CLINICAL SYMPOSIUM ON CAESAREAN SECTIONS

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THE CURRENT INDICATIONS FOR CAESAREAN SECTION by T. K. Chong, L.M.S., M.R.C.O.G.

THE RESULTS OF 500 CONSECUTIVE CAESAREAN SECTIONS AT THE KANDANG KERBAU HOSPITAL, SINGAPORE — 1960 by T. H. Lean, M.B., F.R.F.P.S., M.R.C.O.G.

HISTORICAL ASPECT

The origin of the term "Caesarean Section" has given rise to a great deal of discussion. It is said that Julius Caesar (100 B.C.) was brought into the world by this means. This can hardly be correct as his mother, Julia, lived many years after her son's birth.

However, in Roman law, coded by Numa Pompilius (762-715 B.C.) it was ordered that the operation should be performed upon women dying in the last few weeks of pregnancy in the hope of saving the child. This lex regia, as it was called at first, under the emperors became the clex Caesarea' and the procedure itself became known as the Caesarean operation.

In the early times the operation consisted of little more than the child "was from his mother's womb untimely ripped". As the years passed greater care was no doubt given to the technique of the operation, but the maternal death-rate showed very little improvement.

I shall now discuss the history of Caesarean Section into the following periods according to the improvement of maternal mortality:

1. The first period lasting from the earliest times to the beginning of Nineteenth Century.
2. The second period includes the 1st half of the 19th century from 1800 - 1850.
3. Third period includes the latter half of the 19th century from 1850 - 1900.
4. Fourth period is the Modern era 1900-1950.

During the first period the operation was occasionally performed as a last resort in the hope of obtaining a living child when the mother was dead or so near to death that maternal survival was not considered. The first Caesarean Section to be performed upon a living woman is believed to have been done by Jacob Nufer, a castrator of pigs in Switzerland, in the year 1500. He operated successfully upon his own wife after she had been given up by the midwives and barbers in attendance. It probably consisted in the removal of an extrauterine pregnancy from the abdominal cavity, as she had five spontaneous labours afterwards.

However, the first authentic Caesarean Section, was probably done in 1610 by Trautmann of Wittenberg. After this it was occasionally performed until it was almost given up in favour of Symphysiotomy in 1777, to be taken up again after the latter operation had fallen into disrepute.

THE SECOND PERIOD — 1800 - 1850

During this period the death rate in Caesarean Section was still in the region of 70-80%. Baudeloeque in 1801, described the position in France at the end of the eighteenth century. Not a single successful Caesarean Section was performed in Paris between the years 1787 and 1876. Fleetwood Churchill has reviewed the position for Great Britain and America during the years 1737-1858 — out of 80 cases, 23 mothers saved and 57 lost or more than two-thirds. It is interesting to note that the first success in the above list was operated by a midwife, Mary Dunally in the year 1739. No better results could be expected with ignorance regarding infection, the uterine wound left unstitched and the operation undertaken as a last resort after a protracted labour or failure to effect delivery by other means. Most of the deaths were due to immediate shock and haemorrhage, if not, it was almost certain to follow within a few days from peritonitis or general infection.

Certain important suggestions and experiments were tried during this period to reduce this high

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maternal mortality from the operation and they are worth mentioning here.

1. In 1805, Friedrich Benjamin Osiander of Gottingen in Germany, was the first obstetrician who noticed that ruptures of uterus are comparatively less dangerous when they occur in the lower part of the uterus than when they occur in the upper or middle division of the organ. He immediately applied this principle by putting his incision in the lower part of the uterus and vagina and claimed:
   a) that the incision may be made about two inches shorter than usually employed before.
   b) the foetal head lying in the upper part of the pelvis, can be more easily delivered through an opening in the lower part of the uterus.
   c) the empty uterus retracts and sinks down into pelvis and the wound is hidden behind the symphysis pubis. Prolapse of omentum or bowel into the wound can then occur only with difficulty, and there is free discharge of blood and lochia into vagina. Unfortunately, his only two cases which he operated upon died, which he claimed was due to poor general condition and not due to operation. However, he laid down the principle advantage of modern Caesarean Section with the exception of stitching the uterus which was not taken up till latter part of the 19th century.

2. Another proposal made by Ferdinand Ritgen (1821) of Giessen in Germany, and independently by Sir Charles Bell (1838), the eminent Edinburgh surgeon, was the lateral extraperitoneal approach to the uterus. Not much attention was given to it until the latter part of the 19th century.

3. Yet another suggestion, and more brilliant in conception was that made by P. S. Physick, Professor of Anatomy, Philadelphia (1824) to W. P. Dewees, 'Father of obstetrics' in the United States. It was a medial approach to the lower segment of the uterus by separating peritoneal flap from vault of bladder. It never received much attention until quite recently when Waters of the United States took it up.

