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Post-partum Haemorrhage

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Introduction

Post-partum haemorrhage is still one of the major causes of maternal mortality. Eastman (1956) stated that in the United States of America, post-partum haemorrhage accounted for about one quarter of the deaths in the obstetric haemorrhage group. Walker et al (1957, 1960, 1963) have shown from their Maternal Mortality Surveys in England and Wales that although there has been some decline in the number of maternal deaths due to post-partum haemorrhage during the recent 3-year period (1958-60) of the Survey, this condition has maintained itself as one of the 5 leading causes of maternal mortality, the other causes being toxaemia of pregnancy, abortion, pulmonary embolism and cardiac disease.

Post-partum haemorrhage is also the most important underlying cause of maternal morbidity during the puerperium (Thomas, 1962). As early as 1937, Pastore had pointed out that the puerperal morbidity increased 400% if the haematocrit dropt below 30%. It is thus apparent that it is not only extremely important for the obstetrician to be adept in managing post-partum haemorrhage, but even more important, he should be in constant vigilance of any factor during the pregnancy or labour which may predispose towards post-partum haemorrhage.

Clinical Concept

From the clinician's viewpoint, post-partum haemorrhage can be subdivided into Primary and Secondary; the only demarcating feature between these two subdivisions is the 24-hour interval between the delivery of the infant and the occurrence of the haemorrhage. Secondary post-partum haemorrhage is a relatively insignificant cause of maternal mortality or even morbidity, and will not be discussed in this paper.

Primary Post-partum Haemorrhage is defined as blood loss in excess of 20 fluid ounces (600 ml.) originating from the genital tract in the 24 hours following the delivery of the infant.

As has been pointed out by Professor Morris (1963), this definition has its weaknesses. Thus, for example, it is not easy to collect and measure all blood loss, even when the attempt is restricted to the third stage; and further to estimate blood loss without measurement is notoriously inaccurate.

Physiology of Third Stage

Cycle of Events

Separation of Placenta ↓	Spontaneous / Assisted
Expulsion of Placenta ↓	Spontaneous / Assisted
Arrest of Haemorrhage from Placental Site	Spontaneous / Assisted

Figure 1—Physiology of the Third Stage of Labour

Separation of Placenta

Under normal conditions, the placenta begins to separate from its site of attachment towards the end of the second stage of labour. In normal labour, spontaneous placental separation has to take place prior to its expulsion. The separation of the placenta is assisted to a certain degree by the action of oxytocics administered at the end of the second stage of labour. Manual removal of the placenta is a fully assisted procedure for the separation of placenta.

TABLE I

Signs of Placental Separation/Descent

1. Lengthening of cord vaginally.
2. Sudden "Gush of Blood" vaginally.
3. "Fundal Pressure" Test.
4. Rising of Fundus.
5. Hardening of Fundus.
6. Side-to-side Ballotability of Fundus.
7. "Fundal Retraction" Test.

In Table I (above) are summarised the classical signs of placental separation and descent, with which every medical student, midwife and doctor should be quite familiar, and hence they need no further elaboration. It may not be possible to elicite all the above signs of placental separation and descent in every case.

Expulsion of Placenta

This is the second phase of the third stage of labour. Spontaneous expulsion of the separated placenta is brought about by the propulsion of the placenta down the uterine canal by the contraction of the uterus, and thence from the vagina to the exterior by the actions of the pelvic floor and sphinctre vagina muscles. Assisted expulsion of the separated placenta may be effected either by simple fundal pressure, by Brandt-Andrews technique, or by manual removal.

Arrest of Haemorrhage from Placental Site

This is the 3rd and final phase of the third stage of labour. In normal labour, spontaneous arrest of haemorrhage from the placental site is effected by the interplay of two mechanisms. Firstly, there is the closure of the patent uterine sinuses at the placental site, and this is effected by the contraction and retraction of the uterus after the expulsion of the placenta. Secondly, the normal blood coagulation mechanism comes into play, and the resultant thrombi plug up the small uterine sinuses. Assisted arrest of haemorrhage from the placental site can be effected by the judicious administration of oxytocic agents (ergometrine, syntometrine or oxytocin). These agents may be given either therapeutically or prophylactically, either in the end of the second stage of labour or in the third stage of labour. These oxytocic agents act by promoting a firmer and more sustained state of contraction and retraction of the uterus.

