

RUPTURE OF THE UTERUS DURING PREGNANCY AND LABOUR

by

DINA N. PATEL,

and

MAHENDRA N. PARIKH,

Nowrosjee Wadia Maternity Hospital, Bombay 12.

Incidence. "Rupture of the Uterus" is an extremely grave obstetrical complication. Its occurrence in institutions varies and depends on the obstetric facilities available in that particular locality. The incidence is higher in large institutions where mismanaged neglected cases are sent. Table I gives the incidence reported by various writers. The incidence varies widely from 1:8741 reported by Burkons to 1:117.4 reported by Harris and Angawa. During a period of five years from 1st January 1955 to 31st December 1959, 41 cases of rupture of the uterus were treated at the Nowrosjee Wadia Maternity Hospital. The total number of deliveries during this period was 51,544 giving an incidence of 1:1257.

Age. Table II gives the age incidence. Majority of the cases are between 21 to 35 years. It will be seen from the table that rupture of the uterus is rather rare in the age group 16 to 20. This is due to the preponderance of primiparae in this age group. It can also be seen that rupture of the uterus occurs most frequently in the age group 31 to 35. The rarity of rupture of the uterus in

the age group of 36 and above is due to less fertility in that age group.

Parity. The parity distribution in the present series is given in Table III. There is only 1 primipara in the series. She had a traumatic injury as a result of railway accident. It is well known that in a primipara, spontaneous rupture of the uterus usually does not take place even if the labour is obstructed. The tendency for a primiparous uterus is to go into inertia rather than to rupture. Rupture of uterus in a primipara is either traumatic or a result of misuse of oxytocics. Both the cases of uterine rupture in a primipara reported by Golden and Betson were the outcome of traumatic forceps delivery. Table IV gives the incidence of uterine rupture in different parity groups. It can be easily seen that the incidence of rupture of the uterus markedly increases in the group of parity VI and above.

Booked and Emergency Cases. As shown in Table V, of all the confinements at the hospital only 29.6% were emergency admissions, whereas of the cases of ruptured uterus as many as 51.2% were emergency admissions. The incidence of rupture

TABLE I
Incidence and Results of Rupture of the Uterus

Author	Years	No. of cases of uterine rupture	Total deliveries	Incidence of uterine rupture	Maternal mortality	Foetal mortality
Bak and Hyden ..	1931-53	52	71,483	1 : 1375	15.4%	53.7%
Beacham and Beacham ..	1913-50	96	127,522	1 : 1800	47.9%	79.6%
Brierton ..	1932-46	57	111,753	1 : 1916	43.8%	70.8%
Burkons ..	1941-56	4	34,964	1 : 8741	10.8%	61.5%
Das Gupta ..	1950-53	16	30,000	1 : 1800	32.5%	62%
Delfs and Eastman ..	1900-44	53	53,574	1 : 1010	47.1%	80%
Dugger ..	1931-41	105	318,103	1 : 3029	61.9%	62%
Erwing ..	1930-55	37	96,153	1 : 2598	29.7%	62.2%
Fenny and Barry ..	6 yrs.	45	54,000	1 : 1200	15.5%	—
Ferguson and Reid ..	1935-55	84	101,108	1 : 1204	5.9%	29.4%
Fitzgerald, Webster and Fields ..	1928-48	42	92,226	1 : 2196	54.7%	79.1%
Golden and Betson ..	1940-58	23	36,200	1 : 1572	8.7%	41.7%
Gupta ..	1951-55	11	5,351	1 : 486.5	25%	—
Harris and Angawa ..	1948-49	19	2,211	1 : 117.4	48.5%	—
Lynch ..	1920-45	44	41,706	1 : 1118	52%	89%
Maisel ..	1945-55	11	21,209	1 : 1929	27.2%	81.6%
Meredith ..	1921-52	36	57,167	1 : 1588	11.1%	33.3%
Pedowitz and Perell ..	1933-54	87	131,229	1 : 1508	14.9%	33.3%
Subhadra Devi ..	1943-55	22	13,000	1 : 590	—	—
Voogd, Wood and Powell ..	1943-55	12	17,181	1 : 1432	8.4%	—
Patel and Parikh ..	1955-59	41	51,544	1 : 1257	27.5%	78%

(out of 33 cases)

