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Original Research Article

A Study of maternal outcome in uterine rupture in pregnancy at a Tertiary Care Institute**Shamalee Mistry¹, Meenal Sarmalkar^{2*} and Arun Nayak³**¹Ex-resident, ²Additional Associate Professor, ³Professor and Head of Unit

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Sion Mumbai, Maharashtra, India***Article History:****Received:** 15/02/2016**Revised:** 20/02/2017**Accepted:** 23/02/2017**DOI:** <https://dx.doi.org/10.7439/ijbar.v8i2.3996>**Abstract****Aim and Objective:** The present research was carried out with an objective to determine the incidence, etiology, trend, and management, maternal and fetal outcome of ruptured uterus and to identify the preventive measures.**Material and Methods:** A prospective observational study was conducted over a period of 2 years from Nov 2012 – Nov 2014 in a tertiary care hospital of Mumbai, India. A total of 40 patients who came with rupture of uterus in pregnancy were studied. These cases were analyzed based on clinical features, etiology and risk factors of rupture uterus, the mode of management and the foetal and maternal outcome.**Results:** There were 40 cases of uterine rupture out of 32,200 deliveries giving an incidence of 1 in 805 i.e. 0.12%. Most common clinical features were those of classical signs of rupture with ill defined uterine contour, superficially felt foetal parts and absent foetal heart sounds. The commonest cause of rupture was due to separation of previous cesarean scar rupture (72.5%). The lower uterine segment was the commonest site of rupture. Rent repair was the commonest procedure done in the cases of ruptured uterus. Perinatal mortality of 77.5% and maternal mortality of 10% was observed in this study.**Conclusion:** Skilled attendance with accessible emergency obstetric care and focused antenatal care are key elements for the prevention and management of uterine rupture.**Keywords:** Rupture uterus, Cesarean Section, Trial of Labour After Cesarean (TOLAC), Vaginal Birth After Cesarean (VBAC).**1. Introduction**

Rupture uterus is a hazardous complication of pregnancy and labour and carries high risk both to the mother and fetus. Although its incidence is still higher in developing country as compared to the developed countries, there has been a definite decline in the resulting morbidity and mortality. This can be attributed to improved antenatal and intrapartum care, better anaesthetic and surgical techniques, availability of higher antibiotics and improved blood transfusion facilities [1].

Several factors are known to increase the risk of uterine rupture but previous cesarean section is the main risk factor for uterine rupture. Rupture of an unscarred uterus may be either traumatic or spontaneous. Traumatic factors include abdominal trauma, labor induction and in particular the usage of oxytocin or prostaglandins. Internal podalic version, assisted breech delivery and instrumental delivery also have been linked to traumatic rupture. Spontaneous rupture is usually observed with cephalopelvic

disproportion, malpresentation and delivery of a macrosomic or a grossly anomalous fetus [2-5].

In many cases, ruptured uterus might signify the end of her reproductive career. The loss of menstruation and child bearing function becomes relatively major handicap in a developing country like India. In India, in medically and economically advanced cities, the incidence of rupture preceded by obstructed or neglected labor is decreasing. But in rural parts where there is inadequate medical care, lack of communication and transport, illiteracy, home delivering by untrained dais, incidence of rupture uterus is still high. In modern obstetrics, ruptured uterus at once conjures up a vision of poorly managed labor. It must be admitted; however, occasionally these ruptures are "silent" and occur despite adequate obstetric care.

Hysterectomy once an accepted mode of treatment for ruptured uterus does not find favor with modern obstetrics and conservative method has been suggested, i.e., suturing with or without sterilization. Indeed, it is not an exaggeration to say that the incidence of uterine rupture is an index of obstetric civilization of a country, these two factors being inversely proportional to each other. Early diagnosis and treatment of uterine rupture results in better chances of maternal and fetal outcome. The purpose of current study was to determine the incidence, etiology, management, maternal and fetal outcome in rupture uterus and to recommend strategies for its prevention at primary, secondary and tertiary level so as to reduce the incidence of maternal and foetal morbidity and mortality.