4. The most notable and outstanding contribution to reduce maternal mortality from Caesarean Section in this period under review, however, was made by James Blundell of Guy's Hospital (1834). As a result of successful experiments carried out on rabbits, he suggested that the solution might be amputation of the body of the uterus following delivery of the child. Some 40 years later Porro in 1876, actually performed the operation on a human being.

THE THIRD PERIOD

Advances in respect to the operation of Caesarean Section in the first half of the nineteenth century were not very promising. The position was entirely different in the latter half following the improvements in technique introduced by F. A. Kehrer in 1881 and Max Sanger in 1882 by suturing the uterine wound.

Ever improving surgical cleanliness and anaesthesia in 1847 and Lister's carbolic sterilization in 1867 contributed greatly to the success which followed Kehrer's and Sanger's techniques.

But the most important factor which was responsible for the dramatic fall in the maternal mortality was careful stitching of the uterine wound.

Before we consider them, some other proposals were made in this period, but most of them survived for a very short time.

THE FIRST — The lateral extraperitoneal approach was once again taken up particularly by Gaillard Thomas of New York in 1870 and Arthur Adis of London in 1878. The former entitled it "Gastroelytrotomy" and the latter as "laparo-elytrotomy". Within ten years 1870-1880, eight such operations were performed (6 in America and 2 in England) with a total Maternal mortality of 50%.

THE SECOND AND MOST IMPORTANT PROPOSAL — hysterectomy following extraction of child by Porro of Pavis in 1876 who actually performed the operation and reduced the maternal mortality to a very low level (20-30%) for the first time in the history of Caesarean Section. This although attended with success was only short lived in the history till F. A. Kehrer and Max Sanger almost simultaneously (1881 & 1882) were the first to appreciate clearly that many of the bad results of Caesarean Section were due either to the absence of any attempt to close the uterine incision or to the imperfect and unsatisfactory closures which up till that time, had occasionally been attempted. Sanger's work is well known. The part that Kehrer played in the development of the uterine suture has frequently been overlooked. With regard to priority in its first practical application in Caesarean Section the honour is undoubtedly Kehrer's. The

technique of the two was different. Kehrer made his incision low down on the uterus and transversely. Sanger on the other hand made his vertically. The former came to be designated the "lower segment operation" and the latter the "Classical operation". It must be remembered that the first successful Caesarean section as it is practised today is the lower segment operation performed by Kehrer in Heidelberg on the 25th of September. 1881. The following year 1882 saw the rebirth of the older procedure i.e. classical Caesarean section. This Sanger's technique — a longitudinal uterine incision and stitching of the wound with through and through sutures (leaving out the mucosa) and intermediate stitches to unite the peritoneum being the simpler of the two, was adopted by almost all operators. But we shall see later how this came to be reversed in the next century.

Then a rapid change in different suture material and site of incision followed. First one suture material then another was adopted or discarded. The question of the suture line itself, and the exact layers to be included, was argued and discussed in almost fractional terms. New incisions were planned and practised. Corporal incisions were made both high and low. The fundus was opened, by some transversely, by others longitudinally. The child was even delivered through the posterior wall of the uterus. Almost every site was tested for its own peculiar advantages, except the lower segment.

Not only the technical details of the operation were the subject of consideration in the latter part of the 19th century. The scope of the operation was also slowly extended to other conditions besides extreme pelvic deformity and this extension of its use was not unjustified as between 1890-1900, the mortality of the operation had fallen and in a few clinics, to as low as 5%. Thus the nineteenth century started with a maternal mortality for Caesarean section of 65-75%. This rate continued much the same until the operation by Porro (1876) reduced it by some 20-30%. By the end of the century the mortality rate had been reduced to approximately 5-10%, and most of the mortalities were in the cases which were interfered with attempted vaginal delivery or cases obviously infected before Caesarean section was undertaken. Thus already by the end of the nineteenth century it was realized that, in order to secure further reduction in maternal mortality, patients must be operated on early in labour and uninterfered with previously. This opened up the question of procedure in what came to be designated (1) clean, (2) suspect, (3) infected cases -- a subject which comes for discussion into the present 20th century.

FOURTH PERIOD OR THE LAST PERIOD
1900-1950 (first half of the twentieth century)

Space does not permit a detailed review of the evolution of Caesarean Section in the present century. However, I shall summarise the major developments briefly.

The beginning of the 20th century was confronted with the problem of suspect or infected cases. We have seen at the close of 19th century, that Sanger's classical operation was universally accepted while Kehrer's transverse lower segment incision had been forgotten.

