

The Elderly Primigravida

by

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Historical Review:

Ian Donald (1964), in his introduction to this subject, states that there is a general tendency to include in this category all women going through their first pregnancy over the age of 35. But he states that this is widening the definition too far, and only confuses the issue by diluting the results with large numbers of women who run a perfectly normal obstetrical course. However Donald (1964) was not prepared to categorically specify the age-criteria of an elderly primigravid woman.

Miller (1931), over 35 years ago, reviewed 88 cases of primigravid women, over the age of 40, that were delivered at the Edinburgh Royal Maternity Hospital. He found that this group of patients had a higher risk of toxæmia of pregnancy, fibroid uteri, forceps deliveries, caesarean sections and increased perinatal mortality.

Nixon (1931) in his paper also reviewed a series of 100 consecutive primigravid women over the age of 40, and he contrasted the outcome with 100 consecutive controls, aged between 20 and 25. Like Miller (1931), Nixon (1931) also found that the elderly primigravida had a higher risk of developing toxæmia of pregnancy and even eclampsia. Nixon also found that these patients had higher risks of hyperemesis gravidarum, premature labour, and accidental haemorrhage.

Baird (1952) in his Joseph Baer Oration entitled "The Cause and Prevention of Difficult Labour" has shown that the elderly primigravida stands to have a higher incidence of difficult labours due to uterine dysfunction, especially in the higher socio-economic groups.

Turnbull and Baird (1957) in their paper entitled "Maternal Age and Foetal Oxygenation" have stated that the average oxygen saturation became less as the maternal age and length of gestation increased, and was sometimes dangerously low, especially in primigravidae aged 30 or more delivered after 41st week of pregnancy. They suggested that the relatively high rate of

perinatal mortality in elderly primigravidae — often clinically unexplained and accompanied by post-mortem evidence of foetal asphyxia — is due in part to inadequate foetal oxygenation after term. They showed from their study in Aberdeen that the excess perinatal mortality in the elderly primigravidae could be eliminated by a policy of routine surgical induction of labour in all elderly primigravidae who are undelivered before the end of 41st week of gestation, and by the liberal use of caesarean section in these cases if there were signs of foetal distress, especially meconium in liquor amnii.

Baird, Hytten and Thomson (1958) in their paper entitled "Age and Human Reproduction" had shown from their carefully conducted clinical studies that the elderly primigravida stood to have higher risks of infertility, difficult labours, lactational deficiencies, and perinatal mortality. They stated that for the foetus of the elderly primigravida, pre-eclampsia, post-maturity and prolonged labour are particular dangers, but that these immediate dangers could be largely obviated by the avoidance of undue prolongation of the pregnancy, and the frequent use of caesarean section.

The age at which a primigravida is considered to be "elderly" had not been generally agreed to until July 1958, although Baird, Hytten and Thomson (1955) had shown that there was evidence of a decline of physiological efficiency from the age of 25 onwards. In July 1958, the Council of the International Federation of Gynaecologists and Obstetricians were called upon to set a standard for the "elderly primigravida". The Council recommended that the age of 35 should be accepted as the International standard.

MacDonald and MacLennan (1960) in their paper reviewed 662 consecutive cases of elderly primigravida (aged 35 and over) that were delivered at the Glasgow Royal Maternity Hospital from 1950 to 1957 inclusive (8 years). In their paper a group of primigravidae aged 25 and under who were delivered in the same hospital, was used as

a control. They showed that the elderly primigravida had a higher risk of toxæmia of pregnancy, foetal abnormality, perinatal mortality, fibroid uteri, prolonged labour and operative delivery. They concluded that maternal mortality was no longer a problem in the elderly primigravidae, and that improvements in perinatal mortality could be obtained by admission of all elderly primigravidae to hospital for pre-delivery assessment, and by a more radical approach to the actual confinement, especially with reference to trial of induction or elective caesarean section.

Booth and Williams (1964) reviewed 1,018 consecutive cases of elderly primigravidae, over the age of 35, delivered at Queen Charlotte's Maternity Hospital in a 11 year period, 1951 to 1961. In their large series, 68% of the patients had an uneventful pregnancy, but almost half had an operative delivery. Their induction rate was 14%, their forceps rate was 28%, and their caesarean section rate was over 15%. Their perinatal mortality rate was 37.4 per 1000, as compared to 21.8 per 1000 in a controlled study. They suggested that earlier induction in cases of pre-eclamptic toxæmia may help to reduce foetal mortality.