2. Materials and Methods

A prospective observational study was conducted over a period of 2 years from Nov 2012 – Nov 2014 in Lokmanya Tilak Municipal Medical College and General Hospital, Mumbai, India. A total of 40 patients who were diagnosed with rupture of uterus were included in the study. All cases with scar dehiscence were excluded. On admission, initial resuscitative management was done. A detailed history regarding maternal age, parity, gestational age, booked or un booked, residential address and etiological factors like previous LSCS indication, inter delivery interval was taken. Information related to induction, augmentation of labour, labour progress, any instrumentation or any intrauterine manipulation

intervention done at primary centre was taken from the doctor accompanying the patient or with the help of referral chit. Emergency investigations such as Haemoglobin, Bleeding Time, Clotting Time, Blood Urea Nitrogen, Serum creatinine, Serum electrolytes, Blood for grouping and cross matching were sent. Arterial Blood Gas analysis was done, whenever patient was in shock with tachycardia and breathlessness to rule out metabolic and/or respiratory acidosis. Emergency laparotomy was done. Rupture was labelled as complete when the entire thickness of uterine wall along with visceral peritoneum had given way, irrespective of extrusion of fetal parts. All other types were grouped under incomplete rupture. Hysterectomy or repair of rupture site was done depending upon condition of the patient, parity, presence or absence of infection etc. Depending on the general condition and blood loss, blood and blood products were transfused intraoperatively and/or postoperatively. Post operative follow up was done till discharge and further till 6 months. The total numbers of deliveries during this period were also counted and the incidence of rupture was calculated.

3. Observations and Results

A total of 32,200 deliveries were conducted and 40 cases of uterine rupture managed during the 2 year study period. The incidence of uterine rupture was 1:805 deliveries. Out of 40 cases, 29 occurred in patients with prior caesarean sections and 11 were without prior caesarean section. Majority of the patients (82.5%) presented between the ages of 20-30 years and mean parity was 2, however uterine rupture was more common (45%) in para 2-4 while only 2.5% were nulliparous. There were thirty one (77.5%) un-booked while nine (22.5%) booked cases. Frequency of uterine rupture was maximum (50%) in 37 -40 weeks period of gestation. Only 1 case less than 28 weeks with previous 2 caesarean deliveries was found. In group of 33 to 36 weeks, 2 cases had previous classical uterine scar. 45% of cases had foetal weight of 3000-4000 grams (18 out of 40 cases). The inter delivery interval was 18-24 months in 19 out of 40 (47.5%) cases and > 24 months in 22 cases (52.5%). In 11 cases the inter delivery interval was 18 months. Out of 40 patients, 4 expired giving a maternal mortality rate of 10%, (Table 1).

Table 1: Incidence of rupture uterus with regard to demographic variables and clinical profile

Sr. No	Characteristics	No. of cases (n)	Percentage (%)
1	Age in years		
	<20	1	2.5
	20-30	33	82.5
	>30	6	15
2	Antenatal care		
	Booked	9	22.5
	unbooked	31	77.5
3	Parity		
	0	1	2.5
	1	16	40
	2	14	35
	3	2	5
	4	1	2.5
	5	6	15
4	Gestational age (weeks)		
	<28	1	2.5
	28-32	03	7.5
	33-36	16	40
	37-40	20	50
5	Foetal Weight (grams)		
	<2000	05	12.5
	2001-3000	14	35
	3001-4000	18	45
	>4000	03	7.5
6	Inter Delivery Interval (months)		
	18-24	19	47.5
	24-36	09	22.5
	>36	12	30.5
7	Previous section		
	With previous section	29	72.5
	Without previous section	11	27.5

Most common etiological factor for uterine rupture in present study was caesarean scar rupture in 29 cases (72.5%) followed by multiparity in 23 (57.5%) women, fetopelvic disproportion in 20 (50 %) cases and malpresentation in 4 (10%) women (Table 2). Maximum cases (98%) ruptured during labour out of which 27(67.5%) were scar rupture. Out of 27 cases of scar rupture, 22 (55%) were with prior one LSCS.

Table 2: Etiological factors

Etiological factors	No. of cases (n)	Percentage (%)
Caesarean scar rupture	29	72.5
Multiparity	23	57.5
Fetopelvic disproportion	20	50%
Malpresentation	4	10
Oxytocin induced	12	30
Prostaglandin induced	2	5
Traumatic	2	5

The clinical features were extremely variable and most of them presented with more than one feature. Majority presented with distorted uterine contour and superficially palpable foetal parts (92.5%) followed by signs

of shock (80%), absent FHS (77.5%), scar tenderness (72.5%), vaginal bleeding (32.5%) and hematuria (20%). There were 8 cases (20%) of silent rupture all of which were diagnosed on table during repeat cesarean delivery (Table 3).

