

A STUDY OF AMNIOTOMY IN THE BANTU, WITH SPECIAL REFERENCE TO ELECTIVE AMNIOTOMY

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The use of amniotomy is well established in obstetric practice as a means of inducing labour. In Bantu practice, however, it is apparently rarely used. In Johannesburg,<sup>1</sup> Natal,<sup>2</sup> Uganda,<sup>3</sup> and in Nigeria<sup>4</sup> less than 1% of labours are induced surgically in Bantu patients, whereas in European hospitals surgical inductions of labour in 26%<sup>5</sup> and 24%<sup>6</sup> of patients is not an uncommon finding.

Elective amniotomy, performed for the convenience of mother and doctor, has been practised for over 10 years in the USA,<sup>7,28,29</sup> and the results have proved to be very gratifying. The criteria adhered to have been that the expected date of delivery is known, that the foetal head is engaged in the pelvis and that the cervix is favourable. Forewater rupture is almost invariably the method of choice. It is, moreover, significant that 'mothers' convenience' appears in recent British textbooks,<sup>8,9</sup> as an indication, adding that 'this clearly does not include the convenience of the obstetrician'. It became obvious however that, where elective amniotomy is practised, it is to the mutual convenience of both doctor and patient. The amniotomy series of 522 cases presented here consists of 69% in whom this mutual relationship has applied.

Jane Furse Memorial Hospital is situated in a remote area of the Transvaal, serving a population of roughly 200,000 Bapedi and a sprinkling of Ndebele and Swazi people, as yet untouched by the European or urban way of life. One thousand babies are delivered *per annum*, most women being brought in from outlying clinics. There is no selection of patients for hospital delivery, all women requesting such delivery being accepted for hospitalization. They come, as is the case in most mission hospitals, to await delivery when they are near term according to their reckoning, living in a 'maternity village', built in the ward precincts for this purpose and maintained from limited hospital funds. As their calculation is based on a rough count of the number of full moons noticed since the last vaginal loss of blood, they often arrive up to 6 weeks before term.

These 'ladies in waiting' are reluctant to wait indefinitely, as the majority are multigravid and have small children at home, often leaving the hospital in a state of impatience when the foetus is of adequate size. These women then deliver at home unaided and are either never seen again or leave the decision to return too late, as 12 hours may easily elapse between the time the decision is made to go to hospital and the time of admission. Accurate figures are not available but the mortality—both foetal and maternal—is thought to be considerable, due to accidents in labour occurring during home deliveries. Tribal custom dictates that a woman may only be attended by one close multiparous relative until the placenta is delivered by maternal effort. Active interference during labour is very rarely attempted.

Reasons for Performing Amniotomy

Pressure on the already overstrained facilities and financial resources at the mission hospital are thus considerable. This pressure was considered unnecessary. Amniotomy was performed on the above type of patient for the following reasons:

- (a) mutual doctor and patient convenience, i.e. elective amniotomy;
- (b) to anticipate the effects of postmaturity and disproportion; and
- (c) to ensure prompt treatment of accidents in labour by delivering in hospital.

Providing the foetus was judged to be of adequate size, and on clinical assessment there was no suspected disproportion, the patient was considered suitable for elective amniotomy. Reluctance to use amniotomy in the Bantu often exists because of the high station of the foetal head. The reason for the late descent of the head in the Bantu is unknown, but is obviously a normal feature of their mechanism of labour. Providing the vertex or breech was well applied to the cervix, the station was considered to be of little importance.

TABLE I. AMNIOTOMY

	No. of cases	Present series %	Hospital incidence %
Distribution			
Primiparae .. .. .	151	29.4	30
Multiparae .. .. .	371	70.6	70
Total .. .. .	522		
Indications			
Elective .. .. .	361	69.2	
Disproportion .. .. .	127	24.3	
Toxaemia of pregnancy .. .. .	32	6.1	
Breech .. .. .	4	0.8	
Placenta praevia .. .. .	2	0.4	
Results			
Stillbirth (uncorrected) .. .. .	3	0.57	
Neonatal death (10 days) .. .. .	4	0.76	
Perinatal mortality .. .. .	7	1.31	
Puerperal pyrexia .. .. .	16	3.0	
Neonatal infection .. .. .	2	0.38	
Prematurity .. .. .	47	9.00 (6.3)*	9.3
Postpartum haemorrhage .. .. .	9	1.66	2.29
Prolapse of cord or hand .. .. .	3	0.57	0.63
Persistent occipito-posterior .. .. .	23	4.25 (3.33)	2.7
Deep transverse arrest .. .. .	5	0.94	1.0
Delivery			
Spontaneous .. .. .	492	94.3	
Forceps .. .. .	15	2.9 (0.95)	2.8
Vacuum extractor .. .. .	3		
Caesarean section .. .. .	6	1.15	3.95
Oxytocin drip .. .. .	102	19.5 (14.9)	0.92
Associated conditions			
Previous caesarean section .. .. .	6	1.2	
Previous symphysiotomy .. .. .	9	1.66	
Meconium-stained liquor at amniotomy .. .. .	36	6.8	

\*Present address: Port Shepstone.

