Hassan and Falls (1964) pointed out that the incidence of caesarean section for cephalo-pelvic disproportion tended to rise in the very young patients, and quoted an incidence of 7.6% in 26 patients. Since the pelvic bones tend to fuse around the time of puberty, there can be little alteration in the pelvic measurements once the menarche has occurred. Moreover, the general standard of nutrition has improved considerably since the war years, and the average height has tended to rise. In the present series most of the patients were scattered about the mean on standard growth charts, while the younger patients were noticeably taller than average.

Pre-eclampsia is a definite hazard in this group of patients, the incidence in 103 cases being 20%. Nearly all the cases were quite mild and settled well with bed rest and sedation. There was one case of eclampsia, but no stillbirths or neonatal deaths. These figures are similar to those of Claman and Bell (1964) and Marchetti and Menaker (1950), who reported the incidence of pre-eclampsia at 18 and 19.7% respectively. In the recent British series Stearn (1963) found 8 patients out of 30 in whom the blood pressure rose to 140/90 mm. Hg.

Vaginal delivery presented very few difficulties, and 37% of patients were delivered within six hours of the onset of labour. This compares with the rate of 13% for the control group. Six of the 11 operative deliveries were by low forceps, and there were four mid-cavity rotations and extractions from posterior positions.

Summary

Pregnancy and labour have been considered in 103 patients under the age of 16 at the time of conception. The ages ranged from 11 years and 9 months to 15 years and 11 months. There was one multigravid patient.

The incidence of pre-eclampsia was considerably increased, but the perinatal mortality rate was 1% for the whole group. Easy spontaneous vaginal delivery was the rule. The forceps rate was 10% and the caesarean section rate 4%.

Though pregnancy in young patients presents grave socio-logical problems, pregnancy and labour usually proceed without difficulty. The greatest hazard is pre-eclampsia.

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Obstetrical Implications of Pregnancy in Primigravidae Aged 16 Years or Less

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Teenage marriage is on the increase (*Brit. med. J.*, 1965). Although pregnancy before the age of 16 is rather uncommon, the incidence is rising (Clough, 1958). About 8% of all births are to women in the teenage group (*Brit. med. J.*, 1965). The problems that may arise are both social and obstetrical. In this study attention has been confined to the obstetrical aspect.

In the past 15 years over 20 studies of pregnancy and labour in young primigravidae have been published. Unfortunately, most of these have been based on different age levels, different racial groups, and different diagnostic criteria for pregnancy syndromes. There has, moreover, been little study on young primigravidae of European origin, and there would appear to be particular need for more information regarding pregnancy in this group.

Present Study

During the six-year period, 1 January 1960 to 28 February 1966, 100 white primigravid patients of English and Dutch descent aged 16 or less were managed at the Mowbray Maternity Hospital in Cape Town. A large proportion of these cases were admitted from two institutions which care for unmarried mothers. This group is here called the "study group." A series of 100 consecutive white patients aged 22, delivered during a corresponding period, is termed the "control group." No distinction was made as to social class in this series, but the

majority of these patients were of the lower-to-middle class income group (Classes II-III).

The study group comprised one patient aged 13, 9 aged 14, 21 aged 15, and 69 aged 16. As the numbers were relatively small, the 13- to 16-year-olds were compared as a group with the 22-year-olds.

Thirty-two per cent. of the study group were married as against 78% of the control group.

The adequacy of antenatal care was not easy to assess. Ninety-four per cent. of both groups were seen at antenatal clinics on three or more occasions.

