Intra-abdominal Injuries in the Battered Baby Syndrome

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Gornall, P., Ahmed, S., Jolleys, A., and Cohen, S. J. (1972). *Archives of Disease in Childhood*, 47, 211. **Intra-abdominal injuries in the battered baby syndrome.** In the period 1961 to 1970 six battered children suffering from intra-abdominal visceral injuries were treated in the children's hospitals of Manchester. In addition to the signs of visceral lesions all the children were found to have histories and physical signs clearly pointing to the diagnosis of the battered baby syndrome. Epigastric and small intestinal injuries predominated in these children, and in this respect the pattern of trauma differs from that seen in children injured in road traffic and other accidents. Delay in referral contributed strongly to the death of two of the battered children.

Six cases of abdominal visceral injuries in the battered baby syndrome were treated in the children's hospitals of Manchester during the period of 1961 to 1970. These are compared with 69 other cases of abdominal visceral injuries, seen during the same period, which were due to road traffic accidents, injuries from sport, falls from a height, and accidents on derelict building sites (Table I).

TABLE I

Mode of Trauma in 75 Cases of Visceral Injury Treated in the Manchester Children's Hospitals, 1961 to 1970

	Cases	Deaths
Road traffic accidents	41	4
Other accidents	28	—
Battered children	6	2

Case Reports

Case 1. A boy aged 2 was admitted with bile-stained vomiting. Three months previously he had been admitted with bruising of the penis and lower abdominal wall, and at the age of 17 months he had been in hospital elsewhere with skull and forearm fractures. On examination he was pale with multiple bruises, but investigations showed no coagulation defects, though his parents claimed he bruised easily. There were no remarkable abdominal signs on admission

and he improved a little with intravenous fluids, but barium meal showed partial jejunal obstruction (Fig. 1). Laparotomy (S.J.C.) revealed a haematoma just below the duodenojejunal flexure (Fig. 2) which was evacuated. Two further findings considered to be possible evidence of previous intra-abdominal injury were some thickening of the capsule of the right lobe of the liver, and several small intestinal adhesions in the epigastric region which were divided. The child made a full recovery and went to a foster home for 6 months.

Case 2. A girl aged 2 years 8 months was transferred from another hospital with vomiting and a history that she had bumped herself on a chair two days before. Previously she had been admitted at 8, 17, and 29 months of age for failure to thrive. Though her weight had been well below the third centile on each admission, she gained weight well on a normal diet while she was in hospital. Investigation for malabsorption and intercurrent disease were negative. On examination she was pale and dehydrated with sunken eyes, and had bruises on her trunk, limbs, and face. Abdominal distension was also noted, but appeared less obvious when she had vomited. She was rehydrated by intravenous fluids, but signs of peritonitis supervened. At laparotomy (S.A.) 200 ml bile were aspirated from the peritoneal cavity and exploration revealed complete avulsion of the common bile duct from the duodenum. The duct was reimplanted over a T-tube. Post-operatively the patient recovered slowly. A T-tube cholangiogram performed on the 17th day was satisfactory and the tube was then removed. The patient was discharged home, but outpatient attendances since discharge have been irregular. She was last seen 8 months after operation when she was still very small and underweight for her age.

Received 16 November 1971.

FIG. 1.—Barium meal of Case 1 showing upper jejunal obstruction from an intramural haematoma.

Case 3. A girl aged 1 year 9 months was admitted with a story of having been dropped accidentally 3 hours before, when her father had been throwing her up playfully, and of vomiting since then. Clinically she was severely shocked, the systolic blood pressure being 50 mmHg. There was bruising of the upper abdominal wall, dorsum, forehead, and knees. X-rays showed healing fractures of the right 5th, 6th, and 7th ribs. Resuscitation with intravenous fluids had some effect in the 2 hours before laparotomy (S.A.). This revealed two anterior lacerations in the liver, a tear in the jejunal mesentery, and a retroperitoneal haematoma. Postoperatively on the second day she convulsed and survived cardiac and respiratory arrest, but she died on the fourth day.