Aetiology and Diagnosis

A. Atonic Causes

Uterine atonicity is the commonest underlying cause of post-partum haemorrhage. Post-partum atonicity of the uterus can be predisposed by a number of factors, all of which have been tabulated in Table II. Most of these factors operate for the first time in the third stage of labour, but some have been operative during the first and second stages of labour, and a few factors have been prejudicial to the case before the onset of labour itself, as would be the case of the grand-multiparae and structural uterine defects.

The accepted definition of a retained placenta is one that has not been expelled from the genital tract within one hour of the delivery of the infant. However, in practice, any placenta retained for more than half an hour would necessitate intervention for its removal. Retention of placenta may involve the entire placenta, or a portion of it, as would be the case of an accessory lobe or placental cotyledons; this latter state may present difficulties in diagnosis, and hence be overlooked. A retained placenta may be separated but incarcerated in the uterine cavity, it may be unseparated from its attachment, or very rarely it may be morbidly adherent (placenta accreta). Irrespective of which-ever of the above variants of retained placenta that is operative, this condition predisposes to post-partum haemorrhage by interfering with the normal contraction of the uterus, and in particular the retraction of the placental site. Post-partum retention of blood clots in utero may prevent the proper contraction of the uterus with consequent predisposition to atonic post-partum haemorrhage.

Overdistension of the gravid uterus is an inevitable feature of multiple pregnancy, foetal macrosomia, hydramnios and hydrops foetalis. Such uteri display a very high predisposition towards post-partum uterine atonicity and post-partum haemorrhage. The larger placental bed that is associated with multiple pregnancies and hydrops foetalis, is also said to be a contri-

butory factor. The association of atonic post-partum haemorrhage with grand multiparity is well-known, and it can be said that the risk of atonic post-partum haemorrhage increases pari passu with increasing maternal parity. In those patients with a positive past obstetric history of atonic post-partum haemorrhage or retained placenta, there is a higher predisposition towards a recurrence of atonic post-partum haemorrhage, and hence such cases will have to be booked for confinment in a Maternity Hospital.

TABLE II

Clinico-Pathological Classification of the Aetiology

A. ATONIC CAUSES:

1. Whole Placenta / Accessory Lobe / Cotyledon/Cotyledons — RETAINED PLACENTA — Incarcerated / Unseparated / Morbidly Adherent
2. Retained Blood Clots (post-partum)
3. Overdistension of the Uterus — Multiple Pregnancy / Hydramnios / Foetal Macrosomia / Hydrops Foetalis
4. Grand Multiparity
5. Past History of PPH/Retained Placenta
6. Prolonged Labour/Prolonged Second Stage (Secondary Uterine Inertia)
7. General Anaesthesia
8. Severe Anaemia
9. Accidental A.P.H.
10. Placenta Praevia
11. Prolonged I/V Oxytocin Stimulation
12. Inversion of Uterus
13. Structural Uterine Defects — Fibroids / Congenital Abnormalities

B. TRAUMATIC CAUSES:

1. Rupture of the Uterus — Complete / Incomplete
2. Lacerations of the Cervix
3. Lacerations of the Vagina
4. Lacerations of the Vulva
5. Lacerations of the Perineum
6. Rupture of Vulval Varicose Veins

C. BLOOD COAGULATION DEFECTS:

1. Severe Concealed Accidental Haemorrhage
2. Prolonged Intra-Uterine Death of Foetus
3. Amniotic Fluid Embolism
4. Purpuric Conditions

D. MISCELLANEOUS CAUSES:

Genital cancer—carcinoma of cervix

In cases of prolonged labour or prolonged second stage of labour, there arises the risk of secondary uterine inertia with predisposition towards atonic post-partum haemorrhage. General anaesthesia used in operative obstetrics also predisposes to uterine atonicity with consequent risk of post-partum haemorrhage. Such risks are higher if anaesthetic agents like chloroform or halothane are used. Severe anaemia also predisposes towards atonic post-partum haemorrhage.

