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CRITICAL ANALYSIS OF 669 CAESAREAN SECTIONS IN THE
NOWROSI WADIA MATERNITY HOSPITAL, BOMBAY.

BY

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The status of caesarean section in obstetric practice is much debated. There are two schools, one seeking to increase the scope of the operation and the other who would restrict its use. The ultimate solution depends on the unbiased evaluation of the results of the operation as opposed to the results of more conservative type of delivery.

The error, as to the final solution, will diminish with increase in statistics brought out by various institutions. I am presenting to you the statistics from one of our premier maternity institutions, in the hope that many more such studies will follow.

This institution is composed of the staff of obstetric specialists as well as the resident staff comprising younger men and women working under the

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specialists, and who are changing from time to time.

Fifty per cent of the operations are performed by the resident staff.

Pattern of obstetric care has changed materially in the last ten years. Increasing number of women are taking advantage of the hospital as shown in Tables I and II.

In America in 1949 the percentage of confinements in the hospitals was 86. Today it has gone to 95%. Concurrently with hospitalization, there is a drop in the maternal mortality by 75% and also in the foetal mortality, though not to such an extent. This remarkable record is due to scientific developments of medicine such as antibiotics and chemotherapy, fluid replacement with plasma and blood, and introduction of new anaesthetic agents. Added to this are the improved hospital facilities and increasing number of trained personnel, with better under-

TABLE I & II

*Increasing Number of Admissions and Confinements at the Hospital
from 1946 to 1952*

Year	1946	1947	1948	1949	1950	1951	1952
Admissions	8560	9058	10051	10227	10516	10640	11486
Maternal deaths	72	70	72	*95	59	56	39
Incidence %	0.84	0.77	0.71	0.92	0.56	0.52	0.34
Number of							
confinements	6517	6504	7491	7513	7717	8062	8474
Booked	2156	2690	3786	4788	4827	5703	6050
Emergency	4361	3814	3705	2725	2890	2299	2424
Maternal deaths	40	38	36	45	28	31	27
Booked	9	11	10	16	14	14	3
Emergency	31	27	26	29	14	17	24
Incidence %	0.61	0.58	0.48	0.59	0.36	0.38	0.31

(*30 deaths due to epidemic of toxic jaundice in Bombay).

standing of physiology of pregnancy and labour, and better obstetric care of the pregnant woman. The maternity hospitals have attached to them well established ante-natal clinics. Table II shows increasing number of booked cases from year to year. In 1952 these booked cases were three times the number of emergency cases. As the outcome of this development, less and less number of neglected cases enter the hospitals. Whilst going through the records of the Wadia Hospital one noticed that the patients sought admission to the hospital within less than six hours of either onset of pains or rupture of membranes or haemorrhage.

With the increase in hospitalization, there is a noticeable increase in the incidence of abdominal deliveries. There was a time when all deliveries were effected by vaginal route. Long and difficult labours resulting in damage to the mother and the child

were thought justifiable because of the safety to the mother's life as caesarean section then resulted in the high maternal mortality of 10 to 15%. Abdominal delivery is the only obstetric operation that leaves the mother and baby in danger of their life in subsequent pregnancy. Kennedy calls them the 'tragedies of the uterine incision' as it leaves the woman with a scar in the uterus which is likely to rupture during subsequent pregnancy leading to death of the mother as well as the baby.

Incidence. The incidence of caesarean section has gone up during the last 15 years. The operation is performed by both the skilled and unskilled obstetricians. This increase is due mainly to extension of indications. As a result of this increase in incidence many articles began to appear in the medical press pointing to the abuse of this operation, in spite

of the fact that today there is increase in its safety. Every conceivable obstetric complication is treated by caesarean section as the surgeon knows only one way of getting out of the difficult obstetric problem and this is by means of an abdominal delivery. The incidence varies from 3 to 5%. It is higher in the teaching hospitals. Table III shows the incidence at the Wadia Hospital and at the Chicago-lying-in Hospital.

