OPEN ACCESS

ORIGINAL ARTICLE

Changing Trends of Uterine Rupture Cases Over Three Decades

Laila Zeb[1], Salma Zeb[2], Sumaira Yasmeen[3]

[1]Associate Professor, Department of Obstetrics and Gynecology, Medical Teaching Institute (MTI), Lady Reading Hospital), [2]Peshawar, KPK Associate Professor, Department of Obstetrics and Gynecology, Medical Teaching Institute (MTI), Lady Reading Hospital, Peshawar, KPK Pakistan
[3]Department of Obstetrics and Gynecology, Medical Teaching Institute (MTI), Lady Reading Hospital Peshawar, KPK

Correspondence:
Dr.Laila Zeb
doctorlailazeb@gail.com

Abstract

Background: Uterine rupture is associated with significant maternal and neonatal morbidity and mortality.
Objective: The study described the causes of uterine ruptures concerning maternal morbidity and fetal outcomes. Causes of ruptured cases from the same setting were compared between the years 2001, 2011, and 2021.
Materials and Methods: A cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Lady Reading Hospital (LRH), Peshawar. Forty-three women who had been diagnosed with uterine rupture were included in the study. Information on age, parity, causes of rupture, surgical management, maternal morbidity, and outcome of the fetus, was recorded on a predesigned proforma. Repair procedures, STAH (subtotal abdominal hysterectomy), and internal iliac artery ligation were performed as per requirements.
Results: Sixty two 62.8% of women fell in the 35 years and above age group. Mostly (62.8%) were grand multigravida. The commonest cause of uterine rupture was mishandled labor by traditional birth attendants (44.2%) and followed closely by scar dehiscence (37.2%). The commonest procedure (58%) was STAH. Eighty one percent81.4% of women had no complications. Sixty seven percent (67.4%) of fetuses died due to complications and 32.6% survived. Causes 'mishandled by untrained attendants' (44.2%) and 'previous C-section scar' (37.2%) were recorded with increased percentages in 2021. More cases of direct trauma (8%) and obstructed labor (32%) were reported in the year 2001, as compared to other years.
Conclusion: The percentage of rupture of the uterus was lower (0.56%) in 2021, as compared to 2001 and 2011. The negligence of traditional delivery attendants contributed significantly to the mismanagement, resulting in morbidity and mortality in women and their fetuses. Complications should be checked if healthcare professionals scrupulously follow established standards and surgical procedures are conducted by a competent physician
Keywords: Bladder Repair, Grand Multigravida, Internal Iliac Artery Ligation, Scar dehiscence, Sepsis, STAH (Subtotal Abdominal Hysterectomy),

Cite this article: Zeb L,Zeb S,Yasmeen S,Changing Trends of Uterine Rupture Cases Over Three Decades. BMC J Med Sci. 2023. 4(2):68-73

Introduction

Uterine rupture during delivery is a serious condition with a high rate of fetal and maternal morbidity. As the fetus passes through the mother's birth canal, pressure develops with uterine contractions. This high pressure might rip the mother's uterus if the fetus is not delivered. It frequently rips along the scar from a prior cesarean birth. When the uterus ruptures, the contents of the uterus, including the fetus and placenta may pass into the mother's abdomen. Uterine rupture can be deadly for both the mother and the fetus in rare situations. Mother can lose her uterus and baby as well. The earliest signs and symptoms of uterine rupture are often ambiguous, making identification challenging and perhaps delaying decisive management.[1,2]Common causes of uterine rupture are grand multiparty, injudicious use of oxytocin, obstructed labor, second stage dystocia, previous cesarean section, malpresentation, instrumental delivery, and fetal macrosomia. Thus, in women with a prior uterine scar whose labor does not proceed, a repeat cesarean section might be considered. The research looked at the risk variables and pregnancy outcomes in women who had their uterus ruptured. In a multivariate analysis, the following characteristics were found to be independent

Authorship Contribution: [1,2,3]Substantial contributions to the conception or design of the work; or the acquisition, Final approval of the version to be published & Supervision, [3]Data analysis, Literature review, [4]Drafting the work or revising it critically for important intellectual content

