ADRENAL APOPLEXY

A Report of a Case and its Management

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Cases of spontaneous adrenal haemorrhage in adult life are rare and are almost invariably fatal. Pearl and Brunn (1928) found 20 cases of acute bilateral adrenal haemorrhage in adults reported in the literature between 1906 and 1928. From 1928 to 1942 Thorstad (1942) was able to find reports of another 22 cases which he reviewed and added two cases of his own; all were fatal.

Of these latter 24 cases five were female, 15 were male and in four the sex was not specified; the ages were between 18 and 76 years; the site was bilateral in 15, right sided in four, left sided in one and not reported in three; eight had been subjected to operation.

Case Report

T.T., a young man of 23, was admitted to hospital at 2.30 p.m. on February 7, 1953, with a 48-hour history of right-sided abdominal pain of gradual onset first experienced whilst sitting at home. The pain had steadily increased in severity until, after about 36 hours, it had become almost unbearable. It was localized to the right side of the abdomen and loin and also felt to a lesser degree in the right axilla. There was neither nausea nor vomiting and there were no urinary symptoms. A mild 'shivering attack' lasting only a few minutes had been experienced about four hours after the onset of the pain. There was no history of faintness or weakness and no history of trauma either recent or remote. His previous health had been good apart from occasional discomfort after meals. On examination the temperature was 97.4° F., pulse 90 per minute, respiration 20 per minute, B.P. 115/70. There was tenderness and rigidity over the right rectus and, to a lesser degree, in the R.I.F. There was very marked tenderness in the right loin posteriorly and some pain in the right shoulder was now volunteered. The bowel sounds were present and within normal limits in character and frequency; rectal examination was negative. Auscultation of the chest revealed diminished breath sounds at the right base but no other abnormality was found. X-ray of the chest and

abdomen revealed no abnormality and urine microscopy was negative; the W.B.C. was 9,000. The differential diagnosis at this stage was between (1) a 'slow leak' from a duodenal ulcer; (2) high retrocolic appendicitis and (3) a right-renal or 'perirenal' lesion.

It was decided to withhold everything by mouth and to observe the patient for the next few hours; half-hourly pulse and two-hourly temperature charts were initiated.

By 7.30 p.m., i.e. five hours later, the temperature had risen to 100° F., but the pulse rate had fallen to 80 per minute.

The abdomen was diffusely tender particularly over the right upper rectus where rigidity was 'board-like.' Slight abdominal distension was now apparent and bowel sounds were inaudible. A diagnosis of spreading peritoneal irritation (probably peritonitis) from a leaking duodenal ulcer or possibly a high appendicitis was made and laparotomy undertaken forthwith.

Laparotomy

The abdomen was opened through a right paramedian incision when a large right-sided retroperitoneal haematoma presented. To obtain better exposure and access to the source of the bleeding, a transverse muscle cutting extension of the incision was made well out into the right flank and the posterior peritoneum opened. The kidney was delivered and found to be normal, after which it became apparent that the bleeding was coming from the right adrenal gland, small fragments of which (identified by their characteristic yellow colour) were found in the depths of the wound. As much as possible of the blood clot was removed and the adrenal remnant sutured. Owing to a slight persistent ooze from the adrenal, the suprarenal space was packed and drained, both the pack and the corrugated drain being brought out together through a stab incision in the right flank. Nothing was found to indicate the reason for the bleeding and the appearance was almost as if the gland had 'exploded'; the opposite side appeared normal.

Post-operative Management

It was anticipated that the post-operative course might be 'stormy,' particularly from the point of view of fluctuations in blood pressure, altered blood chemistry and possibly ileus. A blood transfusion was started in the theatre; a pint of blood was given and followed by a pint of 'Dextran.' The drip was continued with N. saline alternating with 5 per cent. glucose in N/5 saline; gastric suction was initiated and morphine, 1/6 gr. (10.8 mg.) six-hourly, prescribed together with the empirical administration of DOCA, 1 ml. four-hourly, for four doses. Penicillin, 250,000 units six-hourly, was deemed a wise precaution in view of a possible infective origin of the haemorrhage and also because of the risk of infection of the haematoma itself. An input and output fluid balance chart was kept and every specimen of urine voided tested for sugar and chlorides; the pulse rate and B.P. were recorded half-hourly.

At 5 a.m., February 8, 1953 (nine hours post-operative), because of the falling blood pressure in spite of the apparent control of bleeding and after i-v fluid replacement, it was decided to use noradrenaline in an effort to combat what looked like a progressive hypotensive state; 4 mg. of noradrenaline ('Levophed') were put into 1,000 ml. of N. saline and the number of drops in the drip counter equivalent to 1 ml. counted. It was found that 24 drops = 1 ml. = 4 µg. noradrenaline. The initial dose was 8 µg. noradrenaline given by running in 48 drops of the solution per minute. The response was immediate and dramatic and the B.P. was raised from 70/50 to 100/70 within three minutes.