\*Figures in brackets refer to cases excluding disproportion.

Amniotomy in the management of disproportion is a special problem and is discussed later. Labour was induced in the remaining patients for the generally accepted indications as reflected in Table I, and represented a general incidence of 15% of all deliveries.

#### METHOD

The decision having been taken, the patient was given a medical induction. In many cases this was omitted because of pressure of work, or impatience on the part of the patient. No account has been taken of the efficacy or otherwise of this procedure, which consisted of giving the patient 2 oz. of castor oil followed by an enema saponis and a hot bath. Thereafter the forewaters were ruptured with a pair of curved Kocher forceps as soon as a bed became available, which was usually within 5 days of the medical induction.

No premedication was given and the operation was carried out in the ward with as little fuss as possible. The patient was asked to void urine after which the vulva was shaved and swabbed with Dettol solution. A vaginal examination was then done assessing: (a) the state of the cervix; and (b) the capacity of the bony pelvis. Next the membranes were swept from their attachment to the lower uterine segment and this structure ruptured. The aperture in the membranes was then enlarged if possible, with the finger.

The foetal heart rate and blood pressure were recorded beforehand and the patient was left in the ward until labour commenced. Maternal and foetal heart rates were recorded every 10 minutes for the first ½-hour, and ½-hourly thereafter until the second stage of labour. The uterus was also palpated for contractions, more especially as these women are reticent about admitting to the onset of labour.

This is a simplified method when compared to that described by Theobald<sup>10</sup> and again quoted by Lewis.<sup>9</sup> As a ward procedure carried out in the bed, scrupulous aseptic technique is difficult to achieve, but routine use of antibiotics was restricted to those few cases whose membranes had been ruptured for longer than 24 hours. Penicillin, 1 million units and streptomycin 1 G, 12-hourly, were given to these patients for 3 days. Routine vaginal swab cultures were not taken.

If labour had not commenced by the following day (an interval which varied from 15 to 30 hours after amniotomy), an intravenous drip was set up containing 5 units Syntocinon in 1,000 ml. of 5% dextrose in water. This was administered at 10 drops per minute for 20-30 minutes and, depending on the routine observations made during this interval, the rate was increased immediately to 40 drops per minute as recommended by Ryan,<sup>11</sup> and kept at that rate until labour commenced and then readjusted if necessary. This rate administered approximately 1 unit per hour. If labour had not commenced after a litre had been given, 10 units were put into the next litre and the drip started again in the same manner. A drip was not continued for longer than 12 hours unless the patient was in established labour, in which case it was continued until the completion of the third stage. Extra attention was paid to the bladder, and if the patient had not had an enema within the last 36 hours she was given one.

The Drew-Smythe catheter for puncture of the hindwaters was only used in patients with very unfavourable cervixes in which it was not possible to introduce the finger as well as the Kocher forceps, and was successful in all cases. It was only necessary to use it in 4% of amniotomies. Following this initial vaginal examination, it was very rarely necessary to perform vaginal or rectal examinations during labour.

#### RESULTS

##### Induction-onset Interval (Latent Period)

It is on the length of this interval that the success of the amniotomy is judged (Figs. 1 and 2). That this interval is gratifyingly short is shown by reference to Figs. 3 and 4, and by comparison with other workers. In Tennant and Black's large series<sup>12</sup> three-quarters of the patients were in labour within 24 hours, whereas in this series 82.5% of multiparae and 74% of primiparae were in labour within

12 hours. These figures are without consideration of the state of the cervix. When this factor is taken into account the prompt response of the Bantu is even more striking, as shown in Fig. 3.

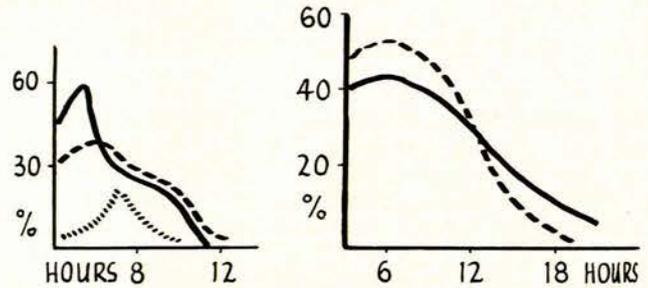


Fig. 1

Fig. 2

Fig. 1. Induction-onset interval. — = favourable cervix, ---- = intermediate cervix, ..... = unfavourable cervix.

Fig. 2. Induction-onset interval. — = primiparae, ---- = multiparae.