Definition:

The criteria for the elderly primigravida has been at variance over the years — from time to time, and from centre to centre. Thus Nixon (1931) and Miller (1931) only considered primigravid patients aged 40 and more in their studies. For practical purposes it is usual to consider primigravid patients aged 30 and over in this category of "Elderly Primigravida".

However in July 1958, the Council of the International Federation of Gynaecologists and Obstetricians had recommended the following to be accepted as the international standard:

"The Elderly Primigravida is any woman having her first pregnancy at the age of 35 years or more."

This international criteria has been used to evaluate the results in this Hospital, which will be presented in this paper.

Incidence Pattern:

The incidence of elderly primigravida has varied from hospital to hospital, and has also varied with the period under review. As far as the author could ascertain, there has been no study to show the incidence of elderly primigravid women in any fixed country or community.

In the majority of the teaching hospitals in the United Kingdom, the Incidence of Elderly

Primigravid (aged 35 years and over) Deliveries is about 1 to 2%. The Incidence of Elderly Primigravid Deliveries at Kangang Kerbau Hospital for the 2 year period 1964-1965 was only 0.15% (Table VII).

Problems in the Elderly Primigravida:

In Table I (below) is outlined the physio-pathological problems that one has to cope with in the elderly primigravid type of patient.

Table I

Problems in the Elderly Primigravida A Physio-Pathological Appraisal	
1.	Impaired Reproductive Capacity: (a) Involuntary Infertility. (b) Shortened Span of Reproductive Phase. (c) Blighted ova/sperms. (d) High Risk of Abortions. (e) Pelvic Endometriosis. (f) Fibroid Uteri.
2.	Increased Hypertensive Predisposition.
3.	Impaired Placental Function.
4.	Impaired Uterine Function.
5.	Rigidity of Pelvic Birth Passages: (a) Flexibility of Pelvic Girdle and Lumbo-Sacral Spine. (b) Rigidity of Pelvic Floor.
6.	Disordered Physiology of the Third Stage of Labour: (a) Retained Placenta. (b) Atonic Postpartum Haemorrhage.
7.	Impaired Lactational Capacity.
8.	Impaired Puerperal Venous Pathology.
9.	Increased Foetal Abnormality Risks.

As outlined in the above table (Table I), the elderly primigravid patient has markedly impaired reproductive capacity compared to her younger sister. Often this type of patient has a prolonged period of involuntary infertility preceding her present pregnancy, which makes the present pregnancy all the more precious. The elderly primigravid patient, at the age of 35, has a considerably shortened span of reproductive phase of life. If one takes the reproductive phase to extend from just after puberty (15 years) to just before menopause (45 years), this natural reproductive phase of 30 years duration is reduced to a third (10 years) in the elderly primigravida, aged 35 or more.

It is natural to surmise that the husband of the elderly primigravida would also be in the

same age group, and there is no doubt that these relatively elderly married couples have a higher tendency towards the release of blighted ova and spermatozoa, which again considerably impairs their reproductive capacity. It is also known that the elderly primigravida has a higher susceptibility towards spontaneous abortion. Further, it has been shown that the elderly primigravida runs a higher risk of developing pelvic endometriosis and uterine fibroids. Both these conditions also contribute towards an impairment of the reproductive capacity of the elderly primigravid patient.

The elderly primigravid patient, because of her age, has a higher tendency to develop hypertensive vascular disease and toxæmia of pregnancy. Both Nixon (1931) and Booth and Williams (1964) have shown this pattern in their studies.

Practically all workers in this field have conclusively shown that the elderly primigravid patient runs a high risk of developing an impaired state of both placental function throughout her pregnancy, as well as disordered uterine function in labour. The former condition will predispose towards an increased risk of perinatal mortality and foetal distress in labour; whereas the latter condition brings in its trail the problems of prolonged labour, maternal distress, foetal distress and the associated tendency towards operative interference in labour. The papers of Baird (1952), Baird, Hytten and Thomson (1958), and Booth and Williams (1964) provide ample evidence in support of this point.

The elderly primigravida has a higher predisposition towards rigidity of pelvic birth passages. This may be in the form of decreased state of mobility and "give" in the joints of the pelvic girdle and lumbo-sacral spine, as well as an increase in the rigidity and tenseness of the soft tissues of the pelvic floor.