In those cases of accidental ante-partum haemorrhage, especially of the severe concealed type, atonic post-partum haemorrhage is a likely complication. Uterine atonicity in such cases is precipitated by a combination of factors, such as Couvelaire uterus, myometrial anoxia, and overdistension of the uterus by retroplacental clots. Besides uterine atonicity, impaired blood coagulation may predispose towards post-partum haemorrhage in these cases. Atonic post-partum haemorrhage may sometimes follow a placenta praevia delivery. The placental bed in the lower uterine segment does not contract and retract optimally, with the consequent risk of atonic post-partum haemorrhage.

The prolonged administration of oxytocin therapy to induce labour tends to decrease the responsiveness of the myometrium to oxytocics in the third stage of labour, with the consequent predisposition towards uterine atonicity and post-partum haemorrhage.

Acute inversion of the post-partum uterus results in its distortion and in failure of retraction of the placental bed, with consequence of atonic post-partum haemorrhage. Finally in those cases with structural uterine defects, such as fibroids or developmental anomalies, there is impairment of post-partum uterine contractility, with consequent risk of atonic post-partum haemorrhage. The risk of haemorrhage is higher if the placenta has been implanted over the site of a submucous fibroid.

B. Traumatic Causes

Obstetric trauma as a cause of post-partum haemorrhage operates less frequently than uterine atonicity. Besides haemorrhage, neurogenic shock is also contributory to the maternal hazards in such cases.

Rupture of the uterus, complete or incomplete, is the most important of the traumatic causes of post-partum haemorrhage, and as will be shown later, this condition is an important cause of maternal mortality both in this Hospital as well as in England and Wales. Obstructed labour, from unrecognised disportions, foetal malpresentations, and foetal abnormalities, is still an important cause of uterine rupture. Unskilled obstetrical manipulations, such as internal versions, destructive operations and faulty forceps applications, can also result in uterine rupture. More recently, with the more liberal use of caesarean sections, the incidence of uterine rupture from dehiscence of caesarean section scars is on the increase.

Lacerations of the cervix, vagina, vulva and perineum, as a cause of severe post-partum haemorrhage are relatively infrequent, and when they do occur, they are the result of unskilled intrapartum obstetrical care. Severe haemorrhage can sometimes follow rupture of vulval varicose veins, and such cases may simulate other causes of post-partum haemorrhage.

C. Blood Coagulation Defects

Severe hypofibrinogenaemia or afibrinogenaemia may sometimes complicate the picture in severe concealed accidental haemorrhage, prolonged intra-uterine retention of a dead foetus, or in the very rare condition of amniotic fluid embolism. This state of defibrination of the circulating blood begins in the antepartum or intrapartum period, and if not adequately reversed, may persist in the immediate post-partum period, with predisposition to post-partum haemorrhage from non-coagulation of the blood in the patent uterine sinuses. Besides hypofibrinogenaemia, uterine atonicity is an important predisposing factor of post-partum haemorrhage in those cases of severe concealed accidental haemorrhage and prolonged retention of a death foetus in utero.

Purpuric disease states severe enough to predispose towards post-partum haemorrhage are rarely encountered in pregnant women.

D. Miscellaneous Causes

The occurrence of genital cancer with pregnancy is extremely rare, and of these,

ovarian and cervical cancers are the common types. In those cases of cervical carcinoma, which are undiagnosed and allowed to deliver per vaginam, there is a high risk of severe post-partum haemorrhage from the traumatised cervical cancer tissue.

