TWIN PREGNANCY: A STUDY OF 1,000 CASES

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It has long been recognized that twin pregnancy is associated with a high incidence of complications and a high perinatal mortality rate. I have been aware that, in this unit, the perinatal mortality in twin pregnancy, among the South African Bantu, has been considerably higher than that shown in series published in Great Britain and America. The literature was searched for articles on twin pregnancy in the African to serve as a yardstick by which we could judge ourselves. This, however, proved to be disappointing. All that could be found were 2 small series concerning twins in the African of Southern Rhodesia,[20] and Nyasaland.[9] Owing to the small number of cases, and the fact that they had not been fully analyzed, these did not serve as a valid basis for comparison.

In the recent literature, differing opinions have been expressed regarding the value of diet and antepartum bed rest in twin pregnancy. My feeling is that among the African this might be a valuable means of combating foetal wastage, but, since no figures regarding this aspect among Africans have been published, conclusions cannot be drawn.

Controversial statements made regarding the relative hazard to the second twin have been followed with interest. It has long been my impression that the second infant is at far greater risk but, once again, there are no figures on twinning among the African to support this impression.

For these reasons, this study of twin pregnancy among a Bantu population has been undertaken.

Material

One thousand consecutive cases of twin deliveries over a period of 6 years and 2 months, from May 1957 to June 1963, have been reviewed. This includes every patient with twins who was delivered, after the 28th week of pregnancy, in this hospital, or was admitted subsequent to the delivery of 1 or both infants outside hospital.

Of these 1,000 cases 254 (25·4%) had never attended the antenatal clinic before admission. The remaining 746 (74·6%) had attended the clinic on at least 1 occasion.

Incidence

The true incidence of twinning among the Bantu population group as a whole cannot be gauged, since this hospital drains a large population over a wide area, and considerable channelling of abnormal and complicated cases from other hospitals occurs. However, the hospital incidence in this series was 1 in 28 deliveries. Other reported incidences among Africans are 1 in 35 in Southern Rhodesia,[20] and 1 in 32 in Nyasaland.[9] In spite of the difficulty in assessing the true incidence it would appear to be considerably higher than the generally accepted figure of approximately 1 in 80 among the White races.

Table I shows that the frequency of twinning increases up to the age of 35 years and decreases thereafter. The mean age was 29·4 years and the greatest number of twins occurred in the age group 26 - 30 years. These findings are in accord with those of Aaron and Halperin.[1]

TABLE I. DISTRIBUTION OF CASES BY AGE GROUPS

Age group (yrs.)	*Cases*	%
15-20	108	10·8
21-25	267	26·7
26-30	302	30·2
31-35	168	16·8
36-40	129	12·9
41-45	21	2·1
46-50	6	0·6

Anderson[3] and Seski and Miller[22] showed that the frequency of twins increases with parity. However, Table II demonstrates that in this series the greatest number of twins occurred in those of para 0, 1 and 2. This agrees closely with the findings of Potter and Fuller[19] and Aaron and Halperin.[1]

TABLE II. DISTRIBUTION OF CASES BY PARITY

Parity	*Cases*	%
0	143	14·3
1	140	14·0
2	150	15·0
3	126	12·6
4	107	10·7
5	102	10·2
6	82	8·2
7	63	6·3
8	46	4·6
9	18	1·8
10	5	0·5
11	5	0·5
12	2	0·2

Seventy-five of the patients in this series had had 1 or more previous multiple pregnancies.

Diagnosis

The diagnosis of twins, before the onset of labour, was made in 94·7% of those patients who attended the antenatal clinic. This is a high incidence of antepartum diagnosis and it is probably due to the fact that in this unit every case at every visit to the clinic is seen by a medical officer. Radiographs were taken without hesitation if twin pregnancy was suspected.

COMPLICATIONS OF PREGNANCY

1. *Anaemia*

A haemoglobin level of below 12·0 G./100 ml. at any stage of pregnancy was accepted as being indicative of anaemia. It was found that 51·8% of twin mothers were anaemic whereas the usual hospital incidence was 45·9%. If the criterion for anaemia was dropped to 10·0 G./100 ml. the incidence in twin pregnancy became 10·8% compared with an overall hospital figure of 2·5%. It thus appears that the incidence of severe

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anaemia in twin pregnancy is 4 times the usual hospital figure, but the incidence of moderate anaemia is only slightly raised.

2. *Hydramnios*

A clinical diagnosis of hydramnios was made in 125 patients, giving an incidence of 12·5%. This is identical to the figure reported by Brown and Dixon.[6] Other workers have given figures ranging from 1·6%[22] to 11%.[23] Most are agreed that the incidence is considerably higher than in single pregnancy.