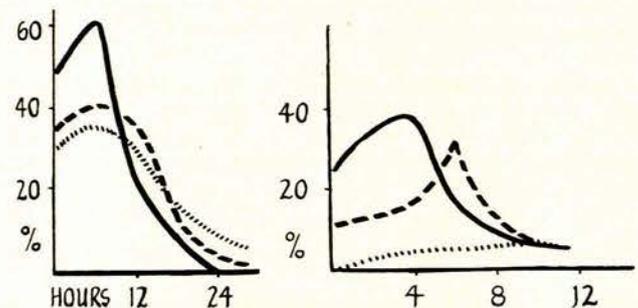


Fig. 3

Fig. 4

Fig. 3. Duration of labour. — = amniotomy in multiparae, ---- = amniotomy in primiparae, ..... = spontaneous onset admissions.

Fig. 4. Duration of labour. — = amniotomy with favourable cervix, ---- = amniotomy with intermediate cervix, ..... = amniotomy with unfavourable cervix.

In the large series of Keetel *et al.*<sup>7</sup> all patients had favourable cervixes and an engaged foetal head at or near term on reliable dates, and 94% were in labour within 24 hours. In this series where only cases with unfavourable cervixes were excluded, 97% were in labour within 12 hours. The state of the cervix is discussed below.

##### Induction-delivery Interval

This interval is used by some observers as being the only accurate one available, and it is of value to consider it here. It will be noted from Fig. 1 that labour is shortened in the majority of cases. Where Eton<sup>13</sup> in a series of 500 cases—of whom 74% were multiparae—found that 59% were delivered in 24 hours, in this series 50% of multiparae were delivered within 12 hours.

##### The Cervix

The classification as described by Cocks<sup>14</sup> was adhered to, with certain modifications possibly peculiar to the Bantu. The most significant one was an unfavourable cervix found in primigravidae. This was a closed but fully effaced cervix, the external os feeling like a soft nipple

projecting from the domed cervix above. In this series the favourable cervix was taken as one which admitted more than 1 finger easily (greater than 1 inch diameter), was soft and effaced. The unfavourable cervix was taken as one which was closed or would only admit a fingertip, was long and of a harder consistency. Any cervix which did not fit into either of these descriptions in all 3 characteristics was classed as intermediate.

The state of the cervix is related both to the induction-onset interval and the length of labour. Prof. J. C. Moir<sup>15</sup> found in cases subjected to amniotomy that 96% with favourable and 63% with unfavourable cervixes were in labour within 48 hours. Reference to Figs. 2 and 3 will show that this observation is confirmed in the Bantu. Furthermore, it was found that 30% of patients requiring oxytocin drips because of a prolonged latent interval, had unfavourable cervixes, while only 12% had favourable cervixes.

If a favourable cervix is associated with term, either chronological or biological, an association between prematurity and unfavourable cervixes could be expected. Only 1 in 8 of the babies weighing less than 5 lb. was associated with a favourable cervix.

#### *Meconium-staining of the Liquor Amnii at Amniotomy*

This was noted in 6.8% of cases, and was not associated with type of cervix. Foetal distress occurred in 7 cases, 4 infants were born with an Apgar score of less than 6, and 5 were born with the umbilical cord around the neck (Table I). Subfertility was evident in the history of 4 patients. There was a suggested association with increased parity, there being 10 grande multiparae (5 or more), 19 multiparae and only 7 primiparae. One patient drained yellow liquor and the baby was subsequently given an exchange transfusion because of ABO incompatibility, which otherwise may not have been detected until too late, as it was unexpected. There were 2 neonatal deaths in this group, 1 being a breech presentation.

#### *Morbidity*

(i) *Neonatal.* Ascending infection with consequent intra-uterine foetal pneumonia and coexistent infection of the amnion and placenta is considered an important hazard to amniotomy. Temperature, vigour, response to feeding, weight gain and jaundice were compared with babies following normal labour during which the membranes ruptured after cervical dilatation of 3 fingers; the majority are found to rupture spontaneously at full dilatation. Although it was found that 11% of babies did not regain their birthweight within 10 days among the control patients, this figure was only 5% in the multiparae of this series, and 9% in the primiparae. There was no other noted difference between the 2 groups.

There were only 2 babies who developed purulent neonatal conjunctivitis. There was no case of frank pulmonary or other systemic infection. The possibility of infection being a factor in the causation of 3 of the neonatal deaths is discussed later. The maximum neonatal morbidity from infection was therefore less than 2%.

It is thought that the limitation of the latent period by the use of oxytocin, the very infrequent vaginal or rectal examinations during labour, and the routine use of anti-

biotics after 24 hours in therapeutic dosage had an important influence in the prevention of infection both in mother and infant. In a recent bacteriological study<sup>16</sup> it was concluded that the rate of contamination increases with the latent interval, and that the incidence of infection is also partly determined by the length of labour (especially second stage) and the ease of delivery.

(ii) *Maternal.* There were 16 patients who showed a temperature of 100°F or above at some time during the puerperal stay in hospital, which varied from 8 to 14 days. This is an incidence of 3%, which compares well with 15% (taken over a period of 20 days) found by McCallum and Telford Govan<sup>16</sup> and 5% by Tennant,<sup>12</sup> but is probably similar to that found in most institutions dealing with Bantu obstetrics.

