PROLAPSE OF THE UMBILICAL CORD

by

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and

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Introduction

Our attention was drawn to the study of this unfortunate accident in labour, mainly because of the unsatisfactory results of our treatment. We hoped that an analysis of our cases with emphasis on the management and foetal mortality would help us to define the problem and come to some solution. A survey of the literature was undertaken to compare our difficulties with those of others and gain from the experience of those who had worked on this before. However, the problems differ from country to country; and authors differ in their opinions on the seriousness of the problem. We also encountered frequent acceptance of treatments which were obviously unsuccessful and at times outmoded, in view of the current trends in obstetric practice. What was more frustrating was that the accepted treatments which did ensure satisfactory results were unsuitable for several reasons for our hospital class of patients.

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Definition

It is still the custom of many to follow the classification of Naegele, and distinguish between presentation and prolapse of the funis — the former being a falling down of the cord in front of the presenting part before the rupture of membranes and the latter being a similar occurrence after the rupture of membranes. The distinction is useful, as the treatment of the two conditions may be different.

Kurzrock (1932) considered prolapsed cord a condition in which that structure had left its normal site and had taken a position compromising the life of the foetus.

Greenhill defined an interesting condition of occult prolapse which gave rise to marked foetal distress. In this the cord lies in the lower uterine segment but not within reach of the fingers during an ordinary vaginal examination. It is diagnosed either at caesarean section or at the time of delivery.

Material and Methods

An analysis of 110 cases of cord prolapse and presentation which

Fig. 2

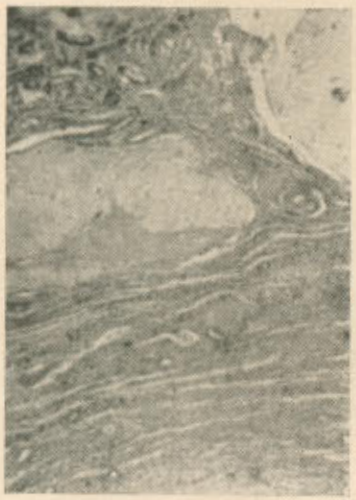


Fig. 1
Section of post-radiated ovary shows multiple corpora albicantes with atrophic changes in the cortex. No Oocytes, primordial follicles or corpus luteum seen.

Fig. 2
Stromal hyperplasia with stromal cells being arranged in whorls and bundles with significant hyaline degeneration in postradiated ovary.

Fig. 3
Highly cellular fibroid revealing sarcomatoid change seven years after deep x-ray therapy of ovaries for fibroids in a bad risk patient.

Fig. 4
Adenomalignum after ten years of deep therapy for dysfunctional uterine bleeding.

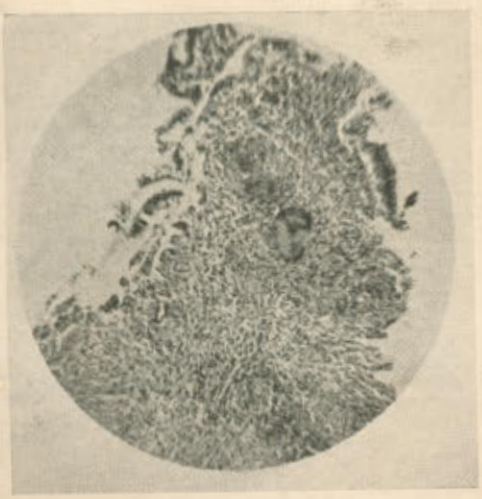


Fig. 1
This case was clinically diagnosed as "Tuberculous endometritis". Well demarcated pale coloured follicles are seen in the stroma. The endometrium was in the secretory phase.

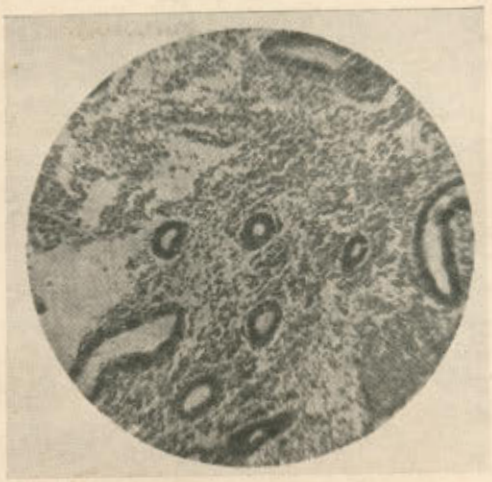


Fig. 2
Only caseous and tuberculous granulation tissue is seen. On naked eye examination the curetted material was caseous in appearance. History of one year amenorrhoea.

