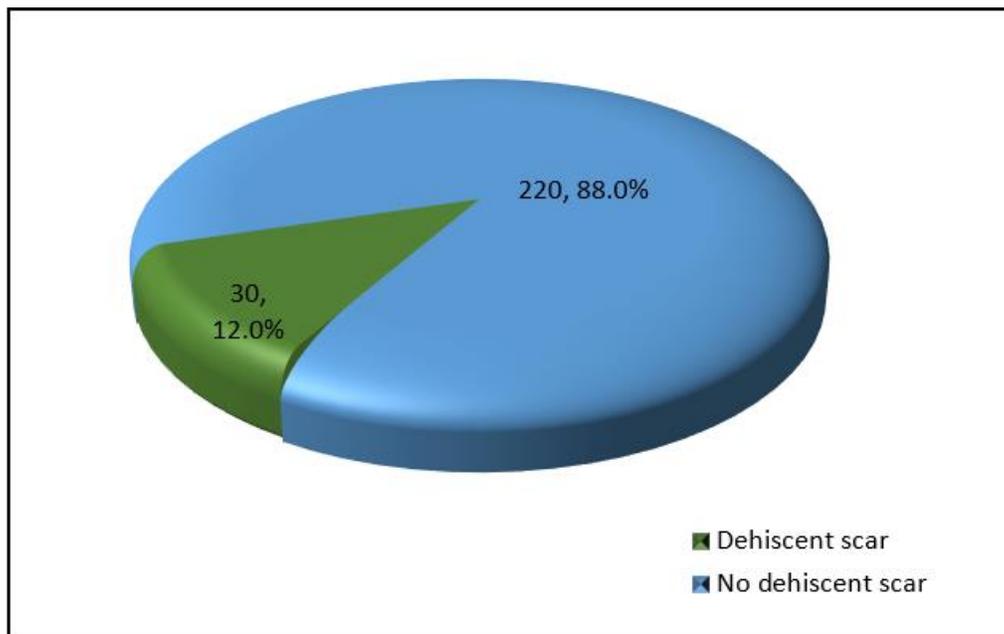


Figure 1. Distribution of studied group according to the dehiscence scar

3.3.1 Dehiscence scar and demographic factors (Table 8)

The cross-tabulation of dehiscence scar against demographic characteristics of the women revealed no significant relationship between the incidence of dehiscence scar and each of maternal age, gravidity, history

of abortion or previous maternal diseases, in all these comparisons, $P > 0.05$.

Conversely, it had been significantly found that the incidence of dehiscence scar was inversely related with the parity ($P=0.03$), where the lower incidence of dehiscence scar was reported in those women with ≥ 3 parities as compared to 10.3% in those with one parity and 27.6% in those with 2 parities, in other words, parity ≥ 3 was protective against dehiscence scar than parity < 3 , (Figure 2). Another significant relationship had been found with the type of hospital, where women whose previous cesarean section was takeover in the general hospitals were less likely to have dehiscence scar than those whose previous cesarean section was in private hospitals, the incidence was 6.7% vs. 15.9% respectively, ($P=0.027$), Figure 3

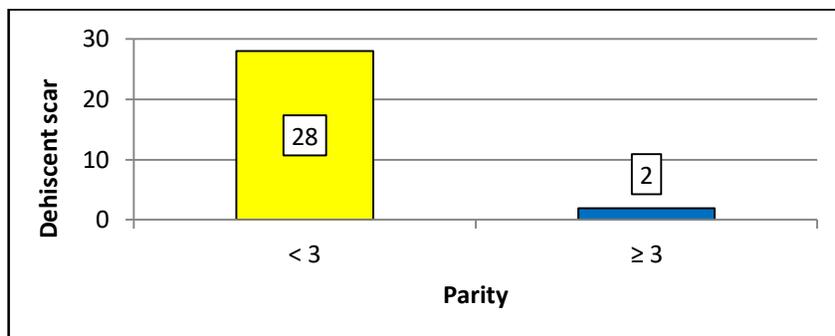


Figure 2. Distribution of dehiscence scar according to parity.

Table 8. Relationship between dehiscence scar and demographic factors

Variable		Dehiscence scar				P. value
		Yes		No		
		No.	%	No.	%	
Age (years)	≤ 20	6	13.6	38	86.4	0.51
	21-30	21	13.0	141	87.0	
	31-40 ⁺	3	6.8	41	93.2	
Gravidity	2	20	11.5	154	88.5	0.12
	3 - 4	9	19.1	38	80.9	
	> 4	1	3.4	28	96.6	
Abortions	Yes	3	7.3	38	92.7	fisher 0.43
	No	27	12.9	182	87.1	
Previous disease	None	27	12.6	188	87.4	0.48 F
	Hypertension	2	7.7	24	92.3	
	D.M	0	0.0	5	100.0	
	Anemia	1	50.0	1	50.0	
	DVT	0	0.0	2	100.0	
Parity 123	1	20	10.3	174	89.7	0.030 F
	2	8	27.6	21	72.4	
	≥ 3	2	7.4	25	92.6	
Type of hospital	General	7	6.7	98	93.3	0.027
	Private	23	15.9	122	84.1	