Fritz Fran of Koeln in 1906 once again started the lower segment operation. Particularly his method of shutting off the general peritoneal cavity by stitching visceral and parietal peritoneum before incision of the uterus, made it possible to reduce the mortality further in suspect and infected cases. Lower segment incision also proved to be ideal for vaginal drainage. Others — Sellheim, Jeannin and Burten Hirst in the United States also worked out an extra-peritoneal technique with the object of minimising the risk of infection in suspect and infected cases which took a heavy toll in fatalities.

Eardly Holland, Munro Kerr, Johnstone and Miles Phillips in recent years also proved that lower segment is the ideal site for the uterine incision, for a sound scar which would stand the strain of a subsequent pregnancy and even labour. In the end, lower segment incision has been proved to be safer against infection and to give a sounder cicatrix, particularly if placed low in the segment and made transversely, although De Lee in America persisted in advocating the vertical incision.

Today transverse incision through lower segment is accepted as the ideal incision, except in a few special circumstances. For example, in constriction ring dystocia or in impacted shoulder if the child is still alive, it may be easier to employ a longitudinal than a transverse incision or if circumstances are such, that the patient has to be sterilized, then the slightly more complicated technique of lower segment operation may hardly be necessary, although it does ensure against intestinal adhesions to the scar, which cannot be said for the 'classical incision', no matter how carefully the stitching may be carried out.

Marshall in his valuable analysis of 7762 cases of Caesarean section in 16 teaching hospitals

(1943-1947) shows that over 75% of the operations were performed through the lower segment, which shows how far this incision has displaced the classical.

For some time in the present century there had been a tendency to revive the extraperitoneal approach to the lower segment. Waters in 1940, Ricci and Marr in 1942, Norten in 1946, in the United States tried to revive the medical extraperitoneal approach, while Latzko, Doderlein, and Rustner tried to persuade the far cruder lateral extraperitoneal approach. But it is unlikely, that all these will ever be widely preferred to the intraperitoneal operation, which is far simpler and equally, if not more, safe.

Regarding the scope of this operation, I must say, that originally employed for dystocia associated with extreme pelvic deformity and pelvis tumours obstructing the birth canal, it has progressively been employed for many other forms of dystocia and complications of pregnancy. One of the most outstanding is placenta praevia, which, when suggested by Lawson Tait in 1890 was received with redicule by the obstetric pundits of the day.

Now the future history of Caesarean section will be to find out, how far extension of the scope of the operation is justified. All I can say is, that the present and successive generations of obstetricians will preserve the balanced judgment of great master William Smellie, illustrated in his own words: "We ought never to trust too much or be over sanguine in respect to any particular method of practice, but vary the same as we feel it necessary".

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THE CURRENT INDICATIONS FOR CAESAREAN SECTION

Originally, the operation of Caesarean Section was employed only for dystocia associated with extreme pelvic deformity and pelvic tumours obstructing the birth canal, and then only when circumstances were desperate. During the present century the ever-widening extension of the operation of caesarean section as a means of combating the complications of parturition must be the most striking development in operative obstetrics. That this is possible is assuredly due to pretty well standardised technique, namely, the trans-peritoneal segment caesarean section, the discovery and employment of the sulphonamides, penicillin and other antibiotics and the ever-increasing attention that has been given to the choice and administration of the anaesthetic.

In our analysis of 500 consecutive cases of caesarean sections done in this hospital in 1960, the section rate is nearly 2%, $\frac{1}{3}$ that of most centres in the West. Even then, an average of 2 caesarean sections has to be done in this hospital everyday of the year, so much so that our medical officers are quite adept at it, if not in its technique, at least in its indications. 98% of the 500 cases of caesarean sections were of the classical type. This type of operation is definitely out-dated. The only reasons for which this classical operation was done were:

1. Fibroids of the lower segment of the uterus which made approach to the lower segment technically impossible.
2. Neglected shoulder presentation, or transverse lie.
3. Pathological uterus which had to be removed at the same time.
4. Post-mortem caesarean section in an attempt to secure a live-child though we had no case of this type in this series.

Table I shows our own current indications for primary caesarean section expressed in percentages on the right side and on the left side, that of Edwin De Costa of the North-western University Medical School, Chicago, Illinois which is based on reports available since 1949.

Cephalo-pelvic Disproportion

Excluding repeat caesarean section from consideration, our figure of 21% is much lower than

that of De Costa (35%). This may be due to the fact that although we are more prone to operate, cephalo-pelvic disproportion is less common to-day. Severe pelvic deformities, the rachitic pelves, the osteomalacic pelvis, etc. so eloquently described in the older text-books are nowadays more of a curiosity. This may also reflect the improved health, nutrition and hygiene of our population.

TABLE I — CURRENT INDICATIONS FOR PRIMARY CAESAREAN SECTION EXPRESSED IN PERCENTAGES.

