Research Article

Rupture of pregnant uterus: incidence, risk factors, maternal and fetal outcome

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Abstract

Objective: To determine the incidence, risk factors, complications, management modalities and maternal and perinatal outcome of rupture uterus in pregnancy. **Methods:** This retrospective study was carried out at a teaching institute, for a period of 10 years from January 2006 to December 2015. Clinical records of cases of uterine rupture were reviewed and information on demographic characteristics, clinical presentation, intraoperative findings, surgical intervention and maternal and perinatal outcome was collected. **Result:** Out of 63237 deliveries, 116 cases of rupture uterus were reported with an incidence of rupture uterus 1 in 545. Majority 52 (44.83%) of cases were in age group 26-30 years. Only 1 was primigravida, 16 (13.79%) were of parity > 5 and remaining of parity 1- 4. Majority were unbooked cases. 93 (80.17%) were referred from other health centers and only 23 (19.83%) cases were admitted directly. Uterine scar (58.62%) and obstructed labor (24.13%) were the common risk factors. Anterior uterine wall of lower uterine segment was the most common site of rupture. Repair of rupture site with or without bilateral tubal ligation was done in 60 (51.72%) cases, while subtotal hysterectomy was performed in 46 (39.65%) cases. Hypovolumic shock was the major cause of maternal death. **Conclusion:** Promotion of skilled attendance at birth, identification of high risk women and timely referral, use of oxytocic drugs cautiously , correct use of partograph, preventing unnecessary caesarean sections and education of people about supervised pregnancy and delivery are essential in reducing the occurrences of uterine rupture.

Key words: Rupture uterus, Maternal mortality, Hysterectomy, Uterine scar.

Introduction

Uterine rupture is a life threatening condition for both mother and fetus. It may be primary, occurring in a previously intact or unscarred uterus, or may be secondary and associated with a preexisting myometrial incision, injury, or anomaly. The profile of causes and mortality varies between developed and developing countries.

Previous caesarean section is the main risk factor for uterine rupture. Because the rate of caesarean section is increasing worldwide, we are dealing with an increasing number of women with previous caesarean section, with consequent higher risk of uterine rupture– a new problem to be addressed [1]. Other risk factors for uterine rupture include obstructed labor, grand multiparity, use of uterotonic drugs, instrumental delivery, placenta percreta and intrauterine manipulations such as internal podalic version and breech extraction [2]. In a systemic review of the prevalence of rupture uterus and its associated mortality conducted by World Health Organization, data from some African countries and Bangladesh indicated that 75% of uterine ruptures still occurred in unscarred uterus [2].

The hospital based incidence of uterine rupture varies from 1 in 100 - 500 deliveries in developing countries to 1 in 3000 - 5000 in hospitals with well developed health services [3]. Maternal morbidity includes hysterectomy that may be necessary to control haemorrhage. Maternal mortality ranges between 1% to 13%, and perinatal mortality between 74% to 92% [2].

The high incidence of rupture uterus cases in developing countries is due to more number of

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unbooked emergencies, arising from poor antenatal care in rural areas and it is an indicator of poor obstetric care, poor accessibility to available comprehensive Emergency Obstetric Care (EmoC) facilities as well as poor socio-economic condition of the community.

Kamla Raja hospital is the largest maternity center in Gwalior, serving the entire city as well as many surrounding districts. The hospital receives many of the complications of labor that occur in the primary and secondary health care facilities and the various private hospitals. Many of the patients come from remote areas where transportation is a big challenge. Home delivery is the norm and resort to hospital is usually after failure of attempts at home. The initial signs and symptoms of uterine rupture are typically nonspecific, which makes the diagnosis difficult and delays definitive therapy. An early diagnosis and prompt treatment of the condition is the most important factor in the improved maternal and perinatal outcome. A retrospective study of ruptured uterus cases was carried out to determine the incidence of ruptured uterus in pregnancy and to identify the associated socio-demographic and etiolotical factors. Clinical presentations, types of intervention, maternal and fetal outcome were also analysed. This study aims to assist in planning interventions that will reduce the incidence, morbidity and mortality associated with uterine rupture.