Most workers in this field have shown that the elderly primigravida has a higher tendency towards a disordered state of physiology of the third stage of labour. These patients run a higher risk of both retained placenta, as well as atonic postpartum haemorrhage. There is no doubts that the co-existence of prolonged labour and uterine fibroids in this type of patient predisposes to the above mentioned complications.

Baird, Hytten and Thomson (1958) have shown from their carefully conducted scientific

studies that the elderly primigravid patient has a higher tendency of developing impaired state of lactational capacity. They showed that compared to their younger sisters these patients had a decrease in their daily volume of milk flow, as well as reduced fat content in their milk.

The elderly primigravid patient, because of her age, runs a higher risk of developing puerperal venous thrombosis.

A higher incidence of mongolism is also said to be an accepted risk in the elderly primigravida.

Complications in the Elderly Primigravida:

Table II

Complications in the Antepartum Period

1. Hyperemesis Gravidarum.
2. Threatened Abortion.
3. Pre-Eclamptic Toxaemia.
4. Eclampsia.
5. Premature Labour.
6. Retarded Foetal Growth in Utero (Placental Insufficiency).
7. Foetal Death in Utero (Placental Insufficiency).

Donald (1964) states that the elderly primigravida is somewhat more liable to develop hyperemesis gravidarum, and he attributes this to the natural anxiety state of this type of patient. He also states that this type of patient is more liable to develop threatened abortion. Both Miller (1931), and Nixon (1931) found from their studies an increase in the incidence in the pre-eclamptic toxæmia and eclampsia. Nixon (1931) found that these patients were four times more liable to develop eclampsia than the younger primigravidae. More recently Booth and Williams (1964) showed that this type of patients had a higher incidence of pre-eclamptic toxæmia, especially in those above the age of 40.

Nixon (1931) showed that the elderly primigravidae were more susceptible to develop premature labour. He recorded an incidence of 10% as against 3.8% in the young primigravidae. The elderly primigravid group of women also ran a higher risk of developing chronic placental insufficiency in the antepartum period with resultant retardation of foetal growth in utero, and even silent intra-uterine foetal death.

Complications in the Intrapartum Period

1. Increased Rate of Induction of Labour, and its associated complications.
2. Prolonged Dysfunctional type of Labour.
3. Increased Incidence of Foetal Distress in Labour.
4. Prolonged second stage of Labour.
5. Increased Incidence of Maternal Distress in Labour.
6. Increased Rate of Episiotomy/Perineal Tears.
7. Increased Rate of Assisted Vaginal Deliveries.
8. Increased Rate of L.S.C.S. (both Elective and Emergency).
9. Intrapartum Foetal Death.

In the context of modern obstetrical practice, the increased rate of induction of labour in the elderly primigravida has been well accepted. Baird (1952), (1958), Baird et. al. (1958), and Booth and Williams (1964) have shown from their studies that this type of patient had a higher incidence of surgical induction of labour. Baird (1958) had an induction rate of 39% in his series, and he advocated the induction of labour at 41 weeks in the elderly primigravidae.

Baird (1952), Baird et. al. (1958) and Booth and Williams (1964) have shown that the incidence of prolonged and dysfunctional type of labour tended to be higher in the elderly primigravidae as compared to the younger patients. Stewart and Bernard (1954) found that the labour became more difficult with advancing age of the patient, and they suggested that this may be due to increased rigidity of the pelvis, and less reserve of power in the uterus.

There is little doubts in the minds of the practising obstetricians that the incidence of foetal distress in labour is considerably increased in the elderly primigravidae. In this context, Baird and Turnbull (1957) have shown that there is a deficient state of oxygen saturation of foetal haemoglobin in this group of patients, resulting from a state of placental insufficiency. Baird (1952), and Booth and Williams (1964) have shown that the incidence of prolonged second stage of labour, resulting from uterine inertia is proportionately higher in the elderly primigravidae. These workers have also shown a higher incidence of maternal distress during labour in the elderly primigra-

vidae. Baird (1952) showed that this type of patients had a higher incidence of episiotomy or perineal tears and this could be anticipated when one realises the increased rigidity state of the perineum in the elderly primigravidae.

In view of the increased incidence of foetal distress, maternal distress, and prolonged second stage of labour, it is natural to anticipate an increased rate of assisted vaginal deliveries, be they forceps or ventouse. Both Baird (1952), and Booth and Williams (1964) had a high rate of forceps deliveries in their series.