Factors in Pregnancy

Toxaemia of Pregnancy.—Pre-eclamptic toxaemia was defined in this study as a blood pressure of 140/90 mm. Hg or higher after 24 weeks and proteinuria. The incidence was 21% in the study group and 12% in the control group. There was one case of eclampsia in the study group and none in the control group. Unclassified toxaemia was found in 15% of the study group—for example, these patients showed hypertension without either proteinuria or oedema. The incidence was only 5% in the control group. The overall picture was thus 36% in the study group and only 17% in the control group. There were three cases of accidental haemorrhage (abruptio placentae) in the study group and none in the controls. Of these cases, two resulted in premature labour, one premature infant being stillborn. The third case was a minor

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revealed type of accidental haemorrhage. There were no cases of placenta praevia in either group.

Engagement of Foetal Head Before Labour.—An interesting finding was that the foetal head was found to be unengaged before labour in 50% of the study group and 48% of the controls. This was unexpected in view of the usual teaching that engagement occurs early in the primigravid patient. Stearn (1963) reported that the head failed to engage before the onset of labour in 16 out of his series of 30 patients. Nevertheless, in his series no caesarean sections were performed and the first stage was not lengthened.

Period of Gestation, Induction of Labour, Infant Birth Weight, and Prematurity Rate.—Labour began in 13% of the study group and in 6% of the control group at 36 weeks or earlier; 2% of both groups were delivered at 41 to 44 weeks' gestation. The tendency for the young primigravid patient to begin labour before term was further emphasized when the incidence of preterm induction was excluded in each series. This was performed in 11 cases of the study group, seven for pre-eclampsia, two for unclassified toxæmia, one for post-maturity, and one for intrauterine death. Fourteen cases required induction in the control group—11 for pre-eclampsia, one for unclassified toxæmia, and two for post-maturity. The prematurity rate—birth weight less than 5½ lb. (2.5 kg.)—in the study group was 10%; of these cases only one followed induction of labour and three were associated with pre-eclamptic toxæmia. There was a prematurity rate of 3% in the control group, one of which followed surgical induction for pre-eclampsia. The corrected prematurity rates were therefore 7% in the study group and 2% in the control group. The average birth weight of the study group was 6 lb. 15 oz. (3.15 kg.) and of the control group 7 lb. 4 oz. (3.23 kg.). This was found not to be statistically significant.

Other Complications of Pregnancy.—No other significant complications of pregnancy were noted in either group. Anaemia was not a significant problem in either group, and the theory that the adolescent girl is in a state of growth and therefore more prone to anaemia of pregnancy was not proved.

Factors in Labour

Duration of Labour; Prolonged Labour.—There was no significant difference between the average duration of the first, second, and third stages of labour. In this study prolonged labour was taken as 24 hours or longer. There were 16 cases of prolonged labour in the study group and 10 in the control group. The inference is that there is a greater incidence of prolonged labour in young primigravidae. However, this conclusion must be modified by the fact that the study group consisted to a large extent of unmarried mothers, and the tendency in this group was not to intervene and to avoid caesarean section if at all possible. Further analysis of these 26 cases regarding the ultimate mode of delivery revealed an interesting outcome; 12 out of 16 in the study group delivered spontaneously and the remaining four by forceps. Two out of 10 in the control group delivered spontaneously and seven by forceps and one by caesarean section.

Malpresentation and Cephalopelvic Disproportion.—No significant difference was found in the two groups with regard to

malpresentation in labour, and this has been found in most other studies (Sinclair, 1952; Poliakov, 1958). There was one case of relative cephalopelvic disproportion in the study group (due to a brow presentation), whereas in the control group two caesarean sections were performed after failed trials of labour. From this it may be concluded that in this series young primigravidae showed no increased tendency to cephalopelvic disproportion.

Labour.—The spontaneous vaginal delivery rate was 88% in the study group and 80% in the control group. The mode of delivery is depicted in Table I, in which an increased operative delivery incidence in the control group is shown. Alternatively it may be stated that the study group did not constitute a high-risk group in delivery. The indications for anaesthesia, general or local, directly paralleled the indications for operative delivery. There was no substantial difference in the incidence of episiotomy or vaginal and perineal lacerations in the two groups. There were no cervical or third-degree perineal lacerations in any of the cases. The incidence of postpartum haemorrhage was high, though not significantly different, in both groups, being 7% in the study group and 8% in the control group. The average third-stage blood loss was 200.4 ml. in the study group compared with 210.8 ml. in the controls.