TABLE VI
Past Obstetric History

Primipara	1	Rupture due to railway accident
All previous deliveries spontaneous	27	
Forceps	2	
Internal podalic version	1	
Classical caesarean section	5	
Lower segment caesarean section	4	
Hysterotomy for termination of pregnancy	1	
Manual removal of placenta	1	
Total	42	

Etiology. Table VII gives a summary of etiological factors in this series. In the 16 cases reported by Das Gupta there were 7 which followed previous section. No doubt,

TABLE VII
Etiology

Scar on the uterus	10	5 classical caesarean section In one case the scar had ruptured on 2 occasions previously 4 lower segment caesarean section 1 hysterotomy for termination of pregnancy
Transverse lie	9	
Cephalopelvic disproportion	11	1 hydrocephalus
Trauma	4	1 accidental fall from a train 1 manual rotation and forceps extraction 1 internal podalic version 1 failed forceps for after coming head
Previous manual removal of placenta	1	
Intramuscular pituitrin in 2nd stage	1	
Cause unknown	5	
Total	41	

(1) *Scar on the Uterus.* Out of the 41 cases, 10 had a previous scar on the uterus, an incidence of 24.3%. There were 5 classical caesarean scars, 4 lower segment caesarean scars and 1 hysterotomy scar. It is claimed by Greenhill and Brierton that half of all the ruptures during labour are ruptures in or along the side of scars of previous caesarean

this is an important cause of rupture. But compared to former years, when classical caesarean section was very common for cases of placenta praevia, the incidence of late has been reduced. A scar on the body of the uterus is much more hazardous than one on the lower segment. It is observed that an inverted T-shaped incision caused by extending a

transverse lower segment incision upwards in cases of extreme technical difficulties in extracting the child produces the most insecure scar of all. This inverted T-shaped incision can be avoided by extracting the baby by Patwardhan's shoulder method when the head is deep inside the pelvis. Even a hysterotomy done before the onset of labour should be with a transverse incision over the lower segment. It was noticed by Pedowitz and Schwartz that rupture of the lower segment scar was most common in those patients who, at the time of the primary section, had not been in labour or had a labour of less than 9 hours or a labour of more than 30 hours duration and in those in whom the section was performed prior to the 39th week of pregnancy. In the last group of patients the lower segment was either poorly developed so that the incision may not have been limited to this segment or the relative thickness of the lower segment at this time favoured poor healing. In our hospital, as far as possible, classical caesarean section is only done if the patient is to be sterilized.

Other scars may be the cause of rupture in pregnancy and labour. It has been stated by Kerr and Moir that few, if any, authentic cases of rupture of the uterus follow myomectomy and Victor Bonney states that he has never witnessed its occurrence. However, Mackie has reported a case of rupture of a myomectomy scar during pregnancy. Ahltop reported 20 cases of rupture in 1,300 pregnancies following myomectomy, an incidence of 1 in 65 cases. Other writers state that if the uterine cavity is opened up during

myomectomy, the incidence of rupture is the same as in classical caesarean section. In this series, we have no case of rupture of the uterus following myomectomy scar.

(2) *Abnormal Presentation.* The next important etiological group is transverse lie. All these cases were emergency admissions. These patients were either transferred from small maternity homes or had an obstructed labour at home. Such cases are still common at our hospital as although the majority of the patients are conscious of the advantages of hospital delivery, there are still some who prefer to deliver at home.

(3) *Cephalopelvic Disproportion.* In our series there were 11 cases of cephalopelvic disproportion, where there was either some fault in the pelvis or the babies were unusually large. These were all in multiparas where previous deliveries were normal and hence the condition was overlooked. Table VIII gives the birth weight of the babies in this series. The average weight of the babies born at our hospital is 5 lbs.

TABLE VIII
Size of Baby

Baby's weight	No.
Below 2 lbs. (less than 24 weeks gestation)	2
3 - 4 lbs.	2
4 - 5 lbs.	4
5 - 6 lbs.	8
6 - 7 lbs.	11
7 - 8 lbs.	10
8 - 9 lbs.	3
Total ..	40 (+ 1 patient expired undelivered)

14 ozs. \pm 1 lb. In the present series, 15 babies, i.e. 36.6%, were more than 6 lbs. 14 ozs. It is known that in multiparas, the baby tends to be larger and larger with each succeeding pregnancy, hence the labours also become more protracted with a greater chance of rupture of the uterus. Incidentally, there was one case of hydrocephalus, which is a common cause of rupture of the uterus, if not diagnosed early enough.