Funding Source: none
Conflict of Interest: none

Received: June13, 2023
Accepted: sep 5 ,2023
Published: Dec 20,2023

risk factors for uterine rupture: prior cesarean section, malpresentation and dystocia during the second stage of labor. Women who suffered uterine rupture experienced higher postpartum hemorrhage, required more packed cell transfusions, and had more hysterectomies. When compared to normal delivery without any complication, neonates with Apgar scores of less than 5 at 5 minutes had a greater incidence of perinatal death. Uterine rupture is a substantial risk factor for maternal morbidity and neonatal deaths in underdeveloped countries.[3] A large, retrospective Canadian research found that trial of labor after a prior cesarean section was related to an increased risk of uterine rupture (by 0.56 percent), but fewer maternal fatalities than elective cesarean section.[4]

Uterine rupture is more common in developing nations than in developed countries. The majority of uterine ruptures in developed countries occur after a cesarean section. Uterine rupture is a significant obstetric complication with a high morbidity and death rate, especially in developing and underdeveloped countries. According to current figures for developed nations, the rate of uterine rupture is roughly 1% for women who have had a previous cesarean delivery, but it is extremely rare for women without previous cesarean section[4]. In general, the rates are less than one in a thousand. With readily available obstetric treatment, including a cesarean section for obstructed labor, rupture of the unscarred uterus should be uncommon. The incidence of uterine rupture in women who have had a previous cesarean section is critical in determining the long-term hazards of primary cesarean section4. In Nigeria, Ghana, Ethiopia, and Bangladesh, over 75% of cases of uterine rupture were related to an unscarred uterus. Maternal mortality varied up to 13%, whereas perinatal mortality ranged between 74-92%.[5-6]every year, 30,000 women in Pakistan die as a result of pregnancy and childbirth-related factors. This rise in incidence is ascribed to the failure of public health services and the poor quality of maternal health care. According to the National Health Survey of Pakistan, 89 percent of births take place at home, with traditional birth attendants doing 80 percent of them. The women with obstructed labor are not referred timely to a Health facility for proper management, which results in uterine rupture and associated complications. Other factors of increased maternal mortality include a delay in seeking care or reaching a hospital, as well as a delay in beginning treatment at the institution owing to a lack of skilled personnel, scarcity of medicine and blood products, and so on. People who reside in distant areas face delays in obtaining care owing to communication issues such as roads, telephones, and transportation. However, even for patients who lived close to the hospital, within one or two kilometers, delays in seeking care may occur owing to taboos and dread of surgery. When asked directly, about 90% of instances of the ruptured uterus was due to delayed seeking care for any reason. The current basic health units and rural health centers must provide 24-hour health services, and the TBA (traditional birth attendants) must be taught not to deliver women with the previous scar but to detect them and refer them at the appropriate time. A recent assessment of uterine rupture confined to women who have hadprevious cesarean section in industrialized nations found that women undergoing a trial of labor had an increased risk of uterine rupture and perinatal mortality when compared to elective repeat cesarean procedures.

[7-11]The present study described the causes of uterine ruptures, maternal morbidity, and fetal outcomes. We mentioned the prevalence of rupture causes and the resulting procedures performed at Lady Reading Hospital, Peshawar, KPK, Pakistan. The purpose of the study was to describe the causes of uterine ruptures in terms of maternal morbidity and fetal outcomes. Data on the causes of ruptured cases from the same hospital setting were compared in 2001, 2011, and 2021.Total deliveries, total C-sections, C-section rates, and ruptured uteruses were also compared.