Material and Methods

This retrospective study, was carried out at Department of Obstetrics and Gynaecology, Kamla Raja Hospital, Gwalior (M.P.), during a period of 10 years from January 2006 to December 2015. All cases of ruptured uterus, who were either admitted with or who developed this complication in the hospital, were included in the study. Clinical records of 116 cases of uterine rupture, managed during the study period were reviewed.

Relevant sociodemographic and clinical data, previous obstetric history, gravidity, parity, gestational age, method of labor induction and augmentation, duration of labor and instrumental delivery were recorded. Operative findings like type and site of uterine rupture, type of surgery performed and bladder injury were also recorded. Units of blood transfused, length of hospitalization, maternal and fetal outcome were also noted. Cases of scar dehiscence, found during elective caesarean section, without preceding clinical symptoms were not included. Women without a known previous caesarean section, previous myomectomy or perforation were considered having an unscarred uterus. Term booked and unbooked was used in relation to whether the patient was registered for antenatal care in the hospital or not.

Results

116 cases of uterine rupture were managed during the study period. During the same period there were 63237 deliveries, giving a hospital incidence of ruptured uterus 1 in 545. The yearly incidence of rupture uterus is shown in table 1. It was at peak (1: 255) in year 2006 and a gradual decrease in incidence was seen from year 2010 to 2015. There were 16 maternal deaths due to uterine rupture, giving a case fatality rate of 13.7%.

Table-1: Incidence and case fatality rate (CFR) of rupture uterus (RU) from year 2006 – 2015.

Year	Total deliveries per year	Cases of RU	Incidence of RU	Cases died from RU	CFR (%)
2006	4850	19	1:255	3	15.7
2007	6797	10	1:679	2	20
2008	6098	13	1:469	2	15.3
2009	6718	12	1:560	2	16.6
2010	5628	12	1:469	2	16.66
2011	5027	10	1:503	2	20
2012	5571	9	1:619	0	0
2013	6679	10	1;668	0	0
2014	7749	11	1:704	1	9
2015	8120	10	1:812	2	20
Total	**63237**	**116**	**1:545**	**16**	**13.7**

Table 2 shows demographic characteristics of ruptured uterus cases. Majority of cases, 52 (44.83%) were in age group 26-30 years. The lowest incidence of uterine rupture was among women less than 20 years.

Table-2: Demographic characteristics.

S.No.	Characteristic	Number	Percentage
1	Maternal age in years		
	15-20	3	2.59
	21-25	32	27.59
	26-30	52	44.83
	31-35	22	18.96
	>35	7	6.03
2	Parity		
	0	1	0.86
	1	24	20.68
	2	34	29.31
	3	26	22.41
	4	15	12.93
	> 5	16	13.79
3	Locality		
	Rural	95	81.90
	Urban	21	18.10
4	Referral status		
	Direct	23	19.83
	Referred	93	80.17
5	Booking status		
	Booked	19	16.38
	Unbooked	97	83.62

Only 1 patient was primigravida, 16 (13.79%) were of parity > 5 and remaining of parity 1- 4. Total booked cases were 19 (16.38%) and unbooked cases were 97 (83.62%). 93 cases (80.17%) were referred from other health centers and only 23 cases (19.83%) were admitted directly. 95 cases (81.90%), were from rural areas.

The associated causes of rupture uterus are shown in table 3.68 (58.62%) women had rupture of scarred uterus, of whom 54 (46.55%) women were with previous one LSCS. One patient had history of MTP (dilatation and evacuation) in previous pregnancy. In 48 (41.38%) cases, rupture occurred in unscarred uterus. Obstructed labor was responsible for rupture in 28 (24.13%) cases.

Table-3: Aetiological factors.

Causes	Number	Percentage
Unscarred uterus	48	41.38
Obstructed labor	28	24.13
Multiparity	8	6.89
Malpresentation	8	6.89
Hydrocephalus	2	1.72
Urerine Anamaly	2	1.72
Scarred uterus	68	58.62
Prior 1 LTCS	54	46.55
Prior 2 LTCS	3	2.58
Prior 3 LTCS	1	0.86
Prior inverted T incision	4	3.44
Prior classical incision	4	3.44
Prior hysterotomy scar	1	0.86
Prior MTP	1	0.86

LTCS – lower transverse caesarean section.