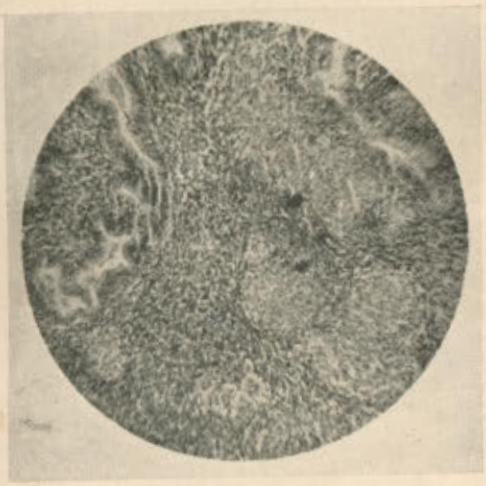


Fig. 3
Here only calcified and caseated tissue is seen. The patient came for secondary sterility with a history of oligomenorrhoea for 3 years and amenorrhoea for 1 year.

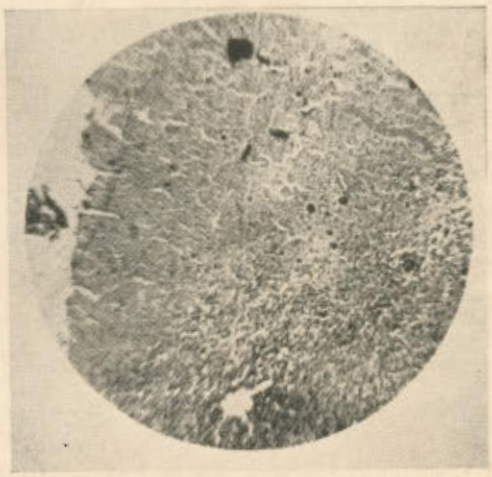


Fig. 4
The diagnosis of tuberculous endometritis was suggested on this very scanty material and a repeat biopsy was advised for confirmation. There was history of secondary amenorrhoea for 10 years.

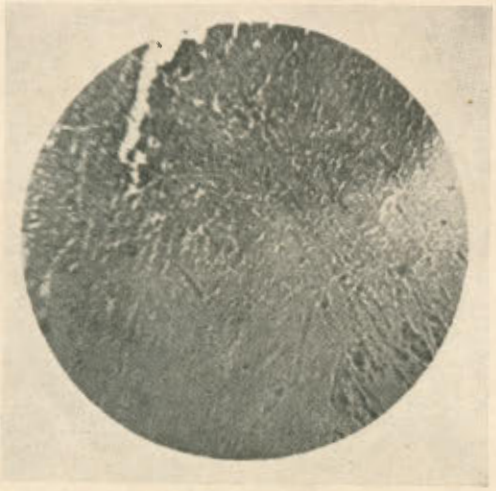


Fig. 5
Another section of the very scanty material showing one or two follicles. History of primary sterility.

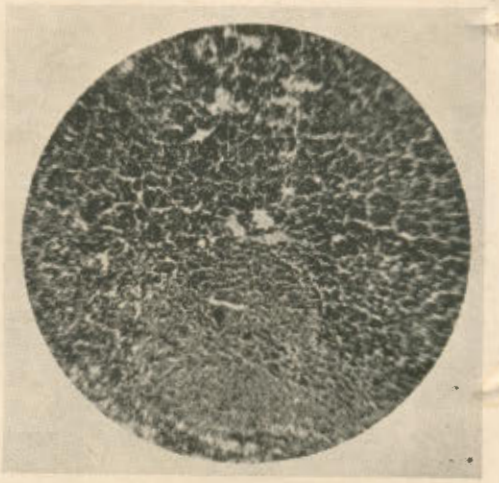


Fig. 6
This patient was an unmarried woman of 15 years age, with a history of two years amenorrhoea. Tuberculous granulation tissue with caseation and few endometrial glands is seen.

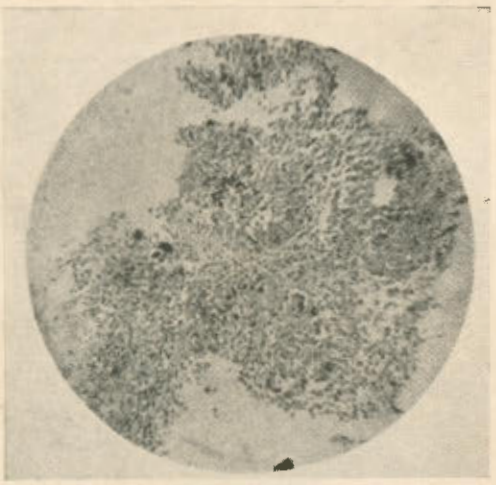


Fig. 7
Normal endometrium after one year anti-tuberculous line of treatment. The periods were normal and regular. Four years ago the histological diagnosis of tuberculous endometritis was made.