3. Influence of training and publishing of reports by the representative authorities of the maternity institutions encourage the younger obstetricians to resort to the operation on the slightest sign of deviation from the normal course of labour.
4. Advent of X-ray pelvimetry. Though no doubt most valuable in cases of dystocia, there is too much pathology and unfavour-

TABLE III

Incidence of Caesarean at the Wadia Hospital and the Chicago Lying-in Hospital

Year	1946	1947	1948	1949	1950	1951	1952	Chicago Lying-in Hospital				
								1931/ 1934	1934/ 1938	1938/ 1942	1942/ 1948	1948/ 1952
Caesareans ..	69	70	79	97	76	132	146	500	500	500	1181	781
Booked ..	52	48	55	74	59	94	111					
Emergency ..	17	22	24	23	17	38	35					
Incidence % ..	1.0	1.0	1.0	1.3	0.8	1.6	1.7	5.6	5.5	4.4	3.1	5.0

Other American authors give incidence as 1 to 3% in maternity hospitals, 4 to 5% in teaching hospitals and 10% among private patients. According to Colvin this increase in incidence is due to the following factors.

1. Hospitalization. It is a most favourable environment for both inexperienced as well as those well-trained but surgically-minded obstetricians. Here consultations are not always compulsory.
2. Advent of antibiotics and free use of blood transfusions have encouraged easy resort to caesarean section in infected and debilitated patients.

able prognosis read in the X-ray films. Many cases are diagnosed as contracted pelvis by X-ray and caesarean section is performed without trial labour.

5. The fallacious idea that caesarean section assures the safety of the child.
6. Remuneration and convenience.

Indications. At first there were only two obvious indications for performing caesarean section, viz. contracted pelvis and tumour. The lower margin of contraction was $2\frac{1}{2}$ inches for the diagonal conjugate of the pelvis. Today with increasing safety of the operation it is raised to $3\frac{1}{4}$ to 4 inches. In 1898 Lawson Tait

made a suggestion that placenta praevia should be treated by caesarean section. The next on the list of indication was toxæmia and from time to time more and more indications began to be added on to the list. The indications are divided into legitimate, relative and miscellaneous. The legitimate indications are: Contracted pelvis, cephalo-pelvic disproportion, repeat caesarean section, placenta praevia,

abruptio placentae, pre-eclampsia and tumours. The rest shown in the list are designated as relative or miscellaneous.

Indications for which caesarean section were done at the Wadia Hospital are enumerated in Table IV below.

1. *Contracted Pelvis.* Today contracted pelvis is less commonly met with. Table IV shows only 7%

TABLE IV
Indications

Year	1946	1947	1948	1949	1950	1951	1952	Total	Per cent	Sloane Hosp. Number	Per cent.
Contracted pelvis		11		21		17		49	7		
Cephalo-pelvic disproportion ..	23	17	34	15	24	47	49	209	31	539	53
Repeat C.S. ..	15	13	10	22	25	25	37	147	21	121	12
Placenta praevia	3	5	11	12	8	18	10	67	11	67	6.7
Abrupto placenta	1	1		3	2	6	6	19	2.8		
Abnormal presentation ..	6	3	6	1	6	5	14	41	6.1		
Bad obstetric history ..	6	2	4	4	5	6	13	40	5.9		
Elderly primipara	—	1	1	1	—	—	3	6			
Tumours ..	—	—	1	1	2	1	—	5			
Toxaemia ..	—	—	—	—	—	—	—	—			
Hypertension ..	2	—	—	—	—	2	1	5			
Heart disease ..	—	1	—	—	—	1	—	2			
Diabetes ..	—	—	—	—	—	—	—	—			
Previous vaginal operation ..	1	1	2	—	1	2	2	9			
Cervical dystocia	1	4	1	—	2	2	4	14			
Uterine inertia ..	1	1	—	—	—	1	1	4			
Foetal distress ..	1	—	—	—	1	—	1	3			
Failed forceps ..	—	—	1	—	—	1	1	3			
Prolapse cord ..	1	—	—	—	—	—	—	1			
Twins ..	1	—	—	—	1	—	—	2			
	(osteo malacia)					(repeat C.S.)					
Triplets ..	—	—	—	—	—	—	1	1			
Not recorded ..								30			
								669			

of these cases. No doubt this is due to elimination of rickets and osteomalacia by improved hygienic and nutritional measures.

2. *Cephalo-pelvic Disproportion.* About one-third of all caesareans are performed for this condition. It relates to maladjustment of presenting part to the pelvis. It is rather a vague term and a most troublesome obstetric problem. It requires accurate judgment. It may be a case of small pelvic measurements, baby of average size, the head remaining unengaged, particularly in a primipara, or the head may be lying in the occipito-posterior position. We all know that 90% of these cases will deliver per vaginam if given a chance. Our responsibility is to see that these vaginal deliveries will end successfully without any damage to the mother or the baby. The question here is to decide between difficult mid-pelvic forceps operation or a caesarean section. A thorough appraisal of the case both clinically and radiologically is essential before admission to the hospital. The house surgeon who admits these cases in the hospital should be thoroughly acquainted with the significance of an unengaged head. On admission his duty is to inform his chief immediately who makes a complete and thorough examination of the case. The patient is then allowed an adequate trial labour, i.e. the patient should be under the constant supervision of an experienced obstetrician who from time to time observes the strength of uterine contractions, the progress of the descent of the head through the pelvis and the dilatation of the cervix. This is more important

than the time factor involved in these trial labours.