Hazards of Post-partum Haemorrhage Maternal Mortality Trends

The principle hazard of untreated severe post-partum haemorrhage is maternal death from exsanguination. Post-partum haemorrhage is still a leading cause of maternal mortality, more so in the under-developed countries of Afro-Asia than in those countries of Europe and America, where improved standards of general health, nutrition and obstetrical care prevail.

Comprehensive statistical data of maternal mortality in post-partum haemorrhage for the Malaysian territories is unavailable, and similar data for the different parts of the world are difficult to come by. However such data for the Kandang Kerbau Hospital for the period of 1955 to 1962 have been made available (Lean, T.H., 1965). The maternal mortality trends from post-partum haemorrhage in England and Wales are also presented for comparative study. Data from England and Wales have been used in preference to other Western countries, primarily because of the ready availability of these data from the "Reports on Confidential Enquiries into Maternal Deaths in England and Wales" for the periods "1952-1954, 1955-1957, and 1958-1960".

TABLE III

Maternal Mortality Patterns from Post-partum Haemorrhage in England and Wales

Period under Review: / Pattern of Study:	1952-54	1955-57	1958-60
Total No. of Deliveries	2,079,275	2,149,396	2,322,229
Total No. of Maternal Deaths	1,812	1,480	1,183
Gross Maternal Mortality	0.87/1,000	0.69/1,000	0.51/1,000
Total No. of Maternal Deaths from PPH	182	113	115
Maternal Mortality Rate from PPH	0.087/1,000	0.053/1000	0.049/1000
No. of Maternal Deaths in Confidential Enquiry	1,410	1,200	996
% of Maternal Deaths due to PPH	12.9%	9.4%	11.5%
No. of Deaths from Atonic PPH with Retained Placenta	53	24	15
Maternal Mortality Rate	0.025/1000	0.011/1000	0.006/1000
No. of Other PPH Deaths excluding Trauma	74	49	55
Maternal Mortality Rate	0.036/1000	0.023/1000	0.024/1000
No. of Traumatic PPH Deaths	55	40 (33)	45 (29)
Martenal Mortality Rate	0.026/1000	0.019/1000	0.019/1000

The above table (Table III) shows that, during the three successive 3 year periods from 1952 to 1960 inclusive, the maternal mortality rate from all forms of post-partum haemorrhage had fallen pari passu with that of all maternal deaths, so that the maternal deaths from all post-partum haemorrhage cases were responsible for about 10% of all maternal deaths in England and Wales throughout the 9 year period. However, a glance at the section dealing with the maternal deaths from "Atonic PPH with Retained Placenta" reveals that there has been a sharp fall in the mortality rate by 50% in each of the three successive 3-year periods reviewed—*viz.* from 0.025/1,000 to 0.011/1,000 to 0.006/1,000. The credit for the precipitous fall in this group of PPH deaths should be primarily given to the more widespread establishment of regional "Flying Squad" and "Blood Transfusion" services throughout England and Wales during this period. The widespread availability of these two services ensured that skilled resuscitative measures were brought to these exsanguinated and often moribund patients at their bedside, be it in a peripheral Hospital, Maternity Home, or Domiciliary Service.

The Table also shows that a high proportion of the Traumatic PPH deaths were due to the rupture of uteri (33 out of 40 deaths in 1955-1957, and 29 out of 45 deaths in 1958-1960).

TABLE IV

Comparative Maternal Mortality Trends from Post-partum Haemorrhage in K.K. Hospital and England and Wales

PLACE:	K.K. HOSPITAL	ENGLAND & WALES
PERIOD UNDER REVIEW:	**1955-1962 (8 yrs.)**	**1955-1960 (6 yrs.)**
Total No. of Deliveries	255,926	4,471,625
Total No. of Maternal Deaths	208	2,663
Total Maternal Mortality Rate	0.81/1,000	0.60/1,000
Total No. of Maternal Deaths from PPH	56	228
Maternal Mortality Rate from PPH	0.219/1,000	0.051/1,000
Total No. of Maternal Deaths Reviewed	208	2,196
% of Maternal Deaths from PPH	26.9%	10.4%
No. of Deaths from Atonic PPH with Retained Placenta	22	39
Maternal Mortality Rate	0.086/1,000	0.009/1,000
No. of Other PPH Deaths excluding Trauma	20	104
Maternal Mortality Rate	0.078/1,000	0.023/1,000
No. of Traumatic PPH Deaths	14 (12)	85 (62)
Maternal Mortality Rate	0.055/1,000	0.019/1,000

