In the true occipito-posterior position a deliberate face-to-pubes delivery with forceps is usually indicated when the head is low, and this has a small foetal risk.

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SUBARACHNOID HAEMORRHAGE IN PREGNANCY

BY

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Since Lazard (1899) reported a case of cerebral haemorrhage arising during labour, many authors have described spontaneous intracranial haemorrhage occurring during pregnancy. Cerebral haemorrhage, often with extension to the subarachnoid space, has been noted in patients with eclampsia (King, 1933; de Carle, 1949) and toxæmia (Masten, 1935; Strauss and Tarachow, 1937), and these observations have inspired the view that generalized vascular changes are usually responsible for subarachnoid haemorrhage in pregnancy, labour, or the puerperium (Dahle, 1946). While this is true of many cases it is now evident that subarachnoid haemorrhage of aneurysmal or angioma origin is an occasional complication of an otherwise normal pregnancy.

Of the 312 cases of spontaneous subarachnoid haemorrhage reported elsewhere (Walton, 1952a), two occurred during pregnancy; these cases are here reported in detail.

Case 74

A housewife aged 35 was admitted to the Royal Victoria Infirmary under the care of Professor F. J. Nattrass on January 27, 1948. Six years previously she had had an illness which began with sudden headache and prostration, and she spent three weeks in an isolation hospital, with a diagnosis of meningitis. For several months afterwards she had occasional headaches. On the day before admission, when in the thirtieth week of her first pregnancy, she was straining at stool, when a bursting frontal headache developed; this was followed by a generalized epileptic fit and a period of unresponsiveness lasting twenty minutes.

On examination on admission, twenty-four hours later, she was rational though drowsy and irritable; there was moderate neck stiffness, but no other abnormal signs were found in the central nervous system. The pulse was 60 a minute, blood pressure 140/90 mm. Hg, and temperature 99.2° F. (37.3° C.). Lumbar puncture revealed a deeply blood-stained fluid under a pressure of 200 mm., and the supernatant fluid was bright yellow. The urine contained small amounts of albumin and sugar.

The patient improved steadily and was transferred to the Princess Mary Maternity Hospital on February 13; she came into spontaneous labour on April 10 and was delivered of a healthy baby. Labour and the puerperium were uneventful. Although troubled for some months by headaches and anxiety symptoms, she is now living a normal life.

Comment.—The illness suffered by this patient six years previously was probably subarachnoid haemorrhage. In the absence of signs of toxæmia it is likely that both attacks arose from rupture of an intracranial aneurysm or angioma. There is no evidence that pregnancy was related to the haemorrhage, and normal labour did not provoke a recurrence of bleeding.

Case 273

A housewife aged 40 was admitted to the Princess Mary Maternity Hospital on October 25, 1942, for investigation. Three days previously, while in the twenty-sixth week of her third pregnancy, she was found to have albuminuria. Her blood pressure was normal and she had no symptoms. Shortly after admission she suddenly became confused and irrational; two hours later a generalized epileptic convulsion occurred, she became comatose, and neck stiffness was noted. She was transferred to the Royal Victoria Infirmary under the care of Dr. F. J. Nattrass three hours later.

On examination she was comatose, with Cheyne-Stokes respiration. The pulse was 68 a minute, blood pressure 140/90 mm. Hg, and temperature 100° F. (37.8° C.). There was severe neck stiffness and Kernig's sign was positive. A large subhyaloid haemorrhage was seen in the right eye; the retinal veins were engorged and small flame-shaped haemorrhages were seen in both retinae, but there was no papilloedema or any evidence of arteriopathy. The pupils were widely dilated and non-reacting; all four limbs were flaccid, and the left plantar response was extensor.

Lumbar puncture five hours after the ictus revealed deeply blood-stained fluid under high pressure; the supernatant fluid was faintly yellow. The urine contained a considerable quantity of albumin but no sugar. The patient deteriorated, and died eight hours after the onset.

At necropsy the following day much blood was seen in the basal cisterns and cerebral sulci. A ruptured aneurysm, 0.5 by 0.5 cm. in diameter, was found at the junction of the left anterior cerebral artery with the anterior communicating. The corpus callosum was ploughed up and haemorrhage had entered the right frontal lobe, reaching the lateral ventricle. Histological examination of the renal and cerebral vasculature showed no evidence of acute vascular pathology. The hepatic parenchyma was also normal on section. A normally formed six-months foetus was found *in utero*.