The drip was slowed to 24 drops (4 µg.) per minute and the B.P. taken every five minutes. The drip rate was increased up to a maximum of 48 drops if the B.P. fell below 100 mm. Hg (systolic). By 'trial and error' it was found that the B.P. remained stable around 105/70 at a drip rate between 40 to 45 per minute, which was given until 10 a.m., February 8, 1953. The rate of infusion was now gradually slowed to 24 drops per minute but by 11.30 a.m. (1½ hours later), the B.P. had fallen to 80/60 and the pulse had risen to 145 per minute. There was no external blood loss. Increasing the drip rate to 48 per minute quickly brought the B.P. to 100/80, at which level it was maintained for the next 13 hours, but any attempt at slowing the drip below 30 drops per minute resulted in a fall to 90/50.

At this stage it was apparent that the 'weaning' of the patient from the noradrenaline was going to prove somewhat precarious owing to the relatively crude regulation of the concentration of the drug being administered. It was therefore decided to try the effect of giving a more dilute solution at a

slightly more rapid rate. Consequently a solution of 2.5 mg. in 1,000 ml. of fluid was prepared and run in at 48 drops per minute commencing at 12.30 a.m. on the 9th. The B.P. was maintained at between 110/70 and 120/75 until 6 p.m. on the 10th, when a further attempt was made to gradually slow the drip, but after reaching 20 drops per minute the B.P. began to fall and in one hour was down to 80/50.

A still weaker solution of noradrenaline (1 mg. in 1,000 ml. of fluid) was finally substituted and run in initially at 60 drops per minute until the B.P. had been restored (10 minutes) and then continued at 45 to 50 drops per minute for the next 18 hours, during which period the B.P. was maintained at between 110/70 and 120/80. Gradual slowing of the drip on this occasion was uneventful and at 2 p.m. on the 11th it was discontinued with the B.P. at 120/80; following the cessation of the drip the B.P. did not fall below 110/70. It was thus four days before this patient could be safely left without noradrenaline and it would seem to be a fair assumption that he would have succumbed but for its use.

On February 13, 1953, the pack was removed under a general anaesthetic and a drainage tube inserted for 48 hours. By February 18, 1953, the wound had healed and the patient's condition was satisfactory apart from some atelectasis at the base of his right lung. He was discharged symptom-free on March 3, 1953.

During the critical four days following the operation there was no evidence of any major biochemical upset and, apart from some anaemia (Hb. 9.3 g.; February 9, 1953), the blood picture was normal. The urinary chlorides as estimated by the Fantus (1936) test did not fall below 4 g. per litre in any specimen voided, and glycosuria did not occur. On February 8, 1953, the plasma sodium was 310 mg. per 100 ml. (135 m.eq. per litre), the NaCl 610 mg. per 100 ml. (106 m.eq. per litre) and the potassium 17.5 mg. per 100 ml. (4.5 m.eq. per litre). The blood sugar estimations on February 8, 9 and 10 were 100 mg. per cent., 80 mg. per cent. and 120 mg. per cent. respectively. On February 10, 1953, the following readings were obtained:—Alkaline phosphatase, 7 units; thymol turbidity, 2 units; thymol flocculation, 0; zinc turbidity, 6 units; colloidal gold, 3; serum bilirubin, 0.6 mg. per cent. The pathologist's report on the adrenal tissue fragments found at operation confirmed their nature but did not reveal the basic lesion. On February 23, 1953, the ketosteroid excretion was 12.7 mg. per 24 hours (urine volume 1,865 ml.). A blood culture taken on return to the ward after operation and before the commencement of penicillin was negative.

The patient was readmitted on March 12, 1953,

with a complaint of further pain in the right loin for three days. The pain was of much less intensity than that experienced formerly but was causing him much anxiety. Examination revealed some tenderness in the right loin posteriorly but no abdominal signs and no shoulder pain; temperature 101°F ., pulse 100 per minute, B.P. 100/70. X-ray of the chest and abdomen were negative but screening showed that although the diaphragm was within normal limits the right side did not move as freely as the left which was hardly unexpected in view of the recent history. The condition was considered to be a residual haematoma which had probably become infected, but exploratory aspiration in the theatre was negative; the W.B.C. was 9,000. He was treated with aureomycin for eight days without any improvement in the pyrexia and then penicillin was substituted with good effect. The pyrexia and loin tenderness disappeared completely after a further six days and the patient remained symptom free up to his final discharge on May 1, 1953.

