Operation (July 1960; J. K. S.).—The interval between the fourth and fifth lumbar vertebrae on the right side was explored and a large postero-lateral protrusion compressing the fifth lumbar root was removed. Convalescence was smooth, and by 5 August his sciatica had resolved. The patient's condition was the same as before the motor accident and has remained so.

FIG. 2.—Antero-posterior myelogram showing incomplete filling of the L5 root sleeve on the right side.

COMMENT

Mowbray *et al.* (1949) found narrow intervertebral disk in nearly half of their cases of ankylosing spondylitis. Romanus and Ydén (1952), showing pathological disks by discography, were able to produce the "lumbago-sciatic symptoms," already so familiar to the patient, by injection of the disks, suggesting that pathological disks were responsible for the symptoms. Hart *et al.* (1949) reported that 31 out of 43 cases had sciatica at some time. Forestier *et al.* (1956) stated that 17 out of 200 cases had sciatica in the L5 distribution, sometimes with hypoaesthesia.

Intrauterine Transfusion of the Foetus in Haemolytic Disease

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In continuation of Liley's recent work on intrauterine transfusion of the foetus (Liley, 1963a, and personal communication) an attempt was made to repeat his success.

CASE REPORT

The mother aged 44 was pregnant for the seventh time. Her first child was normal and now aged 16 years. The second went to full term but suffered from haemolytic disease and died three days after birth in spite of two exchange transfusions. The third was stillborn at term owing to rhesus incompatibility. The fourth lived 15 minutes after induction at 36 weeks for rhesus incompatibility.

Hauge (1960-1) described two cases of long-standing ankylosing spondylitis with urinary difficulty, weakness in the legs, and sacral sensory loss. In one case myelography was normal, but in the other there was an unusual funnel-shaped accumulation of fluid in the lumbar theca. At operation intradural fibrous connective tissue surrounding atrophic nerve roots was found. Bowie and Glasgow (1961) reported three cases of long-standing ankylosing spondylitis in which there was bowel and bladder disorder with weakness and widespread sensory changes in the legs. Myelography in every case was normal and they were unable to account for the neurological picture.

In ankylosing spondylitis an increase in the backache and sciatica may be caused by an exacerbation of the disease process. Motor, sensory, and reflex changes in the lower limbs would, however, make this explanation unlikely and might suggest the presence of other pathological conditions. The neurological pictures presented by Hauge (1960-1) and by Bowie and Glasgow (1961) have been seen only in cases of 20 or more years' duration. In view of the consistent pathology in the intervertebral disks in ankylosing spondylitis it is perhaps surprising that a prolapsed nucleus pulposus has not been reported more often. In fact, we have been unable to find any other account of a prolapsed intervertebral disk in an established case of ankylosing spondylitis. We feel that, as in this case, the condition may arise only in a mild or arrested case of ankylosing spondylitis in which there is little in the way of bony ankylosis of the spine.

In the present case the acute exacerbation of the symptoms following trauma was thought in the first place to be due to an aggravation of the ankylosing spondylitis. However, the marked neurological signs and the positive myelogram established the diagnosis.

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Labour was induced again at 36 weeks in the fifth pregnancy, but the baby died a few minutes after birth. The sixth pregnancy was terminated by a lower-segment caesarean section at 34 weeks. The baby had a cord-blood haemoglobin of 4 g./100 ml. and died after an exchange transfusion.

In the seventh pregnancy the antibody titre was anti-D, 1:32 and anti-C, 1:4 at three months. The patient's blood group was A, Rh-negative and the husband was homozygous. At 32 weeks by date amniocentesis was carried out. The spectral absorption curve (Liley, 1963b) of the fluid obtained showed the optical density of the deviation from linearity at 450 m μ wavelength to be 0.143. This level indicated a fairly severely affected infant, but in view of the history the infant would almost certainly fall into the gloomy end of Liley's probability chart (Liley, 1963b)—that is, a 22% probability of the infant having a haemoglobin at birth of less than 8 g./100 ml. or a possible intrauterine death.

