The unusual step was now taken of closing the anal canal; this was done because of the incontinence of the anal sphincter. This operation was only partially successful, as the urine was now passing through a smaller fistula. There was still incontinence, and the patient, rather discouraged, returned to the country.

On February 17, 1949, 10 months later, the colpoceleisis was completed, with the complete closure of the vagina. Portions of tissue were removed on each side of the vagina, beginning in the region of the coccyx, until the clitoris was reached. Inner and outer cuffs were raised and the inner cuffs approximated. A few buried sutures were inserted before closing the outer cuffs. As a result the whole of the anal canal and vagina was completely closed, leaving the clitoris as the only external landmark of the vestibule (Fig. 1). Before complete closure a catheter was passed

FIG. 2.—Front view showing the patient herself inserting the catheter down the distal opening of the colostomy, to empty the "bladder."

down the distal opening of the colostomy until it was seen in the vagina. The catheter acted as a continual post-operative drain for the newly formed "bladder."

Uninterrupted recovery gave encouragement, and after 10 days the patient was walking around emptying the "bladder" herself by passing a catheter through the distal orifice of the colostomy as occasion demanded

(Figs. 2 and 3). This was the first time the patient had been dry for two years. An intravenous pyelogram showed satisfactory function of both kidneys.

At the time of writing, two and a half years after the final operation and six and a half years after the diagnosis of the cancer, the patient was extremely fit, having put on 35 lb. (15.9 kg.) in weight. The colostomy and bladder were both working well; there was no need to wear a colostomy bag or belt, as she is forewarned when either the proximal or distal loops of the bowel require to be emptied. No sign of menstruation had been seen since the radium treatment.

FIG. 3.—Radiograph showing retrograde filling of the "bladder" with a solution of potassium iodide, from a catheter inserted into the distal orifice of the colostomy. The shadow outlines the pelvic colon, vagina, and remains of the true bladder. Intravenous pyelography had previously shown satisfactory function of both kidneys.

Summary and Conclusion

There are few operations so satisfactory to patient and surgeon as a successful closure of a vesico-vaginal fistula. Such a distressing condition, with the constant odour of decomposing urine, prevents the patient mixing in society. David of old seemed to recognize this when he said: "My lovers and my friends stand aloof from my sore; and my kinsmen stand afar off" (Psalm xxxviii. 11).

A case is described of extensive damage to the bladder and rectum following the use of radium for carcinoma of the cervix uteri and vagina. The double incontinence was treated by providing an inguinal colostomy and completely closing the vagina and anal canal.

An excellent result was obtained, and the patient is now in good health and enormously improved in mental outlook. So far as is known to me, this procedure is unique.

My thanks are due to Professor Chassar Moir, of Oxford, Mr. Oswald Lowsley, of New York, and Mr. Donald Fraser, of St. Bartholomew's Hospital, London, for their encouragement, and to Mr. F. W. W. Bailey, of Jamaica, for the x-ray photograph.

REFERENCES

- Crossen, H. S. and R. J. (1948). *Operative Gynecology*, 6th ed., p. 525. St. Louis.
Latzko, W. (1942). *Amer. J. Surg.*, 58, 211.
Mahfouz, N. (1929). *J. Obstet. Gynaec. Brit. Emp.*, 36, 581.
— (1938). *Ibid.*, 45, 405.
Miller, N. F. (1935). *Amer. J. Obstet.*, 30, 675.
Moir, J. C. (1947). *Edinb. med. J.*, 54, 368.
Simon, G. (1856). *Disch. Klin.*, 8, 310.
Sims, J. Marion (1852). *Amer. J. med. Sci.*, 23, 59.
Te Linde, R. W. (1946). *Operative Gynecology*, p. 192. Philadelphia.

HAEMATOMA OF THE ADRENAL GLAND IN THE NEWBORN

BY

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Haemorrhage of microscopic dimensions in the adrenal gland is often found in the neonatal period, but massive unilateral haemorrhage has been infrequently recognized and only a few cases have been described. Yet the cases present a fairly clear clinical picture, enabling the diagnosis to be made during life and effective treatment instituted.

Talbot (1900) seems to have been the first to draw attention to the condition in this country, but since his description there have been barely a dozen articles on the subject. Stock (1947), reviewing the publications on cysts of the adrenal gland up to that date, was able to find only 50 recorded cases. Most of these were said to be lymphangiectatic or haemorrhagic, but no specific mention is made of their occurrence in the neonatal period.

Kohlbray and Wells (1945) found 3 cases of unilateral adrenal haemorrhage among 452 stillbirths and neonatal deaths in a total of 9,500 births. Arnold (1930) reported

two cases which were diagnosed at necropsy and two others in which the diagnosis was made during life, one child being successfully treated.