Indications	Percentage	
	Edwin J. De Costa	K.K. Hospital 1960
Cephalo-Pelvic Disproportion	35%	21%
Placenta Previa	12%	29%
Accidental Haemorrhage	6%	6%
Toxaemia (Eclampsia)	7% —	14% (5%)
Uterine Dysfunction-Inertia, Prolonged Labour	15%	6%
Foetal Distress (Post-maturity + Foetal Distress)	6% —	12% (5%)
Malpresentation Transverse lie, face brow Breech	7% —	3% 2%
Prolapsed Cord	2%	2%
Diabetes	2%	1%
Previous Pelvic Surgery	2%	—
Obstructed Labour by soft Tissue Tumours	2%	1%
Miscellaneous — including bad obstetric history, carcinoma cervix, grand multipara, etc. each less than 1%	4%	3%

Much more important than gross disproportion is medium or minor disproportion where a trial of labour is indicated. X-ray pelvimetry is essential but only as an adjunct to clinical judgment. The final decision for or against caesarean section in most such cases must be difficult, especially when uterine inertia, inco-ordinate uterine action, cervical dystocia and occiput-posterior positions so often accompany or complicate relative degrees of disproportion. Nothing short of great obstetric finesse is required here to make the final decision to enhance the chance of foetal survival. However, if the disproportion is associated with a breech presentation, an elderly primigravida or a bad obstetric history, then there should be no hesitation in doing a caesarean section forthwith.

Perhaps another factor may be responsible for our lower incidence not only in disproportion but also in *uterine dysfunction* and that is our woman stands labour well. A somewhat similar observation was made by Prof. Gordon King of Chinese women in Hongkong who had comparatively easy labours.

Repeat Caesarean Section

11% of our cases were repeat caesarean section. There is a tendency for the incidence of repeat caesarean section to increase. The dictum "once a Caesarean, always a Caesarean" is applicable if the previous caesarean section had been done for a proved established disproportion. But many American obstetricians to-day will repeat a caesarean section whatever the previous indication. It is not so amongst the British obstetricians where there is no recurrent cause for the caesarean section and over 2/3rds of previous caesarean section, patients were delivered vaginally in their subsequent pregnancies in some centres.

In the choice of these patients for vaginal delivery, they should preferably have had the previous incision made in the lower uterine segment, where it is known that a satisfactory technique was employed, where the puerperium had been uneventful and where the facilities of a fully equipped hospital are available, including placentography to exclude a placenta lying over and thereby weakening the uterine scar. The key to the situation is obviously good clinical judgment.

Placenta Previa

The biggest indication in our series is placenta previa (29%). One of the most outstanding advances in the treatment of Placenta Previa is by caesarean section, which is the method of choice in some centres to the extent of over

seventy per cent. Yet this treatment when first suggested by Lawson Tait in 1890 was received with ridicule by the obstetric pundits of the day. The success in this method of treatment is of course partly due to the expectant treatment as advocated by Macafee.

It is interesting to note that in 56% of our cases of P.P. the patients were elderly.

Accidental Haemorrhage (6%)

In the last 2 - 3 decades, there has been conflicting opinion regarding the place for caesarean section in this condition. The present position appears to be that in revealed or mixed haemorrhage when there is anxiety about the foetus, if the foetal heart sounds can still be heard on admission, especially when after artificial rupture of the membranes is done, there is little or no progress in labour, abdominal section is the best method of delivery.

A few years ago caesarean section was not thought to be necessary as the foetus was so often already dead. Now in the concealed variety, even if the foetus is dead, when the patient's condition begins to deteriorate, with increase in size and tension of the uterus, increase in pulse-rate, restlessness with scanty urine, caesarean section should be done at once lest it becomes more serious by virtue of a fibrinogenaemia and blood loss aggravating shock and anuria.

Toxaemia

Our figure for this indication is probably a little high (14%). This is perhaps to be expected as about 60% of these cases are unbooked. Most of our cases are unbooked grandmultiparae with severe pre-eclampsia who did not respond to recognised medical treatment or who failed to deliver even after amniotomy. With good antenatal care the incidence for this condition will certainly diminish.

Eclampsia (5%)

It might be argued that if, in the severe type of pre-eclampsia, emptying the uterus by caesarean section often saves the mother and child: is it not possible to do the same in the case of eclampsia? Caesarean section for eclampsia was condemned in the old days because of the high maternal mortality associated with the procedure.

Dieckmann as far back as 1937 was already prepared to express a conviction, which many others had begun to feel, to the effect that in really severe eclampsia caesarean section did not add materially to the death rate and that in individual cases, its application might indeed be life-saving.