The trial should also be well standardized, i.e. the patient should be allowed to go into spontaneous labour as induction is not likely to give one an actual idea of true mechanism of labour. With artificial rupture of membranes, there is risk of infection as there may be a long latent period before patient gets into labour. Vaginal examinations should be strictly limited.

We can certainly reduce the incidence of caesarean section as well as the number of difficult operative vaginal deliveries if we will only refrain from interference until the full dilatation of the cervix.

3. *Repeat Caesarean Section.* This indication stands next on the list. The old dictum of 'once a caesarean always a caesarean' does not hold good today, as the operation is now performed for so many various obstetric conditions that may not be present during the subsequent pregnancy. There are many exponents of vaginal delivery following a caesarean section. The danger during vaginal delivery would be rupture of the uterine scar. The decision for vaginal delivery rests with evaluation of the scar, which at times is very difficult. The risk from the rupture of a caesarean scar is much less than that from the rupture of uterus due to obstructed labour. The argument in favour of repeat caesarean section is that the mortality is only 0.1% to 0.02% whilst it is 1.7% from the rupture of the scar during vaginal delivery. The risk of rupture can be greatly minimized by careful management of the case before and

during labour. Every gravida with a history of previous caesarean section should be carefully observed at all times particularly in the last trimester. She should be instructed to attend the pre-natal clinic early in the subsequent pregnancy. She must be acquainted with the danger of rupture of the scar and to report at the slightest sign of discomfort. She should be instructed to enter the hospital as soon as she gets into labour or if the membranes rupture or even at the appearance of "show".

Management of labour should be under the care and strict supervision of a senior obstetrician. The patient must be admitted in a well equipped maternity hospital and carefully observed for any sign of impending rupture. Use of pituitrin should be avoided. Low forceps should be applied to avoid the strain of bearing down pains. All intra-uterine manipulations should be avoided. Placenta should be allowed to separate spontaneously. Oxytocic drugs should be given after the expulsion of placenta and before exploration of the uterine cavity for any sign of rupture of the scar.

4. *Placenta Praevia*. The operation should be performed as near term as possible, in both the primipara and multipara, in the interests of the baby. It should not replace normal vaginal delivery whenever

the latter is possible. The formula should be expressed as "vaginal delivery without interference, or caesarean section." There is a growing tendency to deliver all cases of placenta praevia by caesarean section. The argument in favour of this policy is that abdominal delivery lowers the foetal mortality. Foetal mortality was 15.4% when caesarean was performed in only 30% of all placenta praevia cases. In recent years with increasing number of such cases treated by caesarean section the foetal mortality has dropped to 5.7%. No doubt it is a great achievement. The maternal mortality was 6.4% and foetal mortality 66% when operative vaginal delivery was the treatment of placenta praevia. Adoption of caesarean section has brought down the maternal mortality to 3.0%. In 1942 caesarean section was performed in only 18% of cases with maternal mortality of 6%. Today the operation is performed in 61% of cases without any maternal death. Placenta praevia entails a great risk to the mother and the child. The abnormal position of placenta in the zone of effacement and dilatation increases haemorrhage, trauma and infection. There is increase in vascularity of the part and vaginal manipulations to control bleeding and induce labour will cause laceration and more bleeding.

Total Number of placenta praevia at the Wadia Hospital

	1946	1947	1948	1949	1950	1951	1952
Booked	25	15	19	10	19	30	30
Emergency	79	45	40	49	40	51	37
Total	104	60	59	59	59	81	67 = 489

The hazards of infection are also greatly increased due to the proximity of the placental site to the vagina. Today the conservative methods of plugging, introduction of bags and internal podalic version should become obsolete. Most of these cases will not be endangered by a single bout of bleeding. Manipulations disturb the clots which act as a natural tamponade and which is effective in decreasing the bleeding.

Of the total number of 479 cases only 79, i.e. 13.91% of cases, were treated by caesarean section.