The incidence of caesarean section delivery, both elective and emergency, has been shown to be considerably above the average in the studies of all workers in this field. This is natural when one realises that the elderly primigravidae has a higher incidence of foetal distress, maternal distress, and disordered state of labour, and that no obstetrician would be prepared to resort to that degree of conservatism in the elderly primigravidae as much as he would be prepared to do in younger group of patients.

Most workers in this field have shown that the elderly primigravida stands a higher risk to sustain an intrapartum foetal death, as compared to the younger patients, and this is primarily due to the impaired state of placental and uterine function during labour.

Table IV

Complications in the Postpartum Period

1. Retained Placenta.
2. Atonic Postpartum Haemorrhage.
3. Deficient Lactation.
4. Puerperal Venous Thrombosis/Pulmonary Embolism.
5. Increased Neonatal Mortality resulting from: —
 - (a) Chronic Placental Insufficiency.
 - (b) Intrapartum Anoxia.
 - (c) Foetal Abnormality.

Donald (1964) points out that the elderly primigravida runs a higher risk of developing a retained placenta and/or atonic postpartum haemorrhage, and he points out that the uterine inertia in the first and second stages of labour is the principle predisposing cause of these complications. Further, the co-existence of uterine fibroids again predisposes to these complications in elderly primigravidae.

Baird, Hytten and Thomson (1958) have shown from their studies that the elderly primigravid patient has a higher tendency to develop lactational deficiency. They showed that not only the volume of milk output was below the average, but also the quality of milk was poor, especially in its fat content.

The elderly primigravidae, because of their age, present with higher incidence of varicose veins in the lower limbs, and therefore predispose towards puerperal venous stasis, which in turn readily predisposes to puerperal venous thrombosis and subsequent pulmonary embolism.

Most workers have shown from their studies that the elderly primigravid group of patients have a higher incidence of neonatal mortality and morbidity and this is the result of the following

Table V

General Measures in the Management of the Elderly Primigravida

1. Detailed and careful supervision throughout both pregnancy and labour.
2. Sympathetic, firm and confident handling of the patient, in view of the anxious and nervous state of the patient.
3. X-ray Abdomen to exclude foetal abnormality.
4. Proper assessment of pelvic capacity.
5. No place for trial of labour — Elective LSCS.
6. Liberal Indications for LSCS Delivery.
7. Postmaturity not to exceed one week— Amniotomy — Induction, and if this fails — LSCS delivery to be seriously considered within 24 hours of Induction.

pathological factors:—

- (a) Chronic Placental Insufficiency
- (b) Intrapartum Anoxia
- (c) Foetal Abnormality.

Management of the Elderly Primigravida:

It is not the intention of the author to describe in detail the management of the elderly primigravida, in this paper, and thereby cause confusion in the mind of the reader.

The principles governing the management of the elderly primigravida are now presented under 2 broad categories: (a) General Measures (Table V) and (b) Specific Measures (Table VI). These two tables are self-explanatory and therefore need no further elaboration.

Table VI

Specific Measures in the Management of the Elderly Primigravida

Early Detection and Institution of Specific Treatment for the Respective Complications viz.:

1. Hyperemesis Gravidarum.
2. Threatened Abortion.
3. Hypertension/PET/Eclampsia.
4. Premature Labour.
5. Maternal Distress/Ketosis in Labour.
6. LSCS Delivery, as and when indicated.
7. Assisted vaginal delivery, as and when indicated.
8. Episiotomy, as and when indicated.
9. Proper Management and vigilance of the Third Stage of Labour.
10. Early Ambulation/Anti-coagulant Therapy to prevent and treat puerperal venous thrombosis/pulmonary embolism.