Since then, many others have treated eclampsia by caesarean section e.g. Hudson and Seah in our Hospital, Morris, Menon and ourselves, with consistently good result. The operation is done if the patient is or is not progressing in labour.

The problem now is when, and under what circumstances, should surgical measures be employed to give the best result. When the foetus is dead, the problem is settled as then interference is often unnecessary.

Foetal Distress

Our 12% indication for foetal distress is high indeed by comparison. The high rate is understandable for 42% of the foetal distress were associated with post-maturity. The rest was due to hypertension, premature rupture of membranes, cord round neck and large baby. Our experience here shows post-maturity cannot be ignored.

It is just over a decade ago only that foetal distress has been accepted as an indication for caesarean section.

More significant than just meconium-stained liquor in cephalic presentation, is its association with variations in foetal heart rate or rhythm. A foetal heart rate above 160 or below 100 with thick pea-soup meconium especially in a post-matured primigravida is especially dangerous and caesarean section should be performed forthwith unless dilatation of the cervix is suitable for forceps delivery.

In a multipara who has meconium-stained liquor, but is not post-matured, it may be possible to anticipate early termination by forceps delivery, at the end of the first stage of labour, after enforcing a very careful check on the foetal heart.

The term foetal distress is perhaps vague and as such its indication can be so easily abused or its significance over-estimated.

It is interesting to note that the largest number of paying cases in the series, as opposed to free cases belongs to this group of foetal distress, viz. 23% of the total number of paying cases (45) in the whole series. This may reflect an undue anxiety of the accoucheur over the condition of the foetus in this class of patient.

Malpresentation (7%)

The cases in this series are mainly unbooked and it is very possible that mild cephalo-pelvic

disproportion is present or the foetal size is a little above the average. For these reasons the unbooked *transverse lie* (3%) in this series, admitted in labour as most of them were, had been better treated by caesarean section rather than subjecting them to risky vaginal manipulations.

Breech-presentation (2%)

Our 2% indication for this abnormality is small. The average figure is about 5%.

There is no place where experience and judgment are more important than in the management of primiparous breech labour. As an aid X-ray pelvimetry are invaluable. There are 3 main conditions in favour of caesarean section:

1. When the pelvis is even slightly contracted.
2. When she is an elderly primigravida.
3. When the foetus is very large, i.e. over 8½ lbs., as it may cause disproportion even in an average pelvis.

Admittedly it is difficult to estimate the foetal weight correctly, but when despite good uterine contractions, despite a known adequate pelvis, the buttocks fail to descend, then it is time to think again of a "large" baby.

Prolapsed Cord (2%)

From 1944 onwards, this has almost become a new primary indication for abdominal delivery when the cervix is not fully dilated. Replacement of the cord became obsolete. If the cervix is fully dilated rapid vaginal delivery is possible unless malpresentation hinders it.

Before caesarean section is finally undertaken, the obstetrician must again assure himself that the foetus is alive.

Diabetes Mellitus (1%)

Diabetes Mellitus is relatively a new indication for abdominal delivery, for after the discovery of insulin, the patients could have a family and thereby present a new problem The foetus of the diabetic mother is frequently oversized and the risk of intra-uterine-death is greatest after the 36th week. Hence caesarean section is usually indicated at this time in all primigravidae and in multipara with a firm tightly closed cervix.

The other sections are self-explanatory. Certain patients who have plastic operations done on the cervix in the treatment of habitual abortion or have vaginal repairs done for vesico-vaginal fistulae, should have abdominal delivery for their babies, for it is reasonable to avoid undoing the good accomplished by the corrective surgery.

Those with a bad obstetric history or had difficulty in achieving pregnancy, or if their remaining child-bearing years are few, then clinical judgment may favour a more rapid termination of pregnancy by abdominal section.

Whilst new indications have arisen, others such as severe heart disease, kidney disease and pulmonary disease are no longer considered indications. Yet in spite of these, the outstanding question at the moment is how far extension of the scope of the operation is justified?

Difficult as it must be, the answer is probably to maintain a balanced perspective towards the vaginal and abdominal route of delivery in complicated cases.

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THE RESULTS OF 500 CONSECUTIVE CAESAREAN SECTIONS AT THE KANDANG KERBAU HOSPITAL, SINGAPORE, 1960

It is reasonable to assert that Caesarean Sections as performed to-day have reached a high standard both of safety for the Mother and also in increasing foetal salvage. That we have been able to attain this standard may rightly be attributed to 5 outstanding factors:—

1. Modern achievements of surgical techniques and surgical materials,
2. Almost total control of sepsis,
3. Advances in Haematology and the safety of blood transfusions,
4. Advances in Anaesthesiology,
5. Sounder Obstetric Care and Sounder Obstetric Judgement.