5. *Abruptio placentae*. In abruptio placentae it is only indicated in acute concealed haemorrhage and when the patient shows signs of shock with severe anaemia and feeble pulse and when the cervix does not dilate and uterine contractions cannot be induced by pitocin within a short time.

Severe cases of abruptio placentae are less common and occur in women who are not in labour. They are often associated with chronic hypertension. Sudden separation of placenta gives rise to acute abdominal pain due to increase in uterine tone and distension. Bleeding is concealed or it may be associated with external haemorrhage. The patient goes into shock. The foetus usually succumbs or its circulation is greatly embarrassed. If uterine contractions start they are feeble and irregular and labour does not progress. In such cases abdominal delivery offers the best chance to the mother and even the baby. It will also give the operator a chance to judge the capacity of the uterus to

contract and if need be, enable him to proceed to hysterectomy to save the patient from post-partum haemorrhage.

Schaeffer and Carpenter described patients with premature separation who developed fibrinogenopenia. Bleeding continued even after the uterus was emptied, and in spite of massive blood transfusions their condition deteriorated. These patients showed that procrastination in cases of severe abruptio placentae may be fatal. The longer the condition persists the more serious does the clotting defect become. If vaginal delivery cannot be immediately effected they resort to caesarean section. Since fibrinogen is not generally available, they use large quantities of fresh whole blood to control the bleeding until fibrinogen is available. Caesarean hysterectomy is not the answer to this type of bleeding in premature separation, for bleeding continues from the skin and in the abdominal cavity even after removal of the uterus. The use of intravenous fibrinogen in these patients is a life-saving device.

6. *Abnormal Presentation*. Malpresentations can be diagnosed early in labour and attempts made to correct them. Caesarean section could be resorted to only if version fails. Malpresentations usually occur when the pelvic measurements are inadequate.

Breech. There is an appreciable increase in the use of caesarean section for breech during the past 15 years. In 1934-35-36 the incidence of caesarean section was 5%. In 1946-47-48 it rose to 12.3%. The

foetal mortality dropped from 7 to 2%.

7. *Bad Obstetric History.* It is generally recognised that disproportion does exist in multiparae who have previously delivered normally. Though these deliveries may be uneventful there is history of still-births and neonatal deaths. It must be borne in mind that the foetus increases in size with the increase in number of pregnancies. During trial labour if the head remains unengaged in spite of good uterine contractions and rupture of the membranes, allow the labour to progress for some time, before deciding on caesarean section as it is always difficult to estimate the disproportion with bulging or intact membranes.

We are likely to let the patient go through long drawn unproductive and unnecessary labour because she is a multipara, but it is equally true that such women with relative disproportion need not be subjected to caesarean section without a trial labour. With adequate pre-natal appraisal of these cases both clinically and radiologically it is easy to diagnose cephalo-pelvic disproportion prior to onset of labour.

8. *Elderly Primipara.* Caesarean section incidence increases with age both in the primipara and multipara. The increase in incidence in primipara at about 35 years of age is appreciable. The age in primipara is a more important factor than we realise. In the old primipara when the child-bearing period reaches its end a foetal loss is irreparable.

9. *Toxaemia.* Caesarean section may be justifiable in pre-eclamptic

cases when the condition deteriorates in spite of efficient treatment and when the cervix is not effaced and the pelvis is inadequate. Schaeffer and Carpenter believe that the use of intravenous pitocin will enable one to induce labour in larger number of patients with pre-eclampsia in whom induction was previously not felt to be possible. It has been their experience that if the pitocin induction does not work the first time, it usually will within the next 24 hours.

In eclampsia caesarean section is contra-indicated. It amounts to accouchement force. It may be justifiable only when vaginal delivery through natural passages is difficult. Maternal mortality of caesarean section is 21.8% and foetal mortality is 32%. Results of treatment with Stroganoff's method show maternal mortality of 8% and foetal mortality of 22%. Zweefel clinic gives maternal mortality of 5.3% when treated similarly and in his last 70 cases maternal mortality was zero. You may induce labour within a short time after convulsions are controlled.

10. *Chronic Hypertension.* Caesarean section is indicated for the safety of the child. It should be performed at 32 to 34 weeks of pregnancy in order to anticipate intra-uterine death. The child will thrive better outside and the progress of the disease will also be checked.