Postoperative pyrexia associated with caesarean section occurred in 3 patients, 2 of whom had a urinary tract infection, and the third developed measles. An episiotomy wound broke down due to sepsis in 1 case. Of the remaining patients in whom the cause of the pyrexia was unknown, 3 patients had a second stage lasting longer than 30 minutes and 1 had a forceps delivery. When compared with the hospital incidence for pyrexia there is no significant difference including a comparison with booked patients undergoing caesarean section.

#### *Stillbirths*

One avoidable stillbirth in 522 deliveries is an achievement which must be related to the group as a whole, and to the fact that labour was induced early or at term. The elimination of the effects of the ageing placenta, post-maturity, and disproportion have probably the major role in attaining this result. The details of the 3 stillbirths in the series are as follows:

1. Abnormal foetus born occipito-posterior weighing 5 lb. 5 oz. Univentricular heart with tracheo-oesophageal fistula.
2. Abnormal foetus born as breech weighing 6 lb. Spina bifida, mono-buttock, imperforate anus, bilateral equinovarus, and microcephaly.
3. Mother para 4 (previous history—in second pregnancy a symphysiotomy resulted in neonatal death; fourth pregnancy, unexplained intra-uterine death of foetus at Jane Furse Memorial Hospital). Amniotomy performed in presence of unfavourable cervix. Oxytocin drip commenced after 24 hours. Foetal distress after 8 hours; cervix then 2 fingers dilated. Caesarean section arranged but foetal heart stopped before appointed time. Placenta small, gritty and infarcted. Foetus weighed 6 lb. 13 oz. Induction-delivery time 42 hours. Puerperium normal. Cause of death assumed to be due to placental failure, and could have been avoided by more hasty recourse to operation, or possibly earlier induction.

#### *Neonatal Deaths*

In the first 3 cases intra-uterine infection as a result of the amniotomy may have been contributory causes of the death. The unfavourable cervixes were most probably related to the prolonged latent intervals, and serve to demonstrate the danger of induction in the face of this finding. If the oxytocin drip had been started sooner, the tragic outcome might have been avoided.

1. Para 1. Cervix unfavourable, latent interval 38 hours, despite oxytocin drip for 12 hours. After 8 hours of poor labour cervix still only 2 fingers. Caesarean section for failed induction; infant weighed 6 lb. 11 oz. Respirations only partially established after 2 hours, death in 12

hours. No postmortem performed but death thought to be due to intra-uterine infection and liquor inhalation pneumonia.

2. Primipara. Cervix unfavourable; induction because of group A disproportion. Latent interval 20 hours. Oxytocin drip for 7 hours (1 unit administered). Labour lasted 8 hours, and the infant weighed 6 lb. 3 oz. Cyanotic attacks commenced after 8 hours and death occurred at 15 hours. Postmortem showed macroscopic appearance of respiratory distress syndrome. Intra-uterine infection could have been partially responsible for this death.
3. Primipara. Height 4 ft. 10 in. Cervix unfavourable. Latent interval 30 hours. Ten-unit oxytocin drip after 24 hours and continued for 15 hours. (21 units administered). Labour lasted 9 hours, with a second stage of 25 minutes. The infant weighed 4 lb. 10 oz., and was born in an occipito-posterior presentation. Cyanotic attacks commenced at 4 hours and death occurred at 8 hours. This labour was induced because of group B disproportion, and death was thought to be due to placental insufficiency, prematurity and possible ascending infection.
4. Para 5. After short latent interval and quick labour the patient was delivered of an infant with a severe degree of spina bifida with meningo-myelocoele. Died after 3 days.

### Disproportion

Surgical induction of labour in the management of disproportion has always been a controversial subject. In the belief that uterine action is superior, the pelvis shallower<sup>17-19</sup> and the resistance to infection greater in the Bantu than in the White, amniotomy was used in cases of

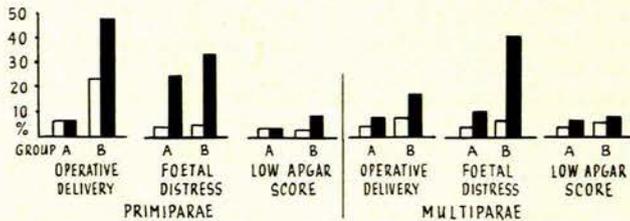


Fig. 5. Amniotomy in disproportion. □ = amniotomy, ■ = spontaneous.

mild disproportion as a means of avoiding caesarean section which, in communities such as this, places the patient at a relatively greater disadvantage for the rest of her obstetric life. On perusal of the multigravid patients' obstetric histories it is found that 15% of first pregnancies result in a stillbirth. This figure, even allowing for inaccuracy and faulty memory of the mother, gives an idea of the immensity of the problem.