Table 4 demonstrates intraoperative findings. Rupture was complete in 106 (91.38%) cases, while 10 cases (8.62%) had incomplete rupture. Anterior uterine wall was the most common site of rupture in 91 (78.45%) cases. Lower uterine segment was involved in 80 (68.97%) cases. Bladder was involved in 7 (6.03%) cases, while vagina was involved in 8 (6.9%) cases.

Table- 4: Intraoperative findings.

Characteristic of rupture	Number	Percentage
Type of rupture		
Complete	106	91.38
Incomplete	10	8.62
Site of rupture		
Anterior	91	78.45
Posterior	6	5.17
Lateral	15	12.93
Fundal	4	3.45
Segment of uterus involved		
Upper	7	6.03
Lower	80	68.97
Both	29	25
Associated complications		
Bladder injury	7	6.03
Broad ligament hematoma	7	6.03
Colporrhexis	8	6.9

The various type of surgical treatment offered to patients with rupture uterus are shown in table 5. Repair of rupture site with or without bilateral tubal ligation was done in 60 (51.72%) cases. Hysterectomy was the procedure of choice in 56 (48.27%) cases, out of which subtotal hysterectomy was performed in 46 (39.65%) cases. Internal artery ligation was done with hysterectomy in 6 (5.17%) cases for control of post partum haemorrhage.

Table- 5: Surgical Intervention.

Surgical procedure	Number	Percentage
Repair	60	51.72
Repair only	22	18.96
Repair with bilateral tubal ligation	38	32.75
Hysterectomy	56	48.27
Subtotal hysterectomy	46	39.65
Total hysterectomy	10	8.62
Internal Artery Ligation for PPH	6	5.17
Bladder repair	7	6.03

Postoperative complications are shown in table 6. Anemia was the commonest morbidity in 108 (93.10%) cases. Other common morbidity was shock seen in 59 (50.86%) cases. 106 (91.37%) needed blood transfusion. Ventilatory support was needed in 10 (8.62%) cases.

Table-6: Maternal and perinatal outcome.

Parameters	Number	Percentage
Maternal Morbidity		
Anemia	108	93.10
Shock	59	50.86
Puerperal sepsis	8	6.89
Bladder injury	7	6.03
Intestinal obstruction	18	15.51
Pulmonary edema	9	7.75
Ventilatory support	10	8.62
Blood Transfusion	106	91.37
Maternal Mortality	16	13.7
Perinatal outcome		
Still birth	98	84.48
Alive	18	15.52

There were 16 maternal mortalities and 98 fetal mortalities. 3 cases developed ARDS, leading to maternal death. In 8 cases maternal death was attributed to haemorrhagic shock, 4 of maternal deaths were due to septicemia with multiorgan failure and 1 was due to pulmonary embolism.

Discussion

Uterine rupture is a serious obstetric complication, with high maternal and perinatal morbidity and mortality.

The incidence of uterine rupture in present study was 1 in 545, lower than the incidence reported in other Indian studies, 1 in 359 by Setu Rathod et al, 1 in 435 by K.Sunita et al, and 1 in 346 by Sahu Latika [4, 5, 6]. This incidence was also lower than the incidence reported in other developing countries like Ghana (1 in 124) and Nigeria (1 in 169) [7, 8]. But this incidence was higher than the incidence reported in developed countries [1, 9]. This variation seen in incidence of rupture uterus is due to difference in socioeconomic factors, available obstetric care, financial and geographic barriers and cultural practices.