Table VII

Pattern of Elderly Primigravidae at the Kandang Kerbau Hospital

1. Criteria of the Elderly Primigravida — Aged 35 years and over			
2. Period of Study — 1964-1965 (2 years)			
3. Number of Cases Reviewed — 116			
4. Incidence and Magnitude of the Problem:			
Total No. of Mothers delivered in 1964-1965 —			78,447
Total No. of Primigravid Mothers in 1964-1965		≈	18,000
Total No. of Elderly Primigravidae in 1964-1965			116
Percentage of Elderly Primigravidae of all Primigravidae		≈	0.64%
Incidence of Elderly Primigravidae in 1964-1965			0.15%
5. Booking Pattern:			
	No. of Cases	Per Cent	No. of S.B./NND
Booked Cases	85	73%	3 (2SB & 1 NND)
Unbooked Cases	31	27%	3 (2SB & 1 NND)
6. Ethnic Pattern:			
	No. of Cases	Per Cent	No. of S.B./NND
Chinese	95	82 %	4
Malays	18	15.5%	2
Indians	3	2.5%	0
7. Pattern of Onset of Labour:			
	No. of Cases	Per Cent	
Spontaneous Labour	69	59.5%	
Induced Labour (ARM)	33	28.4%	
Elective LSCS	14	12.1%	
8. Duration of Labour Pattern:			
	No. of Cases	Per Cent	
Under 12 hours	65	56 %	
12 to 24 hours	43	37.1%	
Over 24 hours	8	6.9%	
9. Mode of Delivery Pattern:			
	No. of Cases	Per Cent	
Spontaneous Vaginal Delivery	47	40.5%	
Assisted Vaginal Delivery	25	21.6%	
Caesarean Section Delivery (LSCS)	44	37.9%	
10. Indications of LSCS (44 cases):			
	No. of Cases	Per Cent	
Elective LSCS	14	31.8%	
Foetal Distress	13	29.5%	
Prolonged Dysfunctional Labour	9	20.5%	
Cephalo-Pelvic Disproportion	5	11.4%	
Severe PET/Eclampsia	2	4.5%	
Breech in Early Labour	1	2.3%	
11. Foetal Abnormality Pattern:			
Incidence of Foetal Abnormality — 1.7% (2 out of 117 Births)			
Pattern: Mongolism — 1 infant			
Hydrocephalus — 1 infant			
12. Perinatal Mortality:			
No. of Stillbirths	—	4	
No. of NND (1st week)	—	2	
Perinatal Mortality Rate	—	51/1,000 (6 out of 117 Infants)	
13. Maternal Mortality: NIL			

In Table VII (above) is presented the results of study of the behaviour of the elderly primigravidae at the Kangang Kerbau Hospital. This study involves a retrospective review of all elderly primigravidae delivered at this Hospital for the 2-year period 1964-1965. The criteria for the elderly primigravida in this study is the accepted international standard of 35 years and above age group. The total number of cases reviewed were 116. During the 2-year period there were 78,447 mothers who had delivered at this Hospital and of these approximately 18,000 were primigravidae. Thus, the incidence for the period 1964-1965 was 0.15%; and the proportion of elderly primigravidae to all primigravidae was approximately 0.64%.

In this study only 73% of the elderly primigravidae were booked cases, whereas the remaining 27% were delivered at this Hospital with inadequate or no antenatal care at all. It will be seen that there were only 3 perinatal deaths in the 85 booked cases, whereas in the 31 unbooked cases there were also 3 perinatal deaths. It is therefore apparent that the perinatal mortality rate is almost three times as high in the unbooked cases as compared to the booked cases.

A study of the ethnic distributional pattern reveals that the ratio of 82% for the Chinese group of elderly primigravidae is consistent with the general population pattern of Singapore. On the other hand, the 15.5% ratio for the Malay ethnic group is disproportionately higher, and ratio of 2.5% for the Indian ethnic group disproportionately lower than their respective general population distributions in Singapore, and in the Hospital deliveries.

A study of the behaviour pattern of the elderly primigravidae in labour reveals several interesting features, even in this small series. The onset of labour was spontaneous in 59.5% of the cases in this series. In 28.4%, the labour had to be induced by amniotomy for a definite obstetric indication; and in the remaining 12.1%, elective caesarean section was performed. The relatively high rate of induced labour and elective caesarean section is an accepted trend in the management of the elderly primigravidae, and similar patterns have been displayed by Turnbull and Baird (1957), MacDonald and MacLennan (1960), and Booth and Williams (1964). In 56% of this series the duration of labour was under 12 hours, in 37.1% it was between 12-24 hours, and in 6.9% the labour lasted more than 24 hours. The proportionately higher number of cases with labour of over 12 hours duration (44%) in this series of elderly primigravidae is to be naturally

expected when it is realised that the state of uterine function in labour in the elderly primigravidae is relatively impaired.

The study of the delivery pattern of the elderly primigravidae in this series reveals that 40.5% of cases ended in spontaneous vaginal delivery. In 21.6% of cases, assisted vaginal delivery by forceps or ventouse had to be effected; and in 37.9% the delivery was by lower segment caesarean section. About one-third of the caesarean sections (14) were performed electively and the remaining two-thirds (30) were emergency sections undertaken for foetal or maternal indications. It is therefore apparent that 60% of the cases in this series of elderly primigravidae required some form of assisted delivery. Both MacDonald and MacLennan (1960), and Booth and Williams (1964), also revealed a similar pattern of high incidence forceps delivery and caesarean section in their series of elderly primigravidae.