3. *Hypertension and Pre-eclampsia*

It is generally recognized that the incidence of hypertension and pre-eclamptic toxaemia is raised in twin pregnancy. This has been reported as from 2½ times[23] to 3 times[4, 17, 21] the usual figure.

In this series a blood pressure reading of 140/90 mm.Hg and above, on more than one occasion, was the standard employed. On this basis the incidence was 10·1%, which is double the overall incidence in this unit.

There were 11 cases of eclampsia (1·1%), 7 of these being unbooked cases. The overall hospital figure is 0·2%.

4. *Antepartum Haemorrhage*

There were 10 cases of abruptio placentae (1·0%) and placenta praevia was diagnosed in 5 patients (0·5%). These figures do not differ from the overall hospital incidence.

5. *Prematurity*

Table III indicates the distribution of infants according to birth weight. A birth weight of less than 2,500 G. (5·5 lb.) was accepted as indicative of prematurity and on this basis the number of premature infants was 1,078, or 53·9%. It is immediately apparent that this is a major complication of twin pregnancy. Other workers have presented similar figures; 71%,[20] 56%,[2] 54%,[22] and 48·6%.[6]

TABLE III. DISTRIBUTION OF INFANTS BY BIRTH WEIGHT

Weight	Twin I		Twin II		Both twins	
	Cases	%	Cases	%	Cases	%
Under 1,000 G. ..	32	3·2	29	2·9	61	3·0
1,000-1,499 G. ..	66	6·6	70	7·0	136	6·8
1,500-1,999 G. ..	147	14·7	146	14·6	293	14·7
2,000-2,499 G. ..	282	28·2	306	30·6	588	29·4
2,500-2,999 G. ..	299	29·9	298	29·8	597	29·9
3,000-3,499 G. ..	148	14·8	126	12·6	274	13·7
3,500 G. and over	26	2·6	25	2·5	51	2·5

Average weights of the infants were 2,385 G. (5·26 lb.) for twin I, 2,349 G. (5·18 lb.) for twin II and 2,367 G. (5·22 lb.) for both twins. Guttmacher and Kohl[13] presented almost identical figures. The average birth weight of single infants in this unit is 3,048 G. (6·7 lb.).

LABOUR

1. *Presentation*

An analysis of the presentations encountered in labour is shown in Table IV. The vertex presented in 74·7% of first twins and 55·8% of second twins.

Review of the antenatal X-ray plates showed that in only 43·3% of cases did the presentations demonstrated ultimately occur in labour.

2. *Duration of Labour*

Contrary to the usual textbook teaching, labour in twin pregnancy appears to be shorter than in single pregnancy. The average duration of the first stage of labour in this series was 8·8 hours, as compared with 11·4 hours in single pregnancies in this unit. However, labour prolonged over 48 hours is more common, having occurred in 1·1% of twin pregnancies compared with 0·4% in single pregnancies. This paradox is probably explained by the fact that a large number of patients with twins had very short labours. Table V reveals that more than one-third of the patients in this series had a labour lasting less than 6 hours.

TABLE IV. PRESENTATIONS ENCOUNTERED IN LABOUR

Presentation		Cases	%
Twin I	Twin II		
Vertex	Vertex	414	41·4
Vertex	Breech	270	27·0
Breech	Vertex	141	14·1
Breech	Breech	104	10·4
Vertex	Shoulder	58	5·8
Breech	Shoulder	18	1·8
Face	Breech	4	0·4
Shoulder	Shoulder	3	0·3
Vertex	Brow	3	0·3
Brow	Vertex	2	0·2
Vertex	Face	2	0·2
Breech	Brow	1	0·1
Shoulder	Vertex	1	0·1
Shoulder	Breech	1	0·1

TABLE V. DURATION OF LABOUR IN TWIN AND SINGLE PREGNANCY

Duration of labour	Twin deliveries			Single deliveries
	Cases	%		%
Under 6 hrs	348	34·8		
6 to 12 hrs	371	37·1	91·2	94·2
12 to 24 hrs	193	19·3		
24 to 48 hrs	56	5·6		5·4
Over 48 hrs	11	1·1		0·4
Not recorded	21	2·1		—

3. *Cord Prolapse*

In the 2,000 deliveries, prolapse of the umbilical cord occurred on 46 occasions, giving an incidence of 2·3%. This is 6 times the overall incidence in this hospital. The perinatal mortality among this group of infants was 30·4%.

4. *Operative Delivery*

Table VI shows an analysis of mode of delivery of first and second twins. Operative delivery was required in 9% of first twins and 22·6% of second twins. The overall operative delivery rate in this unit is 20%.

