the contrary, close linkage between the translocation and the ABO, Rh, or MNS systems has been excluded.

A full report of this investigation is being prepared for publication in the *Annals of Human Genetics*.

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Medical Memoranda

Two Cases of Strychnine Poisoning in Children

Accidental strychnine poisoning in children must, these days, be fairly uncommon. I am reporting two cases of strychnine poisoning in young children as a result of eating Easton's tablets, each tablet containing 1/60 gr. (1 mg.) of strychnine. Both children were admitted to the casualty department of the Bradford Royal Infirmary, where treatment of the acute poisoning was eventually undertaken by members of the anaesthetic staff. After recovery from the acute stage both children were transferred to the Bradford Children's Hospital. They had both developed a mild bronchopneumonia, which was successfully treated with antibiotics.

CASE REPORTS

Case 1.—A boy aged 4 years was admitted to the casualty department on September 6, 1960, at 11 a.m. with a history of having swallowed 50 Easton's tablets one hour previously. On admission he was having convulsions. Attempts were made to wash out the stomach, and 4 ml. of paraldehyde was given intramuscularly. At 12 noon a resident anaesthetist was called to see him. She gave him 50 mg. of suxamethonium chloride and intubated him with a cuffed endotracheal tube, instituting controlled respiration. I first saw him at 1.15 p.m. He was still having convulsions and his general condition was poor. Administration of 2 ml. of 2.5% thiopentone immediately controlled the convulsions. An intravenous saline drip was set up, and at 1.30 p.m. a further 2 ml. of 2.5% thiopentone and 4 mg. of tubocurarine were given. Controlled respiration was again instituted. At 1.40 p.m. 2 gr. (0.13 g.) of intramuscular phenobarbitone was given, and the patient was transferred to a ward. Gastric lavage was continued. At 7.35 p.m. it was considered safe to remove the endotracheal tube. The child remained under observation, and during the next day was sedated with intramuscular phenobarbitone as he still had marked muscular hyperexcitability. He was discharged home from the Bradford Children's Hospital on September 15.

Case 2.—A boy aged 2½ years was admitted to the casualty department at midday on August 11, 1961, with a history of having swallowed about 20 Easton's tablets. He was having convulsions on admission. Gastric lavage was started and 4 ml. of paraldehyde was given intramuscularly. I was called to see him at 12.20 p.m. He was still having convulsions and was very cyanosed. 2 ml. of 5% thiopen-

tone and 5 mg. of tubocurarine were given, and he was intubated with a cuffed endotracheal tube. Controlled respiration was instituted with oxygen. Gastric lavage was continued with good effect. He was then transferred to a ward, where the convulsions were controlled by continued small doses of thiopentone administered as required in a saline drip, and intramuscular phenobarbitone. Gastric lavage was also continued. At 8.30 p.m. it was thought safe to remove the endotracheal tube. He was discharged home from the Bradford Children's Hospital on August 15.

COMMENT

The treatment of strychnine poisoning is a matter of considerable urgency, and one in which the trained anaesthetist can play a useful part. The first and most important step in the treatment is to control the convulsions (Statham, 1956). This is done most effectively with an intravenous barbiturate and a muscle relaxant. It is of course necessary to be able to intubate the patient and institute controlled respiration after administration of these drugs. The second step is to eliminate the strychnine as completely and as quickly as possible.

The two reported cases indicate that if treatment is properly instituted the patients soon recover from the acute poisoning. Any complicating chest infections can then be treated with antibiotics.

I thank the anaesthetic staff of the Bradford Royal Infirmary who helped me with the treatment of the two cases.

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A Case of Double Arteriovenous Fistula

Most patients who received arterial injuries in the 1939–45 conflict will have had definitive treatment. The case here reported is unique not only because of the late onset of symptoms but also because of the presence of two arteriovenous fistulae in the same limb.

CASE REPORT

While serving in Eritrea in 1941 a man, now aged 41, received multiple puncture wounds in the left lower limb from a bursting grenade. He was off duty on this account for 10 weeks, subsequently serving in the Sicilian and North-west European theatres of operations, and being discharged from the Services Category A1 in 1946.

In 1951 he attended hospital for treatment of an eczematous condition of the left leg following a kick at football. This condition recurred in 1952, and on admission to hospital for its treatment many varicosities were noted around the left ankle. The latter were not regarded as severe enough to warrant surgical intervention, and the eczema cleared up with local applications, superficial x-ray therapy, and supportive bandaging. A further injury at football in 1960 was followed by the development of an ulcer over the lower half of the lateral aspect of the left calf. During the four months prior to this he had noticed increased swelling and a sensation of heaviness in the leg.

He was first seen by one of us (W. A.) at the Bradford Royal Infirmary on November 18, 1960.