A comparative study of the maternal mortality trends from post-partum haemorrhage in Kandang Kerbau Hospital (Lean, 1965) and in England and Wales (Walker et al, 1960, 1963) is presented in Table IV (above). The periods under review are almost identical— 1955 to 1962 for K.K. Hospital, and 1955 to 1960 for England and Wales. Although the gross materanl mortality rate at this Hospital (0.81/1,000) is only about 30% more than that for England and Wales (0.60/1,000), the maternal mortality rate from all post-partum haemorrhage deaths at this Hospital (0.219/1,000) is over four times as high as that for England and Wales (0.051/1,000). It is further apparent that post-partum haemorrhage is responsible for 26.9% of all maternal deaths at this Hospital, as compared to only 10.4% of all maternal deaths in England and Wales; that is post-partum haemorrhage is $2\frac{1}{2}$ times as frequent a cause of maternal mortality in this Hospital as compared to the whole of England and Wales.

A further breakdown study of the post-partum haemorrhage deaths is quite revealing. The maternal mortality rate for those cases of post-partum haemorrhage with retained placenta at this Hospital (0.086/1,000) is $9\frac{1}{2}$ times as high as that for England and Wales (0.009/1,000). In comparison, the maternal mortality from other forms of post-partum haemorrhage including trauma at this Hospital (0.078/1,000 and 0.055/1,000) is 3 times as high as that for England and Wales (0.023/1,000 and 0.019/1,000). The rate of maternal deaths from uterine rupture at this Hospital (12 deaths) is also 3 times as high as that for England and Wales (62 deaths).

The comparatively higher rate of maternal mortality from post-partum haemorrhage in this Institution as compared to that prevailing in England and Wales is probably of multifactorial origin. Socio-economy is an important factor. The vast majority of these maternal deaths from post-partum haemorrhage in this Institution, like the majority of the patients, hail from the lower socio-economic strata. Such patients embark on labour in a poorly nourished state, and often with subclinical anaemia, as compared to their western sisters in the Welfare State of the United Kingdom. Complete lack of ante-natal care, and the domiciliary confinment of the high risk cases, again as a sequel of adverse socio-economic circumstances, has lead to a high proportion of this Hospital's maternal deaths being admitted in the third stage of labour, often exsanguinated and in a moribund state. There is little doubt that the establishment of a much needed "Flying Squad" Service in this Hospital may go a long way towards providing such moribund cases with the necessary first-aid resuscitative measures at their homes, before their transference to the Hospital.

The establishment of a Regional Blood Transfusion Service at this Hospital will provide for the immediate availability of the materials necessary for the resuscitation of those shocked and exsanguinated cases, and thus help towards the salvage of such maternal deaths. The administration of general anaesthesia in these cases, either for manual removal or uterine exploration, can be treacherous, and a badly administered anaesthesia by junior obstetric personnel in such circumstances may be just the "last straw" to death in these shocked and exsanguinated cases. Hence the establishment of a resident Obstetric Anaesthetic Service in this Hospital can contribute towards the salvage of such maternal deaths.

Finally, social taboos and ignorance of "Family Planning" has lead to a much higher proportion of grand multiparous patients in this Hospital, and there is no doubt that atonic post-partum haemorrhage and uterine rupture preponderate in such a class of patients. This is yet another important circumstantial factor contributory to a higher maternal mortality from post-partum haemorrhage in this Hospital, as compared to England and Wales.