Material and Methods

A cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Medical Teaching Institute (MTI) Lady Reading Hospital (LRH), Peshawar, from January 2021 to December 2021. Total delivery no was 7617 and total cesarean sections were 2017 in the year 2021.The study included all women who had been diagnosed with uterine rupture. The study was conducted after permission from the ethical committee. Information on age, parity, causes of rupture, and the procedure performed, maternal morbidity, and outcome of the fetus, was gathered on a predesigned clinical proforma. Informed consent was taken from patients, ensuring confidentiality and explaining the risk/benefits to the patient while taking part in this study. Data was analyzed with the statistical analysis program SPSS version 26. The Chi-square test was applied for comparison data on ruptured cases and causes. A p-value less than <0.05 was considered significant. Repair procedures and STAH

(subtotal abdominal hysterectomy) were commonly performed. Moreover, procedures with the following combinations: STAH+ internal iliac artery ligation, and STAH+bladder repair+ internal iliac artery ligation, was also performed wherever required. Dataon causes of ruptured cases from the same hospital setting were compared between the years 2001, 2011, and 2021. The data was compared for total deliveries, total C sections, C-section rates, and ruptured uteruses.

Results

The Causes for Uterine Rupture and the Surgical Procedure (the year 2021). Table II Highlights the causes and various surgical procedures to manage uterine rupture. The commonest cause of uterine rupture had been mishandled labor by traditional birth attendants (44.2%) followed closely by scar dehiscence (37.2%). The commonest surgical procedures performed were STAH (subtotal abdominal hysterectomy) in 58% of cases and 23.3% had STAH + internal iliac artery ligation.

Table III shows the maternal morbidity and fetal outcome. Eighty one% 81.4% of women had no complications.7%of

Table I: Age groups and parities of the patients (n=43)		
Age group	Frequency	%
18-25 years	5	11.6
26-35 years	11	25.6
>35 years	27	62.8
Parity of the patients	Frequency	Percent
Primigravida	3	7.0
Multigravida	13	30.2
Grand Multigravida	27	62.8

Table II: Cause of Uterine Rupture and Surgical Procedure Performed (n=43) [Data of the year 2021]

Causes of Rapture	frequency	%
Mishandling By Traditional Birth Attendants	19	44.2
Obstructed Labor	4	9.3
Direct Trauma	1	2.3
Instrumental Delivery	3	6.97
Scar Dehiscence	16	37.2
Procedure Performed	Frequency	%
Repair	6	14.0
STAH (Subtotal Abdominal Hysterectomy)	25	58
STAH +Internal Iliac Artery Ligation	10	23.3
STAH + Bladder Repair + Internal Iliac Artery Ligation	2	4.7

women had renal failure, 9.3% had sepsis and 2.3% had urinary incontinence. Perinatal mortality was 67.4%.

Table 4 provides a detailed comparison between causes of ruptured uterus reported in 2001, 2011, and 2021. The 'mishandledlabour by unskilled attendants 'and previous caesarean section still represent as major cause of uterine rupture. When compared to previous years, the

Table III: .Maternal Morbidity and Outcome of Fetus (n=43) [Data of the year 2021]

Maternal Morbidity	Frequency	%
Renal Failure	3	7.0
Sepsis	4	9.3
Urinary Incontinence	1	2.3
No Complications	35	81.4
Outcome Of Fetus	Frequency	%
Alive	14	32.6
Dead	29	67.4

Table IV: Causes of uterine rupture – comparisons between the years: 2001, 2011 and 2021

Causes	2001 (n=25)		2011 (n=56)		2021(n=43)	
	N	%	N	%	N	%
Mishandled by the unskilled birth attendant	10	40%	20	35.7%	19	44.2%
Direct Trauma	2	8%	2	3.57%	1	2.3 %
Obstructed Labor	8	32%	11	19.64%	4	9.3%
Instrumental Deliveries	2	8%	6	10.71%	3	6.97%
Previous caesarian section scar	3	12%	17	30.35%	16	37.2%

causes: 'mishandled by untrained attendants' (44.2%) and 'previous C-section scar' (37.2%) were recorded with increased percentages in 2021. More percentages of direct trauma (8%) and obstructed labor (32%) were reported in the year 2001, as compared to other years. However, instrumental deliveries were more (10.71%) in the year 2011.

