(4) *Assessment of Operators' Reactions.*—The operator was entirely satisfied with the analgesia and relaxation in 53 of the cases (81.5%). In only one case (1.5%) was the procedure a complete failure and resort made to general anaesthesia. In the remaining 11 cases (17%) the only objection was lack of co-operation in patients, most of whom ultimately denied undue discomfort.

Discussion and Conclusions

There was one maternal death in the series. This was, however, unavoidable and in no way due to the analgesic. The risk of maternal death as a direct result of general anaesthesia is, on the other hand, sufficiently well known to need no substantiation, and it is probable that this risk is higher where skilled anaesthetists are not available. The incidence of post-partum haemorrhage and of manual removal of the placenta was lower than might have been expected in a comparable series under general anaesthesia. The latter has a well-known adverse effect on uterine contraction and retraction. The incidence of perineal complications was low, and this has done much to allay our fears that local injections around the lower birth canal might increase the sepsis rate and interfere with sound healing.

There were no foetal or neonatal deaths attributable to the delivery, and in no case was any anxiety experienced on account of asphyxia neonatorum. General anaesthesia is a potent cause of the latter, and we have been greatly impressed by the immediate breathing and crying of infants delivered under local analgesia. The incidence of mild asphyxia was somewhat higher than we had expected. This may be a result of the high proportion of unbooked cases admitted because of prolonged labour (7 cases, 10.8%).

It is suggested that local analgesia, used in the manner described, can obviate the risks of general anaesthesia without introducing any new hazards. It is probable that general anaesthesia is still used for the majority of low-forceps deliveries performed in this country, and it seems to us that a much wider use of the local analgesic method is justifiable. Our own experience further suggests that the scope of the method is not limited to low-forceps operations. Thus, while 92.3% of our low-forceps deliveries were performed under local analgesia, 46% of our mid-forceps deliveries were likewise conducted; and of all our cases requiring rotation of the occiput, 22.2% were delivered under local analgesia.

The patient was satisfied in 86.1% of cases, the operator in less (81.5%), and this is as it should be. It should, however, be noted that if the method is limited to low-forceps deliveries the success rate is almost 100%.

The technique should have a valuable place in domiciliary practice. It is not difficult to learn (demonstration is not essential), and it is possible to conduct the delivery single-handed and in a leisurely manner. The term "failed forceps" would lose its serious import, and the fierce determination to deliver that can at times assail the most level-headed obstetrician would be largely forestalled. One of the advantages of the method is that it makes gentleness of manipulation mandatory.

We are aware that the use of local analgesia would present certain difficulties in domiciliary practice. It would be necessary to maintain a supply of reasonably fresh analgesic solution, and a sterile syringe and needles would have to be kept in a special box.

We believe that these difficulties could be overcome and that the disadvantages they represent are far outweighed by the many advantages of the method. Although we prefer the lithotomy position where this is possible, we have used the method for forceps deliveries in the left lateral position and found it to be entirely practicable and satisfactory. All our cases were given ergometrine intravenously, but we do not believe that this is essential.

It is generally agreed that, except where transfer of the patient to hospital is contraindicated, nothing more exten-

sive than a low-forceps delivery should be contemplated in the patient's home; and local analgesia should therefore be almost universally applicable in these circumstances.

Summary

The need for safer anaesthesia for forceps delivery is recognized.

A method of injection is described.

The results of 65 forceps deliveries under local analgesia are discussed.

A wider application of the method is recommended, especially in domiciliary practice.

We are grateful to the following consultants, under whose care the cases were admitted, for their permission to publish our results: Dr. K. V. Bailey, Mr. D. G. Wilson Clyne, Dr. E. A. Gerrard, Dr. J. W. A. Hunter, Professor W. I. C. Morris, Dr. R. Newton, Mr. B. G. Spiers, and Dr. A. H. C. Walker. We wish to thank Professor Morris for his criticism and advice. We are indebted to Miss D. Davison for the drawings.

REFERENCES

- Jeffcoate, T. N. A. (1953). *British Medical Journal*, 2, 951.
Parker, R. B. (1954). *Ibid.*, 2, 65.
Smellie, W. (1951-2). *Treatise on the Theory and Practice of Midwifery*, vol. 1. London.

ACUTE LEUKAEMIA IN PREGNANCY

REPORT OF A CASE

BY

GILMOUR HARRIS, M.B., Ch.B., F.R.F.P.S.