In the absence of expensive equipment, facilities and time, a simple clinical basis of definition was selected, based on that of Williams and Phillips.<sup>20</sup> In addition to those in whom disproportion was already suspected, all primiparae and all women below 5 feet in height were carefully considered. Full clinical pelvimetry, and erect lateral radiography where it was considered necessary, was undertaken. They were then classed according to Table II. In assessing the size of the foetus a general impression of bulk in the absence of excess liquor amnii, together with the length of the foetus and size of the head were considered the most reliable features.

In patients whose labours were induced because of disproportion the term 'desirable premature' had crept

into usage, and many short women were treated with amniotomy in the knowledge that the baby would weigh less than 5½ lb. It is felt that if a primigravida can achieve a vaginal delivery in the presence of disproportion, then subsequent labours, being more efficient, will be easier and more able to cope with a larger foetus. Although many such patients had unfavourable cervixes and were given oxytocin drips, this object was achieved.

TABLE II. CLASSIFICATION OF DISPROPORTION

Group	Relative proportions	Likely mode of delivery
A	No significant disproportion at the time of examination.	Normal vaginal delivery possible with early induction.
B	Some disproportion — minor reservations.	Normal vaginal delivery possible with early induction.
C	Mild disproportion.	Caesarean section possible.
D	Moderate disproportion.	Caesarean section probable.
E	Severe disproportion.	Caesarean section definite.

Group A included all women below 5 feet in height and patients in whom there was reason to believe that by further delay disproportion would develop. An unknown number of women must have been treated in this way before disproportion had become manifest or was suspected, and were therefore included in the elective group. Conversely some patients in the elective group may have developed disproportion had labour not been induced.

Group B, in addition to those assessed to this group, included patients with a history of previous disproportion, e.g. a stillbirth after a prolonged labour, or patients having had a previous caesarean section but in whom the present degree of disproportion was only such as to put them into group B.

Patients fitting into groups C, D, and E were not treated in this way. Amniotomy was performed without regard for the cervix, although on rare occasions attempts at 'ripening' it were made with oxytocin drips before amniotomy. In many cases with unfavourable cervixes the drip was commenced at the same time or within a few hours of amniotomy. When used in labour a very cautious approach

TABLE III. AMNIOTOMY SERIES (127 CASES) COMPARED WITH SPONTANEOUS SERIES (93 CASES)

	Amniotomy series		Spontaneous series	
	Primip.	Multip.	Primip.	Multip.
Distribution				
Group A	28	47	21	32
Group B	27	25	27	13
Totals	55	72	48	45
Cervix				
Favourable	18	27		
Intermediate	22	43		
Unfavourable	23	12		
Delivery				
Forceps	5	2	9	2
Caesarean section	0	0	5	0
	No. of cases	%	No. of cases	%
Premature infants	22	17	25	27
Prematures in primiparae	17	31	15	31
First stage less than 12 hours	98	77	49	53
Second stage less than 20 minutes	99	77	41	44
Oxytocin drip	22	17	3	3

was adopted, and a strength of 2 units per litre of fluid was not exceeded.

An unselected series of 93 patients with disproportion delivered after spontaneous onset of labour during the same period, has been extracted and compared with those treated with amniotomy (Table III). The patients of this series were composed of unbooked admissions (17%), patients not treated by myself and patients reluctant to submit to amniotomy (Table III and Fig. 5). There were 3 stillbirths in the spontaneous onset series, all of multiparous women, and 3 neonatal deaths. Two neonatal deaths occurred among the amniotomy series, and are considered under that heading. After reference to the figures and tables the greatly increased operative delivery rate, foetal distress during labour, infants born with a low Apgar score, prolonged labour and prematurity in the spontaneous onset series can be seen.

#### Prematurity

An increase in the incidence of prematurity is a risk attached to the induction of labour where up to 30% of babies have been premature,<sup>21</sup> clinical assessment of the foetal size being notoriously difficult. However, reference to Table IV and Fig. 6 shows that this risk has not been

significant in this series. The range of weight was in fact narrower than among the general hospital deliveries, although the latter included twins, most of whom were premature.

In areas where women below 5 feet in height are common, smaller babies would be expected, and this is soon obvious from clinical experience where many babies weighing between 5 and 5½ lb. are considered mature.<sup>22</sup> The increased incidence of multiple pregnancy in the Bantu increases the risk of unwittingly inducing labour in these women in the belief that one large foetus is present. This occurred twice in this series, the smallest baby weighing 4 lb. and the largest 5 lb. 13 oz. In the series of Keetel *et al.*<sup>7</sup> there were 29 such patients in 6,800 elective amniotomies. One further misjudged induction resulted in a 4 lb. 14 oz. baby born to a woman 5 ft. 4 in. tall.

As mentioned above there was an increase in the proportion of unfavourable cervixes in this group of patients, as can be seen in Table IV.