TABLE VI. MODE OF DELIVERY IN FIRST AND SECOND TWINS

Type of delivery	Twin I		Twin II	
	Cases	%	Cases	%
Non-operative:				
Normal vertex	688	68·8	454	45·4
Spontaneous breech ..	10	1·0	18	1·8
Assisted breech	211	21·1	299	29·9
Spontaneous evolution ..	—	—	2	0·2
Partus corpore conduplicato	1	0·1	1	0·1
Total	910	91·0	774	77·4
Operative:				
Breech extraction	25	2·5	27	2·7
Internal version and breech extraction	3	0·3	70	7·0
External version and assisted breech	—	—	5	0·5
External version and normal Vertex	—	—	11	1·1
Vacuum extraction ..	12	1·2	31	3·1
Forceps	14	1·4	35	3·5
Caesarean section ..	35	3·5	42	4·2
Craniotomy	1	0·1	5	0·5
Total	90	9·0	226	22·6

The number of spontaneous breech deliveries is low owing to the fact that only those breech deliveries which were completely unattended by a midwife or medical officer have been classified as being spontaneous.

Caesarean section was employed on 42 occasions, 7 of these being for the second twin only. The incidence of 4·2% compares favourably with the usual incidence of 9% for caesarean section in this unit. The indications for caesarean section in this series are presented in Table VII. It is noteworthy that

TABLE VII. INDICATIONS FOR CAESAREAN SECTION

Indication	*Cases*
Cephalo-pelvic disproportion	14
Previous caesarean section	11
Incoordinate uterine action	5
Transverse lie	5
Placenta praevia	3
Brow presentation	2
Cord prolapse	1
Abruptio placentae	1

the commonest indication, as in single pregnancy in this unit, was cephalopelvic disproportion. The fact that only 5 caesarean sections were performed because of incoordinate uterine action demonstrates that this was not a major problem in this series.

5. *Locking and Collision*

Nissen[18] calculated the incidence of locking and collision in twin pregnancy as being 1 in 1,000 cases. In this series no cases were encountered.

6. *Postpartum Haemorrhage*

Postpartum haemorrhage rates show great variation according to geographical areas and racial groups, and for this reason an indication of increased frequency in twin pregnancy can only be obtained by comparing it with the overall rate for the same institution. Incidences quoted vary from 5·9%[24] to 25%.[2] Most authors seem agreed that the incidence is some 2 - 3 times greater than the overall rate. In this series there were 119 cases (11·9%). This is considerably more than the overall hospital figure of 7%. Sixteen of these patients required manual removal of the placenta.

TABLE VIII. PERINATAL MORTALITY IN RECENT SERIES

Author	*Perinatal mortality (%)*
Munnell & Taylor (1946)[17]	28·1
Potter & Fuller (1949)[19]	14·0
Bender (1952)[4]	11·0
Ross (1952)[20]	24·5
Russell (1952)[21]	16·0
Anderson (1956)[3]	18·8
Allen (1959)[2]	6·0
Dabb (1960)[9]	38·7
Waddell & Hunter (1960)[24]	10·0
Macdonald (1962)[16]	12·5
Brown & Dixon (1963)[6]	9·6
Jonas (1963)[14]	11·0
Present series	16·1

MATERNAL MORTALITY

Two patients in this series died following delivery. One, a patient with grade-IV cardiac disease, died in congestive cardiac failure on the fourth day of the puerperium. The other died as a result of air embolism following manual removal of the placenta.

PERINATAL MORTALITY

All perinatal mortality rates quoted are uncorrected and include stillbirths and deaths in the first week of life.

Perinatal mortality rates were 11·6% for twin I, 20·5% for twin II and 16·1% overall. In comparison with other published figures foetal wastage has been high in this series. Table VIII shows perinatal mortality rates in some recent series.

In an attempt to explain the high foetal wastage correlations with various possible causative factors have been made.

1. *Perinatal Loss in Relationship to Birth Weight*

An analysis of perinatal loss in relation to birth weight is presented in Table IX. The mortality for premature infants, of under 2,500 G. (5·5 lb.), was 24·4%, while that for mature infants was 6·2%. It is apparent that prematurity is a major factor in determining the survival of twins. Examination of Table IX reveals that there is dramatic improvement in foetal loss, from 56·6% to 18·1%, when the weight of 1,500 G. is reached; and further significant improvement, from 13·6% to 5·8%, when the weight of 2,500 G. is attained.

2. *Perinatal Mortality Related to Parity*

The foetal loss in primigravidae was 18·8%, for those of para 1 to 4 it was 14·8% and for para 5 or more it was 13·9%. However, when broken up into individual parities, as in Table X, no consistent correlation can be found.