Senior House Officer, Department of Medicine, Stobhill General Hospital, Glasgow

Forkner (1938), reviewing the literature, was able to find reports of 53 cases of all types, in 5 of which the diagnosis was doubtful. Grier and Richter (1939) collected 75, while Moloney *et al.* (1943), presenting one of chronic myeloid type, increased the total to 79. Adding another five to this number, Almklov and Hatoff (1946) reported the tenth published instance of acute lymphatic leukaemia in pregnancy. Erf (1947) published a summary of 100 cases of leukaemia in pregnancy, including two of chronic myeloid leukaemia which he personally observed. His figures for the different forms of leukaemia were: acute myeloid, 24; chronic myeloid, 63; acute lymphatic, 10; chronic lymphatic, 3.

Since 1947 the occurrence of leukaemia in pregnancy has been reported a further 17 times. On three occasions (Williams, 1948) the disease was of the acute type, one being acute lymphatic leukaemia; and Shub *et al.* (1953) described a case of chronic myeloid leukaemia which became acute during pregnancy. Allan (1954) reported four new cases of chronic myeloid leukaemia. Thus there has been reference in the literature to 38 instances of acute leukaemia in pregnancy, and 11 of these were of the acute lymphatic variety.

Case Report

The patient, aged 41, was admitted to the antenatal ward in July, 1954, because of increasing pallor, general fatigue, and swelling of the ankles. She was in the thirty-fifth week of pregnancy. The children of three previous normal pregnancies were alive and well. She had a miscarriage in 1940 at four months, preceded by appendicitis, complicated by peritonitis. Her health had been good until the fifth month of the present pregnancy.

Examination revealed a pale woman with a few purpuric spots on the right leg, both legs being oedematous. Her gums and throat were healthy, the liver and spleen could not be palpated, but there were a few palpable cervical and axillary glands and the sternum was acutely tender to pressure. The blood pressure was normal, the urine clear, and she was apyrexial. Haematological investigation on August 19 revealed: haemoglobin, 10.8 g.%; P.C.V., 28%; M.C.H.C., 26%; leucocytes, 68,400 per c.mm.; platelets, 160,000 per c.mm. Examination of a stained blood film showed notably a large number of blast cells. The red cells appeared normal. The differential leucocyte count showed: blast cells, 68%; large lymphocytes, 16%; small lymphocytes, 9%; neutrophil polymorphs, 6%; neutrophil myelocytes, 1%. The sternal marrow smear showed extreme cellularity, and consisted almost entirely of blast cells. A few normoblasts and an occasional megakaryocyte were seen. On the basis of the above findings a diagnosis of acute (lymphoblastic) leukaemia was made.

The patient was delivered of a live, healthy male child on August 27 by elective lower segment caesarean section. Unfortunately the placenta was not retained for microscopical examination, but macroscopically it showed no abnormality. The operation was not attended by excessive bleeding, although the surface of the uterus was noted to bruise readily. Post-partum progress was uneventful apart from persistent pyrexia and increase in the degree of anaemia. Complete examination of the infant's cord and venous blood revealed no abnormal features.

Five days after delivery the patient was transferred to a medical ward. Her main complaints were lack of appetite and burning retrosternal discomfort on swallowing. The spleen was now palpable one fingerbreadth below the left costal margin. Ophthalmoscopy revealed no abnormality. The haemoglobin was 6.5 g.%, the platelet count had fallen to 90,000 per c.mm., and the clotting and bleeding times were normal.

On September 10 treatment with oral cortisone acetate in dosage of 25 mg. four times daily was begun, without producing any improvement in her haematological state. The patient left hospital at her own request on September 18, treatment having been discontinued.

On September 23 she was readmitted to the gynaecological department because the abdominal wound had broken down. Treatment with 6-mercaptopurine was followed by a haematological remission on two occasions, and she left hospital on December 3 with the abdominal wound well healed. Unfortunately, permission for further marrow examination was not obtained, but examination of the peripheral blood showed a significant change. On December 1 the leucocyte count was 3,000 per c.mm., and only 1% blast cells were seen in the stained blood film.

Discussion

Four aspects of the problem of acute leukaemia in pregnancy may be considered.

1. *Effect of Pregnancy on the Leukaemic Process.*—From reference to the literature it is clear that there is no evidence that pregnancy has either a favourable or an unfavourable influence on acute leukaemia. Erf (1947) noted that of 34 cases of acute leukaemia those who survived delivery did not live longer than three months, while out of 66 cases of chronic leukaemia 43 patients survived pregnancy by more than one year, and several had more than one pregnancy. The survival times do not differ from those in non-pregnant leukaemic patients. Shub *et al.* (1953) suggest that pregnancy may transform chronic leukaemia into the acute form, but the history and clinical state of the present case indicate that the disease was acute from the onset.