#### Forceps

All occipito-anterior cases were delivered with the Simpson-Anderson forceps, while in all malpositions of the occiput the Kielland forceps were used to rotate and deliver. Any second stage of over 30 minutes in a multipara and 40 minutes in a primipara in association with good maternal effort, was considered to be an indication for forceps delivery. There were 3 premature babies, all of whom weighed over 5 lb. 4 oz. Details of indications are seen in Table V. Pudendal block using 1% xylocaine without premedication was used as regional anaesthesia in all cases.

TABLE IV. PREMATURETY

	No. of cases	AM %
Primiparae .. .. .	22	
Multiparae .. .. .	25	
Indication for induction		
Disproportion .. .. .	22	17
Elective .. .. .	15	5.5
Previous unexplained stillbirth	5	
Toxaemia of pregnancy ..	5	
Cervix		
Favourable .. .. .	6	
Intermediate .. .. .	22	
Unfavourable .. .. .	19	
Results		
Oxytocin drip .. .. .	19 (7)*	
Breech .. .. .	1	
Forceps .. .. .	3 (1)	
Vacuum extractor .. .. .	1	
Caesarean section .. .. .	1	
Apgar score below 6 .. .. .	6 (2)	
Neonatal death .. .. .	2	
Stillbirth .. .. .	1	
Weight below 5 lb. .. .. .	15	2.77
Weight below 5½ lb. .. .. .	32	6.29

\*Figures in brackets refer to cases of elective amniotomy.

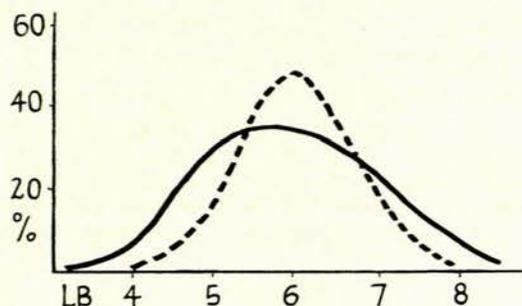


Fig. 6. Weight of baby. — = spontaneous onset, ---- = amniotomy.

TABLE V. INDICATIONS FOR FORCEPS DELIVERY OR CAESAREAN SECTION

	Total cases	Disproportion	Elective
Forceps			
Malposition .. .. .	9	7	2
Delay .. .. .	4	2	2
Foetal distress .. .. .	2	1	1
Caesarean section			
Failed induction .. .. .	3		
Severe toxaemia of pregnancy ..	2		
Prolapse of the cord .. .. .	1		

#### Caesarean Section

The efficiency of the Bantu uterus is further demonstrated by the fact that caesarean section was not necessitated because of disordered uterine action in labour. This was often the main indication for operation,<sup>12,22,23</sup> especially when associated with disproportion. In Keetel *et al.*'s series<sup>7</sup> of elective amniotomy, where disproportion had been excluded a rate of 0.1% was achieved.

The cases of failed induction need further description:

1. Primipara aged 35 or over. On commencing a routine oxytocin drip after latent interval of 24 hours, sudden and severe foetal distress developed. The baby weighed 4 lb. 10 oz., and recovery was uneventful.
2. Para 2. Both previous pregnancies ended in unexplained stillbirths at term. Heavily meconium-stained liquor was obtained at amniotomy through an unfavourable cervix. Operation was performed when labour had not commenced after 24 hours. Both made uneventful recoveries.
3. Described under 'Neonatal deaths'—case 1.

*Oxytocin* (Table VI)

The routine procedure has been described under 'Method'. In cases with unfavourable cervix the drip strength was usually 10 units per litre, and if no labour had commenced after the litre had been administered, the concentration was doubled and the rate of administration halved and steadily increased until contractions had commenced. Intrapartum oxytocin, however, was seldom given

TABLE VI. OXYTOCIN DRIPS

	Cases
Indications	
Delayed latent interval	57
Abnormal action in labour	26
Unfavourable cervix at amniotomy	19
Results	
Prematurity (less than 5½ lb.)	20
Postpartum haemorrhage	3
Persistent occipito-posterior	7
Foetal distress	10
Apgar score less than 6	11
Stillbirth	2
Neonatal death	3
General data	
Primiparae	27
Multiparae	61
Multiparae 5 or more	14
Associated disproportion	22
Toxaemia of pregnancy	10
Previous caesarean section	1
Cervix	
Favourable	12
Intermediate	47
Unfavourable	43
Oxytocin—onset interval	
Less than 3 hours	83
3-6 hours	12
More than 6 hours	8
Duration of drip	
Less than 6 hours	63
6-15 hours	33
More than 15 hours	6
Drip strength	
2 unit	12
5 unit	90
10 unit	12
Hindwater rupture	14

in concentrations stronger than 2 units per litre. While in hospital it was assumed that the patients did not have access to the herbs used liberally by tribal herbalists containing a powerful oxytocic principle. The use of oxytocin in cases admitted as emergencies was never resorted to for this reason, as in so many the uterus was found to be in a state of hypertonus due to the use of this type of herb.