An analysis of annual incidence shows that it has gradually declined over the years from 1 in 255 in 2006 to 1 in 812 in 2015. This may be attributable to improvement in early referral of patients with risk factors for rupture uterus like short stature, cephalopelvic disproportion, previous caesarean section, grandmultiparity, nonprogress of labor and obstructed labor, from primary and secondary health care levels. For ANMs/ staff nurses and MBBS doctors posted at the PHCs / CHCs, training on identification and management of complications and management of normal labor is being conducted. Also the number of deliveries has increased, from 4850 in 2006 to 8120 in 2015. India has implemented a successful national cash transfer programme, the Janani Suraksha Yojna (JSY), to incentivize women to deliver in facilities. It has resulted in steep rise in facility delivery across the country. Also to support access to institutional delivery under the JSY program, the department of health in the large central Indian province of Madhya Pradesh (MP) launched “Janani Express Yojana” (JE or maternal express program) in 2006. This innovative, decentralized, public-private partnership (PPP) is a 24×7 free emergency transport service available to all pregnant women in the province, so that mothers could travel to hospital for delivery. Hence more number of women are getting delivered in our hospital with high risk factors for rupture, under supervision of specialists, resulting in decrease in the incidence of rupture uterus seen in our institute. Majority of cases were in age group 26-30 years, this being the age of maximum childbearing. This is comparable to the study by K Sunita et al, and Sahu Latika [5,6]. The least prone to uterine rupture were women, less than 20 years.

Majority of ruptures occurred in women with parity 1-3. In a study by Sahu Latika, 75.25% rupture occurred in para 1-3 [6]. Increasing parity is known to be an important etiologic factor in uterine rupture. Grandmultiparas are especially prone for rupture. In present study 12.93 % women were para 4 and only 13.79 % women were grandmultiparous. This is in contrast to the study in Ghana, where 41.5% women were grandmultipara [7]. This trend of increased uterine rupture among women of low parity could be as a result of increased rate of primary caesarean section and rejection of subsequent operative delivery by the women. This fear of and aversion for caesarean section drives them away from centres with skilled manpower and facilities for operative delivery.

Spontaneous rupture of the uterus is uncommon in a primigravida, even when labor is obstructed, because a primiparous uterus goes into inertia when faced with an insurmountable obstruction. In present study, there was only one case of rupture uterus in a primigravida, resulted from a road traffic accident. K Sunita et al, also reported a case of rupture uterus in primigravidae [5].

Majority of patients were unbooked. This figure compares favourably with other studies, supporting the notion that lack of antenatal care is associated with increased maternal and foetal morbidity in uterine rupture [5,6]. In modern obstetrics, the single most important risk factor for uterine rupture is the presence of previous scar on uterus. Our study confirmed this, as scarred uterus was the leading cause of rupture in 58.62% of our patients. Previous caesarean section contributed to about 50% of cases. This is comparable with study by Setu Rathod et al [4]. Our labor room protocol allows trial of labor in cases of previous one caesarean section only. 3 women with uterine rupture were with previous two caesarean section and 1 woman was with previous three LSCS. These women were not given a trial but presented to the hospital after laboring at home. Miller et al, reported 3 cases of uterine ruptures in 792 women,

who attempted VBAC with a history of three or more prior caesareans [10]. In a study by AG Cahill et al, there were no cases of uterine rupture or major maternal morbidity in the 89 women, who underwent VBAC attempt with a history of three or more prior caesareans [11]. This increase in scar rupture is due to an increasing use of caesarean section in different health centers. All patients with previous caesarean scars should be made aware of importance of antenatal care in all subsequent pregnancies. They also require careful prenatal supervision, proper selection of cases for vaginal delivery, early hospital admission, and close supervision in labor.

The risk of rupture also depends on the type of prior uterine incision. The risk of rupture with a T- shaped or classical incision is much higher, and ranges from 4 to 9% [1]. In present study, 4 cases had prior T- shaped incision and 4 cases had prior classical incision. We propose the proper documentation of the operative notes in the discharge tickets, so that the women with these scars should be scheduled for elective caesarean section not later than 38 weeks. Prolonged obstructed labor was the main cause of rupture uterus in 24.13% of cases. This observation was similar to the study done by Setu Rathod et al, where 24.3% of rupture uterus cases were due to prolonged obstructed labor [4]. This finding was in sharp contrast to the finding of the study done in Nigeria, where prolonged obstructed labour was found to be the most common associated etiologic factor [8].