TABLE X. PERINATAL MORTALITY RELATED TO PARITY

Parity	*Cases*	*Deaths*	*%*
0	286	54	18·8
1	280	35	12·5
2	300	46	15·3
3	252	34	13·5
4	214	40	18·7
5	204	29	14·2
6	164	19	11·5
7	126	19	15·1
8	92	12	13·4
9	36	6	16·6
10	10	5	50·0
11	10	0	0·0
12	4	0	0·0

TABLE IX. FOETAL MORTALITY RELATED TO BIRTH WEIGHT

Weight group	*Twin I*		*Twin II*		*Both twins*	
	Total cases delivered	*Perinatal mortality (%)*	*Total cases delivered*	*Perinatal mortality (%)*	*Total cases delivered*	*Perinatal mortality (%)*
Under 1,000 G.	32	87·5	29	86·2	61	86·9
1,000–1,499 G.	66	39·4	70	72·8	136	56·6
1,500–1,999 G.	147	14·9	146	21·2	293	18·1
2,000–2,499 G.	282	8·8	306	18·0	588	13·6
2,500–2,999 G.	299	3·0	298	8·7	597	5·8
3,000–3,499 G.	148	4·1	126	11·9	274	7·6
Over 3,500 G...	26	0·0	25	8·0	51	4·0
Total	1,000	11·6	1,000	20·5	2,000	16·1

3. *Perinatal Loss Related to Clinic Attendance*

To stress the importance of antenatal care in this enlightened age should be unnecessary. To any who doubt this, the fact that the perinatal mortality rate among the 254 patients who did not attend the antenatal clinic was 41·4%, compared with 7·3% for those who did attend, should be illuminating. This, among the African, is a major contributing factor to the high foetal loss.

4. *Perinatal Loss Related to Delivery Outside Hospital*

Two hundred and sixteen infants were delivered unattended at home or on the way to hospital. Perinatal loss among this group was 39·1%. That twins should be delivered in a hospital with adequate facilities goes without saying.

5. *Perinatal Mortality in Pre-eclampsia and Eclampsia*

The foetal wastage among the 224 infants in this category was 21·8%. Seski and Miller[22] found that pre-eclampsia was associated with a foetal loss of 50%, whereas Bender[4] and Tow[23] in their series found that the perinatal mortality was actually lower in this group than the overall figure. In the present series, toxaemia of pregnancy cannot be incriminated as a major contributor towards the high overall perinatal mortality. This is probably due to the fact that the majority of these patients receive hospital care.

6. *Perinatal Mortality in Hydramnios*

That the presence of hydramnios in twin pregnancy is a poor prognostic sign is rapidly being appreciated. Seski and Miller[22] found a perinatal mortality of 87%. Other figures are lower, but no less disquieting—54%[6] and 22·9%.[23] Among the 125 patients with clinically diagnosed hydramnios in this series the perinatal mortality was 41%.

It is generally accepted that the causes of the high mortality in hydramnios are prematurity and congenital anomalies. However, in this series the prematurity rate was lower (50·8%) than in the series as a whole (53·9%). Furthermore, there were only 4 cases of major foetal anomaly and all occurred in patients with hydramnios. These consisted of 1 case each of anencephaly, meningocele, conjoined twins and sterno-cleido-dysostosis, the latter being the only survivor. The stillborn conjoined twins were an example of thoracophagus and were born spontaneously without difficulty, their combined weights being 3 lb.

7. *Anaesthesia*

General anaesthesia has been repeatedly incriminated as a major cause of foetal death in twin pregnancy. In this series the number of general anaesthetics administered, apart from caesarean sections, was so small that no conclusions could be drawn. Most operative deliveries were performed under pudendal nerve block, morphine being administered intravenously if intra-uterine manipulation became necessary. The few exceptions to this were cases of neglected shoulder presentation who required full general anaesthesia.

RELATIVE HAZARDS TO THE SECOND TWIN

Reference to Table IX reveals that, apart from those infants weighing under 1,000 G. (2·2 lb.), the mortality rate for twin II is consistently higher than that for twin I. This is further borne out by the total uncorrected mortality rates of 11·6% for twin I and 20·5% for twin II.

Various factors which might be responsible for this state of affairs have been considered.

1. *Presentation*

A detailed analysis of the presentations encountered was shown in Table IV. This table shows that malpresentations occurred in 25·3% of first twins, but this rose to 44·2% in second twins. Camilleri[8] found similar figures of 27·4% and 43·5%. This must militate heavily against the second infant.

2. *Delivery Interval*

Various opinions have been given in the recent literature regarding the delivery interval, but few are agreed on what the optimal time for the delivery of the second twin is.