11. *Heart Disease.* Bramwell, in his article on Hazards of Pregnancy in heart disease, speaking of the treatment says, "If I were asked what I regarded as the most important consideration in the treatment of patients with heart disease who were

pregnant I should have no hesitation in saying that it is never safe under any circumstances to interfere with a pregnancy in a patient with heart failure until all has been done that can be done, and that is often a great deal, to relieve the heart failure. When a woman is admitted to hospital as an urgency, desperately ill with a failing heart, it is tempting to think that to save life termination of pregnancy is indicated. It is not. In these circumstances surgical intervention is an unjustifiable risk. It is surprising how well many of these patients respond to treatment. A few days' rest in bed, with skilled nursing, digitalization and sedatives will often convert what was a hopeless case into a reasonable surgical risk. When the heart condition is stabilized, and not before, is the time to consider whether pregnancy should be terminated."

In such cases when the heart failure has been relieved we used to recommend caesarean section, but further experience has convinced us that normal delivery carries less risk. We now always advise that in the absence of obstetric indication pregnancy be allowed to pursue its normal course.

When we first embarked on the investigation it was generally thought that the strain on the heart increased progressively as pregnancy advanced and on this account induction of premature labour or caesarean section before full term was often advised in women with heart disease to avoid the strain of the final months of pregnancy. We now know that the blood volume and cardiac output do not increase but actually diminish

during the last few weeks of pregnancy. These facts led us to modify our views regarding the management of these cases. There is little danger of heart failure developing during the last months of pregnancy if it has not been present previously. There is therefore no purely cardiac indication for terminating pregnancy at this stage since the strain on the heart will not be increasing but diminishing. Admittedly, presence of cardiac lesion would justify operative intervention in those borderline cases in which there is some obstetric complication. Cardiac patients should never be submitted to trial labour. In patients with heart failure, surgical intervention should never be contemplated until the heart failure has been treated. Patients with heart disease tolerate pelvic delivery better than caesarean section. There is no purely cardiac indication for anticipating normal delivery. Sterilization can be safely carried out after vaginal delivery.

12. *Diabetes.* Pedowitz and Schlevin are of opinion that in order to reduce the foetal loss in the diabetic parturient it is essential in their management to determine when and by what means to terminate pregnancy. At the present time there is no unanimity of opinion in this matter. Most authors say that the greatest number of intrauterine deaths occur from the 36th week of gestation on. In their series, 13 of the 14 intrauterine deaths i.e. 92.9%, occurred during this period. It is readily apparent from an analysis of the intrauterine deaths, that toxæmia and keto-acidosis are the two

prime factors responsible for this occurrence. When these complications exist, it would therefore seem advisable to terminate pregnancy even earlier than the 36th week in order to increase the foetal salvage. It appears that vaginal delivery of the diabetic is fraught with intrapartum deaths and traumatic delivery resulting in either foetal loss or nerve injury. The reason for traumatic delivery is explained by the fact that one-third of all infants, regardless of the period of gestation, weighed 9 lbs or more.

Under the *miscellaneous indications* for caesarean section are included previous extensive vaginal plastic operations, prolapse cord, cervical dystocia, uterine inertia and foetal distress. Two pairs of twins were delivered by caesarean section, the indication being osteomalacia and repeat caesarean section respectively. There is one case of triplet delivered by caesarean section for which the indication is not recorded. In the literature only two cases of triplets so delivered are recorded. The first case was described in the British Medical Journal by C. H. Roberts in July 1927. In 1940 the second case was described by Smith and Catgart of a primipara of 8 years' sterility. She was first seen on February 10, 1939, when she was two months advanced in pregnancy and complained of nausea. Her blood pressure was then 119/87 m.m. Urine was normal and WR was negative. Nausea persisted until the end of the 7th month. Twins were diagnosed clinically but no X-rays were advised for economical reasons. L.M.P. was Dec. 6, 1938. Due date of delivery was

Sept. 12, 1939. Blood pressure rose to 140/98 with slight trace of albumin. She was treated with rest and medicine for one week. Blood pressure went up to 149/104 with appearance of large amount of albumen in urine and oedema. Immediate evacuation was advised but the patient refused. On August 19th at 6 A.M. patient was admitted into the hospital with slight pains and medical induction was tried. Labour pains were very irregular, inefficient and without any dilatation of the cervix. Blood pressure rose to 170 mm. and oedema increased. Consultations were held with two obstetricians and diagnosis of toxæmia was confirmed. Patient was considered definitely pre-eclamptic and immediate operation was advised. Both foetal hearts were heard. At 11 A.M., under novocain 150 mgs. intradurally, caesarean section was performed. After extracting 2 male foetuses from one sac a third one was found in a separate sac. This was a female. Their weights were 4 lbs. 5 oz., 3 lbs. 10 oz. and 3 lbs. respectively. The authors took charge of the babies and at the end of 6 months they were 15 lbs. 8 oz.; 16 lbs. and 13 lbs. 6 oz. respectively.