In common with other conditions occurring in the neonatal period, it is likely that the incidence is higher than is generally supposed, for in this age group clinical diagnosis is difficult and the certification of deaths is notoriously inaccurate.

Case 1

A 10-day-old baby was referred to the medical out-patient clinic with a letter, from which the following is extracted: "Two days after delivery he became pale, irritable, eyes inclined to roll, persistent and irritable cry, temperature 101°." A mass had been felt in the abdomen.

The baby was the first child of healthy parents. The pregnancy had been normal and the baby was born at full term after the mother had been in labour for three days. Delivery by forceps was not difficult. The child was put to the breast on the first day, but seemed very sleepy and did not suck. On the second day he was pale and irritable, the temperature was 101° F. (38.3° C.), and he would take nothing except a little glucose-water. Sulphadiazine was given. On the third day he was very weak and could not take from the breast. On the fourth day he was still looking pale, and was given 5 ml. of the mother's blood into the buttock. From this time he appeared to improve, taking feeds rather better and gaining some weight. On the seventh day his temperature rose to 105° F. (40.6° C.); penicillin, 100,000 units every six hours, was begun and sulphadiazine continued. The child was admitted to hospital at the age of 10 days. His temperature was 99.4° F. (37.4° C.), and pulse 148. The baby was quiet and his colour was normal. There was slight wasting of the subcutaneous tissues but no other abnormality apart from the right loin, where a mass could be palpated bimanually. The swelling measured about 10 by 6 cm.; it was firm and clear in outline and was thought to be of renal origin. The urine showed no abnormality. The blood count showed: haemoglobin, 11.6 g.%; red cells, 3,500,000 per c.mm.; white cells, 11,000 per c.mm. (44% polymorphonuclear leucocytes). The blood urea was 28 mg. per 100 ml. A cystogram revealed no abnormality of the bladder, and the dye did not enter the ureters. Intravenous pyelography, using 8 ml. of 70% diodone, showed good excretion from both kidneys. On the right side the kidney appeared to be displaced downwards and outwards, and the upper pole was tilted outwards. This suggested a displacement of the upper pole of the kidney by some mass just above it. A radiograph of the chest was normal.

At this time (eight days after admission) the child appeared to be thriving, but, in view of the possibility of neoplasm, laparotomy was thought advisable.

Operation was undertaken on March 25, when the child was 3 weeks old. The kidney appeared normal in size and shape, but was displaced downwards by a cystic mass just above it. This mass seemed to be more than 5 cm. in diameter, and on aspiration some blood was obtained. The wall of the mass disintegrated fairly easily, and in all about 10 ml. of thick blood-stained fluid was removed. No attempt was made to excise the wall of the cystic mass, and the abdomen was closed.

The post-operative course was smooth and a subsequent radiograph revealed that the kidney was in the normal position and was excreting well. The child had begun to thrive just before operation, and continued to do so afterwards.

Case 2

A baby girl was delivered by a midwife four days after the expected date of delivery. The mother, aged 41, had four other children, who were well. The pregnancy was normal, and labour lasted about 10 hours. Delivery was straightforward; the child cried well and had a good colour. She was put to the breast nine hours after birth, suckled well, and appeared completely normal until the second day.

When approximately 40 hours old she began crying incessantly and could not be consoled. This continued for about five hours, when the infant "fell asleep" and was found dead by the midwife one hour later.

Necropsy, at the coroner's request, showed a mature but extremely pale female child weighing 7 lb. 15 oz. (3.6 kg.) and 20 in. (51 cm.) long. No external anatomical abnormalities were found.

The peritoneal cavity contained about 30 ml. of blood-stained fluid, and there was a blood clot, approximately 10 by 3 by 1 cm., lying transversely across the abdomen. No naked-eye tears in the peritoneum were seen. The right adrenal gland was converted into a globular haemorrhagic sac, and there was an extensive extravasation of clotted blood surrounding the right kidney and extending beneath the peritoneum to the pelvis and into the root of the mesentery. The renal and adrenal vessels were surrounded by blood clot. The left adrenal gland and kidney seemed to be normal. All other organs in the body were unusually pale but otherwise normal, and no thrombosis of vessels was found.

Microscopy showed a moderate amount of alveolar oedema in the lung but no significant lesion in organs other than the right adrenal. The latter appeared to be almost completely destroyed, the only remaining organized parenchymal tissue being small groups of the most superficial cortical cells immediately in contact with the capsule. The left adrenal appeared to be normal.