Table 3: Modes of presentation

Modes of presentation	No of cases (n)	Percentage (%)
Signs of shock	32	80
Distorted uterine contour	37	92.5
Superficially palpable foetal parts	37	92.5
Absent FHS	31	77.5
Abdominal tenderness	29	72.5
Vaginal bleeding	13	32.5
Haematuria	8	20

In the present study, 38 out of 40 (95%) ruptures occurred during labour where 27 (67.5%) were due to complete scar ruptures. Rest 11 cases occurred in incarcerated uterus, out of which 2 patients had history of dilatation and curettage after spontaneous miscarriage and 2 patients had instrumental delivery. Out of the ruptures that occurred

during labour, 22 (55 %) were associated with previous one LSCS. Most common (95%) site involved was the lower segment. Extension to lateral wall was seen in 22.5 % cases followed by bladder (15%) and cervix (15%). Extension to vagina was seen in 7.5% cases. Out of 40 cases, 25 underwent uterine rent repair whereas 15 cases underwent hysterectomy. Rent repair without sterilization and with sterilization was done in 21(52.5%) and 4 (10%) respectively, (Table 4).

Table 4: Characteristics of Rupture and Surgical Management

Characteristics	No of cases (n)	Percentage (%)
A) Timing of rupture		
1)During pregnancy	2	5
i)Intact uterus	0	0
Spontaneous	0	0
Traumatic	0	0
ii)Complete scar rupture	2	5
2)During labor	38	95
i)Intact uterus	11	27.5
Spontaneous	09	22.5
Traumatic	02	5
ii)Complete scar rupture	27	67.5
B)Type of scar		
1)During Pregnancy	2	5
i)Classical	1	2.5
ii)previous 2 LSCS	1	2.5
2)During labour	27	67.5
i)Classical	2	5
ii)previous 1LSCS	22	55
iii)previous 2LSCS	3	7.5
B)Site of rupture		
1)Upper uterine segment		
Anterior wall	2	5
Fundus	2	5
2)Lower segment		
a)Anterior wall with or without extension into broad ligament	35	87.5
b)posterior wall	3	7.5
3)extension		
a) extension to lateral wall	9	22.5
b) extension to cervix	6	15
c) extension to vagina	3	7.5
d)extension to bladder	6	15
C)Type of surgical management		
Repair without sterilization	21	52.5
Repair with sterilization	4	10
Obstetric hysterectomy	15	37.5
Additional intervention		
Internal Iliac artery ligation	3	7.5
Repair of bladder tear	6	15

Complications were present from first post-operative day excluding fever due to I.V. infusions. More than one complication was present in same patient in some cases. Fever, urinary tract infection, paralytic ileus, wound dehiscence and respiratory complications were commonest

followed by wound dehiscence, DIC, septicaemia, jaundice and acute renal failure (Table 5). Incidence of post-operative morbidity was 51.6%.

Table 5: Analysis of Post-Operative Complications

Postoperative complications	No. of cases (n)	Percentage (%)
Fever	23	57.5
Urinary Tract Infection	12	30
Paralytic Ileus	11	27.5
Wound dehiscence	06	15
Respiratory Complications	08	20
Jaundice	03	7.5
Septicemia	04	10
Genitourinary fistula	01	2.5
Burst Abdomen	01	2.5
Acute Renal Failure	03	7.5
DIC	05	12.5

Table 6 shows the maternal and foetal outcome. 4 out of 40 patients expired giving material mortality rate as 10 %. Most common cause of maternal deaths was haemorrhagic shock (5%) followed by septicaemia with ARF (2.5%) and DIC (2.5%). The perinatal mortality in our study was 77.5 (that is, 31 out of 40 cases) Out of 40 cases, live birth were 9 (22.5%), still births were 31 (77.5%). Two babies died in utero due to rupture uterus. In another case there was unexplained death of foetus, the mother had rupture uterus later in labour after induction. In 31 cases of rupture uterus with still births, 25 had massive intra peritoneal hemorrhage.