Comparison with all routine hospital cases in whom oxytocin was used showed that in 70% it was used for abnormal uterine action, and in 30% the baby was premature, and in this series nearly half of all patients having premature babies had oxytocin. From this observation, and clinical impressions, amniotomy does not appear to have a causative association with abnormal uterine action.<sup>24,25</sup>

*Postpartum Haemorrhage* (Table VII)

Conservative management of the third stage of labour is still practised in this hospital, together with the routine administration of 0.5 mg. of ergometrine maleate intramuscularly with the crowning of the head, or with the delivery of the placenta if this was not possible. The low incidence of this complication is yet another example of the

efficiency of the Bantu uterus, in which the average loss is estimated at less than 6 oz.<sup>18</sup> A loss of over 10 oz. could

TABLE VII. POSTPARTUM HAEMORRHAGE

	Cases
Primiparae	12
Multiparae	15
Grande multiparae	2
Duration of labour	
Less than 3 hours	3
Over 12 hours	7
Second stage over 20 minutes	10
Retained placenta	1
Delivery	
Forceps	2
Vacuum extraction	2
Oxytocin drips	5
Cervix state	
Favourable	10
Intermediate	13
Unfavourable	6

therefore be considered as a postpartum haemorrhage in the Bantu. In this series 3.7% of patients had a loss of over 10 oz., compared with a hospital incidence of 3%. Blood transfusion was necessitated in 4 patients, 2 at the time of haemorrhage and 2 during the puerperium. There was one secondary haemorrhage which occurred on the 4th day, requiring blood transfusion.

*Prolapse of the Cord*

The incidence of this complication of labour in general is approximately 0.5%. In association with amniotomy it varies, e.g. 0.2%<sup>13</sup> to 0.5%.<sup>21</sup> There were 2 cases in this series, an incidence of 0.37%, compared with a hospital incidence of 0.63%. In the series quoted above, and most others,<sup>7,25</sup> the foetal head was fully engaged before amniotomy. Clearly in the Bantu, this is not a serious hazard of amniotomy despite the high foetal head. The rapid response of the uterus and the good application of the presenting part to the cervix probably account for this. The third case described had a prolapse of the hand. Compound presentation occurred in 0.4% of a large series in which the head was engaged before amniotomy.<sup>7</sup>

1. Para 1. Amniotomy because of disproportion in a woman of 4 ft. 10 in. height. Latent interval of 4 hours, and labour of 5 hours. Prolapse of the cord noted at full dilatation. With good maternal effort and episiotomy, a normal delivery followed. Baby weighed 5 lb. 14 oz.
2. Primipara. Elective amniotomy with a ripe cervix. Sudden severe foetal distress 2 hours after amniotomy. Vagina found to be full of cord. Caesarean section performed. Baby weighed 6 lb. 14 oz.
3. Para 2. Elective amniotomy with unfavourable cervix. Latent interval of 6 hours and labour 9 hours. Hand prolapsed at full dilatation which was displaced digitally, and with good maternal effort a face-to-pubis delivery followed. Baby weighed 5 lb. 15 oz.

*Pre-eclamptic Toxaemia*

Induction of labour in the 'mild' group was performed mainly for convenience, and could have been included in the elective group of amniotomy. Caesarean section was performed in 2 patients because of severe fulminating conditions which failed to respond to sedation and amniotomy.

## DISCUSSION

The reasons why amniotomy is used so seldom in Bantu practice are probably very simple. The chief one is a fear

of the consequence of amniotomy in association with the ubiquitous high foetal head, which is found to be engaged before the onset of labour in only 5% of women in this area. It is interesting to note that over 10 years ago in a large British series<sup>22</sup> no account was taken as to whether the head was fixed or free. Another reason is probably based on the fact that in the majority of institutions dealing with Bantu obstetrics there is a shortage of staff, and only procedures which are very definitely indicated on obstetrical grounds are carried out. Thirdly, pre-eclamptic toxæmia and postmaturity, accounting for three-quarters of all inductions in European obstetrics, present certain difficulties in the Bantu.

Thus, not only is toxæmia relatively uncommon but the decision to terminate pregnancy is so often based on the expected date of delivery. This date is almost never known with any accuracy, making the decision very difficult. The diagnosis of postmaturity too is thereby rendered well-nigh impossible at our present state of knowledge of this subject. Rhesus immunization is sufficiently uncommon as to be of no consequence in this respect, sensitization only occurring in 0.08% of patients.<sup>23</sup>

Defective placental function is a serious problem, fully deserving the attention being devoted to it. It is believed that after 38 weeks gestation there is a steady slowing down of placental function and that prolongation of pregnancy beyond 42 weeks (40 weeks in some circumstances) is dangerous to the foetus. It is considered desirable to terminate pregnancy during this 4-week period. Added to the placental decline are the mechanical factors such as increasing hardness of the foetal skull and increased risk of prolonged labour, which become specially important in a population so bedevilled by disproportion. Prophylaxis in the absence of a reliable history has been the guiding practice here, and the loss of only 1 baby in the series is evidence enough to assume that the effects of postmaturity have been virtually eliminated. That this stillbirth was in all probability due to the effects of placental insufficiency strengthen this belief.