Maternal Mortality. Caesarean section performed by an experienced specialist at the right time on the right patient and for the right indication is quite safe. Direct causes of death due to operation are infection, haemorrhage and shock, and pulmonary embolism. To-day mortality due to infection, haemorrhage and shock is at its minimum with the advent of antibiotics, freely available blood supply and improved methods of anaesthesia. The great-

est danger lies in the wrong choice of the time when caesarean section is performed as a last resort. Presence of infection is a great menace even with our perfected technique of lower segment as well as extraperitoneal caesarean section. Dieck-

mann gives maternal mortality as 1% to 2% in a general hospital and 0.5% to 1% in a maternity hospital. Table V shows maternal mortality at the Wadia Hospital and the Chicago Lying-in Hospital.

With elective C.S. and lower seg-

TABLE V

Maternal Deaths at Wadia and Chicago Lying-in Hospitals

Year	1946	1947	1948	1949	1950	1951	1952	1931/34	1934/38	1938/42	1942/48	1948/52
Maternal deaths	2	1	5	5	3	2	1	5	3	2	1	1
Booked	1	1	4	2	—	1	—					
Emergency	1	—	1	3	3	1	1					
Incidence %	2.9	1.4	6.3	5.1	3.9	1.6	0.7	1.0	0.6	0.4	0.08	0.13

Analysis of maternal deaths

Year	Number	Indication.	Cause.
1946	1 booked	Toxaemia	Post-operative shock
	1 emergency	Contracted pelvis	Paralytic ileus
1947	1 booked	Placenta praevia Bleeding	Haemorrhagic shock (5 hours)
	1 emergency	Anaemia	Hyperpyrexia (6 hours)
1948	1 booked	Cord prolapse, rectal cancer	Post-operative shock (2 days)
	1 booked	Rigid cervix	Post-operative shock
	1 booked	Previous caesarean	Paralytic ileus (2 days)
	1 booked	Obstructed labour	Septicaemia (32 hours)
	1 booked	Intranatal sepsis	
1949	1 booked	Central placenta praevia	Haemorrhagic shock (3 days)
	1 booked	Accidental haemorrhage	Paralytic ileus
	1 emergency	Accidental haemorrhage	Uraemia, Eclampsia (9 days)
	1 emergency	Placenta praevia I.P.V. Bleeding	P. P. H. (uterus packed)
1950	1 emergency	Placenta praevia, toxaemia	Haemorrhagic shock
	1 emergency	Central placenta praevia	Shock (9 hours)
	1 emergency	Accidental haemorrhage	Shock
	1 emergency	Central placenta praevia	Shock (3 hours)
1951	1 booked	Rupture uterus, repair	Sepsis (5 days)
	1 emergency	Rupture uterus, repair	Shock (3 hours)
1952	1 emergency	Marginal placenta praevia	Shock (2 days)

ment type of operation, the mortality is low. There is no mortality if the operation is done at the right time on the right patient and for the right indication. Any additional operative procedure at the time of caesarean section increases the incidence of maternal mortality.

Mortality could be classified into the following three groups.

1. Due to operation itself.
2. Due to pathological condition existing at the time of the operation.
3. Due to some intercurrent disease.

Out of these 19 deaths, only seven are directly due to the operation itself. Thus the corrected maternal mortality is 1.04%. This compares favourably with that of the Chicago Lying-in Hospital.

Morbidity. The usual B.M.A. standard does not express the true index of infection. There is that physiological post-operative febrile response which may be included in the morbid group. Such reaction is usually due to emotional disturbance, constipation, engorgement of breasts, and so on.

The true febrile index as calculated would be when the temperature rises $1/10^{\circ}$ above 99°F . continuously for 10 days, excluding the first day of the operation. Calculated accord-

ing to the febrile index the morbidity rate would show much lower percentage than that recorded according to the usual B.M.A. standard as in Table VI.

The morbidity was of short duration. It did not prolong the stay in the hospital beyond 10 days.