It is customary for results to be assessed first on Maternal and then on Foetal aspects and although this series boasts of a Zero Maternal Mortality, nevertheless there are some aspects which makes discussions of Foetal results first, necessary.

FOETAL RESULTS

Consistent with the improvement in the Maternal Mortality Rates in association with Caesarean Sections, Foetal Mortality on the whole has also taken a tumble when compared with 30 years ago. Reports from various institutions in different countries show an average Foetal Mortality of about 9% Still-Births for the years 1941-1951, and in 1956, further reports from European centres give the still-birth rate as 6.5%.

In this survey of 500 Consecutive Caesarean Sections performed for the various indications at the State's Kandang Kerbau Hospital, the comparative Foetal Mortality for 1960 is shown in the following table:

PERI-NATAL MORTALITY		STILL-BIRTHS		DEATHS IN THE FIRST WEEK OF LIFE
Overall	Corrected	Overall	Corrected	
55 Deaths in 509 Births 10.8%	54 Deaths in 509 Births 10.6%	30 Deaths in 509 Births 5.9%	29 Deaths in 509 Births 5.7%	25 Deaths in 509 Births 4.9%

It can thus be seen from the above table that there appears to be considerable room for improvement of Foetal salvage for although the still-birth rate compares favourably with other countries, the peri-natal mortality of 10.8% (Corrected 10.6%) would appear to be slightly high. The responsible factors for this mortality ratio may now be discussed:—

(a) BOOKING

It appears still discouraging to report that the booking rate in general for this hospital is still comparatively low. Thus in the series under review — only 8 cases who lost their babies either at birth or during the first week of life had been well and truly booked. This represents only 14.9% as a booking rate. Thus therefore the enforcement of a complete, co-ordinated and non-haphazard ante-natal care will considerably improve this figure as it must surely improve maternal mortality rates as well.

(b) INDICATIONS FOR CAESAREAN SECTIONS

The break-down of the peri-natal mortality figures in relation to the varying indications under which Caesarean sections had been performed in this institution is as follows:—

1. **Haemorrhage** — Ante-Partum

Abruptio Placentae	12 cases	21.8%
Placenta Praevia	24 cases	43.6%
Total:	36 cases	65.4%

Ante-Partum Haemorrhage exhibited in both its forms of Abruptio Placentae and Placenta Praevia took the highest toll of foetal deaths in this series under review. A total of 36 deaths or 65.4% of the total deaths occurred. It is true to say that perhaps the cases of Abruptio Placentae may not have required accouchement force in the form of a Caesarean Section but when rigidly analysed, the operations had been performed more for Maternal interests than for foetal interests. 4 of such cases necessitated Caesarean Hysterectomies. In similar instances, there had been 12 cases of Placenta Praevia which could not be conserved to improve the foetal salvage for this type of condition. Caesarean Sections had to be resorted to also in the interests of the Mother.

2. Toxaemia and Eclampsia

Only 3 births did not survive and were made up as follows :—

Eclampsia	2 cases	3.7%
Imminent Eclampsia	1 case	1.8%
Total :	3 cases	5.5%

Analysis further showed that the Caesarean Sections had been carried out for more pressing Maternal Indications and also in the belief that for such conditions, the foetus, even premature, stands a better chance of survival in a well organised Premature Unit Nursery than if left in Utero.

3. Obstetric Abnormalities

Under this title is included an assortment of Obstetric indications, and most of these cases had Caesarean Sections performed in the midst of established labours. The breakdown of these conditions include :—

(a) Prolonged Labour (over 24 hours) & Failed Trial of Labour	8 cases	14.5%
(b) Transverse Lies & Obstructed Labours	4 cases	7.3%
(c) Ruptured Uterus	1 case	1.8%
(d) Prolapsed Cord	2 cases	3.7%
TOTAL	15 cases	27.3%

These results must of necessity caution us against an injudicious selection of cases for trials of vaginal deliveries. In a similar vein, searching questions must be asked in cases of Prolonged Labours — thus for example, it might have been wiser for us to ask ourselves why labour towards a vaginal delivery should be terminated in favour of an abdominal Caesarian Section than to postulate the reasons why labour towards a successful vaginal delivery be continued.

It is needless to say that good preventive obstetrics should obviate Rupture of the Uterus, and it must be emphasised that only judicious vaginal examinations can detect funic presentations and prolapse in good time to save babies by operative interventions.

4. Medical Conditions Co-existing

Only a single case of death was recorded in this series for this indication. A Baby weighing 6 pounds and 11 ounces born of a Mother with a moderately severe Diabetes Mellitus, died 72 hours after delivery. The cause of death was Pulmonary Atelectasis and Broncho-Pneumonia.