Accordingly, it was decided to attempt intrauterine transfusion of the foetus. At 32 weeks 3 days an amniogram was carried out. An injection of 20 ml. of 76% "urografin" (diatrizoic acid) was made into the amniotic cavity. The placenta was situated high up

and posteriorly, and the foetus was presenting by the vertex R.O.L. with no evidence of hydrops or ascites. Four hours later, with a premedication of 100 mg. "pethilorfan" (pethidine hydrochloride) and 20 mg. "triflupromazine" (fluopromazine), an 18 cm. 16 gauge Tuohy needle was inserted into the amniotic cavity. After several unsuccessful attempts the tip of the needle was inserted into the abdominal cavity of the foetus. This was confirmed by the injection of 3 ml. 76% urografin, and the taking of a further radiograph (Fig. 1). A full-length "portex" epidural catheter was inserted through the Tuohy needle and the needle gradually withdrawn. Next 100 ml. packed warmed group O, Rh-negative cells compatible with the mother's serum was injected over 40 minutes. Finally 1 g.

FIG. 1.—The tip of the Tuohy needle is in the peritoneal cavity, which is clearly outlined by the injected urografin.

FIG. 2.—Fading puncture marks at the two transfusion sites (1) and (2), and several scars from mishits in the region of the left knee (3).

streptomycin and 1,000,000 units of crystalline penicillin were injected into the amniotic cavity. No further antibiotic cover was provided.

Eight days later a further 100 ml. of blood was injected into the foetal abdominal cavity using the same technique again, except that preliminary amniogram was not thought to be necessary.

Two days after this transfusion—that is, at 33 weeks 6 days—spontaneous rupture of membranes occurred and uterine contractions

began, culminating in the normal delivery of a 2,954-g. male infant 10 hours later. He appeared to be in good condition, though the liver and spleen were both enlarged. The placenta was large and pale and weighed 907 g. Cord blood was 9 g./100 ml. Direct Coombs test was positive, and the blood group was O, Rhesus-(D)-positive. Central venous blood showed 10 g./100 ml. haemoglobin. There were three healing puncture marks on the abdomen and several others on the thighs and legs (Fig. 2).

An immediate exchange transfusion of 176 ml. per kg. using group O, Rh-negative blood occupied two and a half hours. There was no sign of respiratory distress syndrome and the baby's condition was good throughout. A.C.T.H. 10 units twice daily was given for two days. Over the next few days the serum bilirubin rose to a maximum of 15 mg./100 ml. and then fell steadily. The haemoglobin level was 13.8 g./100 ml. on the fourth day.

Fractionation of the cord and central venous blood by the method of Singer, Chernoff, and Singer (1951) showed Hb F 26%, Hb A 74%.

The baby's condition has continued to improve throughout the past four weeks.

Total estimated irradiation due to the numerous films involved in this initial venture was 4.2 r. Total dosage used in a subsequent case was 0.8 r for a single transfusion.

COMMENT

There is no doubt that the infant in this case absorbed most of the transfused blood, as indicated by the very low level of foetal haemoglobin in the central venous blood at birth. Similarly, it can be calculated (using the actual foetal haemoglobin percentage and the average expected percentage without pre-natal transfusion) that the haemoglobin at birth would have been more of the order of 3–4 g./100 ml., a level that would have made survival of the baby most unlikely.

The history was at least as important as the findings based on spectrophotometry, and events more than justified the emphasis placed on this.

There was no evidence either before or after birth of any severe trauma due to the Tuohy needle. In fact all the puncture marks on the abdomen and thighs were virtually healed at the time of birth.

It appears that the technique outlined, though not without risk of damage to a major organ or blood-vessel, may offer the prospect of a live baby to a good number of the women who produce severely affected erythroblastotic infants.

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