Table XI shows the mortality of the second twin in relation to the delivery interval. It is immediately apparent that in this series the optimal delivery interval is 11 - 20 minutes. More important, however, is the revelation that undue haste (0 - 10 minutes) is more lethal than delay of up to 45 minutes. In anticipation of the criticism that a higher mortality can be

TABLE XI. MORTALITY OF SECOND TWIN RELATED TO DELIVERY INTERVAL

Time interval (mins.)	*Cases*		*Deaths*		*Perinatal mortality (%)*	
0–5	38		7		18·4	
6–10	183	221	29	36	15·8	16·3
11–15	186		17		9·0	
16–20	140	326	11	28	7·8	8·5
21–30	126		15		11·9	
31–45	96		15		15·6	
46–60	34	421	11	108	32·3	23·2
Over 60 ..	165		67		40·5	

expected in the 0 - 10 minute group (because patients requiring immediate delivery, e.g. in cord prolapse, intrapartum haemorrhage, transverse lie, and foetal distress fall into this group), the figures were further analysed. It was found that there were 19 such cases in this group with 6 foetal deaths. The omission of these cases does not alter the mortality rate of 16·3% in the 0 - 10 minute group.

The figures presented in Table XI have been subjected to a Chi-square test and are statistically significant ($P = .01$).

3. *Mode of Delivery*

An analysis of perinatal mortality of twin I and twin II in relation to mode of delivery is presented in Table XII. The operative delivery rate in the first twin was 9% and was associated with 12·9% of the total deaths, whereas in the second twin the operative delivery rate was 22·6% and was associated with 29·2% of the total deaths. Thus the necessity for operative or manipulative procedure in the delivery of the second twin plays a considerable part in increasing the risk for this infant.

The most lethal modes of delivery were spontaneous (unattended) breech delivery and internal version with breech extraction. Although the figures are small, it would appear that external cephalic version followed by normal vertex delivery and external podalic version followed by assisted breech delivery are associated with a lower mortality. Of all the operative procedures caesarean section and vacuum extraction were associated with the lowest mortality rates.

THE EFFECTS OF HOSPITALIZATION

It has been the policy of this unit to admit as many twin patients as possible during the last 6 weeks of gestation. The reason for this has been the known high incidence of premature labour and the fact that many of our patients live far from the hospital. Many patients, for various reasons, were unable to avail themselves of this hospitalization. This is, accordingly, a comparative series in which to observe the effects of bed rest and an adequate diet on the foetus.

All patients who were delivered before 32 weeks gestation and all who were not delivered in hospital (a total of 138) were excluded from this portion of the study. The control group consisted of 460 patients who were not hospitalized before the onset of labour. The remaining 402 patients had all spent at least 1 week in hospital before delivery and have been grouped according to duration of stay in hospital.

TABLE XII. PERINATAL MORTALITY IN RELATIONSHIP TO MODE OF DELIVERY

Type of delivery	Twin I		Twin II		Both twins	
	Total cases delivered	Perinatal mortality %	Total cases delivered	Perinatal mortality %	Total cases delivered	Perinatal mortality %
Non-operative:						
Normal vertex	688	11·6	454	20·2	1,142	15·1
Spontaneous breech	10	40·0	18	61·1	28	51·0
Assisted breech	211	8·0	299	14·0	510	11·5
Spontaneous evolution	—	—	2	100·0	2	100·0
Partus corpore conduplicato	1	100·0	1	100·0	2	100·0
Total	910	11·1	774	17·5	1,684	14·8
Operative:						
Breech extraction	25	28·0	27	29·6	52	28·8
Internal version and breech extraction	3	33·3	70	32·8	73	32·8
External version and assisted breech	—	—	5	20·0	5	20·0
External version and normal vertex	—	—	11	18·2	11	18·2
Vacuum extraction	12	16·6	31	10·0	43	11·6
Forceps	14	7·1	35	25·7	49	20·4
Caesarean section	35	5·7	42	14·3	77	10·4
Craniotomy	1	100·0	5	100·0	6	100·0
Total	90	16·4	226	26·1	316	25·0

1. *Effect on Perinatal Mortality*

Table XIII shows an analysis of the effects of hospitalization on perinatal mortality rates. It is apparent that hospitalization markedly reduces foetal loss and that this effect increases with duration of stay in hospital. The overall result is that perinatal mortality is reduced from 18·1% among the non-hospitalized to 6·3% among those spending 1 week or more in hospital.

These figures have been subjected to a Chi-square test and are highly significant ($P = <.001$).

TABLE XIII. THE EFFECT OF BED REST ON PERINATAL MORTALITY

Duration of hospitalization	Total infants delivered	Perinatal mortality (%)
Nil	920	18·1
1 week	130	7·7
2 weeks	170	6·5
3 weeks	122	6·5
4 weeks	156	6·4
Over 4 weeks	226	5·3
Total hospitalized	804	6·3

2. *Effect on Average Foetal Weights*

The effects of hospitalization on average foetal weights are reflected in Table XIV. Both infants show a consistent rise in birth weight related to duration of stay in hospital. The average weight for those receiving no bed rest was 2,358 G. (5·2 lb.), while for those receiving 1 week or more bed rest it was 2,653 G. (5·85 lb.).