Comment.—Although albuminuria was noted before subarachnoid haemorrhage developed, there was no clinical or pathological evidence of toxæmia, and the necropsy findings were such as are commonly seen in non-pregnant patients with ruptured intracranial aneurysms; it cannot be suggested with any authority that the coexistence of pregnancy provoked the haemorrhage or influenced the outcome.

Discussion

Clinically typical attacks of spontaneous subarachnoid haemorrhage complicating normal pregnancies have been reported by Sands (1929, 1 case), Russel (1933, 1 case), Moskowitz and Schneider (1938, 3 cases), Richardson and Hyland (1941, 3 cases), Dahle (1946, 1 case), Rhoads (1947, 2 cases), Hamby (1948, 4 cases), Garber and Maier (1948, 3 cases), Ramstad (1948, 1 case), Olivecrona and Riives (1948, 1 case), de Carle (1949, 3 cases), Bell (1949, 2 cases), Gershenfeld and Savel (1950, 1 case), Ask-Upmark and Ingvar (1950, 2 cases), and Conley and Rand (1951, 8 cases). This complication may pose important problems of management, and, as Mackenzie (1933) has pointed out, diagnostic difficulties may arise, since hypothalamic irritation by subarachnoid blood may produce hypertension and albuminuria. If these signs are discovered in a comatose patient a misdiagnosis of eclampsia is possible, particularly if no search is made for signs of meningeal irritation. Even in a confirmed case of subarachnoid haemorrhage it may be difficult to be sure that toxæmia has not played some part in the aetiology (Conley and Rand, 1951). However, many

cases have now been reported in which toxæmia could be excluded completely, but no authoritative evidence is yet available to confirm the significance of the association.

Before an opinion on this point can be expressed and a rational scheme of management formulated, the following questions must be answered: (1) Does subarachnoid haemorrhage occur significantly more often in cases of non-eclamptic pregnancy than in other female members of the population in the same age group? (2) Is the aetiology of the illness different during pregnancy? (3) Is the time relationship of the illness to the stage of pregnancy constant enough to suggest a connexion between the two? (4) Does the coexistence of pregnancy affect the outcome of the illness?

1. *Incidence.*—De Carle (1949) found only three cases of subarachnoid haemorrhage complicating normal pregnancy in 15,417 deliveries, whereas subarachnoid bleeding, usually secondary to intracerebral haemorrhage, had occurred in 15 eclamptic patients in the same series. In the Newcastle series of 312 cases of subarachnoid haemorrhage there were 48 female patients between 20 and 45 years of age, and two of them were pregnant. By taking the average birth rate in the years 1940–9 it is possible to estimate that at any one time during that period approximately one in 20 to 25 women in the given age group would be pregnant. Thus the incidence of pregnancy in these cases was identical with that to be expected in the general population. Although somewhat greater in the series reported by Richardson and Hyland (1941), Dahle (1946), Hamby (1948), and Ask-Upmark and Ingvar (1950), the incidence was never high enough to nullify this conclusion.

2. *Aetiology.*—About 80% of cases of spontaneous subarachnoid haemorrhage arise through rupture of an intracranial aneurysm, perhaps another 10% through bleeding from an angioma, and in the remainder many pathological conditions may be implicated (Walton, 1952a). Ruptured aneurysms have been demonstrated by angiography or at necropsy in many pregnant patients (Sands, 1929; Richardson and Hyland, 1941; Rhoads, 1947; de Carle, 1949; Conley and Rand, 1951), while in at least three cases (Olivecrona and Riives, 1948; Conley and Rand, 1951) an arteriovenous angioma was the cause. Although in Thompson's (1949) three cases the bleeding was of unusual origin, the available evidence does not suggest that the aetiology of the illness in non-eclamptic pregnancy differs significantly from that in the general population.

3. *Time of Occurrence.*—It has been suggested that the burden of pregnancy and the strain of labour are responsible for provoking bleeding. If physical stress is the operative factor it would be expected that most cases would occur in labour or the early puerperium. Conley and Rand (1951) have pointed out that this is not so. They tabulated 20 reported cases and added eight of their own; when the two cases reported by Ask-Upmark and Ingvar (1950) and the two described here are added, it is seen that, of 32 cases, only four (12.5%) occurred during labour. In 18 (56%) the haemorrhage developed before birth (usually late in the second or in the third trimester) and in 10 (31.5%) after birth (within twenty-four hours of delivery in six). Clearly the time relationship is by no means constant.