(4) *Trauma*. There were 4 cases in the traumatic group. In one case a primipara had an accidental fall from the train. There were two cases of rupture after forceps deliveries, one of a forecoming head and another of an aftercoming head. Both these forceps deliveries were outside the hospital. One should take great care in instrumental deliveries to make certain that the cervix is fully dilated, otherwise a tear of the cervix may extend up, resulting in rupture of the uterus, more so in a primipara. There was one case of rupture of the uterus after internal podalic version. It is well known that this operation, done in a multipara where the liquor has drained out and the uterus has retracted on the body of the foetus, carries great risk.

(5) *Previous Damage to the Uterine Wall*. There was one case who had had manual removal of placenta. Probably, rupture during present labour was due to a weakened uterine wall as a result of previous manual removal of placenta. In this case the uterus ruptured at the fundus spontaneously during the sixth month of pregnancy. There is a great temptation for obstetricians to perform manual removal of pla-

centa after an operative delivery when the patient is already under anaesthesia. This should be strictly avoided as an unnecessary manual removal of placenta may be the predisposing factor in uterine rupture in the succeeding labour.

(6) *Misuse of Oxytocics*. There was one emergency case where intramuscular pituitrin was given to an 11th para outside the hospital. Misuse of pituitrin is an important cause of rupture of the uterus. During labour, it is far safer to administer intravenous pitocin drip than to give pituitrin intramuscularly. Only those with good obstetric experience should use oxytocics during labour. It is particularly dangerous to use oxytocics during labour in grand multiparae.

(7) *Miscellaneous*. There were 5 cases where the cause of rupture of the uterus was not obvious. One was para VI and the others were IIIrd and IVth paras. No cause could be attributed for the rupture. Delfs and Eastman think that the changes in the wall of the uterus that take place in an elderly multipara may predispose to spontaneous rupture.

Time of Rupture. Table IX gives the time of rupture of the uterus.

TABLE IX
Time of Rupture

During pregnancy	4	1 railway accident 2 scar on the uterus 1 previous manual removal of placenta
During 1st stage	9	
During 2nd stage	28	
Total	41	

Rupture of the uterus usually takes place during labour but it is

14 ozs. \pm 1 lb. In the present series, 15 babies, i.e. 36.6%, were more than 6 lbs. 14 ozs. It is known that in multiparas, the baby tends to be larger and larger with each succeeding pregnancy, hence the labours also become more protracted with a greater chance of rupture of the uterus. Incidentally, there was one case of hydrocephalus, which is a common cause of rupture of the uterus, if not diagnosed early enough.

(4) *Trauma*. There were 4 cases in the traumatic group. In one case a primipara had an accidental fall from the train. There were two cases of rupture after forceps deliveries, one of a forecoming head and another of an aftercoming head. Both these forceps deliveries were outside the hospital. One should take great care in instrumental deliveries to make certain that the cervix is fully dilated, otherwise a tear of the cervix may extend up, resulting in rupture of the uterus, more so in a primipara. There was one case of rupture of the uterus after internal podalic version. It is well known that this operation, done in a multipara where the liquor has drained out and the uterus has retracted on the body of the foetus, carries great risk.

(5) *Previous Damage to the Uterine Wall*. There was one case who had had manual removal of placenta. Probably, rupture during present labour was due to a weakened uterine wall as a result of previous manual removal of placenta. In this case the uterus ruptured at the fundus spontaneously during the sixth month of pregnancy. There is a great temptation for obstetricians to perform manual removal of pla-

centa after an operative delivery when the patient is already under anaesthesia. This should be strictly avoided as an unnecessary manual removal of placenta may be the predisposing factor in uterine rupture in the succeeding labour.

(6) *Misuse of Oxytocics*. There was one emergency case where intramuscular pituitrin was given to an 11th para outside the hospital. Misuse of pituitrin is an important cause of rupture of the uterus. During labour, it is far safer to administer intravenous pitocin drip than to give pituitrin intramuscularly. Only those with good obstetric experience should use oxytocics during labour. It is particularly dangerous to use oxytocics during labour in grand multiparae.

