At necropsy 18 hours later the only evidence of disease was in the coronary arteries, both of which were calcified, and the right artery was completely occluded. There was no evidence of multiple emboli.

The LD 50 of the batch of ferrivenin when originally tested was approximately 300 mg. of iron per kg. of body weight in mice, and a recent toxicity test on the same batch showed no significant departure from this original figure.

COMMENT

Trivial and severe reactions to the use of intravenous ferrivenin have previously been reported. This case in which sudden death followed the first injection emphasizes the necessity for care: the initial dose should not exceed 25 mg. and the possibility of severe reactions even in patients who have had repeated injections should be kept constantly in mind.

We are indebted to Dr. R. A. Hickling for permission to publish details of this case.

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REFERENCES

- Davidson, L. S. P., and Girdwood, R. H. (1948). *British Medical Journal*, 1, 733.
Govan, A. D. T., and Scott, J. M. (1949). *Lancet*, 1, 14.
Mitchell, D. (1949). *J. med. Ass. Eire*, 24, 25.
Mooney, F. S. (1950). *British Medical Journal*, 1, 1267.
Nissim, J. A. (1947). *Lancet*, 2, 49.
— and Robson, J. M. (1949). *Ibid.*, 1, 686.
Ramsey, A. S. (1950). *British Medical Journal*, 1, 1109.
Sinclair, R. J. G., and Duthie, J. J. R. (1949). *Lancet*, 2, 646.
Slack, H. G. B., and Wilkinson, J. F. (1949). *Ibid.*, 1, 11.

Long-delayed Rupture of Spleen: Report of Two Cases

Delayed bleeding occurs in about 15% of all splenic injuries, the latent period varying between a few hours and many days. According to Zabinski and Harkins (1943) this latent period is less than seven days in 50% of the cases and less than 14 days in a further 25%. They could find only eight reported cases in which the delay was longer than 19 days, one of these being as long as two years. The following cases are of interest mainly on account of their long latent period—22 and 26 days respectively.

CASE REPORTS

Case 1.—A soldier aged 22 was admitted to a military hospital in 1942 with gunshot wounds of his feet and hands, sustained when he was blown up by a landmine. He had apparently no other injuries. These wounds healed, and on the 22nd day after injury he reported to the commanding officer's office for discharge from hospital. Here he collapsed with sudden severe abdominal pain and considerable shock. After resuscitation a laparotomy was performed and a ruptured spleen removed.

Case 2.—A married woman aged 29 was brought to hospital in November, 1950, having collapsed in the street with sudden severe upper abdominal pain, radiating to the tip of the left shoulder. She gave a history of a fall from a chair 26 days before, when she had "bruised" her left side. After this injury she had been confined to bed for five days with severe pain in her left side and shoulder. She had then returned to her work as a school teacher, which included "keep-fit exercises." She had experienced a dull ache in her side but no severe pain until her sudden collapse. On examination she was shocked and very pale. There was great tenderness in the upper abdomen, with rigidity in the left hypochondrium and loin. At operation, after resuscitation, the peritoneal cavity contained a fair amount of liquid blood. Examination of the spleen showed a small tear on the costal surface with a large amount of surrounding clot. Splenectomy was performed, and the patient made an uneventful recovery.

COMMENT

Numerous theories have been advanced to account for the latent period. The formation and later rupture of a subcapsular haematoma probably account for some cases, and McIndoe (1932) points out that the severity of the tear as found at operation may be much greater than the original injury suggests, and that it is possible that the haematoma ruptures with almost explosive violence, causing the very sudden collapse of the patient.

The theory of the perisplenic haematoma as advanced by McIndoe and later by Delannoy (1939) seems to fit in with the symptoms in many cases and with the findings at operation of large amounts of clotted blood in the region of the spleen. Other theories are: intrasplenic bleeding controlled by pressure of the haematoma on the pulp; temporary haemostasis due to shock; tamponade by omentum, colon, stomach, etc. McIndoe places these injuries in three categories: (1) minor capsular rupture or parenchymal injury; (2) subcapsular haematoma; and (3) capsular haemorrhage with perisplenic haematoma. Of these, Nos. 2 and 3 are the most important.

Delannoy associated these pathological lesions with the symptomatology, and suggested two clinical types. (1) Splenic rupture with delayed haemorrhage. This corresponds with McIndoe's subcapsular haematoma and usually with a symptom-free latent period. (2) Rupture with retarded symptoms, corresponding with the perisplenic haematoma. Here the latent period may be marked by pain of varying severity occurring in the left hypochondrium and shoulder or sometimes by generalized abdominal discomfort.

Examination at this stage will reveal persistent tenderness and rigidity in the left upper quadrant, and x-ray films may show a paralysed diaphragm on this side. Other symptoms are pallor, weakness, dizziness, and fainting attacks, though these latter are probably more common with a slow continuous leak than with true delayed rupture. A number of such cases have been recorded, and one reported by Coyle, Kleiman, and Smith (1950) presented with gradual abdominal distension and anaemia.

The cases reported here fit well into these clinical categories. Case 1 had no symptoms referable to the abdomen between the time of his injury and his collapse 22 days later. Case 2 experienced intermittent pain in the left hypochondrium, and at operation a large clot was found around the splenic region, with liquid blood in the rest of the peritoneal cavity.

The pain in these cases is usually sudden and severe, and most commonly felt in the splenic region. Zabinski and Harkins reported the frequency of associated fractures of the ribs—a fact previously recognized by McIndoe, who stressed the importance of keeping under observation for at least 14 days any patient with an injury to the left side, particularly if complicated by fractured ribs. It must, however, be remembered that delayed rupture of the spleen can occur after quite a trivial and sometimes forgotten injury, and it is probable that many, if not all, the cases reported as "spontaneous rupture of a normal spleen" fall into this category.

My thanks are due to Mr. Stanley O. Aylett for his helpful advice and for permission to publish these cases, which were treated under his care.

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REFERENCES

- Coyle, J. A., Kleiman, A., and Smith, M. K. (1950). *N.Y. St. J. Med.*, 50, 1264.
Delannoy, E. (1939). *Mém. Acad. Chir., Paris*, 65, 279.
McIndoe, A. H. (1932). *Brit. J. Surg.*, 20, 249.
Zabinski, E. J., and Harkins, H. N. (1943). *Arch. Surg.*, 46, 186.