On examination the left leg was thicker than the right, the difference in circumference being 1 in. (2.5 cm.), and numerous small punctate scars were evident in its anterior and medial aspects. From 6 in. (15 cm.) below the knee to the ankle the skin was pigmented, varicosities being present round the malleoli and over the anterior and medial aspects of the leg below the knee. On the lateral aspect of the calf a healed ulcer extended over the lower half. On palpation the skin of the left leg below the knee was notice-

ably warmer than that of the right, the femoral and dorsalis pedis pulses were present, and a thrill could be felt over the midpoint of Hunter's canal; a second thrill was also detected on the antero-medial aspect 6 in. (15 cm.) below the level of the knee-joint. A bruit could be heard on auscultation at these sites, that in the thigh being well conducted towards the inguinal ligament.

The blood-pressure, measured on two occasions, was 140/100 and 145/90. No enlargement of the heart could be detected. Blood haemoglobin was 108% (16 g./100 ml.) and W.B.C. 6,000/c.mm.

Pre-operative arteriograms (F.K.D.) were taken on March 10, 1961. Straight films showed widespread distribution of small shrapnel fragments lying mainly in the medial side of the left thigh and calf. Arteriograms taken after percutaneous puncture of the right femoral artery, using the Seldinger method, showed a considerably increased rate of flow to the left lower limb. The left common and external iliac arteries were grossly dilated and tortuous, and took the greater proportion of the circulation at the aortic bifurcation. Two arteriovenous fistulae were demonstrated.

The proximal fistula was clearly outlined as a small channel running horizontally and connecting the superficial femoral artery in Hunter's canal to the deep femoral vein (Fig. 1). Shunting of the opaque medium (60% "urografin")

FIG. 1.—Arteriogram of femoral artery taken $\frac{7}{3}$ second after injection, showing arteriovenous fistula in Hunter's canal and dilated veins.

was so rapid that both the iliac artery and the grossly dilated iliac vein were demonstrated simultaneously on the same film.

A second arteriovenous fistula was demonstrated as a communication between the posterior tibial artery and the deep tibial veins 6 in. (15 cm.) below the knee-joint, rapid shunting being evident with filling of the varicose superficial veins (Fig. 2).

Operation.—This was performed by one of us (A.N.) on March 17. The left femoral artery and vein were exposed in Hunter's canal above and below the site of the fistula. Marked dilatation of the superficial subcutaneous vessels was noted. The fistula was gradually approached by dissection, and after heparinization the artery and vein were clamped above and below the fibrous mass enclosing it. Further dissection exposed a small fistulous track $\frac{1}{8}$ to $\frac{3}{16}$ in. (3.2 to 4.8 mm.) in length, but approximately $\frac{1}{4}$ in. (6.4 mm.) in width, connecting the artery and vein, a large muscular branch leaving the artery immediately distal to it. The fistula was excised and the artery and the vein were each closed by a continuous silk suture. A second incision

was made over the medial aspect of the calf, numerous varicosities being encountered. The posterior tibial artery was exposed above and below the fibrous mass enclosing the fistula, as determined by the localized thrill on palpation, and divided between ligatures at both points. All veins leaving the mass were divided between ligatures.

The effect of the heparin was reversed with protamine sulphate and both incisions were closed.

The post-operative course was uneventful, anticoagulant therapy being started on the fifth post-operative day. The decreased size of the leg was noticeable after the second day. The patient was allowed up on the fourteenth day and discharged home; he attended for regular control of the anticoagulant therapy. He resumed his pre-operative work as an engineer on May 17.

On August 25 the left leg was the same size as the right and all sensation of heaviness had disappeared, while the eczematous condition had cleared. No thrill or bruit could be detected. Post-operative arteriograms were now taken, using the same technique as previously (F.K.D.). The left common and external iliac arteries were seen to have

FIG. 2.—Arteriogram of tibial vessels taken $4\frac{1}{2}$ seconds after injection, showing second arteriovenous fistula 6 in. (15 cm.) below knee-joint.

FIG. 3.—Arteriogram taken five months after obliteration of fistulae.

remained tortuous and dilated although their diameter had decreased from 1.5 to 1.3 cm., indicating a reduction of cross-sectional area by 25%. Successful obliteration of both fistulae was demonstrated, although some relative narrowing of the dilated femoral artery was observed at the site of the repair. A good flow was evident below this. At the site of the obliterated posterior tibial fistula an adequate collateral circulation was shown (Fig. 3).

COMMENT

Multiple traumatic arteriovenous fistulae in a limb are rare, while it must be unique for the onset of symptoms to be delayed as long as in the present case. This delay was advantageous in that a good collateral circulation had developed, but against this must be set the definite disadvantage that some permanent damage to the venous system of the limb had occurred, producing deficiency of the venous valves and varicosities. Fortunately no cardiac enlargement had developed.