2. *Effect of Leukaemia on Pregnancy.*—The most common result of leukaemia in pregnancy is premature labour. Almklov and Hatoff (1946) concluded that the association of pregnancy and acute leukaemia resulted in a high foetal

mortality, less than 50% of infants being successfully delivered. It is more likely that acute leukaemia will develop during pregnancy than that a patient suffering from acute leukaemia will become pregnant. If the disease begins early in pregnancy the chances of a live child are extremely remote, unless the mother has a remission, either spontaneous or induced. When it occurs late in pregnancy, as in the present instance, the production of a live child is more probable.

3. *Effect of Leukaemia on the Child.*—In no case of leukaemia in pregnancy has there ever been reported transmission of the disease to the child. While there have been at least 21 published cases of congenital leukaemia (Wintrobe, 1951), in no instance was the mother affected, and leukaemic cells were demonstrated only on the foetal side of the placental barrier. No foetal abnormalities have ever been directly related to leukaemia in the mother.

4. *Management of the Patient.*—Acute leukaemia is a fatal disease with a rapid course, and treatment is normally a matter of academic and research interest. Where pregnancy coexists, however, there is the problem of producing a live child, and treatment of the patient will require special consideration. The folic-acid antagonists induce remission, mainly in children, and this is probably true also of 6-mercaptopurine (Burchenal *et al.*, 1953). Improvement has sometimes been produced in adults with the latter drug (Hall *et al.*, 1953), and in the early months of pregnancy it would seem reasonable to use these drugs in the hope that a remission may be induced long enough to allow pregnancy to run a normal course. It should be remembered, however, that the effect of the antimetabolites on developing foetal tissues is unknown, and for this reason, in the late stages of pregnancy where the course of the illness is not a fulminating one, it is probably justifiable to withhold therapy of a specific nature and to rely on supportive measures such as blood transfusion and antibiotics, as was done in this patient.

Where thrombocytopenia is present with its attendant risk of haemorrhage, platelet transfusion or that of polycythaemic blood may be a valuable measure.

The management of labour constitutes another problem. Haemorrhage may be a hazard, and its treatment has been referred to. In general, the mother should be delivered, where possible, by the normal route. In the present case caesarean section was performed only when surgical induction had failed. The failure of the abdominal wound to heal may be attributed either to the leukaemic process or to the use of cortisone.

Summary

The twelfth reported case of acute lymphatic leukaemia in pregnancy is described, a live healthy child being delivered by caesarean section. Some of the problems of management are discussed.

I wish to thank Dr. J. L. Markson for his encouragement and advice, and Dr. J. B. Rennie and Dr. D. McK. Hart, under whose care this patient was treated, for permission to publish.

REFERENCES

- Allan, J. (1954). *British Medical Journal*, 2, 1080.
 Almklov, J. R., and Hatoff, A. (1946). *Amer. J. Dis. Child.*, 72, 202.
 Burchenal, J. H., Murphy, M. L., Ellison, R. R., Sykes, M. P., Karnofsky, D. A., Leone, L. A., Tan, T. C., Craver, L. F., Dargeon, H. W., and Rhoads, C. P. (1953). *Blood*, 8, 965.
 Erf, L. A. (1947). *Amer. J. clin. Path.*, 17, 268.
 Forkner, C. E. (1938). *Leukaemia and Allied Disorders* (Bibliography). Macmillan Co., New York.
 Grier, R. M., and Richter, H. A. (1939). *Amer. J. Obstet. Gynec.*, 37, 412.
 Hall, B. E., Richards, M. D., Willett, F. M., Feichtmeier, T. V., and Aggeler, P. M. (1953). *Stanford med. Bull.*, 11, 237.
 Moloney, W. C., Heffernan, R. J., and Kasdon, S. C. (1943). *J. Amer. med. Ass.*, 122, 1170.
 Shub, H., Black, M. M., and Spear, F. D. (1953). *Blood*, 8, 375.
 Williams, J. A. (1948). *Amer. J. Obstet. Gynec.*, 55, 967.
 Wintrobe, M. M. (1951). *Clinical Haematology*, 3rd ed., p. 857. Kimpton, London.