

# Bleeding oesophageal varices with long term follow up

R A J SPENCE, G W JOHNSTON, G W ODLING-SMEE, AND H W RODGERS

*Department of Surgery, Institute of Clinical Science, Belfast*

**SUMMARY** Complete long term follow up was obtained in 27 children who had bled from oesophageal varices. Most presented with haematemesis or melaena at an average age of 5.2 years in the portal vein thrombosis group (20 children) and 9.5 years in the intrahepatic group (7 children). All had splenomegaly. Only 6 of 20 children with portal vein thrombosis had a possible precipitating factor. A total of 182 admissions for bleeding are reported, in 68 of which injection sclerotherapy was used to control bleeding. Control rate with injection sclerotherapy was 97%. Shunts performed below age 10 years were associated with a high thrombosis rate. A conservative approach to bleeding varices in children is recommended with transfusion, pitressin, and injection sclerotherapy. Oesophageal transection may have a role in the emergency management of the few children in whom bleeding is not controlled by injection sclerotherapy.

Portal hypertension in children is uncommon and presents several difficult problems in diagnosis and management. Smith and Howard in 1927 first documented haematemesis associated with splenomegaly in children and suggested that splenectomy might be of benefit,<sup>1</sup> but later reports have indicated that recurrent haemorrhage usually follows this procedure.<sup>2</sup> Traditionally, children with bleeding varices have a better prognosis than adults but there have been few long term follow up studies from a single centre.<sup>3</sup> We report complete long term follow up of 27 children with portal hypertension who bled from varices. Our study covers a period of 38 years (1945–83) in Northern Ireland.

## Materials and methods

The records of 27 children from Northern Ireland who had bled from oesophageal varices were studied. Complete follow up was obtained from hospital records and general practitioners and this was supplemented by information from the family or patients themselves.

## Clinical findings

**Age at presentation.** The age at presentation was mean (SD) 5.9 (4.4) years with a range of 3 months to 14 years. The mean age in the extrahepatic portal venous obstruction group (20) was 5.2 years com-

pared with 9.5 years in the intrahepatic group (7). There were 9 boys and 18 girls in the series.

**Presentation.** Most children (23) presented with haematemesis or melaena, but one child with  $\alpha_1$  antitrypsin deficiency presented with anaemia, two children with cryptogenic cirrhosis presented with splenomegaly, and one child with secondary biliary cirrhosis presented with jaundice. Two of the 27 children, one with secondary biliary cirrhosis and the other with chronic active hepatitis, had bleeding associated with aspirin ingestion and 7 children had an upper respiratory tract infection preceding 20 bleeding episodes (11% of all admissions for bleeding).

**Signs.** All children had a palpable spleen at presentation. Ten patients had an enlarged liver (7 of whom had portal vein thrombosis), one child was jaundiced, one child with chronic active hepatitis had encephalopathy and ascites, and one child with cryptogenic cirrhosis had a caput medusa.

**Cause of portal hypertension.** Twenty patients (74%) had extrahepatic portal venous obstruction, three patients (11%) had cryptogenic cirrhosis, one (4%) had chronic active hepatitis, one (4%) had congenital hepatic fibrosis, one (4%) had  $\alpha_1$  antitrypsin deficiency, and one (4%) had biliary cirrhosis secondary to biliary atresia (Table). Three patients in the series had radiological evidence of

Table Causes of portal hypertension in 27 children with bleeding oesophageal varices

Cause	No (%)
Extrahepatic portal vein obstruction	20 (74.1)
Cryptogenic cirrhosis	3 (11.1)
Chronic active hepatitis	1 (3.7)
Congenital hepatic fibrosis	1 (3.7)
$\alpha_1$ antitrypsin deficiency	1 (3.7)
Secondary biliary cirrhosis	1 (3.7)

recanalisation of a previously thrombosed portal vein.

Of the 20 patients with extrahepatic portal venous obstruction, the medical history of 6 children (30%) showed probable predisposing factors—two children had had umbilical sepsis and osteomyelitis, one neonatal gastroenteritis, one volvulus neonatorum with umbilical vein catheterisation, one an exchange transfusion, and one staphylococcal septicaemia.