4. *Outcome of the Illness.*—Of the 32 patients mentioned above, 13 (40%) died and 19 (60%) recovered. Separate consideration of the 10 cases occurring during labour or in the first twenty-four hours afterwards has shown that half of them survived. In 1,300 reported cases of subarachnoid haemorrhage the mortality rate was 45% (Walton, 1952a); it is clear that the prognosis of the illness during pregnancy, labour, or the puerperium is similar. Of the patients who recover from subarachnoid haemorrhage, 10.5% suffer a further attack within six months (Walton, 1952b), but there is no evidence that such recurrent haemorrhage is more likely to occur, even during labour, in a patient who has survived an attack in pregnancy; indeed, recurrent bleeding after an interval during the same pregnancy has been reported in only one case (Rhoads, 1947).

In the two cases reported above, the onset, progress, and outcome of the illness did not appear to be related to the associated pregnancy. Subarachnoid haemorrhage seems to occur no more commonly during a normal pregnancy than in an unselected group of women of the same age. The aetiology of the illness is not unusual in pregnant women, and the coexistence of pregnancy does not affect the prognosis. Admittedly most cases occur late in pregnancy or during labour or the early puerperium, when physical stress is greatest; as in any case of subarachnoid haemorrhage, exertion may promote rupture of an anomaly which was

about to bleed spontaneously (Walton, 1952a). However, from the evidence quoted, it seems that the association of subarachnoid haemorrhage with non-eclamptic pregnancy is, in general, fortuitous.

Management

If an attack of subarachnoid haemorrhage begins during labour, alleviation of physical strain is an urgent matter; in selected cases, depending upon the stage of labour, emergency caesarean section or instrumental delivery will be indicated before adequate treatment for the subarachnoid haemorrhage, whether conservative or surgical, can be implemented. Occasional cases of grave outlook in later pregnancy may require caesarean section in order to save the child. During pregnancy or the puerperium, however, it is usually wise that each patient should be treated as would any other case of subarachnoid haemorrhage. Details of treatment have been discussed elsewhere (Walton, 1952a); probably, if surgery is indicated, the pregnancy should not influence the decision on the optimum time of operation.

Rhoads (1947) has suggested that when a patient has recovered from subarachnoid haemorrhage during pregnancy termination is the wisest course; one of his patients suffered a fatal recurrence of bleeding during labour. However, this event is apparently unique, and it has been shown that restriction of activity is of no value in the avoidance of recurrent bleeding, while undue emphasis on caution may lead to disabling psychiatric sequelae (Walton, 1952b). It is suggested, therefore, that termination is unjustifiable and that the pregnancy should be allowed to progress to term. After four to six weeks in bed, and if the pregnancy is progressing normally, graduated activity should be permitted in patients who have made a good recovery. The obstetrician must then consider the most satisfactory method of delivery. Conley and Rand (1951) have suggested that caesarean section is indicated in order to avoid undue effort. This view may have some validity if bleeding has occurred within two or three weeks and the causal lesion has not been given adequate time to heal, but it should be remembered that the procedure carries with it the risks of a major abdominal operation. In view of the evidence quoted on the infrequency of recurrent bleeding, it is surely preferable in the majority of cases to allow spontaneous labour in hospital, with adequate analgesia and sedation, and possibly instrumental assistance in the second stage.

It will undoubtedly be asked whether a woman who has recovered from an attack of subarachnoid haemorrhage should undertake further pregnancies. In the series of cases reported by Symonds (1923), Sands (1929), Ask-Upmark and Ingvar (1950), and Walton (1952a) many women had weathered previous pregnancies, uncomplicated by subarachnoid bleeding. Five patients in the Newcastle series have passed through uncomplicated pregnancies since recovery from the illness. It seems that recurrent haemorrhage is no more likely to occur in pregnancy than during ordinary activity, and hence there is no justification for advising against further pregnancies when satisfactory recovery has occurred.

Summary

Two cases of spontaneous subarachnoid haemorrhage complicating otherwise normal pregnancies are reported.

From a study of these and of 30 similar cases previously reported it is suggested that the incidence of pregnancy in patients with subarachnoid haemorrhage is no greater than in the general population. The aetiology of the illness is not unusual in pregnant women, nor does the association affect the prognosis. It is concluded that the two conditions are associated fortuitously, except in so far as the burden of pregnancy or the exertions of labour may provoke rupture of a vascular anomaly which is about to bleed spontaneously.

Except during labour, when caesarean section or instrumental delivery may occasionally be necessary

for the alleviation of physical stress, patients should be managed as would any other case of subarachnoid haemorrhage.