Abdominal pain and tenderness, absent fetal heart sound, vaginal bleeding, loss of uterine contour and shock were the predominant clinical presentation in this study. A high index of suspicion is necessary to make a diagnosis. The anterior wall of the lower uterine segment was the most common site of rupture in this study. Similar observation was found in other studies [4,5]. Treatment must be individualized and must consider the clinical condition of the patient, her desire to maintain reproductive capability and menstruation, her long term reproductive health and the experience of the surgeon. Abdominal hysterectomy was performed in 48.27% of cases, where repair was not possible. Patients that had more extensive, multiple or infected tears were not suitable for repair. Repair of the uterus without tubal ligation was performed in 18.96% of the young patients in whom uterus was repairable. Repair with tubal ligation was done in 32.75% patients. However repair of ruptured uterus increases the possibility of recurrence of rupture in subsequent pregnancy, therefore, elective caesarean section should be performed at 37 weeks of pregnancy in this group of patients [3]. Anaemia and shock were the commonest complications noted in our patients. This is expected because uterine rupture is a traumatic event and haemorrhage is a part of its pathophysiology. Most patients required between 2-4 units of blood during their hospital stay. This highlights the need to have a good blood transfusion facility.

Maternal case fatality was 13.7%. In an Indian study by Ganesh Shinde et al, maternal death occurred in 16.22% cases [12]. The intensity of initial resuscitative measures plays a major role in determining maternal outcome. Late presentation to the hospital was the major cause of poor prognosis. This late presentation could be as a result of poverty, lack of skilled birth attendant, delayed referral, poor transport network and aversion for operative delivery. Most of the patients were referred from remote areas. Our facility being a regional referral, women often come in critical condition resulting in poor outcome. The main reasons for referral were non availability of well equipped operation theaters, adequately trained staff (surgeons and anaesthetists) and blood bank facilities. This study confirms, that delay in the provision of the appropriate treatment still contributes to morbidity and mortality. Strengthening of these hospitals in terms of staffing and equipment will help in the management of these patients with better outcome.

On analysis of trend of maternal mortality, there were 11 maternal deaths due to rupture from 2006 to 2010 with case fatality rate of 16.66%, which has dropped to 10% in next five years from 2011 to 2015. The improved maternal mortality is related to improved quality of care including round the clock services of competent obstetricians and anaesthetists enabling prompt management, better ICU facility including ventilators and availability of blood transfusion services.

In this study perinatal mortality was 84.48%. In a study by Sahu Latika, perinatal moratilty was 94.07% [6]. Foetal prognosis in ruptured uterus is largely dependent on the degree of placental separation and magnitude of maternal haemorrhage and hypovolumia. Majority of our patients were unbooked and were transferred to our hospital in emergency in obstruction or after uterine rupture was suspected. The time delay between onset of rupture and delivery contributed to high neonatal mortality, as observed in our study. The main limitation

of our study was its retrospective nature. Cases were referred from other health centers without proper documentation of events that were responsible for rupture. We were able to analyse only information that was documented in case records. Induction with prostaglandins is considered a strong risk factor for uterine rupture in women who attempt vaginal birth after one previous section [2]. We lacked information about indications or method for induction, and the exact induction agent (prostaglandins, oxytocin or both) used to enhance contractions during labor. So we were not able to analyse the role of oxytocics in rupture uterus.

Conclusion

Uterine rupture still remains one of the major causes of maternal and newborn morbidity and mortality in India. Promotion of skilled attendance at birth, use of family planning services among those at high risk, identification of high risk women and timely referral, use of oxytocic drugs cautiously in multiparous women, correct use of partograph, preventing unnecessary caesarean sections and education of people about supervised pregnancy and delivery are essential in reducing the occurrences of uterine rupture. For the best outcome, women with history of caesarean section in previous pregnancies, attempting vaginal delivery need to be looked after in an appropriately staffed and equipped health care facility, where immediate facilities for caesarean delivery and advanced neonatal care are available. Not recommending trial of labor to mothers with higher risk for failed attempts at VBAC might reduce the rate of uterine rupture.

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