Sections taken across the adrenal veins showed them to be collapsed and empty; no thrombi were seen. The blood vessels of the adrenal gland lay within a mass of blood clot, which in some areas was quite fresh whilst in others it showed lamination. The anatomical diagnosis was that bleeding had occurred into the right adrenal gland with rupture of the gland; the immediate cause of death was internal haemorrhage.

Discussion

Many of the cases of adrenal haemorrhage reported in the literature (Langmead, 1904; Rabinowitz, 1923) occurred in older children and, being associated with generalized purpura and sepsis, fall into the category of the Waterhouse-Friderichsen syndrome. Another group of cases occurs in the newborn and is characterized by multiple haemorrhages. The type of case we have described, however, was recognized by Talbot in 1900, and has since been described by a few authors. The principal features of these cases are summarized in the Table.

Summary of Cases in the Literature

Author	Onset of Symptoms	Maximum Symptoms	Outcome	Adrenal Affected	Tumour Palpable in Abdomen
Talbot (1900)	—	5 days	Died	R	No record
" "	—	3 "	"	—	" "
" "	—	4 "	"	—	" "
" "	—	14 hrs.	"	—	" "
Corcoran and Strauss (1924)	4 days	5 days	Recovd.	L	Yes
Goldzieher and Greenwald (1928)	24 hrs.	4 "	"	R	"
Arnold (1930)	4 days	4 "	Died	R	No record
" "	3 "	3 "	Recovd.	—	Yes
" "	3 "	3 "	"	R	"
" "	3 "	3 "	Died	R	No record
Kohlbrun and Wells (1945)	4½ hrs.	2 "	"	R	Yes
" "	3 days	3 "	"	L	No record
Present Case 1	2 "	3 "	Recovd.	R	Yes
" " 2	40 hrs.	45 hrs.	Died	R	No record

Although there is some variation in the symptomatology of these cases, a general pattern is discernible. The baby appears to be normal at birth after an uneventful pregnancy and a straightforward delivery. A few hours, or at the most a few days, after birth the baby becomes ill, will not take feeds, and becomes noticeably pale. There is invariably some pyrexia, sometimes of extreme degree. The baby

may be restless, but in the later stages becomes weak and comatose. A mass is often palpable in the loin. Death may occur with dramatic suddenness.

The three principal aspects for discussion are the cause of the haemorrhage, the cause of death, and the treatment, if any.

Cause of the Haemorrhage.—It has been suggested that trauma during labour or delivery is the factor responsible for massive unilateral adrenal haemorrhage (Mitchell-Nelson, 1950). Cases in adults have been reported in which haemorrhagic cysts of the adrenal have followed trauma. However, it is difficult to understand how the adrenal glands, which are unusually well protected from external trauma, could suffer during normal labour or could be damaged during delivery without external signs of injury. Moreover, in our two cases delivery was quite straightforward.

Venous thrombosis, a fairly common occurrence in the neonatal period, could be a causal factor, but cases of adrenal vein thrombosis without gross haemorrhage are not rare. Moreover, in Case 2 the adrenal veins were found to be empty. It is conceivable that massive haemorrhage into the adrenal gland could be part of the picture of haemorrhagic disease in the newborn which may produce bleeding from one site only. Prothrombin estimations were not done in these cases, and no definite conclusion is possible concerning this suggested cause. A further possibility which several authors have entertained is that there is excessive degeneration of the foetal cortex. It would seem strange if this tendency were manifest on one side only; the adrenal gland on the opposite side in Case 2 appeared to be normal.

Cause of Death.—Acute adrenal insufficiency has been suggested as the immediate cause of death, but this seems to be unlikely. In the neonatal period the medullary and the chromaffin tissue are situated principally outside the adrenal gland, and the gland itself consists largely of involuting foetal cortex (von Reuss, 1920). Furthermore, Zuelzer (private communication) describes a case in which a child died when 8 days old, both adrenals having been destroyed by haemorrhage. He believes that the haemorrhage had occurred at birth, and that the child had lived for eight days virtually without adrenals. In the fatal cases so far reported the severity of the haemorrhage seems to have been a sufficient cause of death—particularly when there has been rupture of the haemorrhagic mass into the peritoneal cavity. The clinical picture is also in keeping with the diagnosis of severe internal bleeding.

Treatment.—Mild cases in which the haemorrhage is self-limited will need no treatment—in fact, many will pass unrecognized. In others the bleeding is so rapid and profuse that the infant is dead before effective measures can be started. In cases of intermediate degree early recognition of the condition and the administration of blood transfusion may be life-saving.