The major problem of disproportion in these areas and the management thereof is of great concern to obstetricians. Caesarean section, once performed, imposes great risks on the patients' future obstetric career as mentioned before. Symphysiotomy is still an operation to be assessed in its true light. By its very simplicity and relative freedom from obvious complications in the Bantu it may appear to be an easy way out in many cases, and be performed unnecessarily often. The use of forceps is somewhat restricted by the frequency of the more difficult cases. Trial of forceps has a place in this type of practice but is dependent upon the skill and experience of the operator. The vacuum extractor is largely unassessed in Bantu practice. The risks of poor labour in Bantu patients treated with amniotomy are minimal, and amenable to the cautious use of oxytocin drips. In patients exhibiting a minor degree of disproportion when first seen, or in whom there is reason to believe that by further delay disproportion might develop, surgical induction of labour may well prove to be a very satisfactory solution.

The use of the oxytocin intravenous drip is now well established though there are many ways of using it. Al-

though Ryan<sup>24</sup> has been criticized<sup>25</sup> for his method, it has been used in this series. Agreement is voiced with Upton<sup>27</sup> that 'the pitocin drip is a safe procedure without constant medical supervision, and can be used safely in almost all patients who are to be allowed a vaginal delivery'. It is thought to be unwise to wait longer than 24 hours after amniotomy before commencing the drip, since the vast majority of patients are in labour within 18 hours, and the longer the delay thereafter the greater chance there is for the many theoretical complications to occur. Its use, in fact, is considered to be an essential component of this practice, and was found to be necessary in 14.4% of patients, excluding cases of disproportion. It was used in 11.5% of Lennons' cases in his large series.<sup>25</sup>

Owing to the difficulty of establishing the ages of these patients, this factor was not taken into account, and the findings of Eton<sup>28</sup> that the older women do not respond as well as the younger ones could not be confirmed. Parity, however, did have a small effect. The latent interval and length of labour was slightly increased in primiparae. Labour was still quicker than the average duration for the hospital (Fig. 1). They also needed oxytocin slightly more often than the multiparae. The grande multipara showed no difference in the latent interval, the length of labour or the necessity for oxytocin than other multiparae.

Amniotomy is not always an easy operation to perform. The cervix is not always easy to identify, easily accessible or easily dilated in order to introduce 2 fingers and the curved Kocher forceps. Forewater rupture is found to be easier to perform with the Smythe amniotomy forceps, specially designed for this purpose. Poor results are usually a result of poor technique; the head must be positively identified by touch, and the rupture of the forewaters proved by the demonstration of foetal hair if a good flow of liquor amnii is not obtained. Blind introduction of the forceps and clamping in the hope of gripping membranes cannot be too strongly condemned. Should the cervix be found to be unsuitable for rupture of the forewaters for any of the above reasons, the use of the Drew-Smythe catheter was used, and usually proved easier to use in the presence of the unfavourable cervix. It is felt that the continuous drainage of liquor is of great importance in the procedure. The timing of the enema, a previous dose of castor oil, or the initial volume of liquor drained were not found to be of any significance in shortening the latent interval.

#### CONCLUSION

No new indication for amniotomy has been advocated and no plea for its increased use has been issued. The safety and efficiency of the procedure has however been demonstrated and the fear of its use in the Bantu removed. Under certain circumstances, such as overcrowded and financially strained mission hospitals, elective amniotomy performed by experienced workers for the mutual convenience of patient and doctor is advocated. This indication may well be extended in the future.

If the harmful effects of postmaturity are accepted, then it is justifiable to proceed with induction of labour provided the size of the foetus is judged to be adequate and the use of oxytocin is considered part of the procedure

where necessary. The state of the cervix is of some importance but not sufficient to influence the decision to induce labour. It is suggested that prophylactic amniotomy be used to prevent disproportion in a community where caesarean section is such a serious liability to the patient.

#### SUMMARY

1. Elective amniotomy was performed on 361 rural Bantu women, and the method and results reported.

2. Comparison with similar investigations on White women shows that the Bantu respond more rapidly and labour is more efficient.

3. Amniotomy was used in the management of disproportion in a further 122 women. When compared with a control series the results suggest an increased salvage rate, decreased foetal morbidity and operative delivery rate.

4. The response to amniotomy was prompt and the labour shortened and uncomplicated. There was a decreased incidence of prematurity, prolapse of the cord, puerperal and neonatal infection, postpartum haemorrhage, operative delivery, stillbirth and neonatal death.

5. A high foetal head is found to have no deleterious effect on the outcome after amniotomy.

6. The use of the oxytocin drip where necessary is considered to be an essential part of the procedure.

7. The significance of the state of the cervix is discussed and found to be of some influence on the latent interval and labour.

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