Table 6: Maternal and Fetal Outcome

Outcome	No of cases (n)	Percentage
Maternal deaths	4	10
Septicaemia with ARF	01	2.5
DIC	01	2.5
Haemorrhagic shock	02	5.0
Foetal deaths still births	31	77.5

4. Discussion

In current study 40 cases of uterine rupture were analyzed, out of 40 cases 25 i.e. 62.5% cases were emergency admission who had either no ANC visit or very infrequent (less than 3) ANC visits. The rupture uterus occurred more commonly in the age group between 20 and 30 years (82.5%) whereas in women of age more than 30 years there were 6 cases (15%). As the trend is increasing towards more cesarean section, the mean parity is on decrease. The age and parity distribution of patients with ruptured uterus in current study were similar to findings from other studies [5-8]. Rupture uterus occurred in 11 cases (27.5%) with unscarred uterus. The unscarred uterus constituted a substantial number of uteri that ruptured spontaneously thus replicating findings in different studies [2,7]. Frequency of rupture of unscarred uterus was more in

grand multipara. Cephalopelvic disproportion was one of the leading causes in rupture uterus in scarred uterus. Despite a significant decrease in cesarean rates and an increase in VBAC rates, the incidence of uterine rupture in our community hospital remained at 0.05% during the study period. Rupture of a cesarean-scarred uterus rarely occurs and when it does, it is usually associated with a good prognosis [2,8,9]. In 1997, 53.8% (100/186) of women who delivered in our unit with a previous cesarean birth attempted vaginal delivery, compared to 40.5% nationwide [10].

The maximum cases of rupture uterus occurred with interdelivery interval of 18 to 36 months. A prolonged inter pregnancy interval may allow time for the previous cesarean delivery scar to reach its maximal tensile strength before the scar undergoes the mechanical stress and strain with a subsequent intrauterine pregnancy. Interestingly, the authors also observed that the combination of a short inter delivery interval of ≤ 24 months and a single-layer closure was associated with a uterine rupture rate of 5.6%. This is comparable to the rate of uterine rupture for patients undergoing a TOLAC with a previous classic midline cesarean scar [11]. One hypothesis to explain this association is that a short interval leads to incomplete fibrosis of the uterine scar from the previous caesarean delivery, thus increasing the risk of rupture. A study that evaluated incision healing after caesarean section using magnetic resonance imaging reported that at least 6 months were needed for the zonal anatomy of the uterus to recover [12]. Our findings suggest that women with a previous caesarean section should be advised to wait at least 12 months before conceiving again. In our study, 3 out of 40 uterine rupture cases had previous classical cesarean scar (7.5%). There was no case of previous myomectomy scar on the uterus. Most commonly, women of ruptured uterus presented with Classical signs of rupture, like ill-defined uterine contour, superficially felt fetal parts (92.5 %) and absent fetal heart sounds (77.5%).

Obstructed prolonged labour with hand prolapsed was found in 2 cases of rupture uterus. One patient delivered with forceps application at primary centre. Baby delivered and postpartum patient had deep forniceal tears and severe hemorrhage. Patient was immediately transferred within 2 hours with 3 pints of blood on flow while on transfer and explored at our hospital. The other patient presented with prolonged labour and forceps application was done at primary centre but failed. Patient was then transferred to tertiary centre and was explored. Intraoperative findings showed ragged and necrosed lower uterine segment rupture with cervical tear. We should be doubly careful in cases of cervical or vaginal wall tears to suspect or to diagnose the extension of the tear into the

lower segment or the vault in case where hemorrhage is not controlled by uterotonics and cervical tracing. We have no case reported with rupture of uterus in a congenitally malformed uterus.

The most critical aspects of treatment in the case of uterine rupture are establishing a timely diagnosis and minimizing the time from the onset of signs and symptoms until the start of definitive surgical therapy. Once a diagnosis of uterine rupture is established, the immediate stabilization of the mother and the delivery of the foetus are imperative. Hysterectomy should be considered the treatment of choice when intractable uterine bleeding occurs or when the uterine rupture sites are multiple, longitudinal, or low lying. This study confirms that institutional delay in the provision of treatment still contributes to morbidity and mortality. Reasons adduced for these delays include inadequate surgical facilities, unavailable blood supplies and financial reasons which were also reported with different studies [8,13-15].