Discussion

The present study analyzed the frequencies of causes of uterine ruptures concerning maternal morbidity and fetal outcomes. As per data forth year 2021, the majority of the included women were aged 35 and above accounting for 62.8 percent of the participants. The majority of these women (62.8 percent) were grand multigravida. The most prevalent cause of uterine rupture (44.2 percent) was mismanaged labour by traditional attendants, followed closely by scar dehiscence (37.2 percent). STAH (subtotal abdominal hysterectomy) was the most prevalent surgery in 58 percent of patients, with STAH +

internal iliac artery ligation accounting for 23.3 percent. Eighty one percent (81.4%) of women experienced no complications while 7% of the women suffered renal failure, 9.3% had sepsis, and 2.3 percent had urine incontinence. Twenty nine (67.4%) of the 43 fetuses died as a result of asphyxia related to uterine rupture while [14] (32.6%) survived. In 2001, 2011, and 2021, data on the causes of ruptured cases from the same hospital setting were also compared. Total deliveries, total C-sections, C-section rates, and uterine ruptures were all compared in the present study. A total of 25 rupture cases were reported in 2001, 56 in 2011, and 43 in 2021. The cause 'mishandled by unskilled attendants 'was reported at 40%, 35.7%, and 44.2%; obstructed labor was reported at 32%, 19.64%, and 9.3%; instrumental deliveries were reported at 8%, 10.71%, and 6.97%; and previous caesarian section scar was reported at 12%, 30.35%, and 37.2% in years 2001, 2011, and 2021, respectively. In 2021, the cases mishandled by inexperienced attendants' (44.2 percent) and 'prior C-section scar' (37.2 percent) were noted with higher percentages than in previous years. In 2001, the percentages of direct trauma (8%) and obstructed labor (32%), respectively, were higher than in previous years. However, instrumental deliveries were recorded at a higher rate (10.71 percent) in 2011.In 2011, a higher percentage (1.05 percent) of ruptured uterus was reported than in previous years. There was a significant difference between the reported data from 2001, 2011, and 2021.According to the comparative results of the present study, the percentage of ruptured uterus was lower (0.56%) in 2021, as compared to 2001 (0.64%) and 2011 (1.05%). Zeb L and Bibi (2013) [12]provided a comparative trend in frequency and causes of uterine rupture between 2001 and 2011 from the same setting (Department of Gynecology Obstetrics, Lady Reading Hospital .Peshawar). As per their findings, in 2011, there were a total of 5313 births, including 1229 cesarean sections. The average age was 35 years. A total of 56 uterine ruptures were reported. The prevalence of uterine rupture was 1.05 percent. Sixty percent of the patients had previously had a cesarean surgery. In 2001, there were a total of 3885 births, including 716 cesarean sections. There were 25 (0.64 percent) incidences of uterine rupture. The most prevalent cause of uterine rupture in grand multigravidas was obstructed labor. A threefold rise in the ruptured uterus was seen in connection with the scarred uterus, i.e., in 2001, 12% of patients with a ruptured uterus had scarred uterus, whereas 35.7 percent of cases had scarred uterus in 2021. Their findings were found to parallel with the research of Gilani and Hassan (2001), and Malik (2006)[13-14]. Malik (2006) 13reported 0.55% of rupture cases, and around 54% of cases of previous C-sections had section scar in women aged between 26-36 years. Setting were also compared. Total deliveries, total C-sections, C-section rates, and uterine ruptures were all compared in the present study. A total of 25 rupture cases were reported in 2001, 56 in 2011, and 43 in 2021. The cause 'mishandled by unskilled attendants 'was reported at 40%, 35.7%, and 44.2%; obstructed labor was reported at 32%, 19.64%, and 9.3%; instrumental deliveries were reported at 8%, 10.71%, and 6.97%; and previous caesarian section scar was reported at 12%, 30.35%, and 37.2% in years 2001, 2011, and 2021, respectively. In 2021, the cases mishandled by inexperienced attendants' (44.2 percent) and 'prior C-section scar' (37.2 percent) were noted with higher percentages than in previous years. In 2001, the percentages of direct trauma (8%) and obstructed labor (32%), respectively, were higher than in previous years. However, instrumental deliveries were recorded at a higher rate (10.71 percent) in 2011.In 2011, a higher percentage (1.05 percent) of ruptured uterus was reported than in previous years. There was a significant difference between the reported data from 2001, 2011, and 2021. In another recentPakistani retrospective study, Abrar et al. (2021) 15reported the frequency, risk factors, and fetal/maternal outcomes. They reviewed data on uterine rupture from Bannu, from 2016-to 2018. 46% of patients were in 31-40 years. The frequency of uterine rupture was 1.71 percent. Important etiological variables were: grand multiparty (35.2 percent), obstructed/neglected labor (32.9 percent), injudicious usage of oxytocin (31.8 percent), prostaglandins (14.7 percent), prior cesarean section (19.8 percent), and previous pelvic surgery (0.5 percent). In 80.6 percent of cases, a hysterectomy was performed, 19.2 percent of patients had a uterine repair, and 4.5 percent needed bladder repair. According to them, this is a higher incidence than the reported incidences from the same hospital in 2009. According to the Author this might be due to increased work load on the hospital due to military operations in Waziristan. They indicated poor maternal outcomes linked with prolonged surgery. In their setting, the majority of women had a hysterectomy as an emergency surgery with STAH was done in 45.4% of cases. However, less prevalence was reported in other developing countries like India (0.057%), and Tanzania (0.22%) in 2012 and 2015, respectively[16-17]. Qudsia et al.