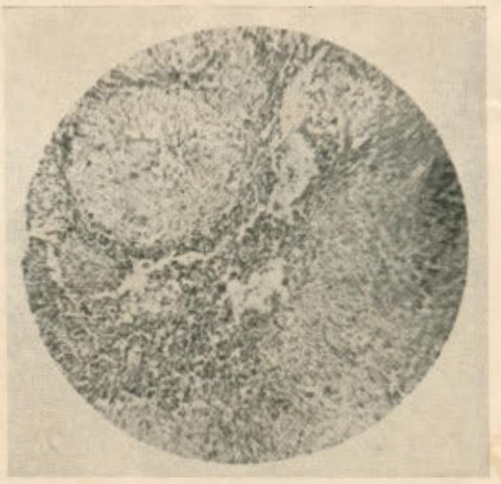


Fig. 8
Typical picture of tuberculous endometritis. This woman had leprosy for the last 7 years with patches on the body and history of amenorrhoea. There were tuberculous lesions on the cervix. Suitably stained sections did not show lepra bacilli.

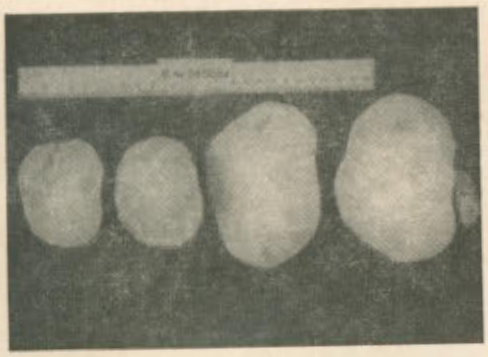


Fig. 1
Photograph shows the bilateral ovarian tumour masses from Case No. 4 showing predominantly solid structure with only a few cystic areas.

Fig. 2
Photograph from Case No. 5 indicates the predominantly cystic nature of the tumour with few solid areas.

Fig. 3
Photomicrograph illustrates the fibroadenomatous nature of the tumour with cleft-like spaces.

Fig. 4
Photomicrograph illustrates the clear nature of the lining cuboidal epithelial cells.

Fig. 5
Photomicrograph illustrates the cystic spaces with dense fibrotic areas and also areas of calcification could be seen.

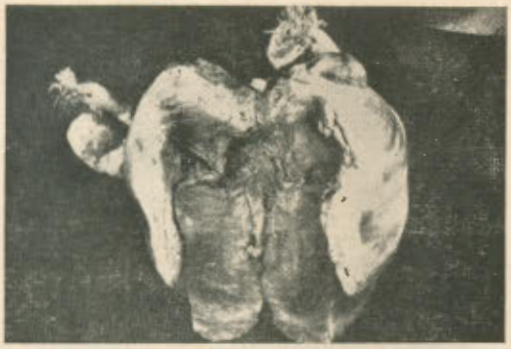


Fig. 1
Gross appearance of the tumours. The polypoid tumour is seen in the cavity and the intra-mural tumour is seen in the wall of the uterus.

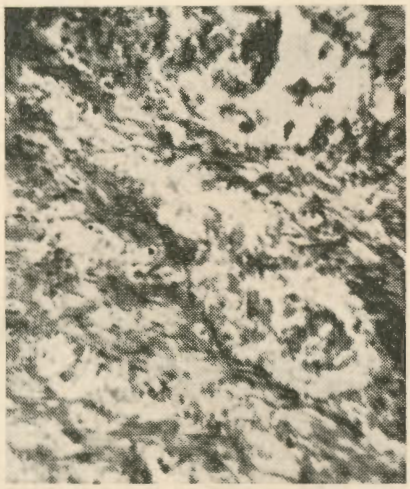


Fig. 2
Photomicrograph of the polypoid tumour showing the cavernous spaces with well-formed connective tissue walls, containing blood (H & E stain x 450).

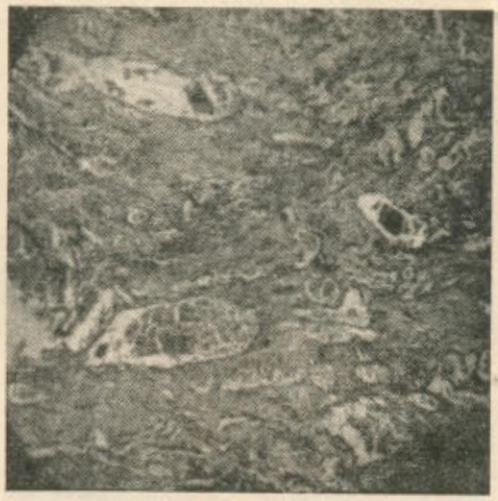


Fig. 3
Photomicrograph of the intra-mural tumour showing dilated capillaries and veins (H & E stain x 100).