The danger of the operation increases every hour elapsing after the onset of labour when ascending infection of the uterus occurs from the vagina whenever labour has progressed for some time. On caesarean section the peritoneal cavity is exposed to this contamination as the uterus is incised. Dieckmann stresses the importance of this infection as the main cause of morbidity and mortality. Before the advent of antibiotics, preoperative vaginal instillations of mercurochrome, iodine or acriflavine were recommended. To-day antibacterial therapy and the technique of lower segment caesarean section has completely changed the problem of infection in abdominal delivery. The governing factors that reduce the morbidity are, the bacterial virulence, patients' resistance to invading bacteria and the resistance of the bacteria to the antibiotics. The other contributing factor is the health of the patient through better antenatal care and lastly by the use of blood transfusions in anaemic and debilitated patients.

TABLE VI
Morbidity

Year	Chicago Lying-in Hospital.												
	1946	1947	1948	1949	1950	1951	1952	1931/34	1934/38	1938/42	1942/48	1948/52	
Morbidity ..	36	16	25	30	36	24	51						
Incidence % ..	52	23	32	30	47	10	35.	41	41	31.	20	18	

Foetal Mortality—Table VII shows that Caesarean Section is no guarantee for survival of the child.

TABLE VII

Foetal Mortality at the Wadia Maternity Hospital & Chicago Lying-in Hospital

	1946	1947	1948	1949	1950	1951	1952	Chicago Lying-in Hospital.				
								1931/34	1934/38	1938/42	1942/48	1948/52
Hospital Foetal mortality	681	661	691	717	662	606	648					
Percentage	1.4	1.1	0.92	0.95	0.85	0.75	0.76					
Still-births	6	5	4	10	2	17	13					
% mortality	8.6	7.1	5	1.3	2.6	12	7.5	2.8	2.0	2.2	1.2	1.1
Neo-natal deaths	1	1	10	5	7	8	3					
% mortality	1.4	1.4	1.2	5.1	9.2	6.0	2.0	3.4	5.0	7.0	4.7	3.2

It is fallacious to think that caesarean section assures safety of the child. In elective caesarean section one is likely to miscalculate the maturity of the foetus. Landau attributes some of the infant loss to lack of conditioning the infant receives during vaginal delivery. During normal labour the chest of the baby is compressed by the narrow pelvic outlet squeezing out most of the swallowed amniotic fluid and mucus from the respiratory passages. Whilst during the abdominal deli-

very it would be all aspirated into the lungs at the first attempt at inspiration.

The cause of foetal mortality is respiratory failure. Table VII shows that foetal mortality from caesarean section is higher than that of the hospital as a whole.

Table 8 shows that larger number fall into the weight groups between 5 and 6 lbs. Underweight is the predisposing cause of foetal mortality.

TABLE VIII
Weight of Baby

Year	1946	1947	1948	1949	1950	1951	1952	
Weight of baby in lbs.								
Under 5	*16	22	*17	22	10	30	@18	* One twin
Between 5 & 6	24	27	27	33	24	47	54	@One triplet
Between 6 & 7	18	13	26	31	36	35	46	
Over 7	12	8	10	11	6	20	30	

TABLE IX
Parity

Year	1946	1947	1948	1949	1950	1951	1952
Primipara	.. 7	23	24	30	9	32	46
Multipara	.. 62	47	55	67	67	100	100
Parity 2 - 4	.. 44	31	33	34	43	60	54
5 -10	.. 15	14	20	26	20	37	43
Over 10	.. 3	2	2	7	4	3	3

Parity and age.

Apparently, no parity is exempt; the incidence of caesarean section is very low in those patients who had many deliveries, (Table IX).

operation. In lower segment there is less bleeding and the integrity of the scar is better assured. Table XI shows that 73% of caesarean sections are of the lower segment type at the

TABLE X
Age of Mother

Year	1946	1947	1948	1949	1950	1951	1952
Under 20 ..	3	6	3	4	6	13	11
Between 20 - 29 ..	41	38	50	56	42	81	73
„ 30 - 39 ..	19	22	19	30	27	32	57
Over 40 ..	6	4	7	7	1	6	5

Majority of caesarean patients fall into the age group between 20 and 39 years, which represents the period when most of the pregnancies occur. More of the patients fall into the age group of 20 and 30 years. Of the American women about twice as many fall into the age group of 30 and 39 years as those in the younger group of 20 and 25 years (Table X).

Wadia Hospital.