(2012) 18reported that the frequency of ruptured uterus in the hospital was identified as 9/1000 deliveries. Important factors were: multiparty (42%), injudicious use of oxytocin (51.6%), obstructed labor (12.5%), and previous C-sections (18.8%). Rizwan et al. (2011)19, reported from Sindh, that the uterine rupture was 0.74% in 2008 in most of the cases (53.3%) with parity 2-4. Previous C-section scar was identified in 41.6% of cases. Gul (2004) 20reported 0.47% of uterine rupture prevalence in 2003 from Lahore General Hospital. She reported 3.3% maternal mortality and 60% fetal mortality. So results of our study are comparable to this study, although we had no maternal mortality in our retrospective analysis. Aboyeji et al. (2001) [21]studied the incidence, etiology, trend, and treatment of uterine rupture in Nigeria. There were 100 ruptured uteri among the 20,960 births over the research period, yielding a hospital rate of 1 in 210 deliveries. The most prevalent related variables were oxytocin usage (39%), uterine scar (23%), and obstructed labor (16%). In the study group, the uterine rupture was substantially related to poor socioeconomic status, lack of prenatal care, and high parity as compared to the controls. The maternal death rate was 13%, while the fetal mortality rate was 92%. A modest rise was observed as compared to the previous frequency of 1 in 298 births. A ruptured uterus is still a prevalent obstetric danger in contemporary society, and its prevalence appears to be increasing. The complication is strongly linked to advanced maternal age, grand multiparty, a lack of prenatal care, and the patients' poor socioeconomic condition[21]. Authors of Norway, Al-Zirqi et al. (2017) [22]reported that the complete uterine rupture occurred in 51 cases without prior cesarean birth and 122 cases with prior cesarean delivery. The biggest risk factor was sequential labor induction with prostaglandins and oxytocin. Other significant risk factor for women with and without prior cesarean birth was oxytocin-assisted labor. An interdeliveryinterval of 16 months and a previous cesarean delivery with significant postpartum hemorrhage enhanced the chance of rupture after a previous cesarean delivery.