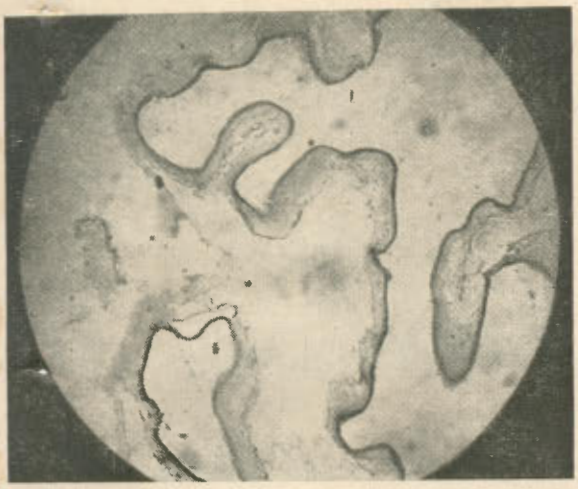


Fig. 1
Section of normal chorion and amniotic membranes. The cuboidal lining cells and connective tissue are clearly made out H. & E. Stain (X 1350).

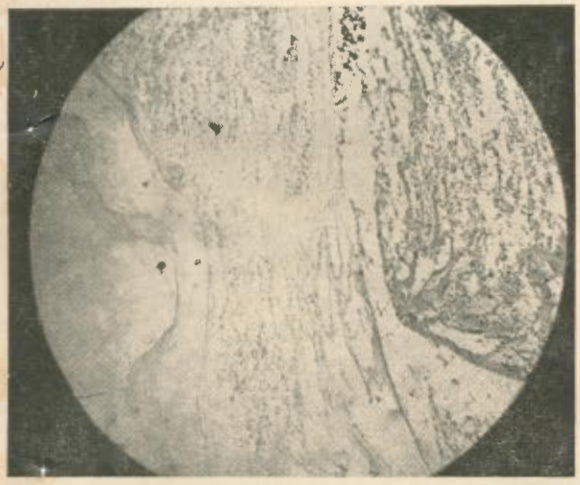


Fig. 2
Chorioamnionitis, showing a dense inflammatory exudate—polymorphs and lymphocytes—infiltrating the chorion and extending almost to the amniotic lining epithelium (X 1350).

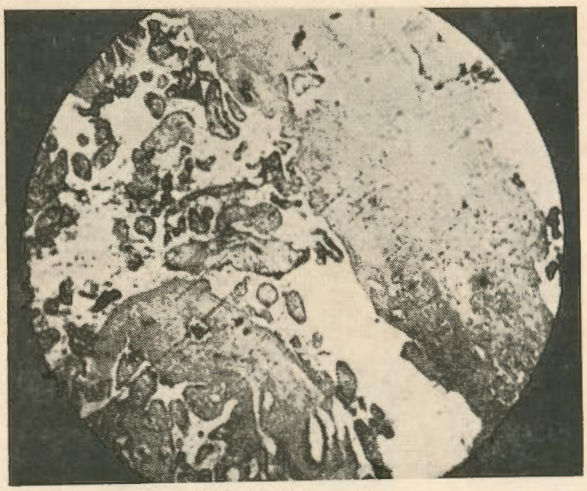


Fig. 3
Placentitis. A high power view showing congestion and dilatation of the capillaries, exudate consisting mostly of polymorphonuclear cells and lymphocytes (X 1350).

Anencephalic Foetus with shoulder Dystocia —Ramamurthi pp 237-239

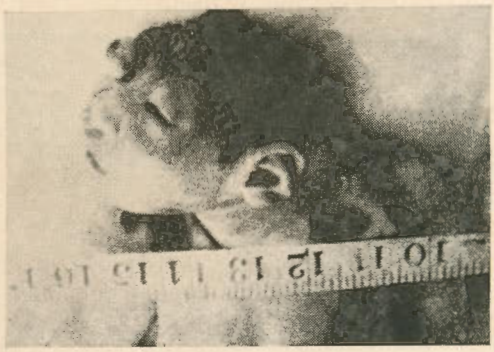


Fig. 1

Fig. 1
Showing the acardiac monster and two placentae.

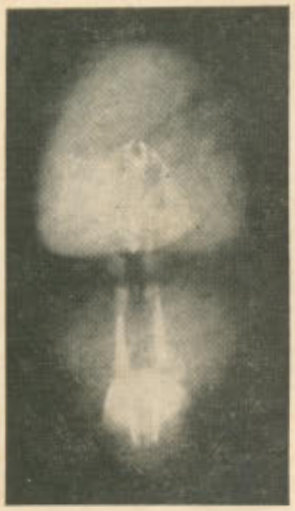


Fig. 2

Antero-posterior x-ray photograph of the monster showing the vertebral column with ribs and long bones. Note the elongated os pubis and the single midline bone presumably formed by the fused fibulae.