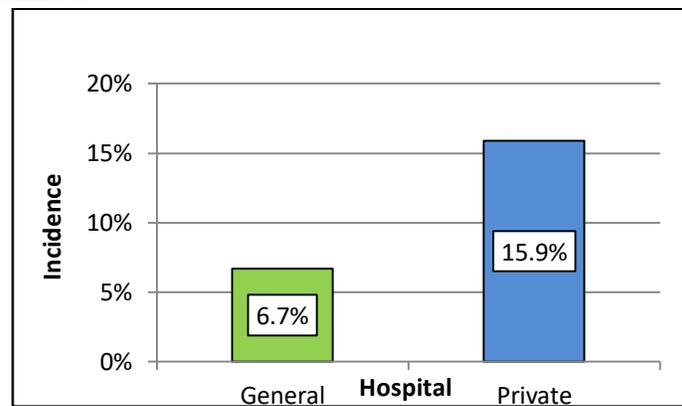


Figure 3. Comparison of incidence of dehiscent scar according to the type of hospital.

3.3.2 Dehiscent scar and factors related to the cesarean delivery (Table 9)

a. Gestational age:

Gestational age of ≤ 36 weeks completed weeks in both the previous and the current cesarean section was significantly ($P=0.002$) associated with higher incidence of dehiscent scar, where the incidence was 30.3% among those women whose previous cesarean section was at ≤ 36 completed weeks compared to 9.2% among those with > 36 weeks of gestation in the previous cesarean. Similarly, incidence of dehiscent scar section was significantly ($P=0.033$) higher in those delivered at gestational age of ≤ 36 weeks at the current cesarean section than those delivered at > 36 weeks of gestation.

b. Interpregnancy interval of pregnancies:

It had been significantly found that incidence of dehiscent scar was inversely related to the time space between pregnancies; higher incidence of dehiscent scar in those women whose interpregnancy interval was 6 months or less while the lowest incidence in those whose interpregnancy interval ≥ 12 months, 23% vs. 13 %, respectively, ($P=0.002$).

c. Trial of labor:

The incidence of dehiscent scar was significantly associated with the trials of labor, where the incidence increased significantly ($P=0.032$) with the higher number of hours of trials of labor, the incidence was 6.7% with less than 2 hours of trial, 9.8% with 2-4 hours and 29.2% with > 4 hours, (Figure 4).

Table 9. Relationship between dehiscent scar cesarean section related factors

Variable		Dehiscent scar				P. value
		Yes		No		
		No.	%	No.	%	
Gestational age at previous cesarean	≤ 36	10	30.3	23	69.7	0.002
	> 36	20	9.2	197	90.8	
Gestational age at current cesarean	≤ 36	8	22.9	27	77.1	0.033
	> 36	22	10.2	193	89.8	
Interpregnancy interval (month)	≤ 6	14	23.0	47	77.0	0.002
	$> 6-12$	4	4.1	93	95.9	
	> 12	12	13.0	80	87.0	
Trial of labor (hours)	< 2	1	6.7	14	93.3	0.032
	2-4	4	9.8	37	90.2	
	> 4	7	29.2	17	70.8	

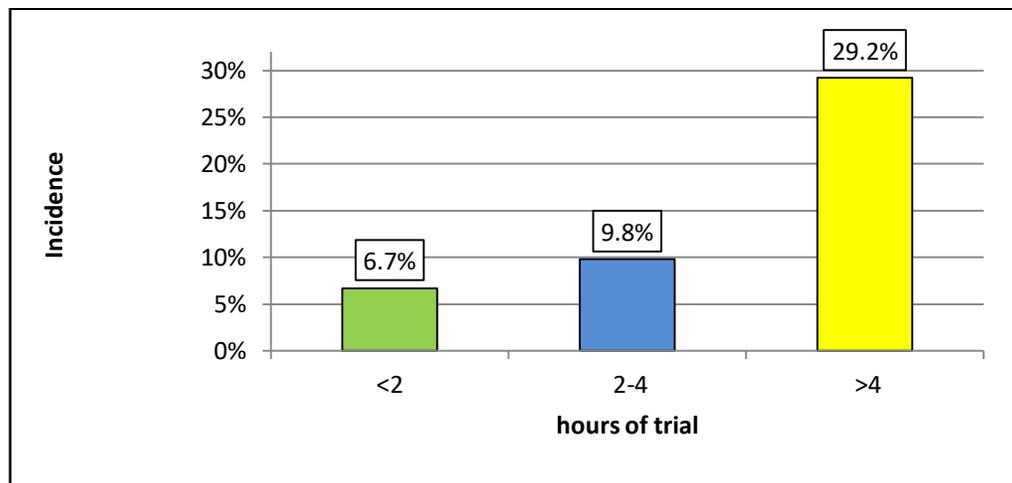


Figure 4. Comparison of incidence of dehiscence scar according to the number of trials of labor