In poor nations, maternal mortality and morbidity remain extremely high. The uterine rupture is a common cause if it is not managed urgently. The incidence of the ruptured uterus was observed to be decreasing in the current review study of 227 cases in year 2021compared to 2001 and 2011.Seventy one percent (71.4%) of the patients did not get prenatal care, and 48.4 percent had a previously scarred uterus. Prolonged labor was the most prevalent etiological cause. Uterine rupture is more frequent and sometimes deadly in resource-poor Sub-Saharan Africa[23]. Uterine rupture is a potentially fatal obstetric complication, with high rates of perinatal morbidity and mortality. Previous uterine surgery is the most common risk factor, and most incidences of uterine rupture occur in women who have had a previous cesarean birth. Although spontaneous rupture of the prim gravid uterus is an extremely unusual occurrence, a handful of such instances have lately been recorded. This may be related to overdose and misuse of Prostaglandins and Oxytocin for IOL24.Figueiró-Filho et al. [25]from Canada investigated maternal and perinatal risk factors for uterine rupture and dehiscence. A large cohort study found that distinct risk variables are related to either uterine rupture or dehiscence. Uterine rupture remains a significant concern to fetal-maternal health, and, contrary to popular assumptions, uterine dehiscence can potentially jeopardize perinatal outcomes.Zhu et al. (2021) investigated the ultrasonography characteristics of uterine scar dehiscence in Chinesepregnant women, as well as maternal and newborn outcomes. Preoperative identification of uterine scar dehiscence in women who have had previous cesarean deliveries aids in the prevention of maternal and neonatal morbidity and death. However, the most advantage may be acquired only by scanning at suitable intervals throughout pregnancy and accurately identifying the ultrasonographic signs of uterine scar dehiscence. Dehiscence of uterine scar tissue from a prior cesarean section is the most prevalent cause of uterine rupture. Fetal survival is particularly low in patients with uterine rupture.Sonographic evaluation of LUS scar and myometrial thickness (both with TAS and TVS) is a safe, reliable, and non-invasive method for predicting the risk of scar dehiscence/rupture.

Conclusion

According to the comparative results of the present study, the percentage of rupture of the uterus was lower (0.56%) in 2021, as compared to 2001 (0.64%) and 2011 (1.05%). When compared to previous years, the causes: 'mishandled by untrained attendants' and 'previous C-section scar' were recorded with increased percentages in 2021.The delivery by traditional birth attendants played a major role in the mishandling of the cases leading to morbidity and mortality in mothers and their fetuses. Caesarean scar dehiscence played a major contribution to the worse outcome. The primary caesarean section rate must be reduced to prevent future dehiscence of scar in trial of labour. Complications should be checked, if proper guidelines are meticulously followed by

health care providers and surgical procedures are performed by properly qualified and trained personnel. Uterine rupture is more common and has more significant implications in under developed nations. To solve the issue, novel approaches are required. Future studies on the prevalence of uterine rupture should distinguish between uterine rupture after a previous cesarean section and uterine rupture without a previous cesarean section.