Fig. 3
Lateral x-ray photograph of the monster showing the vertebral column with ribs and long bones.

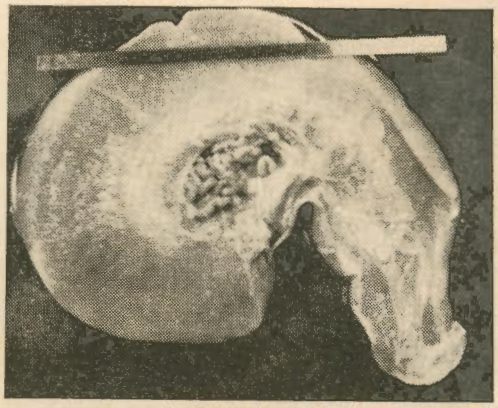


Fig. 4
Dissected right half of the sagittal section of the monster showing coils of intestine, vertebral column and outline of the long bones of the lower extremity.

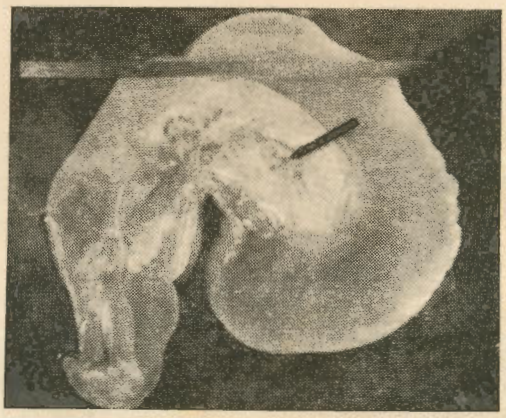
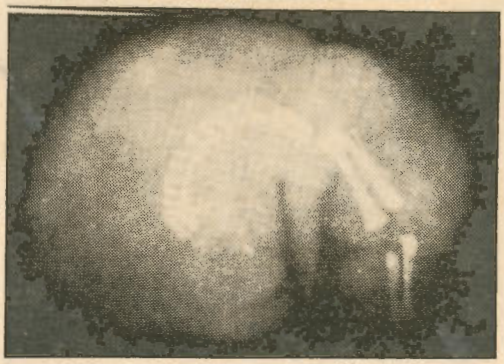


Fig. 5
Dissected left half of the sagittal section of the monster. Arrow shows polycystic disease of the single kidney.



occurred during the period January 1959 to the end of June 1964, at the Cama & Albless Hospitals, Bombay, was made. During this period there were a total of 32,268 deliveries. Cases of cord prolapse complicating labour before the 28th week had been excluded. Emphasis was laid on the management and the foetal outcome. Wherever possible our results have been compared with those of other authors.

The prophylaxis, aetiology, diagnosis, management and the foetal mortality are discussed with reference to the present analysis. Certain aspects of improvement in results are discussed for future guidance. Opinions of other authors in the field are stated.

Finally, certain conclusions are reached regarding the present day status of this complication in our obstetric practice.

Incidence

Out of 32,268 deliveries there were 110 cases of cord prolapse, an incidence of 0.34%. Out of these, 38.2%, were booked while the rest, that is 61.8%, were emergency admission.

Table I gives the incidence as reported by various authors.

During our survey of Indian literature over the last 15 years, we encountered only one reference to this complication. This was the series published by Ghose and Dey from Calcutta in 1961. Our incidence of 0.34% seems to be on the lower side of the avarage.

Eighty-eight cases had completed their period of gestation, while 16 cases had gone over 28 weeks of gestation but had not reached full-term. In 6 cases of twins the period of gestation could not be ascertained with any degree of accuracy.

There were 87 cases of cord prolapse, 20 of cord presentation, and in 3 cases the cord prolapsed after artificial rupture of membranes.

Incidence according to parity: Only 18% of our cases were primiparas while the rest were multiparas. The incidence of prolapse cord against the total of 32,268 deliveries was 0.061% in primiparas and .278% multiparas. Bouregeois reports this incidence as almost equal .41% and .43%, while Slate and Randall report .25% and .41% and Ghose and Dey report .13% for primiparas and .37% for multiparas.