3. *Effect on Foetal Maturity*

For the purposes of this study prematurity has been defined as a birth weight below 2,500 G. (5·5 lb.), and immaturity as a birth weight below 2,000 G. (4·4 lb.). The effects of hospitalization on prematurity and immaturity rates are shown in Table XV. It will be noted that there is a steady decrease in both.

TABLE XV. THE EFFECT OF BED REST ON FOETAL MATURITY

Duration of hospitalization	Total infants delivered	Weight below 2,500 G.		Weight below 2,000 G.	
		Cases	%	Cases	%
Nil	920	556	60·4	239	24·9
1 week	130	76	58·4	29	22·3
2 weeks	170	68	40·0	24	14·1
3 weeks	122	33	27·1	9	7·4
4 weeks	156	37	23·1	10	6·4
Over 4 weeks	226	39	17·2	4	1·8

One week or more in hospital reduces the prematurity rate from 60·4% to 33·1% and the immaturity rate from 24·9% to 9·9%. Brown and Dixon[6] found very similar reductions: the prematurity rate was reduced from 50·7% to 37·2% and the immaturity rate from 20·7% to 12·8%.

The figures in Table XV are also highly significant ($P = <.001$).

TABLE XIV. THE EFFECT OF BED REST ON AVERAGE FOETAL WEIGHTS

Duration of hospitalization	Twin I		Twin II		Both twins	
	Total cases delivered	Average weight (lb.)	Total cases delivered	Average weight (lb.)	Total cases delivered	Average weight (lb.)
Nil	460	5·4 (2,499 G.)	460	4·9 (2,222 G.)	920	5·2 (2,358 G.)
1 week	65	5·5 (2,494 G.)	65	5·2 (2,358 G.)	130	5·4 (2,449 G.)
2 weeks	85	5·6 (2,540 G.)	85	5·6 (2,540 G.)	170	5·6 (2,540 G.)
3 weeks	61	5·9 (2,676 G.)	61	5·8 (2,630 G.)	122	5·85 (2,653 G.)
4 weeks	78	6·1 (2,766 G.)	78	6·1 (2,766 G.)	156	6·1 (2,766 G.)
Over 4 weeks	113	6·4 (2,903 G.)	113	6·1 (2,766 G.)	226	6·3 (2,857 G.)

It is apparent that the longer the duration of stay in hospital the greater the benefits to the foetus. The optimum time for admission to hospital would appear to be between 32 and 36 weeks in order to prevent and save as many premature infants as possible. Admission later than 36 weeks will defeat this object.

DISCUSSION

Comparisons between this and other published series are liable to be erroneous owing to the entirely different racial groups and socio-economic circumstances. In spite of this difficulty, however, it appears that twin pregnancy in the African is associated with very much the same complicating factors as it is in the White races.

Complications of Pregnancy

I have been able to confirm that certain complications of pregnancy occur more frequently in twin than in single pregnancies. Severe anaemia occurs 4 times more often than in single pregnancy, but the incidence of moderate anaemia is only slightly raised. Pre-eclamptic toxaemia is twice as common, and hydramnios occurs far more frequently, the precise figure not having been estimated. On the other hand, this series has not demonstrated any increase in the frequency of either placenta praevia or abruptio placentae. The latter finding is rather surprising in view of the two-fold increase in the incidence of pre-eclamptic toxaemia.

Complications of Labour

In labour malpresentations are frequent and, especially in the second twin, cord prolapse occurs 6 times more often than in single pregnancy and the incidence of postpartum haemorrhage is increased from 7% in single pregnancy to 11·9% in twin pregnancy.

Munnell and Taylor,[17] Bender[4] and Russell[21] found that twin pregnancy has no appreciable effect on the duration of labour. In this series the incidence of labour prolonged over 48 hours is 1·1% compared with 0·4% in single pregnancy. However, one-third of the patients in this series had a first stage of labour lasting less than 6 hours, with the result that the average duration of labour was 8·8 hours as compared with 11·4 hours among single deliveries in this unit.

The operative delivery rate among first twins was 9%, which is far less than the overall rate in this unit (20%), whereas it rose to 22·6% among second twins. The caesarean section rate was 4·2%, which is less than half the overall rate in this hospital. That cephalopelvic disproportion can be a problem in twin pregnancy is demonstrated by the fact that it was the most frequent indication for caesarean section.

Perinatal Mortality

In comparison with most of the other recently published series the perinatal mortality rate in this series is high, the overall figure being 16·1%. This may to some extent be explained by the nature of the population group under review. With few exceptions these patients fall into social classes IV and V. The only series which could be found in comparative African population groups are those of Ross[20] and Dabb.[9] Their perinatal mortality figures were 24·5% and 38·7% respectively.