Perinatal Mortality.—The perinatal mortality in the study group was 4%. There were two stillbirths; no apparent cause could be found for either. The two neonatal deaths were caused by hyaline membrane disease in premature infants, one following on accidental haemorrhage. The perinatal mortality in the control group was only 1%. A neonatal death was caused by hyaline membrane disease in a premature infant. No gross congenital anomalies were found in either group.

TABLE I

Mode of Delivery	Study Group	Control Group
Spontaneous vaginal ..	88	80
Forceps	10	17
Vacuum extraction ..	1	—
Caesarean section ..	1	3
Total	100	100

Discussion

Three major obstetrical problems were revealed in this study of pregnancy in primigravidae aged 16 or less. These are shown in Table II, in which the results of this study are compared with several previously published series.

Increased Incidence of Pregnancy Toxaemias.—In the young primigravid group 15% developed hypertension and 21% classifiable pre-eclamptic toxæmia, an overall incidence of 36% compared with only 17% in the control group. Most published series reflect this finding; however, few show an incidence of pre-eclampsia as high as this. This may perhaps be attributed to the variation in diagnostic criteria in different institutions. The reason for this high incidence of toxæmia is not apparent (Sinclair, 1952; Aznar and Bennett, 1961; Stearn, 1963; Hassan and Falls, 1964). A disturbing feature was that the study group were more prone to the severe or fulminating type

TABLE II.—Comparison of Studies on Young Primigravidae

	Mowbray Series	Mowbray Control	Aznar and Bennett (1961)	Bochner (1962)	Briggs et al. (1962)	Clough (1958)	Hassan and Falls (1964)	Jarvinen and Katila (1959)	Poliakov (1958)	Sinclair (1952)	Stearn (1963)
Years of study:	1960-6	1963-6	1953-9	1958-60	1951-60	1953-6	1955-62	1935-57	1949-53	1940-50	1961-2
Age of patients ..	13-16	22	12-16	12-16	12-16	13-16	12-15	13-16	12-15	12-16	13-15
Toxaemia (%) ..	21.0	12.0	10.0	11.0	3.0	16.0	8.8	11.4	17.7	16.1	22.0
Prolonged labour (%) ..	16.0*	10.0*	7.8*	4.0†	—	—	3.15†	33.0*	4.4*	4.3*	10.0*
Prematurity (%) ..	7.0	2.0	18.7	10.0	7.0	—	10.7	12.1	17.4	8.0	3.3
Perinatal loss (%) ..	4.0	1.0	5.0	1.4	1.5	—	2.5	—	5.9	—	—

* Over 24 hours' prolonged labour. † Over 30 hours' prolonged labour. ‡ Over 48 hours' prolonged labour.

of pre-eclampsia. Only prompt and active treatment prevented a higher incidence of eclampsia. The single case of eclampsia occurred in a 16-year-old unbooked patient who presented at term with a blood pressure of 200/150 mm. Hg, no significant increase in weight, and no albumin in the urine. It became apparent in the management of these young patients that proteinuria was not a constant feature and its absence should not lull one into a false sense of complacency.

Increase in Prematurity Rate.—It has been shown in this study that young primigravidae have an increased tendency to begin spontaneous labour before term. These findings are in marked contrast to those of Clough (1958), who reported on 175 young primigravidae and stated that these patients went beyond the expected date of confinement more often than older primigravidae. Both Bochner (1962) and Stearn (1963) found that the birth weights were much the same as in the control groups. Of more significance was the finding of a corrected prematurity rate of 7% in young primigravidae and of 2% in the controls. Of nine studies included in Table II, a prematurity rate of 10% or greater is demonstrated in five (Aznar and Bennett, 1961; Bochner, 1962; Hassan and Falls, 1964; Jarvinen and Katila, 1959; Poliakov, 1958). This prematurity rate is to some extent reflected in a higher perinatal mortality rate in the younger patients.