TABLE I

Incidence of Cord Prolapse (Various authors)

Year	Author	Total No. of deliveries	Cases of cord prolapse	Incidence =
1932	Kurzrock	16,942	100	0.59%
1940	Mengert & Longwell	9,546	58	0.61%
1946	Gusberg	16,904	71	0.42%
1951	Bradberry & Kistner	24,533	116	0.47%
1956	Slate & Randall	15,370	63	0.40%
1957	Dilworth and Ward	19,893	66	0.30%
1959	Cushner	87,963	424	0.48%
1955—59	Ghose & Dey	37,555	111	0.30%
1959—64	Present series	32,268	110	0.34%

Abnormal presentations: Our incidence of abnormal presentations is high and is accounted for by the increased number of emergency admissions. Vertex presentation was found in 53% of cases, while breech presented in 19% and transverse in 14%. Compound presentation and twins were noted in 6.36% each. Only once was face presentation encountered i.e. 1.28% (Total 100%).

Cord lengths: It is generally believed that the longer the cord, the greater are its chances of prolapse. Similarly a low insertion of the cord, particularly a velamentous or battledore type, predisposes to prolapse. We take 30 to 50 cms. as the average cord length. Between 50 cms to 70 cms, the cord length is considered to be on the higher side of normal. We had 51 such cases. In 5 cases, the cord was abnormally long i.e. over 70 cms in length.

Cervical dilatation at the time of cord prolapse: Fenton and D'Esopo, in 1951, observed the greatest incidence of prolapsed cord when the cervix was fully dilated. Joubert Kush found full dilatation in almost half of their cases, and Kurzrock in 3/4 of his. In the present series also, in 36% of cases the cervix was found to be fully dilated. The prognosis for the foetus depends very much on the degree of cervical dilatation.

Details of Results

The results in our series are discussed in two groups, cord presentation and cord prolapse, as the results differ remarkably in the two groups.

Group 1: Results of cord presentation: There were 20 babies out of which 3 died and these were all non-salvageable. All the 17 salvageable babies survived, giving a corrected foetal mortality of 0%. Out of the 3 non-salvageable babies, one was premature breech and in the other two the foetal heart sounds were absent on admission.

In all 17 cases, where the babies were salvageable, active treatment was undertaken. Conservative treatment was not attempted. In 2 cases, spontaneous vertex delivery took place after artificial rupture of membranes and the vertex and cord delivered simultaneously. One case, required breech extraction and in one case, manual dilatation of the cervix, breech extraction and forceps to the aftercoming head was done. In the rest, that is 13 cases, lower segment caesarean section was done. The caesarean section rate was 65%.

Group No. 2: Results of cord prolapse

Results in this group were not so satisfactory.

Out of 90 babies 33 were not salvageable as the cord was non-pulsating on detection of prolapse.

Out of 57 salvageable babies, 48 were discharged alive; 7 died during management and 2 died in the immediate-post-natal period. This gave an overall foetal mortality of 46.6%. If one excludes the non-salvageable cases, the corrected foetal mortality was 15.7%.

Table II gives the details of those babies who died during the management.

In the first case, judgement was perhaps faulty. An internal podalic version should not have been attempted. If a caesarean section had been

done at the first instance the baby might have been saved. In the second case, in view of the large size of the baby a caesarean section should have been performed.

In general, breech extractions give poor results. Prognosis depends very much also on the obstetrician who does the breech extraction. An experienced obstetrician may have better results. The fifth case is justifiable in view of the small size of the baby. Caesarean section was not considered for such a premature baby.

The cause of death of the two babies who died in the post-natal period was not nkown as post-mortem was not performed. However, it seems reasonable to suppose that asphyxia occurred in both cases.

Table III gives the mode of delivery in salvageable cases of cord prolapse. This table shows that except for 12 cases where spontaneous delivery took place, the rest, i.e. 36 cases, or 75%, required some kind of operative interference. This proves that a better foetal salvage is possible only at the expense of increased maternal hazards due to interference.

Foetal Mortality

Out of 110 babies 45 died, giving an overall mortality of 40.9%. If we consider only the 74 salvageable cases, that is cases where the cord was pulsating on detection of cord prolapse or presentation, the corrected foetal mortality works out to 12.1%, which is reasonably low. A high foetal mortality is attributed to

TABLE II
Foetal Deaths

	Died during delivery	Wt. Lbs.	Wt. Oz.
1.	IPV failed—LSCS done	6	14
2.	Breech—forceps	7	
3.	Breech extraction	4	4
4.	Breech, difficulty with after-coming head	5	8
5.	High forceps—Flat pelvis—ARM	3	3
6.	Spontaneous compound delivery	6	
7.	IPV and breech extraction	6	
	Died during post-natal Period		
1.	Died after 5 minutes, normal vertex delivery	5	14
2.	Died on 2nd day—normal vertex delivery	6	

TABLE III
Mode of Delivery in Salvageable cases of Cord Prolapse

	Mode of Delivery in Salvageable cases of Cord Prolapse		
1.	Spontaneous vertex		12
2.	Breech extraction		15
3.	I.P.V.		3
4.	Forceps—all vertex presentation		4
5.	L.S.C.S. Vertex	9	
	Compound	1 (C.P.D. 8, Pr. RM 1)	
	Breech	2 (Floating 1, Pr. RM 1)	
	Transverse	2 (1 for failed IPV)	14
		Total	48

asphyxia, birth injury and prematurity.