Maternal Morbidity Trends

If one pictures the entire "Hazards" from post-partum haemorrhage in the form of an "ice-berg", then the maternal mortality hazards represent that small portion of the "ice-berg" which is apparent above the water-level. Of far more importance are the maternal morbidity hazards that can follow upon post-partum haemorrhage, and just like the larger portion of the hidden "ice-berg", this is a far larger problem.

The immediate maternal morbidity hazards are many, some minor and some serious. Puer-

peral debility, deficient lactation, poor wound healing, and flare-up of sepsis tend to occur with a fair degree of frequency in those cases where severe anaemia has followed upon the haemorrhage. Acute cardiac failure may result in those cases with pre-existing cardiac pathology—rheumatic or congenital heart disease. Acute renal failure may result if there has been a prolonged phase of shock following upon the haemorrhage. Irreversible anoxic cerebral trauma with mental changes is a rare complication, and may occur in those cases which recover from severe and prolonged state of shock following the haemorrhage.

Delayed maternal morbidity hazards are relatively rare, and can be difficult to detect. There are two groups of possible complications. Firstly, those cases with acute puerperal anaemia and debilitation, if not adequately treated, the patients may enter into a phase of chronic anaemia and debilitation. Secondly and rarely, patients, with severe post-partum haemorrhage

TABLE V

Maternal Morbidity from Post-partum Haemorrhage

A. Immediate:

1. Exsanguination → Shock → Death
2. Cardiac Failure
3. Flare-up of sepsis
4. Poor Wound Healing
5. Acute Renal Failure
6. Deficient Lactation
7. Irreversible anoxic cerebral trauma
8. Puerperal anaemia/debilitation

B. Delayed:

1. Chronic anaemia/debilitation
2. Hypopituitrism of varying degrees:
   a) Hypothyroidism
   b) Secondary amenorrhcea/infertility
   c) Regression of secondary sexual characteristics
   d) Adrenal Insufficiency

TABLE VI—**Prevention of Post-partum Haemorrhage**

A. Prevention of Atonic Post-partum Haemorrhage:

1. Prevention and treatment of anaemia during ante-natal period
2. Hospital confinement of high risk cases
3. Avoidance of prolonged and exhausted labours (esp. second stage)
4. Proper management of the third stage of labour
5. Preferential use of regional anaesthesia to general anaesthesia
6. Early manual removal of retained placenta
7. "Flying Squad" Service
8. Family Planning Service

B. Prevention of Traumatic Post-partum Haemorrhage:

1. Skilled intrapartum obstetrical care:
   (a) Manipulative vaginal obstetrical procedures
   (b) Wider use of caesarean sections in preference to difficult vaginal delivery
2. Early detection and repair of genital lacerations/Hysterectomy

C. Prevention of Post-partum Haemorrhage from Blood Coagulation Defects:

1. Prevention of severe accidental APH
2. Prompt reversal of coagulation defects:
   (a) Evacuate uterine contents
   (b) Liberal blood transfusion
   (c) Use of triple strength plasma/fibrinogen
3. Avoidance of prolonged retention of 1. U.D.
4. Skilful management of the third stage of labour

D. Prevention of Post-partum Haemorrhage from Genital Cancer:

1. Elective LSCS delivery in preference to vaginal delivery

and exsanguination, may sustain varying degrees of pituitary necrosis, with the long term effects of hypopituitrism. The form of these hypopituitary complications will vary with the extent of pituitary damage sustained. Minor forms may present with features of hypothyroidism, whereas the severe forms may in addition manifest features of secondary amenorrhoea, infertility and regression of secondary sexual characteristics due to ovarian insufficiency, or features of chronic adrenal insufficiency.

Prevention of Post-partum Haemorrhage

"Prevention is better than cure", and this statement applies without reservations to the management of post-partum haemorrhage.