(7) *Miscellaneous*. There were 5 cases where the cause of rupture of the uterus was not obvious. One was para VI and the others were IIIrd and IVth paras. No cause could be attributed for the rupture. Delfs and Eastman think that the changes in the wall of the uterus that take place in an elderly multipara may predispose to spontaneous rupture.

Time of Rupture. Table IX gives the time of rupture of the uterus.

TABLE IX
Time of Rupture

During pregnancy	4	1 railway accident 2 scar on the uterus 1 previous manual removal of placenta
During 1st stage	9	
During 2nd stage	28	
Total	41	

Rupture of the uterus usually takes place during labour but it is

the commoner rupture on the left side is attributable to the manner in which the left ovarian vein enters the left renal vein at an angle of 90° , thus favouring the development of passive venous congestion in the left broad ligament.

Clinical Features and Diagnosis. Due to the infrequent occurrence of rupture of the uterus and especially due to the varied clinical picture the condition presents, at times, the diagnosis is missed in the beginning. When a typical text book set of symptoms occur, it is almost impossible to miss the diagnosis, but it is, however, not uncommon for the symptoms to be obscure and indefinite and in these cases the condition may not be recognized until precious and irretrievable time is lost. In pregnancy there may be silent or latent rupture of the uterus where the general condition remains good throughout and abdominal examination might even mislead one regarding the uterine contour, when the foetus is lying in the peritoneal cavity surrounded by its amniotic sac. A clinical feature of particular interest in these silent ruptures is incessant vomiting and intestinal distention which is due to peritoneal irritation. These cases of silent ruptures may be missed as the general condition of the patient is good, with a slow good volume pulse and normal blood pressure. There are a few cases of silent rupture in the present series where the diagnosis was missed for many days. Silent rupture usually occurs during pregnancy but it does on occasion occur during labour, especially when lower segment caesarean scar is giving way after the head is deeply engaged in

the pelvis.

As opposed to the silent rupture is the picture of violent rupture which suddenly occurs during the course of an obstructed labour. A patient who is restless with strong pains suddenly becomes quiet, has no more uterine contractions and soon goes into profound shock. Normal uterine contour is no more present, the foetal parts are very superficial and readily palpable, and the foetal heart sounds disappear. There may or may not be any vaginal bleeding, but there usually is much internal haemorrhage. These cases are rarely missed even by the less experienced.

There are also cases which are preceded by a picture of threatened rupture as indicated by an overstretched lower segment, tenderness over the lower segment and distended bladder. In such cases vaginal bleeding and haematuria are a good indication of the untoward happening. A threatened rupture may so gradually end in an actual rupture that one may, for sometime, fail to realise the gravity of the situation. Yet, very soon there develops a typical clinical picture with all the features of an uterine rupture.

Traumatic ruptures resulting from external trauma are rather obvious as the trauma is usually severe and the history of trauma is readily available. Besides, the sudden uterine rupture, in no time, gives full blown clinical picture.

Ruptures resulting from operative trauma are readily missed unless one makes it a point to look out for rupture at the end of every major operative delivery. Amongst the operative deliveries, internal podalic

version is the commonest culprit. When during the course of a difficult internal version, if version suddenly becomes readily possible one should bear in mind the possibility of uterine rupture. Difficult forceps deliveries, especially if preceded by manual or instrumental rotation of the head and if carried out through an incompletely dilated cervix, are dangerous to the uterus. Uterine rupture caused by operative procedures is usually apparent in one of three ways: (i) accidental detection during manual removal of the placenta, (ii) an unhappy finding during routine digital exploration of the uterus after the difficult delivery, and (iii) the patient gradually passing into a state of shock and collapse after the operative interference.

An incomplete rupture is usually not accompanied by shock and collapse, as against the complete rupture. The latter not only results in peritoneal irritation but is more likely to cause severe internal bleeding. However, severe haemorrhage into the broad ligament will also result in profound shock.

Treatment

The most important factor in the treatment is early diagnosis followed by a quick laparotomy. Good surgical facilities, blood transfusion, antibiotics and proper anaesthesia are all essential for a successful outcome. Collins has shown that intra-arterial blood transfusion can save lives, where acute blood loss results in profound shock. It has been found that 500 c.c. of whole blood transfused into one of the large pelvic arteries, through an 18 gauge needle

directed towards the heart, will restore circulatory equilibrium. Intravenous transfusion can then be continued as long as necessary.