The hazards of Infants in Pregnant Diabetics and the hazards during labour and after delivery are now well recognised both by Obstetricians, Physicians and Paediatricians. With co-ordinated care, no case should be lost under present day circumstances.

(c) BIRTH-WEIGHTS

It is universally agreed that the risks of premature babies delivered by Caesarean Sections are much greater than of those delivered normally per vaginam.

In the 500 cases under review involving 509 births, comparative analysis could not substantially confirm this view but nevertheless this view must be accepted. The risks of course can be minimised by up-to-date Premature Unit Nurseries. It is felt that survival chances in any large premature Unit nurseries for premature infants should give a 1 in 3 chance for babies born 3 pounds; and at 4 pounds and over, one should be able to save most if not all the babies.

Taking those infants born 4 pounds and under as premature, the relative mortality rates are as follows :—

Maturity	Birth Weights	Nos.	Per Cent
PREMATURE	2 to 3 Pounds	5	9.0
	3 to 4 Pounds	15	27.0
	TOTAL :	20	36.0
MATURE	4 to 5 Pounds	8	
	5 to 6 Pounds	10	
	Over 6 Pounds	17	
	TOTAL .	35	64.0

(d) ANAESTHESIA

Analysis on the effects of the type of anaesthesia on foetal mortality gave no significant figures except the observation that there had been 3 cases of Spinal Anaesthesia on 3 cases of Prolonged Labour which accounted for 3 foetal deaths — viz : 2 Still-Births and 1 within the

first week of life. Under present experiences, one would have the impression that in some cases, it is the delay in the anaesthesia service that stands to be criticised rather than the type of anaesthesia that had been employed. There is thus the cogent necessity of an integrated Obstetric-Anaesthesic Service being in function full-time in this institution.

MATERNAL RESULTS

Mortality

About 30 years ago when maternal mortality rates for Caesarean Sections for all indications were in the regions of 6 to 10%, the hall-mark of an Obstetrician was adjudged by his Caesarean Section Rate; and it would appear then, that the lower his rate, the higher his hall-mark. In these few years, maternal mortality rates for Caesarean Sections have shown a tremendous fall but this must not mean that the Obstetrician with the higher Casesarean Section rate has a higher hall-mark. In most instances rather, a good Obstetrician must be able to count the number of Caesarean Sections he had to do and had done, as well as the number of Caesarean Sections he need not have to do and had not done. Comparative figures for maternal mortality are appended in the following table :—

CLINIC	RATE
North of England (1949)	Lower Uterine Segment 0.3% Classical Section 4.0%
McIntosh Marshall — Mass Statistics (1949)	Varying from 4.3% to 0.09%
North American Clinics (1940-1950)	Varying from 0.01% to 0.05%
Beck & Hillejan (1937-1956) (Western Germany)	0.36%
Kandang Kerbau Hospital (1960)	Consecutive 500 cases Zero%

It is only logical to assume that the Zero Mortality attained had been one of chance incidence, although one would hope that it was deliberately designed and attained. It might be the next dozen cases might encounter with 2 or 3 maternal deaths. But this factor notwithstanding, it is a safe assumption to make that the mortality rate in this hospital is somewhere in the region of 0.3% to 0.4% — by every manner and means a very safe ratio but still, one which may be considerably improved. It is fitting to comment that the Zero Mortality presented in this series under review had occured despite the fact that the majority of the cases had been unbooked ante-natal cases (54.4%) and that surgery carried out was done as emergency in the majority of them — unprepared for a General Anaesthesia and unprepared for Major Surgery.

Morbidity

Whilst death would appear to be very unlikely nowadays in mothers who undergo Caesarean Sections, there remains the undeniable existence of Morbidity to consider in almost if not all the cases involved.

Morbidity as such, involve features as follows :—

(a) Immediate Disablement and Enforced Hospitalisation with a variable period of rehabilition

An average period of about four weeks is required in most cases for satisfactory constitutional recovery. This period may need to be prolonged in cases such as wound sepsis, anaemia, urinary tract infections and chest infections. "Disablement" in these periods would mean an inability of the mother to provide concentrated maternal attention to the baby and invariably some babies would be affected especially by feeding problems. It must also mean that increased home help would naturally be required and the economic costs of these necessities as well as the cost of the operation itself would certainly mount considerably.

(b) Blood Transfusions

In the 500 cases under review, each case of Caesarean Section needed on the average to be transfused with one pint of blood. Thus about 500 blood transfusions were carried out and certainly 500 patients had to be exposed to the risks and hazards normally attendant with blood transfusions.