A. Prevention of Atonic Post-partum Haemorrhage

The institution of preventive measures to reduce the occurrence and severity of atonic post-partum haemorrhage should rightly commence during the ante-natal care of the patient. The early detection and treatment of anaemia, and the proper selection of high risk cases for Hospital confinement falls within the province of good ante-natal care. The avoidance of prolonged and exhausted labours, especially in the second stage, and the proper management of the third stage of labour, with the routine prophylactic use of oxytocic agents, especially I/V ergometrine or syntometrine can contribute considerably towards the reduction of maternal mortality and morbidity from atonic post-partum haemorrhage.

The wider use of Family Planning Service in this State of Singapore can contribute towards the reduction of atonic post-partum haemorrhage, especially when it is apparent that a high proportion of this Hospital's confinements occur in the grand-multiparae.

B. Prevention of Traumatic Post-partum Haemorrhage

The availability of skilled intrapartum obstetrical care is of considerable importance for the avoidance of traumatic post-partum haemorrhage. In particular, all manipulative vaginal obstetrical procedures, be they forceps, internal versions or destructive operations, should be skilfully undertaken. In preference to difficult vaginal delivery, the wider use of caesarean sections should be advocated. The early detection and repair of genital lacerations, and prompt performance of hysterectomy in those cases of uterine rupture can contribute considerably towards the reduction of maternal mortality and morbidity from traumatic post-partum haemorrhage.

C. Prevention of Post-partum Haemorrhage from Blood Coagulation Defects

Hypofibrinogenaemia following upon severe concealed accidental antepartum haemorrhage can be prevented by the prompt and early treatment of pre-eclamptic toxaemia. In those cases of established concealed accidental haemorrhage, the severity of coagulation defects could be arrested and reversed by the speedy evacuation of the uterine contents, liberal blood transfusion, and the use of triple strength plasma/fibrinogen.

Hypofibrinogenaemia following upon the prolonged retention of a dead foetus in utero could be avoided, if efforts are made to dislodge such a foetus within 3 to 4 weeks of the occurrence of the intra-uterine death.

In both the above conditions, particular skill and care should be exercised in the management of the third stage of labour, as severe haemorrhage can occur from the combination of uterine atonicity with hypofibrinogenaemia.

D. Prevention of Post-partum Haemorrhage from Genital Cancer

Severe post-partum haemorrhage, following upon vaginal delivery, in cases of carcinoma of cervix, can be prevented by the early detection of the condition, and the performance of abdominal delivery in such cases.

Management of Post-partum Haemorrhage

Most aspects of the management of post-partum haemorrhage have been discussed in the preceding section, dealing with the preventive aspects of post-partum haemorrhage. It is, therefore, intended only to outline the salient aspects in the management of post-partum haemorrhage in the following two tables (Tables VII and VIII). These tables are self-explanatory.

TABLE VII—**Outline of First-Aid Measures in the Management of Post-partum Haemorrhage in Domiciliary/Maternity Home Practice**

1. Emergency administration of oxytocics by attendent— { Doctor / Midwife }
2. Summoning of "Flying Squad" Service
3. Resuscitation of Shocked Patient— { Transfusions / Sedation }
4. Arrest of Haemorrhage Procedures:
   (i) Oxytocics
   (ii) Manual Removal of Placenta
   (iii) Uterine/Vaginal Packing
   (iv) Replacement of Inverted Uterus
5. Transfer of Resuscitated Patient to Hospital

TABLE VIII—**Outline of Management of Post-partum Haemorrhage in Hospital Practice**

1. Emergency administration of Oxytocics
2. Resuscitation of Shocked Patient— { Transfusions / Sedation }
3. Diagnosis of the Underlying cause of Haemorrhage:
   (i) Atonic causes
   (ii) Traumatic causes
   (iii) Blood Coagulation Defects
   (iv) Miscellaneous
4. Treatment of the Underlying cause of Haemorrhage:
   (a) **Atonic PPH:**
      (i) Manual removal of placenta/exploration of the uterus
      (ii) Parenteral oxytocics—ergometrine, syntometrine, oxytocin
      (iii) Hot Uterine Douche
      (iv) Uterine Packing—Fibroid uterus only indication
      (v) Replacement of inverted uterus
      (iv) Hysterectomy—last resort
   (b) **Traumatic PPH:**
      (i) Prompt reparative surgery (ii) Hysterectomy
   (c) **Coagulation Defect PPH:**
      (i) Fresh Blood Transfusions
      (ii) Triple/quadruple strength of plasma transfusions
      (iii) Fibrinogen Therapy
      (iv) Supportive Medication— { I/V calcium gluconate / I/V oxytocic agents }
   (d) **Carcinoma of Cervix:**
      (i) Vaginal Packing (ii) Wertheim Hysterectomy