After recovery from the acute illness, pregnancy should be allowed to progress to term. Spontaneous delivery, with adequate pharmacological and instrumental assistance, is advised, save in cases with recent haemorrhage, when caesarean section may occasionally be indicated.

After recovery has occurred there is no justification for advising against further pregnancies.

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Medical Memorandum

Acute Appendicitis in the Newborn

Acute appendicitis is rare in young infants, and extremely so in the first few weeks of life. The literature on this subject has been widely surveyed by Etherington-Wilson (1945), who reported an additional case in an infant aged 16 days. Including his own case, Etherington-Wilson found sixteen cases in the age group 0-4 weeks. In six of these the appendices were in hernial sacs; in the remaining ten the diseased appendices were intra-abdominal. Of the sixteen infants ten died and six recovered. In all six recoveries the appendices were in hernial sacs.

A further search of the literature has revealed one other case, reported by Ch'eng and K'ang (1937). The infant was 3 days old, and presented with constipation, intense meteorism, and vomiting. A diagnosis of acute diffuse peritonitis was made. The treatment was expectant and the child died on the 12th day of life. Necropsy showed an acute gangrenous appendicitis, without macroscopic perforation, which had given rise to a diffuse purulent peritonitis.

CASE REPORT

The infant, a first-born male, was premature and weighed 4 lb. 12 oz. (2,150 g.) at birth. There was no abnormality of labour or delivery, but the infant was stated to be feeble at birth. At first he had difficulty with sucking, but by the age of 10 days he had improved and was taking expressed breast milk satisfactorily from a bottle.

On the eleventh day difficulty in breathing was noticed, and pneumonia was diagnosed. Penicillin was started and there was some clinical improvement, followed by a

relapse. He was then transferred to Southmead Hospital, where he was found to be pale and wasted, with gross dehydration. The abdomen was enormously distended and tympanitic. There were many visible coils of bowel. No abnormal mass was felt, and the liver, spleen, and kidneys were not palpable. Rectal examination was normal and the stools were small, hard, and yellow. The heart, lungs, and nervous system were normal, and there was no abnormality of pulse, temperature, or respiration rate. The left tympanic membrane was inflamed.

An intravenous infusion of glucose-saline was begun. This produced an apparent improvement in the general condition, but diarrhoea had now developed, and there was much mucus in the stools. Sulphaguanidine and penicillin were given without effect, and deterioration was rapid. A generalized oedema was now present; the respiration rate became rapid, the temperature rose, and the left ear began to discharge. Death occurred suddenly on the 20th day of life.

At necropsy the significant findings were: (1) Gangrene of the appendix, with the formation of an appendix abscess. The appendix had sloughed off about 0.5 cm. from its base and lay in an abscess cavity, whose walls, formed from the caecum, terminal ileum, and omentum, were held together by delicate fibrinous adhesions; the cavity contained about 3 ml. of thin pus. Organisms present: *Staphylococcus aureus* (coagulase-positive), and *Bact. coli*. (2) Left otitis media: *Staphylococcus aureus* (coagulase-positive) and *Proteus vulgaris* were found.

COMMENT

In the above case the diagnosis of an acute intraperitoneal condition was not considered; the symptoms and signs were thought to be due to acute otitis media, with secondary diarrhoea leading to dehydration and a marasmic state. The diagnosis of acute intra-abdominal appendicitis in the very young appears to be fraught with difficulty, and so far does not seem to have been made at a stage early enough for treatment to be effective.

Localizing signs are more often absent than present (Holt and McIntosh, 1940), as in the case here reported. Abt (1917), in his review of 80 cases under the age of 2 years, and Etherington-Wilson (1945), both emphasize the fact that vomiting is almost invariable. However, vomiting is a feature of many neonatal states and therefore cannot be of much value in diagnosis. In the present case it was absent throughout.

Abdominal distension seems to be a frequent finding, and, if associated with constipation and visible peristalsis, may mimic intestinal obstruction. Diarrhoea may further confuse the diagnosis. On several occasions the condition has been mistaken for pneumonia on account of the rapid respiration rate.

If the diagnosis could be made early enough, before the apparently inevitable gangrene and perforation have occurred and before peritonitis has become general, operation would surely save some of these infants. Etherington-Wilson is convinced that spinal analgesia is the anaesthetic of choice, and this, combined with proper fluid and electrolyte replacement and antibacterial therapy, should go far towards improving the prognosis of this rare but very fatal condition.

I am indebted to Dr. H. J. L. O'Sullivan for details of the infant's birth and early life, and to Dr. R. Sandry for the report on the necropsy:

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