(c) Pyrexias

It is common for pyrexia to occur after major surgical operations. In the 500 cases of Caesarean Sections reviewed, 55 cases or

11% of the total assumed pyrexia of significance as follows:—

Wound Sepsis	19 cases
Urinary Tract Infections	7 ,,
Chest Infections	3 ,,
Anuria/Oliguria/Uraemia	1 case
Unexplained	25 cases
TOTAL:	55 cases

Although it would appear that the majority of the cases had no known cause, a reasonable explanation could be given that resolving blood and blood clots in the peritoneal cavity coupled with the intense metabolic response after surgical operations are responsible factors. No vascular thrombotic episodes were recorded and thrombophlebitis, phlebo-thrombosis and the much dreaded pulmonary embolism seemed uncommon in experiences in this State.

LONG-TERM PROBLEMS

Because a patient had been afflicted with Obstetric Surgery as a Caesarean Section, it is not fitting for an Obstetrician merely to consider the present and lose sight of the future. There are definitely important and long-term problems involved; and to one's mind, it must appear that in probably no other branch of surgery is the problem more vexing as the problem of a Caesarean Section Scar in Obstetric Surgery.

Salient features of such problems include.—

(a) Psychic Factors

It is reasonable to conclude that no Mother goes through the experience of a Caesarean Section without any psychic trauma. The degree of such a trauma varies of course with the individual and with the circumstances which had led her to this end. Dugald Baird (1955) followed a series of cases for 4 years after Caesarean Sections and when compared with other women, 60% of these cases had not had another baby when the rest of the controls had at least one. Caesarean Section seemed to have its deterent effect and it might be true to say that badly educated women might be more easily frightened by an 'abdominal' operation performed unexpectedly in labour than the better educated who know that Caesarean Section had been the only means of saving the baby.

(b) Obstetric Invalidism

Any mother with a Caesarean Section Scar on her Uterus is to all intents and purposes, an obstetric "invalid" — the varying indications necessitating this form of Obstetric Surgery notwithstanding. The dictum of "Once a Caesarean Section, always a Caesarean Section" may be carried to active practice in some centres.

An Obstetric "invalid" connotes a woman with a previous Caesarean Section scar who in a subsequent pregnancy would need specialised ante-natal care and compulsory institutional confinement.

Invariably this must mean a demand for more obstetric beds and of course, specialised doctors. An average of about 600 Caesarean Sections is being performed presently in this institution annually. There will be 3000 such Obstetric "invalids" to consider over a period of 5 years. About 20% of them will most certainly need repeat Caesarean Sections in subsequent pregnancies but Caesarean Sections, performed in a "Virgin Field" are generally much easier technically than in those with Caesarean Sections already performed on them previously. Thus one can expect increased morbidity and increased gynaecological disorders to occur in the latter cases.

Of those with no recurrent case for a repeat elective Caesarean Section, no complacency should be adopted for the incidence of Scar rupture in subsequent pregnancies and labour has been variously quoted as follows:—

Classical Caesarean Section Scar	1.8%
Lower Uterine Segment Section Scar	0.9%

Most of the scars ruptured after the 37th week of gestation and it would appear advisable to have all cases with a previous Caesarean Section Scar to be hospitalised at or about the 37th week of gestation.

Obstetric Invalidism goes a stage further, and that is to what number of repeat Caesarean Sections may an individual be safely submitted. The answer is variable, but one fact remains and that is, the uterus withstands the strain of subsequent pregnancies less efficiently. Reports from Catholic countries like Spain and Southern Ireland give the maximum number of Caesarean Sections that had been performed on a single person as 6 and 8 — but to our experience in this hospital, we have frequently limited the maximum number to four — perhaps something less but certainly nothing more.

In part therefore, Obstetric Invalidism encroaches also on problems of family planning and Conception Control.

(c) Surgico-Gynaecological Invalidism

1. Gastro-intestinal and omental dynamics after an operation such as a Caesarean Section must involve aspects of paralytic ileus in the immediate post-operative period to organic intestinal obstructions — acute or sub-acute and subsequent adhesions. Nil was encountered in this series.
2. The bladder and ureters lie intimate and close to the Uterus and are thus exposed to hazards during Caesarean Sections operations, Cysto-Pyelitis occurred in 7 cases of the series under review. Incontinence, either Stress or from fistulous connections between the bladder and/or Vagina and Uterus are possibilities, but no case was encountered in these 500 cases under review.
3. Dysmenorrhoea may be anticipated in subsequent gynaecological check-ups. Cases as such may vary from adhesions to retroversions or purely psychogenic. On this aspect, no analysis was carried out on this series, but there would appear to be some scope for such investigations.
4. Dyspareunia as a complaint has been observed in some of the cases under review. There had been 4 patients who complained of a painful pubic scar near the region of the clitoris during intercourse. It would appear to be a wise practice technically to avoid making extended abdominal incisions distally so as to obviate such a painful scar developing.

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