Discussion

Pathology. The condition of spontaneous adrenal haemorrhage in the adult appears to be of quite a different origin to that occurring in infancy and childhood. In the latter, the Waterhouse-Friderichsen syndrome is due to a septicaemia by the meningococcus in 60 per cent. and by either a pneumococcus or haemolytic streptococcus in the remaining 40 per cent. (Thorstad, 1942).

In the adult a variety of lesions were found in the 24 cases reviewed by Thorstad (1942). These were listed as follows, viz.:—Trauma, six; thrombosis, one; phlebothrombosis, one; leukaemia, one; carcinoma, one; pregnancy, one; infection, three; metastases, three; embolism, one; convulsions, one; uraemia, one; unknown, six.

It will be noted that trauma appeared to be causative in six of the 24 cases (25 per cent.), whilst another 25 per cent. were frankly 'idiopathic.' The other 50 per cent. were associated with lesions of dubious significance in relationship to the adrenal catastrophe.

According to Dudgeon (1904) the lesion is usually bilateral but unilateral cases are generally of enormous size and occur most frequently on the right—possibly related to the fact that its vein drains directly into the inferior vena cava.

The morbid anatomy of the gland conforms to one of three patterns, viz.:—

1. The whole gland is converted into a blood sac.
2. Medullary haemorrhage with sparing of the cortex.

These two types were associated with throm-

bosis of the suprarenal vein and if bilateral are fatal.

3. Scattered haemorrhages—chiefly medullary with little or no parenchymatous destruction. This type is usually associated with acute infectious disease and is not usually fatal.

Clinical Features and Diagnosis

Arnoud (quoted by Laverson, 1908) describes three types of presentation:—

1. *Peritoneal type.* This is very like acute pancreatitis with profound 'shock' terminating in death in coma.

2. *Progressive asthenia* associated with hypochloroemia and culminating in death.

3. *Nervous type* associated with delirium, convulsions and typhoid-like state.

Laverson (1908) describes a type presenting as sudden death in infancy with no other lesions apparent at autopsy apart from the adrenal haemorrhage. In children, adrenal haemorrhage may occur as part of a general septicaemia associated with purpura involving the viscera and skin and often accompanied by hypoglycaemia (Friederichsen-Waterhouse syndrome). Inevitably the clinical picture is usually complex since it is governed by at least three factors, viz.:—Adrenal insufficiency, haemorrhage and the underlying causative factor whatever that may be.

Diagnosis, particularly in the adult is very difficult and most unlikely to be made during life except at laparotomy. Retroperitoneal bleeding might be expected to produce signs of peritoneal irritation and loin tenderness as was present in the case described herewith, in which event exploration would probably be undertaken. Should the clinical picture simulate acute pancreatitis it is likely that conservative management may be adopted and the diagnosis missed in the event of recovery or in the absence of autopsy.

If adrenal apoplexy is included in the differential diagnosis of an 'acute abdomen' the clinical picture of marked loin tenderness associated with homolateral tenderness and rigidity of the abdominal wall, with absence of free gas under the diaphragm, normal urine, normal blood picture (high leucocytosis has been reported in some cases—Thorstad, 1942), normal serum amylase and lipase and normal antithrombin titre (Innefield *et al.*, 1952), might suggest the diagnosis. In the event of a history of trauma (present in 25 per cent. of Thorstad's cases), a ruptured kidney or other viscus is a very much more likely diagnosis or, in the absence of trauma, high retrocolic appendicitis, leaking duodenal ulcer, spontaneous rupture of a renal 'tumour' (hydronephrosis or cyst) or a leaking aneurysm would most certainly

take rightful precedence in diagnosis over adrenal apoplexy.

Treatment

To date treatment has been of little more than theoretical interest. Thorstad (1942) enumerated rest, adrenalin, adrenal cortical extract, maintenance of normal water balance and blood chemistry, intravenous fluids including blood and plasma and chemotherapy. He suggested the use of desoxycorticosterone but there were no reports of its use up to the time of his paper (1942). It was admitted that surgery theoretically offered a little hope in unilateral cases but none in bilateral ones.

The present case suggests that if at laparotomy the diagnosis is established, bleeding might be arrested and hypotension brought under control with the aid of noradrenaline which appeared to play a decisive role in the management of this particular case. As far as could be ascertained, the cortical constituents of the adrenal played no significant part in the clinical course of the con-

dition, probably owing to the fact that the lesion was unilateral.

Summary

1. A case of unilateral adrenal apoplexy in an adult and its successful management is described.
2. The pathology and clinical features are discussed.
3. The use of noradrenaline was thought to have played a decisive role in the control of hypotension which was a prominent feature in this case.

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