Necropsy confirmed the clinical and operative findings. No intracranial lesion was found to account for her convulsion.

Case 4. A boy aged 2 years 4 months was admitted with malaise and respiratory infection. He was the second child of an unmarried mother. On examination he was pale and ill with bruises on his back, left loin, and arm, linear marks on his buttocks, and burns on both his legs. His abdomen was described as 'tense'.

Investigations showed a haemoglobin of 9.9 g/100 ml, normal clotting time and platelet count, but a reduced prothrombin concentration and prolonged bleeding time. Skeletal radiological survey revealed no fracture and intravenous pyelogram was normal. The next day his condition deteriorated and as the signs suggested intraperitoneal bleeding, laparotomy was performed

FIG. 2.—Intramural haematoma of jejunum in Case 1.

(A.J.). There was a tear of the gastrohepatic ligament and a laceration of the undersurface of the liver, bleeding from which could be controlled only by the insertion of a pack. The pack was removed gradually over 5 days, and the patient recovered well. He was discharged home on the eleventh day. *Why?*

The child was seen again at the age of 9 years for investigation for epileptic manifestations. It had also been learned that his elder sister was admitted to another hospital at 18 months of age with multiple bruises and bilateral forearm fractures.

Case 5. A girl aged 11 months was admitted with a 2-day history of vomiting bile. At 5 months she had undergone laparotomy in South Wales for rupture of the duodenojejunal flexure. There was also a history of fracture of the left clavicle. The child (Fig. 3) weighed only 6.4 kg, which was well below the third centile. She was moderately dehydrated. Abdominal x-ray showed some distension of a small intestinal loop and a few fluid levels. On a presumptive diagnosis of intestinal obstruction due to intraperitoneal adhesions, she was treated conservatively with intravenous fluids and nasogastric suction for 6 days, with some success. However, she relapsed, and at laparotomy (A.J.), though adhesions were present, the obstructing lesion was found to be an intramural haematoma of the ileum, which was evacuated. She recovered well and gained 700 g weight before discharge 3 weeks after operation. Her mother said that she bruised easily but no coagulation pathology was found on investigation.

Eight months later another obstructive episode occurred and at laparotomy (A.J.) this was attributed to recurrent adhesions. The patient returned to South Wales and was lost to follow-up in Manchester. However, it has been learned that at a later date a younger sib was battered and both are now in care.

Case 6. A boy aged 2 years 4 months was transferred from an accident department elsewhere with vomiting reportedly occurring since a large meal of spaghetti. While the history was being obtained the

FIG. 3.—Case 5 on first admission.

parents were quarrelling between themselves for not having taken the child to hospital a week earlier when he was said to have fallen downstairs. On examination he was shocked, with bruises all over the body, black eyes, a haematoma of the forehead, and a cut on the penis. X-rays showed an occipital fracture and periosteal thickening of the distal metaphysis of the left radius. Erect abdominal x-ray showed gas beneath the diaphragm (Fig. 4). Laparotomy (A.J.) revealed severe peritonitis from a large perforation of the pelvic colon, which was exteriorized. The child died the next day.

Necropsy reinforced the clinical findings. The skull fracture appeared to be some weeks older than the colonic injury, but was not associated with any intracranial lesion.

Discussion

Diagnosis. Kempe wrote in the paper in which the term 'battered child' was originally coined (Kempe *et al.*, 1962), 'The syndrome should be considered in any child exhibiting evidence of the fracture of any bone, subdural haematoma, failure to thrive, soft tissue swelling, or skin bruising, in any child who dies suddenly, or when the degree and type of injury is at variance with the history given . . .'. In each of the reported cases two or

FIG. 4.—Erect abdominal x-ray of Case 6.

more of these criteria were seen, except that none suffered subdural haematoma. Also in this series there are criteria emphasized by the NSPCC (Skinner and Castle, 1969), viz. previous hospital attendance for injury, and a history of injury to another child in the family. In 2 cases, the parents' excuse that the child bruised easily was not supported by laboratory investigations (Helfer, 1968).