As expected foetal mortality is very high when cord prolapse is associated with abnormal presentation; 15% for breech, 25% for transverse and 33% for compound. It is the lowest in vertex presentation, 9%. Death in vertex presentation is due to cord compression.

Slate and Randall (1956) stated that the greater the degree of cervical dilatation when the diagnosis is made, the lower the foetal mortality. This is due to the fact that conditions are favourable for quick vaginal delivery.

TABLE IV

Comparison of % Incidence of Presentation in Cord Presentation

Author	Total	Vertex	Breech	Transverse	Compd.	Other
Kurzrock 1932	100	59.0	23.0	18.0	....	....
Mengert and Longwell 1940	58	358.5	33.0	8.5	....	....
Kush	105	52.0	29.0	19.0	....	....
Joubert	203	46.3	25.6	20.7	7.4	....
Fenton D'Esopo	216	63.5	26.0	6.0	4.5	....
Slate & Randall	59	58.0	22.0	12.0	8.0	....
Ghose & Dey	111	49.6	15.3	25.2	8.1	....
Present series	110	53.63	19.09	14.54	6.36	7.26

Comments

There are several predisposing factors responsible for prolapse of the cord. Amongst these, malpresentation stands out as the commonest. Incidence of abnormal presentation as met with in our practice is 47%, very high because of poor antenatal care. Abnormal presentations contribute also by favouring premature onset of labour and premature rupture of membranes. Correction of this factor would substantially reduce the incidence of cord prolapse.

The other predisposing factors are prematurity, multiple pregnancy, contracted pelvis, placenta praevia, artificial rupture of membranes and hydramnios.

Table No. IV gives the incidence of various presentations as reported by several authors.

Diagnosis

Diagnosis must be made early before the rupture of membranes. In all cases of abnormal presentation and cases showing foetal distress, an internal examination to exclude a forelying cord is mandatory.

The first sign of occult prolapse is the occurrence of foetal bradycardia when firm fundal pressure is applied. The firmer the pressure, the lower the heart beat will fall. On discontinuing fundal pressure the foetal heart will return to its normal rate fairly rapidly. The second characteristic is the presence of thick meconium-stained liquor.

In the presence of these findings Eastman has recommended an additional test. It is desirable, with the patient in mild Trendelenberg position to insert 2 fingers in the vagina and ascertain whether elevation of the foetal head by a centimeter or so relieves the bradycardia. If it does, there can be little question about the diagnosis.

If a diagnosis is made early, treatment can be instituted promptly. This will result in an increase in the salvageable cases and a corresponding decrease in the non-salvageable group. It will also increase the caesarean section rate, but that will be justified by a better foetal outcome.

Treatment of cord prolapse has evolved from the days of cord repositors and manual dilatation of the cervix to the very modern trend of the liberal use of caesarean section. In the present day obstetric practice, the choice is narrowed down to only 3.

1. Conservative management with: high Trendelenberg position, elevation of the persenting part, oxygen and glucose intarvenously till delivery is feasible either vaginally or per abdomen.

2. Rapid vaginal delivery by forceps, breech extraction or internal podalic version, provided the cervix is fully dilated.

3. Caesarean section — Conservative treatment to be given till arrangements are being made for a caesarean section.

Conservative treatment has a place as a first aid measure in almost all cases of cord prolapse. When the examining fingers diagnose a cord prolapse, the entire hand should be introduced into the vagina and the presenting part held above the brim. There are certain cases of asphyxia seen even in the absence of pressure on the prolapsed cord. Rhodes postulated that in such cases, foetal death is due to the spasm of the umbilical vessels. The spasm is presumably due to manipulations and/or cooling of the cord and he cites as experimental evidence the works of Barcroft and Hasselhorst both of whom wrote of the increasing sensitivity of the umbilical vessels to these influences as term approaches.

The place of conservative management of presentation of the cord is as yet not well established. Cope suggested conservative management with posture, followed later by amniotomy and forceps delivery.

Most authors recommend active obstetric management once cord presentation is diagnosed.

Rapid vaginal delivery is possible only if the cervix is fully dilated and there is no disproportion. In some of the series published this has been cited as the most favourable set of circumstances, both for the mother and the baby. But our experience has been to the contrary. We lost nine babies not because of asphyxia but because of birth injury.