In our study, 60% cases of rupture uterus were treated by suturing the tear similar to in studies of Revicky *et al* [13]. This is possibly due to the fact that it is the easiest and safest procedure in many cases. It might also be because of desire to maintain reproductive capability and menstruation in a group of people who place high premium on children and menstruation for various socio-cultural reasons [6,16]. 70% of uterine rupture required a blood transfusion. Jaundice appeared 8 – 10 days post-operatively, particularly in patients who were received 3 or more blood transfusions. Similar to studies of Revicky *et al* [13] most patients (80%), required between 2 to 4 units of blood, during their hospital stay. This highlights the need to have functional blood banking services, especially during the peri-operative period. After confirming that both ureteral orifices are intact and productive of urine, closure of the bladder defect was done in a two layer fashion and indwelling catheter is left for at least 10 -14 days to facilitate the healing of the defect. Cystogram was obtained before catheter removal to confirm healing and to rule out leak. Respiratory complications were common in patients who needed mechanical ventilator support.

Out of four, 1 patient died with hemorrhagic shock before exploration with delay in referrals to tertiary centre. 1 patient operated for obstetric hysterectomy with indication of obstructed prolonged labor with hand prolapse with intraoperative ragged and necrosed margins of lateral rupture. Total obstetric hysterectomy was done but patient died of complications of septicemia and acute renal failure. 1 patient with clinical diagnosis of previous 1 LSCS with severe preeclampsia with intraoperative finding of fundal uterine rupture operated for total obstetric hysterectomy died of Disseminated Intravascular Coagulation. 1 patient

grand multipara with hand prolapse had lower uterine segment rupture which was sutured and abdominal drain was put, Patient had 1000 cc drain output in post-operative 24 hours. Patient was re-explored and total obstetric hysterectomy was done and patient died of hypovolemic shock. In our study, the mortality associated with hysterectomy in cases of uterine rupture was higher than for repair operation similar to study by Revicky *et al* [13].

Out of 40 babies, those survived (9 babies) were due to traumatic rupture after forceps delivery, few were due to incomplete rupture of lower segment scar in a case of previous one LSCS. In most of the cases, the fetal heart was already absent on admission. Fetal mortality is less in cases having rupture after admission / traumatic rupture. Maximum numbers of patients were transferred with intrauterine fetal death or severe bradycardia. 2 neonates (5%) out of 40 born to women who had rupture of uterus developed neonatal asphyxia. Fetal acidosis detected by umbilical artery pH of less than 7. Our study found that 24 newborns (60%) had an umbilical-artery pH level of less than 7, and 20 of these newborns had a pH level of less than 6.8. Of these 24 the most important factor for the development of fetal acidosis was complete extrusion of the fetus and placenta into the maternal abdomen.

The average duration of hospital stay was 10.6% day with maximum stay of 27 days in one case with septicemia and bladder repair. It was seen that Piperacillin and Metronidazole were commonest used as compared to Ciprofloxacin, Sulbactam + Ampicillin, third generation Cephalosporins were required in later half of our study. This is due to increased antibiotic resistance developing in bacteria.

Bearing in mind, to the present wide use of caesarean section, our aim must be to secure a scar which will stand up to any future labor, although this may not be always be possible, one should try to achieve this ideal in cases operated upon before or early in labor, when there is no infection present, when there exists a reasonably thick uterine wall which will permit accurate suturing. Regarding precision in technique while suturing the uterine scar, the wound must be accurately approximated, the suture line is checked for hemostasis, the sutures must be firm at the end of the operation, the wound should contain no decidua or flakes of vernix and the muscle layer if thinned out should be reinforced by a second in rolling row of sutures including the fascia covering the muscle. In our country the challenge is multifactorial with patients' ignorance, apathy, poverty and superstitions. The battle has to be fought on all fronts if finally a victory has to be sensed if not achieved in a true sense.

5. Conclusion

In most of cases, uterine rupture during pregnancy is a preventable complication. To reduce the incidence of uterine rupture focus should be on promoting more of institutional deliveries, traditional birth attendants should be properly trained, public awareness campaign should be started etc. The present study concluded that in an institution that has in-house obstetric, anesthesia, and surgical staff in which close monitoring of fetal and maternal well-being is available, uterine rupture does not result in major maternal morbidity and mortality or in neonatal mortality.

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