The most important factor affecting the survival of twins is birth weight. Guttmacher and Kohl[13] suggested that the critical birth weight for the survival of twins is 2,000 G. This is not borne out in this series, which shows two critical weights, 1,500 G. and 2,500 G. There is dramatic improvement in foetal mortality at these two weight levels. Other important factors influencing perinatal mortality are non-attendance at antenatal clinic and delivery outside hospital —two major problems in this population group.

Why hydramnios is associated with the high foetal mortality of 41% is obscure. The incidence of prematurity in this group was actually lower than in the series as a whole; there were very few foetal anomalies and complications of labour were not more frequent. Other writers have also pointed out the dangers of hydramnios, but as yet no explanation has been found.*

Relative Hazard to the Second Twin

Potter and Fuller[19] insist that there is no increased risk for the second twin. They are supported in this contention by several writers.[1, 4, 24] Others,[13, 17, 22, 23] are equally insistent that the second foetus is at greater risk. Camilleri,[8] in reviewing many published series, has demonstrated convincingly that the mortality of the second twin is higher than that of the first. This is borne out in this series which shows that the mortality for the first twin was 11·6%, while that for the second twin was 20·5%. Apart from possible relative asphyxia as a result of sudden reduction in volume of the uterus, after the birth of the first infant, with consequent reduction in placental blood flow, there are other possible reasons to account for this.

Malpresentations occur in 44·2% of second twins as opposed to 25·3% of first twins, and in particular, the incidence of transverse lie is increased from 0·5% in first twins to 7·9% in second twins. This partly explains the increased risk for twin II.

Most writers agree that there is an optimum time for the delivery of the second twin. However, agreement ends there, since varied optimum delivery intervals have been laid down: 1 - 10 minutes,[15] within 15 minutes,[24] 10 - 20 minutes,[16] and within 30 minutes.[4] At the extremes are Guttmacher and Kohl,[13] Tow,[23] and Seski and Miller[22] who maintain that the delivery of the second twin should be immediate, and Danielson[10] who maintains that it is permissible to wait 2 hours. This series shows that the delivery interval is of vital importance to the second twin and the optimal delivery interval has been convincingly demonstrated as being 11 - 20 minutes. Of equal importance is the finding that delivery within 10 minutes is more lethal than delay of up to 45 minutes. The figures presented in demonstrating this are statistically significant.

The final factor affecting the relative hazard to the second twin is the mode of delivery. Operative delivery, by virtue of the fact that it is more frequently required in the delivery of the second twin, is responsible for a large

*Some interesting new work regarding this problem has been published recently [Annotation (1963): Brit. Med. J., 2, 1354].

number of foetal deaths. Internal version and breech extraction is particularly hazardous, the mortality being 32·8%. It is felt that review of some established methods of treatment might effectively reduce this mortality. Table XII shows that the mortality associated with external podalic version followed by assisted breech delivery is 20%, that associated with external cephalic version followed by normal vertex delivery is 18·2%, and that associated with vacuum extraction is 11·6%. Although the figures are small, these 3 modes of management are associated with a far lower mortality than is internal version and breech extraction. It is submitted that insufficient use is made of external version in cases of transverse lie of the second twin. Internal version and breech extraction should be reserved only for those cases where external version has been proved to be impossible. With the advent of the vacuum extractor, internal version and breech extraction should seldom be necessary when the vertex is presenting, with consequent almost certain improvement in perinatal mortality figures. This instrument has been used in this unit with increasing frequency to deliver the second twin when internal version and breech extraction would have been the only alternative. The results have been impressive.

The perinatal mortality associated with caesarean section is low and its increased use for foetal malpresentation in twin pregnancy would substantially reduce foetal wastage.

Antepartum Bed Rest and Diet

Several writers,[4, 6, 11, 21, 23] have reported enthusiastically on the benefits of antepartum bed rest in twin pregnancy. On the other hand, many have been less impressed with its value.[3, 11, 13, 14] That an adequate diet has considerable effect on foetal outcome has been well documented. Ebbs and his co-workers[12] found that, among women receiving a poor diet, the addition of supplementary food and vitamins reduced the miscarriage and stillbirth rate from 9·4% to 0%. Williams[25] found that an adequate diet reduced foetal deaths by one-third. Burke *et al.*[7] demonstrated a close relationship between diet and foetal condition, including birth weight. Ebbs *et al.*,[12] however, found little correlation between diet and birth weight in spite of the greatly improved foetal loss. Bourne and Williams[5] believe that a good diet greatly improves foetal vigour.