**Associated medical conditions.** In the 16 girls with portal vein thrombosis the following abnormalities were found: congenital adrenal hypervirilism (one); coeliac disease (one); multiple intestinal angiomata (one); intersex with mental retardation (one); duplex kidney calyceal system (one); Marfanoid features (one); and sarcoidosis (one). Of the four boys with portal vein thrombosis one had sarcoidosis and one had micrognathia. One boy with cryptogenic cirrhosis had Ehlers-Danlos syndrome and one girl with chronic active hepatitis was mentally retarded.

**Hypersplenism.** Six patients (22%) in the series (four with extrahepatic and two with intrahepatic obstruction) had evidence of hypersplenism as defined by a platelet count of less than  $50 \times 10^9/l$  ( $50\ 000/\mu l$ ).

**Admissions for bleeding.** The 27 children had a total of 182 admissions for bleeding from varices, an average of 6.7/child. The average number of bleeding episodes from varices between first and last haemorrhage was 1.5/year. The 15 children who survived beyond 17 years, however, had fewer bleeding episodes, averaging only 0.11/year.

**Injection sclerotherapy.** Injection sclerotherapy with the rigid oesophagoscope was used to control bleeding in 68 admissions in 18 children (16 with extrahepatic portal venous obstruction, two with cryptogenic cirrhosis). The sclerosant used in all injections was ethanolamine oleate.<sup>4</sup> All injections were carried out to control acute bleeding and no child received sclerotherapy for chronic bleeding. In

only two patients did injection sclerotherapy fail to control the bleeding—one dying from haemorrhage and the other requiring emergency surgery. Control rate with injection sclerotherapy was 97% in the series. Most bleeding episodes were controlled by one injection and the total average number of injections/child requiring sclerotherapy was 3.8 in the series. Delayed perforation of the oesophagus was seen in two children after injection; one child had emergency colonic replacement and later died from anastomotic dehiscence and mediastinitis and the other survived after drainage of the resultant empyema. One child developed an oesophageal stricture after 8 injections for bleeding, and required three dilatations. One child died of variceal bleeding after sclerotherapy failed to control bleeding and of the remaining injected patients there were two late deaths—one from rupture of the aorta and one from cerebrovascular accident, 7 and 12 years after presentation respectively. Follow up of the 16 patients surviving acute injection sclerotherapy ranged from 6 to 30 years, mean 16.4 years, median 16 years.

**Definitive surgery.** During the 38 year period reviewed in this study a wide range of operations for the management of bleeding varices in children was in vogue; indeed many of the children in this series had several different procedures. In the early years splenectomy alone was carried out in 7 patients (26%), one with  $\alpha_1$  antitrypsin deficiency and 6 with portal vein thrombosis; all except one had further bleeding from varices, usually within 6 to 12 months of surgery. Four of these patients subsequently required acute injection sclerotherapy. One cirrhotic patient underwent Boerema button transection and had no recurrence of bleeding before death from liver failure 7 years later.

Eight shunts were carried out in 6 patients. One 6 year old patient with extrahepatic portal venous obstruction had a lienorenal shunt which subsequently thrombosed. One year later a lienocaval shunt was carried out with no subsequent bleeding during the 12 year follow up. Two patients with extrahepatic portal venous obstruction had conventional lienorenal shunts (at age 5 and 8 years) both of which thrombosed within 18 months with recurrent bleeding and required acute sclerotherapy for variceal haemorrhage. Two further patients, also with extrahepatic portal obstruction, had conventional lienorenal shunts at age 10 and 13 years. The latter patient had previously had a makeshift inferior mesenteric internal iliac shunt carried out as an emergency elsewhere; this thrombosed with recurrent bleeding within four months. These latter two patients have had no subsequent bleeding from

varices at follow up of 12 and 9 years respectively. A mesocaval shunt carried out on a 13 year old girl, also with extrahepatic portal obstruction, was complicated by a temporary chylous fistula. She developed recurrent bleeding varices within 10 months of surgery and required injection sclerotherapy.