4. Discussion

The current study was planned for due to rising rate of dehiscence scar in pregnant ladies with previous one scar, the rate of dehiscence scar in this study was (12%), on 1996 a study conducted by [15] it was 0.6% and on 2010, in Kallayanpur a study was conducted by [16] the incidence of scar dehiscence was (3.33%). Our study showed that the incidence of ruptured uterus was (0.8%), which is in consistent with rates of national guidelines as WHO reported risk of uterine rupture in a woman with one previous caesarean as (1.0%) at 2005, and ACOG reported risk of (0.5-0.9%) at 2010 [17]. Uterine rupture occurred at a rate of 2 per 1000 women in spontaneous labor who did not receive oxytocin augmentation at a big Irish maternity hospital with tight criteria for a trial of labor following caesarean procedure [18]. In this research, 33% of dehiscence patients complained of scar soreness, while [16] reported that only 2.5% of patients with scar dehiscence complained of scar sensitivity. On 2012, HS Gaikwad discovered that the sensitivity and specificity of scar tenderness as a predictor of scar complications were 92.3 percent and 3.8 percent, respectively, indicating that scar tenderness is a sensitive indicator of scar complications and should be elicited for all women undergoing trial of labor following previous caesarean section [19].

In this study we found that (22.0%) of primary caesarean section were done due to the cephalopelvic disproportion while failure of progress was the indication in 46 pregnant lady (18.4%) of primary caesarean section. Miller et al. (2013) discovered that the most quickly growing reason for primary caesarean delivery is maternal request, which has doubled in the last decade [20]. Aaron B. Caughey et al. concluded that labor arrest and abnormal or ambiguous fetal heart rate tracing accounted for more than half of all primary caesarean deliveries in their research group [20]. In current study in repeated caesarean delivery, fetal distress was the indication for caesarean in 57 cases (22.8%), failure of progress in 45 (18.0%), cephalopelvic disproportion in 38 (15.2%) contraction and tender scar with no cervical dilatation in 28 case (11.2%) and Postdate in 25 case (10%).

Fetal distress is a substantial cause of caesarean section in the United Kingdom (22%), presumably as a result of the procedures used to detect fetal impairment during labor. In contrast, fetal intolerance of labor has a minimal influence on the overall caesarean rate in the United States. However, and generally speaking, as electronic fetal monitoring has grown increasingly widespread, the caesarean section rate has increased [21]. Caesarean section is one of the most often performed major surgical procedures in the private sector and in private health care [22].

58% of our sample had their previous cesarean performed in private sector and significant rate has been found for dehiscence of uterine scar in current cesarean section among women whose previous cesarean section was performed in the private hospital. The significant difference between the general and private sectors demonstrated in this study may be based on the argument that doctors do not adhere to scientific guidelines regarding the timing and indications for cesarean sections, as well as the type of surgical sutures used, and they also perform cesarean sections at an earlier gestational age. Current study showed that gestational age of ≤ 36 completed weeks in the previous cesarean section was significantly associated with higher incidence of dehiscence of scar, this may be explained by the poorly developed lower segment at the time of performing the first cesarean section and also showed the incidence of dehiscence of scar was higher in women undergoing trial of labor at 2008 observed in patients with one previous cesarean delivery, that failure to progress and preterm labor were associated with uterine scar dehiscence [23]. It had been significantly found that incidence of dehiscence of scar was inversely related to the time space between pregnancies. A higher incidence of dehiscence of scar in patients whose interval between pregnancies was 6 months or less while the lowest incidence in those whose interval was ≥ 12 months, 23% vs. 13 %, respectively. Numerous studies have proven that the risk of rupture is inversely proportional to the time between the previous C/S and the subsequent pregnancy, and therefore considered as a risk factor for uterine scar dehiscence and rupture [24].

It is necessary to advise patients with scarred uterus to delay conception for many years, since the ratio of dehiscence and paper-like lower segment is strikingly low in women who give birth within a year after a C/S. This may correlate with the highest percentage of elective C/S in this group. This study reported no relationship between dehiscence of scar in current cesarean and fever post cesarean delivery this is inconsistent with study conducted by [14] as they found postpartum fever after cesarean delivery is associated with an increased risk of uterine rupture.

5. Recommendation

Don't do elective cesarean section before 39 weeks gestation unless there is other indication
Use the technique on scientific base and the sutures that are approved scientifically.

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