In a population group such as the one under review, hospital conditions are so vastly superior to anything they have experienced under normal home circumstances that the effects of hospitalization are likely to be more readily demonstrable. Among the Zulu people the female is traditionally the hewer of wood and drawer of water, and as a result of this admission to hospital, even if bed rest is not absolute, implies far more relative rest than it does for her softer-living White counterpart. Furthermore, hospitalization implies a diet very different from her vitamin-poor staple diet. In hospital she receives a balanced diet, 1 pint of milk daily and in addition to this various daily supplements, viz.: 3 tablets of fortified brewer's yeast (Vit. B Co.), 300 mg. of vitamin C, 5 mg. of folic acid, and 600 mg. of ferrous fumarate.

On the basis of the results presented in this paper, the value of this regime in the management of twin pregnancy, in the African at least, cannot be disputed. Among those patients hospitalized the perinatal mortality was reduced from 18·1% to 6·3%, the prematurity rate was reduced from 60·4% to 33·1% and the average foetal weight was raised from 2,358 G. (5·2 lb.) to 2,653 G. (5·85 lb.). These figures are highly impressive, but, when one considers the group of 65 patients who spent only 1 week in hospital, it is apparent that reduction in prematurity is not the sole reason for the reduction in foetal mortality. Among this group the infant's chance of being premature was reduced by only 2% compared with those who had received no hospitalization, and its average weight was increased by only 90 G. (approximately 3 oz.), but its chances of death were dramatically reduced from 18·1% to 7·7%. It can only be concluded that maternal rest and an adequate diet with vitamin supplements must confer benefits on the foetus which make it more resistant to the hazards facing it during labour and during the first week of life.

SUMMARY

One thousand consecutive cases of twin pregnancy among a South African Bantu population group have been studied, with particular reference to:

1. Complications of pregnancy.
2. Complications of labour.
3. Perinatal mortality.
4. The relative hazards to the second twin.
5. The place of antenatal bed rest and dietary supplements in the management of twin pregnancy.

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REFERENCES

1. Aaron, J. B. and Halperin, J. (1955): Amer. J. Obstet. Gynec., **69**, 794.
2. Allen, L. A. (1959): S. Afr. Med. J., **33**, 285.
3. Anderson, W. J. R. (1956): J. Obstet. Gynaec. Brit. Emp., **63**, 205.
4. Bender, S. (1952): *Ibid.*, **59**, 510
5. Bourne, A. W. and Williams, L. H. (1948): *Recent Advances in Obstetrics and Gynaecology*, 7th ed., p. 35. London: Churchill.
6. Brown, E. J. and Dixon, H. G. (1963): J. Obstet. Gynaec. Brit. Cwlth, **70**, 251.
7. Burke, B. S., Beal, V. A., Kirkwood, S. P. and Stuart, H. C. (1943): Amer. J. Obstet. Gynec., **46**, 38.
8. Camilleri, A. P. (1963): J. Obstet. Gynaec. Brit. Cwlth, **70**, 258.
9. Dabb, R. G. (1960): Cent. Afr. Med. J., **6**, 392.
10. Danielson, C. O. (1960): Acta obstet. gynec. scand., **39**, 63.
11. Dunn, B. (1961): J. Obstet. Gynaec. Brit. Cwlth, **68**, 685.
12. Ebbs, J. H., Scott, W. A., Tisdale, F. F., Moyle, W. J. and Bell, M. (1942): Canad. Med. Assoc. J., **46**, 1.
13. Guttmacher, A. F. and Kohl, S. G. (1958): Obstet. and Gynec., **12**, 528.
14. Jonas, E. G. (1963): J. Obstet. Gynaec. Brit. Cwlth, **70**, 461.
15. Kurtz, G. R., Keating, W. J. and Loftus, J. B. (1955): Obstet. and Gynec., **6**, 370.
16. Macdonald, R. R. (1962): Brit. Med. J., **1**, 519.
17. Munnell, E. W. and Taylor, H. C. (1946): Amer. J. Obstet. Gynec., **52**, 588.
18. Nissen, E. D. (1958): Obstet. and Gynec., **11**, 514.
19. Potter, E. L. and Fuller, H. (1949): Amer. J. Obstet. Gynec., **58**, 139.
20. Ross, W. F. (1952): Brit. Med. J., **2**, 1336.
21. Russell, J. K. (1952): J. Obstet. Gynaec. Brit. Emp., **59**, 208.
22. Seski, A. G. and Miller, L. A. (1963): Obstet. and Gynec., **21**, 227.
23. Tow, S. H. (1959): J. Obstet. Gynaec. Brit. Emp., **66**, 444.
24. Waddell, K. E. and Hunter, J. S. (1960): Amer. J. Obstet. Gynec., **80**, 756.
25. Williams, J. R. (1933): *Op. cit.*,[5] p. 14.