Four oesophageal transections using a circular stapling gun have been done in patients with no available veins for shunts. One patient had a gastrotomy leak after transection and temporary dysphagia for 9 months. He has had no recurrent variceal bleeding during 6 years follow up. A girl aged 12 years had a transection and has had no further bleeding at three years follow up. One patient transected at 14 years of age, had a minor bleed from gastritis at 6 years follow up. One patient with portal vein thrombosis underwent emergency transection but developed recurrent varices one year later. He underwent a further transection two years later and one year later has had no recurrent variceal haemorrhage. He has, however, required several dilatations for stricture.

**Pregnancy.** Two patients in this series with portal vein thrombosis have had three successful pregnancies with normal babies. No specific problems were experienced during pregnancy.

**Deaths.** Seven patients have died. Three died from liver failure (cryptogenic cirrhosis, secondary biliary cirrhosis, chronic active hepatitis) due to progression of their disease; one girl with portal vein thrombosis died of cerebral haemorrhage (age 16 years); one girl mentioned earlier with portal vein thrombosis died after oesophagectomy for perforated oesophagus after injection sclerotherapy; and one boy who had cryptogenic cirrhosis and Ehlers-Danlos syndrome died from spontaneous rupture of the aorta. One patient in the series who had portal vein thrombosis died from uncontrollable variceal bleeding. This was the only death from bleeding out of 182 admissions for haemorrhage (admission mortality for bleeding of 0.5%). Including the death from the perforated oesophagus, the mortality after injection sclerotherapy for bleeding varices was 2.9%.

## Discussion

The portal vein thrombosis group in our series usually presented earlier (mean 5.2 years) than the intrahepatic group (9.5 years); this is similar to other published reports.<sup>5</sup> Sex distribution in the published reports varies<sup>6-8</sup> but most of the patients in our series were girls. In common with other series most patients presented with haematemesis or melaena

and all had splenomegaly.<sup>5 6 9 10</sup> In our study possible predisposing factors for portal vein thrombosis were found in 6 patients (30%); half of the series reported by Wilson *et al*<sup>5</sup> had a possible cause for portal hypertension and Shaldon and Sherlock noted a history of umbilical sepsis in 9 of 16 children with portal vein thrombosis, with exchange transfusion, pyelophlebitis, and osteomyelitis possible causes in a further three of their patients.<sup>6</sup> Only 22% of children in the study by Fonkalsrud *et al* had a form of neonatal sepsis,<sup>10</sup> however, and similarly only four of 17 patients with portal vein thrombosis had neonatal omphalitis in the series of Foster *et al*.<sup>8</sup> In several other published reports the cause of portal vein thrombosis was apparent in only a few cases.<sup>11 12</sup>

Several children in our study had important congenital abnormalities such as adrenal hypervirilism, Ehlers-Danlos syndrome, intersex, and multiple gut angiomata. It is uncertain in the small numbers involved whether congenital abnormalities are appreciably increased in these children. The association of 'congenital absence of the portal vein' with atrial septic defects has been reported in two patients.<sup>7</sup> Odièvre *et al* noted congenital abnormalities in 40% of children in their series; extrahepatic portal hypertension of unknown cause with an atrial septal defect being the most common finding.<sup>13</sup>

Only two children in our study showed good evidence of an association of variceal bleeding with aspirin ingestion, in contrast to half of the children in the series of Wilson *et al*.<sup>5</sup>

In contrast with traditional teaching, only 11% of our admissions for bleeding were preceded by a known upper respiratory tract infection. Pinkerton *et al* found a history of respiratory infection in over 50% of their children<sup>14</sup> and, although this is of doubtful value, others have suggested routine tonsillectomy as a preventive measure in children with varices.<sup>15</sup> Over one fifth of our children had evidence of hypersplenism and similar findings have been noted by others.<sup>16</sup>

As expected, the children had multiple admissions for bleeding. There was a definite decrease in bleeding episodes with increasing age, however, especially in patients aged over 17 years. This finding has been noted by others and must be due in part to further opening of collateral circulation.<sup>10 16 17</sup> Webb and Sherlock also noted a reduction in the severity of haemorrhage after age 15 years, although between the ages of 10 and 15 years the frequency and severity of the bleeding increased.<sup>18</sup>

Most children tolerated bleeding well and responded to transfusion and pitressin. Only occasionally was oesophageal tamponade required.