TABLE IX

Summary of Programme for the Reduction of Maternal Mortality and Morbidity from Post-partum Haemorrhage

1. Improvement in the Socio-Economic Standards of the community
2. Comprehensive Ante-Natal care:
   (a) Detection and treatment of anaemia
   (b) Detection and treatment of Toxaemia of Pregnancy
   (c) Selection of cases for Hospital confinement
3. Adequate Hospital facilities for the confinement of high risk cases
4. Skilled intrapartum obstetrical care:
   (a) Adequate trained obstetric personnel
   (b) Avoidance of prolonged labours
   (c) Skillful management of the second stage of labour
   (d) Proper management of the third stage of labour
   (e) Prompt treatment of causative factor of PPH
5. Adequate Blood Transfusion Service:
   (a) Elective blood grouping/cross-matching of high risk Ante-Natal cases
   (b) Establishment of a Regional (Hospital) Blood Transfusion Service
   (c) Ready availability of blood stocks
6. "Flying Squad" Service
7. Obstetric Anaesthetic Service
8. Comprehensive Family Planning Service

Programme for the Reduction of Maternal Mortality and Morbidity from Post-partum Haemorrhage

As a summary of the discussion that has prevailed, in Table IX is outlined a comprehensive programme for the reduction of maternal mortality and morbidity from post-partum haemorrhage. This Table is self-explanatory.

Conclusions

It is apparent that post-partum haemorrhage is still a leading cause of maternal mortality and morbidity in most centres. These hazards are higher in this Hospital in comparison to western countries. Improvements in the general standard of living, and in the standards of overall obstetric care can contribute considerably towards the reduction of these hazards. In view of the large volume of abnormal obstetric work that can arise in a centre which deals with about 40,000 deliveries per annum, there is a strong case for the establishment of Para-Obstetrical Services within this Hospital, such as a Regional Blood Transfusion Service, an Obstetric Anaesthetic Service, and a "Flying Squad" Service. Such services are necessary if the hazards of maternal mortality and morbidity from post-partum haemorrhage are to be reduced to those comparative levels prevailing in western countries. The wider advocation of Family Planning also contributes indirectly towards the same goal.

References

Beller, F.K. (1964): Clin. Obst. & Gynec., **7,** No. 2, 372, 383.

Browne, F.J. & McClure Browne, J.C. (1964): "Postgraduate Obstetrics and Gynaecology", 3rd Ed., Butterworths, London. p.597.

Eastman, N.J. (1956): "William's Obstetrics", 11th Ed., Appleton-Century-Crofts, New York.

Lean, T.H. (1965): Personal Communication.

Morris, W.I.C. (1963): "British Obstetrics Practice", 3rd Ed., William Heinemann, London, p.862, 867.

Pastore, J.B. (1937): Am. J. Surg., **35,** 417.

Sinnathuray, T.A. (1965): K.K. Hospital Bulletin, **4,** No. 1, 14.

Thomas, W.O. (1962): Clin. Obst. & Gynec., **5,** No. **3,** 655.

Walker, A.L. et al (1957): "Report on Confidential Enquiries into Maternal Deaths in England and Wales, 1952-4". London, p.14.

Walker, A.L. et al (1960): "Report on Confidential Enquiries into Maternal Deaths in England and Wales, 1955-7". London, p.10, 44.

Walker, A.L. et al (1963): "Report on Confidential Enquiries into Maternal Deaths in England and Wales, 1958-60". London, p.8, 36.