Caesarean section is the third alternative and should ensure the least foetal mortality. Opinions on the place of caesarean section in cord prolapse are divided.

Mengert and Longwell, in 1940, believed that it was hardly justifiable to subject the mother to the additional risks of a caesarean section. But that was in 1940 and conditions have changed remarkably since then. Recent authors, notably Rhodes in 1956, Dilworth and Ward in 1957, feel that the use of caesarean section should be extended to all cases where the cervix is not fully dilated. Myles, in 1959, analysed the caesarean section rate at Royal Maternity Hospital, Belfast, and he stated that caesarean section had gained favour as a method of treatment of prolapsed cord.

Before resorting to caesarean section, one has to take into account many other factors, at least as far as our hospital class of patients is concerned.

These patients are usually emergency admissions and hence are not prepared for anaesthesia. They are usually multiparae with sufficient number of children. A baby delivered by caesarean section may not survive through the neonatal period as the neonatal death rate is unusually high. The patient may not return to the hospital for a post-caesarean delivery and may risk the chances of scar dehiscence at her next confinement. In view of the above difficulties, we are still cautious about performing a caesarean section purely in the interest of the baby.

Very often the problem facing the obstetrician is whether the foetus is viable or not. The foetal heart sounds become slow and irregular and then stop. Can we predict the outcome in a case which is showing marked foetal distress? Here again opinions in world literature are at variance.

Slate and Randall state that if there is any question as to whether the baby is viable or not, the benefit of doubt should be given to the baby who may be alive although the foetal heart tone is inaudible and no pulsation in the cord detectable. They say that only in cases of extreme prematurity and cases of severe distress associated with conditions not satisfactory for vaginal delivery and showing no improvement by supportive efforts should the presence of a cord prolapse be accepted as an unfortunate circumstance about which nothing can be done.

Cushner states that the only practical means by which the status of the foetus can be evaluated is by auscultating the foetal heart and determining its rate, and that this technique for prognosticating the outcome of the foetus has its limitations. He states further, that in those cases in which the foetal heart was heard and was normal in rate, the perinatal mortality rate was relatively low but still over 30%. This of course, is merely an expression of the seriousness of this complication, all methods of management notwithstanding. Among these cases in which there was foetal bradycardia following the prolapse, the corrected mortality rate was 47.9%. It must be remembered that in this group there is a tendency to anticipate foetal mortality or foetal damage and to be reluctant to engage in any heroic attempts to effect early delivery. Taking this attitude into account, it is surprising that over 50% of these infants survived. The question of possible cerebral damage due to hypoxia in these foetal survivors is also discussed.

In Cushner's series, out of 81 cases in which the foetal heart sounds could not be heard at the time of prolapse, 9 infants survived. He states therefore that the absence of foetal heart sounds should be considered as presumptive evidence of foetal death in utero; however, the finding of nine survivors in this group should call for very careful auscultation at repeated attempts, in order to prevent an erroneous impression of foetal death, with the inactive type of therapy which usually follows such a diag-

nosis. Careful and repeated auscultation of foetal heart is likewise important in cases of foetal bradycardia.

Late foetal outcome: The current interest in obstetric and paediatric circles in regard to the late neonatal outcome of diseases of pregnancy has shown that the less apparent and more subtle forms of cerebral damage are due to intrauterine hypoxia. In every case of cord prolapse, the obstetrician is perplexed whether an infant will develop into a useful citizen, or it must inevitably be left with neurological or mental residue due to cerebral hypoxia

Cushner (1961) made an attempt to locate as many foetal survivors as possible. Out of 152 foetal survivors, contact was made in 93 cases of which 66 replied; 60% of these children were normal according to the information which was obtained from the parents. Three of the children who were located were abnormal. These findings would warrant the tentative conclusions that:

1. Permanent cerebral damage is a less common sequel in foetal survivors of prolapsed cord than was formerly feared:

2. Prematurity may well be a more potent cause of such residue than the cord prolapse itself.

Eastman in a study of cases of cerebral palsy, has shown that birth injury plays some role in permanent brain damage. This would curb the enthusiasm shown by obstetricians in salvaging asphyxiated babies.

Conclusions

1. One hundred and ten cases of cord prolapse have been presented, giving an incidence of 0.34%.

2. Abnormal presentation was the commonest associated finding.

3. Results of cord presentation are very much better than those of cord prolapse.

4. A large number of babies were non-salvageable on detection of cord prolapse.

5. The overall foetal mortality is high — 40.9%.

6. The corrected foetal mortality is reasonably low 12.1%.

7. Diagnosis, foetal mortality and management are discussed briefly in relation to present day obstetric practice in India. Current views on the subject are reviewed.

8. A plea is made to give due consideration to the future obstetric career of the mother before employing caesarean section.

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