Injection sclerotherapy was used successfully to control bleeding in 18 patients with a 97% control rate for the 68 injections, and similar encouraging results have been reported by others.<sup>11 15 19</sup> The rigid oesophagoscope was used in all cases and there were three local complications related to injection—delayed perforation of the oesophagus in two children and stricture in one after multiple injections. Recently Stamatakis *et al* reported a consecutive series of 21 children injected for varices. Three died from primary liver disease and the remaining 18 have had no further haemorrhage at a median of 8 months follow up with a mean of 3.5 injections.<sup>20</sup>

Because of the long period of our study a wide range of definitive surgical procedures have been carried out, depending on popularity at the time. They can be divided into three groups, namely splenectomy alone, shunts, and 'direct attack' procedures. Early enthusiastic reports of splenectomy results have not subsequently been confirmed by other workers<sup>2 10 16 21 22</sup> and bleeding recurred in 6 of 7 patients in our study who underwent simple splenectomy alone.

Lienorenal shunts in our series, when carried out in patients aged below 10 years have been disappointing—all have thrombosed and the patients have bled again. Two lienorenal shunts carried out on children aged 10 and 13 years have remained patent and one child of 7 years who had a lienocaval shunt has had no subsequent bleeding. Our findings are similar to others who have noted a very high shunt thrombosis rate where the anastomosis is less than 1 cm, especially in children aged less than 8 years.<sup>14</sup> Bismuth *et al* have, however, reported a series of 90 children treated by portal diversion, with more encouraging results. In 61 shunts the veins used for anastomosis were less than 1 cm but shunt thrombosis occurred in only five children, with recurrent bleeding in two.<sup>23</sup>

Portal-systemic shunting in patients with extrahepatic portal hypertension may still give rise to encephalopathy. Voorhees *et al* found a significant incidence of encephalopathy in children 4 to 19 years after shunting procedures.<sup>24</sup>

In common with others, we found porta-azygos disconnection to be of little benefit due to the high incidence of recurrent bleeding.<sup>16 25</sup> The Boerema button procedure, although effective in preventing recurrent variceal bleeding, resulted in considerable problems with oesophageal stricture.<sup>26</sup> The most recent 'direct attack' procedure for varices, however, has been the oesophageal transection procedure using a circular stapling gun. Results in adults after a 6 year follow up are encouraging.<sup>27</sup> Four children in our study underwent transection and although our numbers are small, there may be a role

for this procedure in children—perhaps in preference to shunting procedures, with their high incidence of thrombosis and possible risk of intellectual impairment.

## Conclusions

Where the aetiology of the portal hypertension is portal vein thrombosis the patients present earlier and frequently have recurrent bleeding which usually reduces with increasing age, although an increase between age 10 and 15 years has been reported.<sup>18</sup> A history of upper respiratory tract infections as a precipitating factor was uncommon in our series. The intrahepatic group commonly presented later and the prognosis depended chiefly on the underlying liver pathology. Death was usually due to the liver disease rather than haemorrhage.

Children with extrahepatic portal hypertension tolerated haemorrhage well and a conservative approach is strongly advocated. Blood transfusion and pitressin treatment are usually sufficient but occasionally oesophageal tamponade may be required. Injection sclerotherapy is considered the treatment of choice to maintain children into their teens when bleeding becomes less frequent. Should emergency injection fail, oesophageal transection can be used as it is better tolerated in the emergency situation in children than adults. There is probably little need to risk possible intellectual impairment from shunt surgery, especially in the extrahepatic group.

The authors thank the surgeons and physicians of the Royal Belfast Hospital for Sick Children for permission to report children under their care.

## References

- Smith RM, Howard PJ. The early occurrence of gastric haemorrhage in children with splenomegaly. *Am J Dis Child* 1927;**34**:585-94.
- Foster JH, Holcomb GW, Kirtley JA. Results of surgical treatment of portal hypertension in children. *Ann Surg* 1963;**157**:868-81.
- Fonkalsrud EW. Surgical management of portal hypertension in childhood. *Arch Surg* 1980;**115**:1042-5.
- Johnston GW, Rodgers HW. A review of 15 years' experience in the use of sclerotherapy in the control of acute haemorrhage from oesophageal varices. *Br J Surg* 1973;**60**:797-800.
- Wilson KW, Robinson DC, Hacking PM. Portal hypertension in childhood. *Br J Surg* 1969;**56**:13-22.
- Shaldon S, Sherlock S. Obstruction to the extrahepatic portal system in childhood. *Lancet* 1962;**i**:63-9.
- Keighley MRB, Girdwood RW, Wooler GH, Ionescu MI. Long-term results of surgical treatment for bleeding oesophageal varices in children with portal hypertension. *Br J Surg* 1973;**60**:641-6.
- Foster JH, Sawyers JL, Scott HW. Management of portal hypertension in children. *Bulletin de la Societe Internationale de Chirurgie* 1964;**4**:398-409.