Increased Frequency of Prolonged Labour.—There is no uniformity of opinion on what constitutes prolonged labour. In the reported studies on young primigravidae the upper limit for labour varies from 24 hours (Poliakov, 1958; Aznar and Bennett, 1961) to 48 hours (Sinclair, 1952). The reported average duration for normal labour varies from 9 hours and 42 minutes to 16 hours and 32 minutes (Clough, 1958; Hassan and Falls, 1954). Further analysis of these studies revealed that the first stage, rather than the second stage, was what determined the duration of labour. Though labour may be prolonged, as shown in this study, there is an increased incidence of spontaneous birth. Fear of labour has been ascribed as a cause of prolonged labour (Aznar and Bennett, 1961). Stearn (1963) found no significant prolongation of labour. He stated that these girls were taken from their families and immediate friends; thus no fear of labour had been instilled into them, and one of the more potent causes of inertia was therefore not experienced. In the present study the definite tendency to conservatism in view of the high illegitimacy rate probably

accounted to a certain extent for the increased incidence of prolonged labour.

Conclusions

Pregnant adolescents demonstrate an increased tendency to at least two major complications in pregnancy—namely, toxæmia of pregnancy and prematurity—which should be avoided by more adequate antenatal care; these patients should therefore be seen at least weekly after the 32nd week.

From the standpoint of pure physical ability the young primigravida does very well—in many respects better than the slightly older patient. A high incidence of spontaneous vaginal delivery can be expected and operative intervention thereby avoided.

Summary

A series of 100 consecutive white primigravid patients aged 13 to 16 years was analysed and compared with a control group of 100 consecutive white 22-year-old primigravid patients.

In the former there was a high incidence of hypertension and toxæmia. The prematurity rate was higher than in the control group, as was the perinatal mortality. There was also a greater incidence of prolonged labour. Though the foetal head was not engaged before labour in half the patients, the instrumental delivery and caesarean section rate was very low. A comparison between this series and other published studies is made.

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Renal Failure after Cholangiography

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Renal failure after the use of intravenous radiological contrast media has often been described, and their nephrotoxic properties have been investigated experimentally (Killen and Lance, 1960). Attention has mostly been directed towards angiographic agents. In this paper we describe two cases of renal failure after the use of iodipamide (Biligradin) in intravenous cholangiography. This agent, which is the methylglucamine of N,N'-adipic-di-(3-amino-2,4,6-tri-iodobenzoic acid), has until recently been regarded as innocent in this respect (Lindgren *et al.*, 1966).

Case 1

A 77-year-old woman was admitted to Westminster Hospital on 18 October 1966 with a history of fluctuating painless jaundice for three weeks, itching of the skin, and dark urine. She noticed pale stools on one occasion. Two years previously she had been an

inpatient at another hospital with abdominal pain and vomiting. At that time a plain film of the abdomen showed a calcified opacity, thought to be a gall stone. An intravenous cholangiogram was performed, 20 ml. of 30% iodipamide being used, but no concentration of dye was seen. Surgery was not undertaken. She had no history of past renal disease.

On her last admission she was a frail, mildly jaundiced woman who weighed 38 kg. Bilateral basal crepitations were heard in the respiratory system, but there was no evidence of congestive cardiac failure. The blood pressure was 160/100. The liver was palpable three fingerbreadths below the costal margin; it was smooth and not tender.

Investigations.—Haemoglobin 76%. Electrolytes normal. Blood urea 41 mg./100 ml. Urine protein-free. Liver-function tests: bilirubin 3.2 mg./100 ml. (conjugated 2.1 mg./100 ml.). Alkaline

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