Arteriography was invaluable not only as a means of locating the fistulae but because it gave accurate and precise information on the size of the fistula and adjacent connexions. The rapidity of flow through the fistula and vein often prevents satisfactory delineation of the defect. In this case the successful arteriograms were obtained by taking a rapid series of films of the whole limb at intervals of 1/3 second, it being important to begin taking the films at the commencement of the injection of opaque medium and to continue the series during the injection phase.

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Palmar-arch Thrombosis

The arterial anastomoses in the palm are so free that obstruction of one of the main vessels does not normally produce any appreciable impairment of the circulation in the fingers. Jackson (1954) records a case of traumatic thrombosis of the ulnar artery in the palm causing ischaemia of the middle finger, and quotes two previous similar reports; in all three the symptoms were relieved by resection of the thrombosed arterial segment. These seem to be the only instances of this condition appearing in the literature, though Cameron (1954) has a case of similar but more acute symptoms arising spontaneously and being relieved by division of the volar carpal ligament.

CASE REPORT

A builder's labourer aged 60 used the common practice in the trade of catching bricks, tossed from one worker to another, in the left hand. Six weeks prior to being seen he developed pain and numbness in all the fingers of that hand but not in the thumb. The symptoms became gradually more severe; the fingers felt swollen and the pain became intense, particularly at night. It was slightly improved by elevating the hand in a sling.

On examination the tips of all the fingers in the left hand were pale and slightly cyanotic, the pallor extending to the proximal interphalangeal joints. The fingers were cold and were hypersensitive to light touch, pressure causing intense pain. The pulp of the middle finger was indurated. The colour and sensation in the thumb were normal. The radial pulse was present, and the ulnar artery could also be felt pulsating at the wrist. The vessels were thickened and the blood pressure was 240/120. There were no other abnormal cardiovascular or neurological findings.

Anticoagulant therapy was started with phenindione 100 mg. b.d. on the first day followed by 50 mg. b.d. The prothrombin time was increased from 20 seconds to 30 seconds and being maintained at this level without any relief of the symptoms. The cervico-dorsal sympathetic chain was then injected with lignocaine, producing a Horner's syndrome and the following rises in skin temperature after 30 minutes: index finger, 28.6 to 31.4° C.; middle finger, 27.4 to 31.0° C.; and ring finger, 24.2 to 28.6° C. This relieved the pain and sensation of numbness in the index and ring fingers temporarily but did not affect the subjective symptoms in the middle finger.

After a week the hand had relapsed to its original condition; all four fingers were painful, pale, cold, and hyperaesthetic, the middle finger being the most severely affected. The phenindione was therefore discontinued and the ulnar artery was explored. A small firm bluish swelling of the artery was found just proximal to the origin of the digital branch to the ulnar side of the little finger; it did not transmit the pulse. The swelling was excised between ligatures and sent for section. The strength of pulsation in the proximal end of the artery increased immediately.

On recovery from the anaesthetic the pain in the hand was completely relieved. The fingers were all normally warm and pink though the pulps of the middle and ring fingers were still tender. A week later only the indurated pulp of the middle finger caused discomfort; a fortnight after this the induration had almost completely resolved, there was no pain, and the circulation in all the digits was normal.

Pathological Report: "Section of ulnar artery shows successive waves of thrombosis gradually occluding the artery. The early thrombi have undergone organization with considerable small-channel revascularization."

COMMENT

The hands of manual workers are exposed to often-recurring minor trauma for long periods; it is surprising that thrombosis of the palmar vessels is not encountered more often. It may be that the condition is not recognized, the symptoms being ascribed to vasomotor disorders arising around the thoracic outlet; or it may be that it occurs without any but mild transient symptoms because of the development of an adequate collateral circulation. The failure of this development in the presence of numerous anastomoses is remarkable and can only be attributed to reflex spasm. This would appear to be confirmed by the dramatic response to excision of the local lesion, though the simple operative decompression of the palmar circulation may also have had a beneficial effect. The result of the sympathetic block suggests that a cervico-dorsal sympathectomy might be effective, but it is a more severe procedure with less certain results. Resection of a coincident cervical rib or fibrous band would clearly be useless.

It is important to recognize the true nature of the vascular disease so that the patient is not subjected to unnecessary major operations in the root of the neck when a comparatively minor procedure in the hand is all that is required. The failure of conservative measures reported by previous observers has been confirmed in this case, so that delay in resorting to operative treatment appears to be unjustified.

I am grateful to Dr. J. H. D. Millar for referring this patient and to Dr. J. D. Hopewell for the pathological report.

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