- <sup>9</sup> Hsia DYY, Gellis SS. Portal hypertension in infants and children. *Am J Dis Child* 1955;**90**:290-298.
- <sup>10</sup> Fonkalsrud EW, Myers NA, Robinson MJ. Management of extrahepatic portal hypertension in children. *Ann Surg* 1974;**180**:487-93.
- <sup>11</sup> Trusler GA, Morris FR, Mustard WT. Portal hypertension in childhood. *Surgery* 1962;**52**:664-70.
- <sup>12</sup> Walker RM. Treatment of portal hypertension in children. *Proc R Soc Med* 1962;**55**:770-2.
- <sup>13</sup> Odièvre M, Pigé G, Alagille D. Congenital abnormalities associated with extrahepatic portal hypertension. *Arch Dis Child* 1977;**52**:383-5.
- <sup>14</sup> Pinkerton JA, Holcomb GW, Foster JH. Portal hypertension in childhood. *Ann Surg* 1972;**175**:870-86.
- <sup>15</sup> Fearon B, Sass-Kortsak A. The management of oesophageal varices in children by injection of sclerosing agents. *Annals of Otolaryngology, Rhinology and Laryngology* 1959;**68**:906-15.
- <sup>16</sup> Walia BNS, Mitra SK, Chandra RK. Portal hypertension in the liver and biliary systems in infants and children. In: Chandra RK, ed. *The liver and biliary system in infants and children*. Edinburgh and New York: Churchill-Livingstone, 1979:276-95.
- <sup>17</sup> Mikkelsen WP. Extrahepatic portal hypertension in children. *Am J Surg* 1966;**iii**:333-40.
- <sup>18</sup> Webb LJ, Sherlock S. The aetiology, presentation and natural history of extrahepatic portal venous obstruction. *Q J Med* 1979;**XLVIII**:627-39.
- <sup>19</sup> Lilly JR. Endoscopic sclerosis of oesophageal varices in children. *Surg Gynecol Obstet* 1981;**152**:513-4.
- <sup>20</sup> Stamatakis JR, Howard ER, Psacharopoulos HT, Mowat AP. Injection sclerotherapy for oesophageal varices in children. *Br J Surg* 1982;**69**:74-5.
- <sup>21</sup> Arcari FA, Lynn HB. Bleeding oesophageal varices in children. *Surg Gynecol Obstet* 1961;**112**:101-14.
- <sup>22</sup> Shumacker HB, King H. Portal hypertension in children associated with gastro-oesophageal haemorrhage. *Arch Surg* 1968;**65**:499-510.
- <sup>23</sup> Bismuth H, Franco D, Alagille D. Portal diversion for portal hypertension in children. *Ann Surg* 1980;**192**:18-24.
- <sup>24</sup> Voorhees AB, Chaitman E, Schneider S, et al. Portal-systemic encephalopathy in the non-cirrhotic patient—effect of portal systemic shunting. *Arch Surg* 1973;**107**:659-63.
- <sup>25</sup> O'Donnell B, Moloney MA. Development and course of extrahepatic portal obstruction in children. *Lancet* 1968;**i**:779-89.
- <sup>26</sup> Johnston GW, Kelly JM. Early experience with the Boerema button for bleeding oesophageal varices. *Br J Surg* 1976;**63**:117-21.
- <sup>27</sup> Johnston GW. Six years' experience of oesophageal transection for oesophageal varices, using a circular stapling gun. *Gut* 1982;**23**:770-3.

Correspondence to Mr R A J Spence, Department of Surgery, Institute of Clinical Science, Grosvenor Road, Belfast, BT12 6BJ, Northern Ireland.

Received 19 December 1983