The actual line of treatment can only be decided after the abdomen is opened up. If the tear is small, recent, clean cut and not involving larger vessels, it should be sutured up, preferably with ligature of the fallopian tubes. If it is a large irregular tear involving big vessels and extending into the broad ligament it would be advisable to do a quick hysterectomy provided the patient is in a condition to stand this procedure.

In our series of 41 cases, in 25 patients suturing was done and in 15 cases hysterectomy was done. In one case hardly any treatment was possible as she died within 25 minutes of admission.

TABLE XII
Treatment

Suturing of tear	..	25	
Hysterectomy	..	15	(total hystérectomy in 1 case)
Died within 25 minutes of admission	..	1	
Total	..	41	

According to Gupta, conservative treatment is preferable in our country and the results are better. He says that cases of uterine rupture are usually admitted in an extremely low condition due to blood loss, infection and shock. He advocated simple suturing under local infiltration and liberal use of antibiotics. Bey, in his collection, reported in 1932 that the mortality was extremely high where suturing was done. He says in such cases there is con-

tinuous absorption of toxins as the uterus is left in. In recent years, this has been counteracted by the powerful antibiotics and antihistaminics. It may be said that by simple suturing a weak scar will be left in to stand future pregnancies and labour, unless the patient is sterilised. But suturing is aimed at the survival of the patient in the present crisis, and a patient on whom hysterectomy may be performed, can certainly be sterilized if suturing of the tear is preferred to hysterectomy.

Results

Table XIII gives the maternal mortality in our present series of 41 cases. 29 mothers were discharged in good health from the hospital. There were 12 deaths giving a mortality rate of 29.3%. One patient died within a few minutes of admission without any treatment. Hence the corrected mortality rate is 27.5%. Two patients expired on the operation table as they were in a very low condition. Five patients died of shock within 6 hours of operation. Two other patients died of shock between 6-24 hours after operation. One patient died on the 4th day due to paralytic ileus and another died on the 7th day due to uraemia. One feels that the mortality rate could be reduced by an early diagnosis, quick laparotomy, minimum of handling, rapid transfusions and the liberal use of antibiotics.

TABLE XIII
Result: Mother

Alive	..	..	..	29
Expired	..	..	..	12
Total	..	..	..	41

Table XIV gives the results to the foetus. Out of the 41 cases 2 were of less than 24 weeks' gestation. Of the remaining 39 cases, 9 babies were born alive. They were discharged from the hospital in good condition. Out of the remaining 30 cases, one patient died undelivered and there were 29 still-births. This gives a foetal loss of 32 in 41 cases, i.e. 78%.

TABLE XIV
Result: Baby

Stillborn	..	29	
Liveborn	..	9	
Total	..	38	(+ 2 babies less than 24 weeks, + 1 patient expired undelivered)

Discussion

Uterine rupture is, perhaps, the gravest and the most unfortunate complication that an obstetrician runs into, for about one-fourths of the mothers and two-thirds of the babies perish as a result. Prevention of uterine rupture is the most important aspect of the problem. Proper antenatal care will result in ready recognition and prompt correction of abnormal presentation and in proper management of cephalopelvic disproportion. Uterine ruptures resulting from misuse of oxytocics and from operative traumas can be eliminated by hospital deliveries managed by competent obstetricians. Even in hospitals, scars on the uterus, obstructed labours, and threatened ruptures should be looked upon as potential ruptures and handed over to senior obstetricians. Apart from the fact that universal hospital confinements is merely a sweet dream,

considering the existing obstetric facilities in our country, uterine ruptures cannot be entirely prevented. For with the wider and wider use of caesarean section, the number of cases of rupture of the scar is on the increase. It is obvious that repeat caesarean is no answer to the problem, for many scars give way not only very early in labour but also during pregnancy. The incidence of scar ruptures can be minimised by avoiding unnecessary sections, choosing a lower segment incision, suturing the uterine incision with due care and preventing and promptly treating sepsis.