Age. Characteristically all these children were under the age of 3 years (Table II). There were 8 others in the same age group out of a total of 75 cases of visceral injury.

TABLE II

Mode of Trauma in Cases of Visceral Injury Under 3 Years Old Treated in the Manchester Children's Hospitals, 1961 to 1970

	Cases	Deaths
Road traffic accidents	6	—
Other accidents	2	—
Battered children	6	2

Type of injury. The liver is a frequent victim in battered children, and the mortality is high. Camps (1969) reported 19 liver injuries in 100 fatal cases of battered children. Touloukian (1968a) reported 1 liver injury in 5 necropsy studies, and McCort and Vaudagna (1964) reported another 2 cases of liver injury 1 of them fatal. Simpson (1965) reported a conviction for murder after the death of sibs, both of whom suffered liver rupture. There were 2 cases of liver rupture in this series,

one of them fatal. In both of the cases violence had evidently been directed into the epigastrium.

Intestinal injuries are the most commonly reported intra-abdominal lesions in battered children. Intramural haematoma of the duodenum or jejunum is well documented (Kempe, 1971; Touloukian, 1968a; Eisenstein, Delta, and Clifford, 1965), and in some of these cases the more serious aspects of the child's clinical picture may divert attention away from the possibility of parental abuse as the cause of the injury (Stewart, Byrd, and Shuster, 1970). Two cases of intramural haematoma were seen in this series, and astonishingly in Case 5 the haematoma was the second intestinal injury received by the child, who had previously suffered a rupture of the duodeno-jejunal flexure. Rupture of the intestinal tract has also been observed (McCort and Vaudagna, 1964; Touloukian, 1968a), though surprisingly colonic rupture does not seem to have been reported previously; the case in this series died, and the parents admitted delay in bringing the child to hospital.

Avulsion of the common bile duct has not been reported before, but is in keeping with injuries in battered children to relatively fixed viscera in the epigastrium, the duodenum (Stewart *et al.*, 1970; Touloukian, 1968a), the pancreas (Bongiovi and Logosso, 1969), the root of the mesentery (Vollman, Keenan, and Eraklis, 1966), and the liver (see above).

Comparison of these injuries in battered children with the general pattern of abdominal visceral injury can be made from Table III. The kidney and spleen are the most commonly injured abdominal organs in childhood (Touloukian, 1968b), but the only reported injuries in these organs in battered children are 6 renal and 3 splenic in Camps' series (1969) of 100 fatal cases. By contrast, small intestinal injuries, including duodenal, are the most commonly reported visceral injuries in battered children. There were 2 in this series, but out of the 69 cases of accidental visceral injury, only 5 were in the small intestine.

Mortality. The 2 cases which died arrived in a state of advanced shock, and in one case delay in seeking medical advice was admitted. Neither case had extra-abdominal injuries except for bruising in the superficial tissues. By contrast all 4 fatal cases of abdominal visceral injury from road traffic accidents also suffered severe cranial or thoracic injuries which contributed to their deaths.

In conclusion, we wish to emphasize the need to be on guard in paediatric and general surgical

TABLE III

Injured Abdominal Viscera in 69 Children Accidentally Injured and 6 Battered Children, 1961 to 1970

	Road Traffic and Other Accidents	Battered
Kidney	27	
Spleen	18	
Liver	15	2
Small intestine	5	2
Large intestine	2	1
Common bile duct		1
Mesentery	1	
Pancreas	1	
Bladder	3	

Note: In 2 accidental cases both liver and spleen were injured and in one accidental case both large and small intestine.

practice for the battered child with possible abdominal injuries. The suspect case is any child, particularly under 3 years of age, with bruising or who appears undernourished, presenting with vomiting or other symptoms, however vague, relating to the alimentary tract. As indicated by the 2 fatal cases in this report, a seriously imperilled child may be seen if there is delay in referral.

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