References

1. Nahum GG, Pham KQ. Medscape. Uterine Rupture in Pregnancy. Available from: https://reference.medscape.com/article/275854-overview. 2018. Accessed on 10th May, 2022
2. Turner MJ. Uterine rupture. Best practice & research Clinical obstetrics & gynaecology. 2002 Feb 1;16(1):69-79.
3. Ofir K, Sheiner E, Levy A, Katz M, Mazor M. Uterine rupture: risk factors and pregnancy outcome. American journal of obstetrics and gynecology. 2003 Oct 1;189(4):1042-6..
4. Justus Hofmeyr G, Say L, Metin Gülmezoglu A. Systematic review: WHO systematic review of maternal mortality and morbidity: the prevalence of uterine rupture. BJOG: An International Journal of Obstetrics & Gynaecology. 2005 Sep;112(9):1221-8.
5. Hofmeyr GJ. Obstructed labor: using better technologies to reduce mortality. International Journal of Gynecology & Obstetrics. 2004 Jun;85:S62-72..
6. Björklund K. Minimally invasive surgery for obstructed labour: a review of symphysiotomy during the twentieth century (including 5000 cases). BJOG: an international journal of obstetrics and gynaecology. 2002 Mar 1;109(3):236-48.
7. Khan S, Parveen Z, Begum S, Alam I. Uterine rupture: a review of 34 cases at Ayub Teaching Hospital Abbottabad. Journal of Ayub Medical College Abbottabad. 2003;15(4).
8. Guise JM, McDonagh MS, Osterweil P, Nygren P, Chan BK, Helfand M. Systematic review of the incidence and consequences of uterine rupture in women with previous caesarean section. Bmj. 2004 Jul 1;329(7456):19.
9. Dodd J, Crowther C. Vaginal birth after Caesarean versus elective repeat Caesarean for women with a single prior Caesarean birth: a systematic review of the literature. Australian and New Zealand journal of obstetrics and gynaecology. 2004 Oct;44(5):387-91.
10. Wen SW, Rusen ID, Walker M, Liston R, Kramer MS, Baskett T, Heaman M, Liu S, Maternal Health Study Group, Canadian Perinatal Surveillance System. Comparison of maternal mortality and morbidity between trial of labor and elective cesarean section among women with previous cesarean delivery. American journal of obstetrics and gynecology. 2004 Oct 1;191(4):1263-9.
11. Bujold E, Gauthier RJ. Neonatal morbidity associated with uterine rupture: what are the risk factors?. American journal of obstetrics and gynecology. 2002 Feb 1;186(2):311-4.
12. Zeb L, Bibi S. Trends in frequency and causes of uterine rupture in a tertiary care center between year 2001 and 2011. Journal of Postgraduate Medical Institute. 2013 Jun 21;27(3).
13. Zeb L, Bibi S. Trends in frequency and causes of uterine rupture in a tertiary care center between year 2001 and 2011. Journal of Postgraduate Medical Institute. 2013 Jun 21;27(3).
14. Mustafa R, Mustafa R, Hashmi H, Jawed M. Emergency Obstetrical Hysterectomy. Journal of Bahria University Medical and Dental College. 2011 Jan 1;1(1):3-7.
15. Abrar S, Abrar T, Sayyed E, Naqvi SA. Ruptured uterus: Frequency, risk factors and feto-maternal outcome: Current scenario in a low-resource setup. Plos one. 2022 Apr 8;17(4):e0266062.
16. Kidantou HL, Mwampagatwa I, Van Roosmalen J. Uterine rupture: a retrospective analysis of causes, complications and management outcomes at Muhimbili National Hospital in Dar es Salaam, Tanzania. Tanzania journal of health research. 2012 Jul 1;14(3):220-5.
17. Aggarwal P, Terhase N. Unscarred uterine rupture: a retrospective study.Int JReprodContracept Obstet. 2015; 4(6):1997-2000
18. Qudsia QA, Akhtar Z, Kamran KH, Khan AH. Woman health; uterus rupture, its complications and management in teaching hospital bannu, pakistan. Maedica. 2012 Jan;7(1):49.
19. Rizwan N, Abbasi RM, Uddin SF. Uterine rupture, frequency of cases and fetomaternal outcome. JPMA-Journal of the Pakistan Medical Association. 2011 Apr 1;61(4):322..
20. Gul A. Rupture of previously scarred uterus. Annals of King Edward Medical University. 2004;10(4)..
21. Aboyeji AP, Ijaiya MD, Yahaya UR. Ruptured uterus: a study of 100 consecutive cases in Ilorin, Nigeria. Journal of Obstetrics and Gynaecology Research. 2001 Dec;27(6):341-8.
22. Al-Zirqi I, Daltveit AK, Forsén L, Stray-Pedersen B, Vangen S. Risk factors for complete uterine rupture. American journal of obstetrics and gynecology. 2017 Feb 1;216(2):165-e1..
23. Konje JC, Odukoya OA, Ladipo OA. Ruptured uterus in Ibadan—a twelve year review. International Journal of Gynecology & Obstetrics. 1990 Jul 1;32(3):207-13.
24. Walsh CA, Baxi LV. Rupture of the primigravid uterus: a review of the literature. Obstetrical & gynecological survey. 2007 May 1;62(5):327-34.
25. Figueiró-Filho EA, Gomez JM, Farine D. Risk factors associated with uterine rupture and dehiscence: a cross-sectional Canadian study. Revista Brasileira de Ginecologia e Obstetrícia. 2022 Jan 12;43:820-5.