It can be safely concluded that even with the best of obstetric facilities uterine rupture is liable to occur on occasions. Attention must, therefore, be diverted to minimising the dangers of the condition. Early diagnosis and prompt treatment can achieve the best results both to the mother and the foetus. In view of the varied clinical picture accompanying uterine rupture, mature experience is the only key to early diagnosis. The possibility of uterine rupture should be ruled out at the end of every major obstetric manoeuvre. The role of prompt and proper treatment in obtaining good results is already referred to and needs no emphasis.

Lastly, the present trend of limitation of family will reduce the incidence of rupture of the uterus by preventing 'grand-multiparity'.

Summary

- (1) 41 cases of uterine rupture treated during a 5-year period at the N.W.M. Hospital have

been analysed.

- (2) The incidence of the condition was 1:1257, the maternal mortality 27.5% and foetal mortality 78%.
- (3) The possibilities of preventing uterine rupture are discussed.
- (4) Means of improving the outcome of uterine rupture are considered.

Acknowledgment. Our sincere thanks are due to Dr. K. M. Masani, M.D. (Lond.), F.R.C.S. (Eng.), F.I.C.S., Hon. Principal Medical Officer, Nowrosjee Wadia Maternity Hospital, for his kind permission to study the hospital records and to publish this paper.

References

1. Ahltop G.: Acta Obst. Gyn. Scandinav.; 26, Suppl. 6, 1946, quoted by Mackie.
2. Bak T. F. and Hayden G. E.: Am. J. Obst. Gyn.; 70, 961, 1955.
3. Beacham W. D. and Beacham D. W.: Am. J. Obst. Gyn.; 61, 824, 1951.
4. Bey N. M.: J. Obst. Gyn. Brit. Emp.; 39, 743, 1932.
5. Brierton J. F.: Am. J. Obst. Gyn.; 59, 113, 1950.
6. Burkons H. F.: Obst. & Gyn.; 7, 675, 1956.
7. Collins C. G., Frederick B. J., Weese W. H., Thom J. C. and Braden F. R.: Am. J. Obst. & Gyn.; 74, 465, 1957.
8. Das Gupta K. J.: J. Obst. & Gyn. of India; 6, 371, 1956.
9. Delee J. B. and Greenhill J. P.: The Principles and Practice of Obstetrics (9th ed.); Saunders, Philadelphia, 1947.

10. Delfs E. and Eastman N. J.: Canadian Med. Ass. J.; 52, 376, 1945.
11. Duggan J. H.: Surg. Clinics, N. America; 25, 1414, 1945.
12. Erwing H. W.: Am. J. Obst. Gyn.; 74, 251, 1957.
13. Fenny K. and Barry A.: Brit. Med. J.; 1, 65, 1956.
14. Ferguson R. K. and Reid D. E.: Am. J. Obst. Gyn.; 76, 172, 1958.
15. Fitzgerald J. E., Webster A. and Fields J. E.: Surg. Gyn. Obst.; 88, 652, 1949.
16. Golden M. L. and Betson R.: Obst. & Gyn.; 13, 506, 1959.
17. Gupta U. P.: J. Obst. & Gyn. of India; 7, 83, 1956.
18. Harris B. P. and Angawa J. O. W.: J. Obst. Gyn. Brit. Emp.; 58, 1030, 1951.
19. Kerr M. and Moir C.: Operative Obstetrics (5th ed.); Baillere, Tindall and Cox.
20. Lynch F. J.: Am. J. Obst. Gyn.; 49, 514, 1945.
21. Mackie J. E.: J. Obst. Gyn. Brit. Emp.; 59, 838, 1953.
22. Maisel F. J.: Am. J. Obst. & Gyn.; 72, 25, 1956.
23. Meredith R. W.: Am. J. Obst. Gyn.; 70, 84, 1955.
24. Nystrom C.: Acta Obst. Gyn., Scandinav.; 35, 70, 1956.
25. Patwardhan B. D. and Motashaw N. D.: J. Obst. & Gyn. of India; 8, 1, 1957.
26. Pedowitz P. and Perell A.: Am. J. Obst. Gyn.; 76, 161, 1958.
27. Pedowitz P. and Schwartz R. M.: Am. J. Obst. & Gyn.; 74, 1071, 1957.
28. Subhadra Devi N.: J. Obst. Gyn. of India; 7, 55, 1956.
29. Voogd D. V., Wood H. B. and Powell D. V.: Obst. & Gyn.; 7, 70, 1956.