Summary

Two cases of unilateral neonatal haemorrhage of the adrenal gland are reported and the symptomatology is described.

The aetiology of the haemorrhage and the cause of death are discussed.

It seems probable that some of the more severe cases might be saved by early and vigorous efforts to deal with internal haemorrhage.

REFERENCES

- Arnold, D. P. (1930). *Amer. J. Dis. Child.*, **40**, 1053.
 Corcoran, W. J., and Strauss, H. A. (1924). *J. Amer. med. Ass.*, **82**, 626.
 Goldzieher, M. A., and Greenwald, H. M. (1928). *Amer. J. Dis. Child.*, **36**, 324.
 Kohlbry, C. O., and Wells, A. H. (1945). *Minn. Med.*, **28**, 1002.
 Langmead, F. (1904). *Lancet*, **1**, 1496.
 Mitchell-Nelson (1950). *Textbook of Pediatrics*, 4th ed. Edited by W. E. Nelson, p. 328. Saunders, Philadelphia.
 Rabinowitz, M. A. (1923). *Amer. J. med. Sci.*, **166**, 513.
 von Reuss, A. R. (1920). *Diseases of the Newborn*, p. 451. Bale and Danielson, London.
 Stock, F. E. (1947). *Postgrad. med. J.*, **23**, 530.
 Talbot, E. (1900). *St. Bart's Hosp. Rep.*, **36**, 207.

ARTERIAL SPASM DUE TO AN INTRAVENOUS INFUSION

BY

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The following case provides an example of an unusual danger that may be encountered in the common surgical procedure of "putting up a drip."

Case Report

A bricklayer aged 52 was admitted to hospital with frequency and dysuria attributable to a myoadenoma of the prostate. He was otherwise quite healthy and no abnormalities were detected in his cardiovascular system. His blood pressure was 120/90, and his blood urea 29 mg. per 100 ml. Transvesical prostatectomy was performed (Mr. Roche), the anaesthetic being thiopentone, nitrous oxide, trichloroethylene, and D-tubocurarine chloride. On return from the theatre the patient was pale and his skin was moist. His pulse rate was 120 and blood pressure 105/75. The foot of the bed was raised on blocks, and it was decided to administer an intravenous saline infusion. The left median cubital vein was selected. French's needle from the transfusion set pierced the skin and vein wall as one, and entered the vein smoothly without any manipulation or withdrawal being necessary. Normal saline was infused at the rate of 60 drops a minute. The needle and tube were fixed in position by strapping and the whole arm was loosely bandaged to a splint. When the apparatus had been set up completely there appeared to be nothing untoward occurring, and no difference in the colour of the left hand and that of the rest of the body was observed. The patient was not in any way restless.

One and a quarter hours later it was noticed that the left hand and forearm were pale and cold, and the tips of the fingers of the left hand were slightly cyanosed; also, the intravenous drip had stopped. It had not run into the tissues. Neither the radial nor the ulnar pulse was palpable. The brachial artery was pulsating strongly down to a point about $\frac{1}{2}$ in. (1.9 cm.) proximal to the site of the intravenous infusion, but distal to this it could not be felt. Pressure on the palm of the left hand produced a blanching which persisted for about three minutes. Auscultation of the heart revealed no abnormality except that of the tachycardia (120 a minute) that was present. There appeared to be no source of origin for an embolus, but it did seem possible that the intravenous infusion was a traumatic factor, and so a diagnosis was made (later confirmed by operation) of spasm of the brachial artery. On disconnecting the infusion apparatus it was noticed that a small clot obstructed the terminal orifice of the needle. A radiant-heat chamber was placed over the patient in order to encourage cutaneous vasodilatation.

The pulse not having returned in 15 minutes, the patient was taken to the operating theatre. He had not regained consciousness from the anaesthetic given that afternoon, and anaesthesia was continued with cyclopropane and oxygen. Procaine, 4 ml., was injected subcutaneously into the left antecubital fossa. A 3-in. (7.6-cm.) longitudinal incision was made in the antecubital fossa over the line of the brachial artery. A portion of the median cubital vein $1\frac{1}{2}$ in. (3.8 cm.) long was resected; it included the site of the infusion. There was no evidence at operation that saline had leaked out into the tissues. The bicipital aponeurosis was incised and the brachial artery exposed. Bleeding during this dissection was almost completely absent even though no tourniquet was being used. The brachial artery was narrow and pulseless. The vasa vasorum were empty, making the wall of the vessel appear white. There was a small red circular area about $\frac{1}{4}$ in. (3 mm.) in diameter situated in the wall of the brachial artery almost underlying that part of the median cubital vein into which the infusion had been given.