A study of the indications for the 44 caesarean sections performed in this series reveals a pattern of behaviour that could be anticipated in the elderly primigravidae. About a third (31.8%) of the caesarean sections were electively performed, as it was felt that labour might have been detrimental to the interest of either the foetus or the mother. In 29.5% of sections, foetal distress was the indication, and this could be anticipated in view of the impaired state of placental function in the elderly primigravidae. In 20.5% of sections, prolonged dysfunctional labour was the indication, and this again could be anticipated in view of the impaired state of uterine function during labour in these cases. In 11.4% of sections, cephalo-pelvic disproportion was the indication; and the citing of this indication in a relatively high proportion of sections is due primarily to the fact that even in the cases of minor cephalo-pelvic disproportion, caesarean section would be readily resorted to in this class of patients, rather than subject such patients to a trial of labour. Such a radical concept in the management of the elderly primigravidae seems justifiable when one considers the precious state of pregnancy to this class of patients. Of the remaining three sections in this series, two were done for fulminating toxæmia of pregnancy, and one for a breech presentation in early labour.

There were two cases of gross foetal abnormality in this study, giving an incidence of 1.7%. One was mongol, and the other a mild case of hydrocephalus. Both these abnormal foetuses survived their first week of life, and hence did not

fall into the criteria of perinatal deaths. This incidence of 1.7% foetal abnormality is higher than the overall incidence for this Hospital.

The gross perinatal mortality rate in this study was 51 per 1,000 (6 out of 117 infants, one set of twins). Of these 6 perinatal deaths, there were 4 stillbirths and 2 neonatal deaths (first week), and these were equally distributed in the booked and unbooked cases. A study of the clinico-pathological causes of deaths reveals that 3 deaths could be attributed to severe states of placental insufficiency syndrome. One death was

the result of prematurity combined with chronic placental insufficiency. One death followed prolapse of the umbilical cord in labour, and the last death was probably the unfortunate result of an unsuccessful attempt at external cephalic version in the antenatal clinic at the 35th week of gestation. The silent intra-uterine foetal death that followed the manoeuvre in the last death should serve as an indicator of the hazards of such a procedure in all cases of precious pregnancies.

There were no maternal deaths in this series of elderly primigravidae.

SUMMARY:

1. A review of recent literature has been made.
2. The internationally accepted criteria for the elderly primigravida of 35 years has been used as a basis in this study.
3. The incidence of 0.15% for the elderly primigravidae at the Kandang Kerbau Hospital is very low compared to western countries.
4. The problems in the elderly primigravida, as viewed from a physio-pathological angle, have been tabulated and discussed.
5. The complications in the elderly primigravida in the antepartum, intrapartum and postpartum periods have been tabulated and discussed.
6. The general and specific measures to be instituted in the management of the elderly primigravida have been outlined.
7. The pattern of the elderly primigravidae at the Kandang Kerbau Hospital have been presented and discussed on the basis of a retrospective review of 116 consecutive cases delivered at this Hospital during the 2-year period 1964-1965.

REFERENCES

1. Baird, D. (1952): *Amer. J. Obstet. Gynaec.*, **63**, 1200.
2. Baird, D. (1958): *Brit. Med. J.*, **1**, 1477.
3. Baird, D., Hytten, F. E. and Thomson, A. M. (1958): *J. Obstet. Gynaec. Brit. Emp.*, **65**, 865.
4. Booth, R. T. and Williams, G. L. (1964): *J. Obstet. Gynaec. Brit. Cwlt.*, **71**, 249.
5. Donald, I. (1964): "Practical Obstetric Problems," 3rd Ed. Lloyd-Luke, London. p. 61.
6. MacDonald, I. R. and MacLennan, H. R. (1960): *J. Obstet. Gynaec. Brit. Emp.* **67**, 443.
7. Miller, D. (1931, 1932): *Trans. Edinb. Obstet. Soc.* **52**, 16.
8. Nixon, W. C. W. (1931): *J. Obstet. Gynaec. Brit. Emp.*, **38**, 82.
9. Stewart, D. B. and Bernard, R. M. (1954): *J. Obstet. Gynaec. Brit. Emp.*, **61**, 318.
10. Turnbull, E. P. N. and Baird, D. (1957): *Brit. Med. J.*, **2**, 1021.