Lower segment caesarean scar will neither rupture during pregnancy as there is no strain on it nor in early labour when the lower segment is not distended. In case the scar ruptures there is not much haemorrhage. The peritoneum does not tear as it is loosely attached to the lower segment. The baby remains in the uterine

TABLE XI
Type of Operation

Year	Chicago Lying-in Hospital.												
	1946	1947	1948	1949	1950	1951	1952	1931/34	1934/38	1938/42	1942/48	1948/52	
Classical													
Operation	16	57	17	18	16	27	46						
Lower Segment	53	30	62	79	60	105	100	73%	92%	93%	91%	80%	80%

Type of operation.

The increase in lower segment caesarean and decrease in classical caesarean section are in accordance with the experience of many. Lower segment operation is preferred in presence of infection and after trial labour. Classical caesarean is performed as elective and when speed is necessary in the interests of the mother and the child. Both give equally good results in elective

cavity as there are no contractions. Transverse incision is preferable to vertical as the latter is likely to extend into the upper segment, thus frustrating the object of keeping the incision under the peritoneum. If the scar ruptures during later weeks of pregnancy the baby will remain in the uterine cavity as there are no contractions in the lower segment. The scar will rupture during labour when the patient is in the hospital.

In 1933-37 classical and lower segment were performed in equal number. Since 1947 lower segment has superseded to a great extent; about three-fourth of the caesareans are of lower segment type.

Advantages of lower segment caesarean section.

1. Spill of amniotic fluid is limited to the lower portion of the abdominal cavity.
2. Haemorrhage is more easily controlled.
3. Omentum and intestines do not come in the way.
4. There is less shock and less post-operative complications.
5. Healing of the wound is more satisfactory due to rest in the part.
6. The wound is covered by fascia and peritoneum preventing seepage of lochia.
7. There is free drainage of lochia into the vagina.
8. Rupture of the scar is rare. Incidence is 0.28%. Incidence of rupture in Cl. C. S. is 1 to 4%.
9. Rupture occurs during labour when the patient is in the hospital.
10. Spilling of infected amniotic fluid and meconium is limited to the pelvic cavity only, thus eliminating the complication of paralytic ileus which is likely to result when the infective fluid is spilt in the abdominal cavity during the classical caesarean section.

Anaesthesia. Until the year 1950, the chief anaesthetic agents used at

the Wadia Hospital were ether and chloroform. Local was rarely employed. From 1951 more and more of local anaesthesia was employed with the occasional addition of pentothal. Caudal and low spinal anaesthesia were tried on one or two patients. It is not advisable to use anaesthesia in such haphazard way. It is best to keep to one or two only.

In 1952, local anaesthesia completely replaced all forms of other anaesthesia with pethidine as a pre-anaesthetic agent, occasionally supplemented by general. Local anaesthesia is best though time consuming and not suited to nervous patients. General anaesthesia is quite safe but there is increased blood loss and foetal anoxia and post-operative pulmonary complication. Pentothal is contra-indicated in shock, haemorrhage and toxæmia. The drug passes through the placenta, the amount reaching the foetus during the first five minutes being very small. Throughout the first 5 to 10 minutes it is decidedly less than that reaching it after 15 to 20 minutes. It is quite suitable in elective operation when both the mother and the baby are in fit condition. Low spinal has been favoured by some. It requires an experienced anaesthetist. It should be used with caution and great consideration. Caudal is well suited particularly after trial labour when mother may be exhausted or in cases of haemorrhage and in women with cardio-vascular, renal and pulmonary complications. It is also suitable for premature deliveries. Local anaesthesia is coming in to assume more importance and its use is successfully extended.

Antibiotics. In 1946 only sulpha drugs were used whenever there was slightest indication of post-operative infection. Gradually when penicillin was released to the civilian population it was added to the list of chemo-antibiotics, particularly when the infection was of severe type or when the infection showed resistance to the sulpha therapy. The notable feature of this therapy was the sudden swing in 1952 when penicillin was routinely given to all caesarean patients as a prophylactic. One would like to ascertain if penicillin does act as a prophylaxis against the spread of infection once it has entered the uterine cavity.

Conclusion. Although the trend in recent literature is towards an increase in the incidence of caesarean section, mainly due to additions of indications, we can lower the incidence by careful evaluation of each indication and by compulsory consultation by two qualified obstetricians. A thorough discussion of the indication for each section performed, at the weekly staff conference will further tend to reduce sections done for some tenuous indication.

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ERRATA

Article "A Clinical Review of 400 Cases of Prolapse of the Uterus" by Dr. R. G. Krishnan, F. R. C. S., in Vol. IV No. 1, on page 61 read Fig. 1 as 4 and Fig. 4 as 1.