BANTI'S SYNDROME IN CHILDHOOD : A REPORT OF FOUR CASES

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Haematemesis in childhood is a rare event which may be due to similar causes to those occurring in adults, barring malignant disease. After the age of infancy the commonest disorder in which it is found is splenic anaemia or Banti's disease. The distinction between those two conditions is ill defined; they are commonly regarded as synonymous and either diagnosis is applied to a case exhibiting splenomegaly and anaemia of obscure origin, with or without haemorrhages, hepatic cirrhosis or ascites.

Banti^{1, 2, 3} described three stages of his disease—namely a pre-ascitic stage of anaemia and splenomegaly, a short intermediate stage associated with gastro-intestinal disturbances and hepatic enlargement, and a final ascitic stage of cirrhosis of the liver with ascites. He clearly differentiated his disease from Laënnec's cirrhosis, but admitted that it resembled splenic anaemia, which he had previously described in a monograph⁴. He stated that the symptoms of splenic anaemia were identical with those of the pre-ascitic stage of his disease and that distinction was virtually impossible; but he denied that his disease merely represented the last stage of splenic anaemia—in that it occurred so rarely, and because patients with splenic anaemia of even two years' duration never developed cirrhosis of the liver.

Banti was right in this last assertion when it is realized that splenic anaemia, at that time, literally meant anaemia with splenomegaly. With the advance of medicine, those conditions in which anaemia occurs with splenomegaly but without subsequent hepatic cirrhosis—such as Gaucher's disease, Niemann-Pick's disease, acholuric jaundice and achlorhydric anaemia—have been recognized as definite entities, and are no longer classified as splenic anaemia. Nevertheless there still remains a group of cases characterized by anaemia and splenomegaly, perhaps with haemorrhage and sometimes with hepatic cirrhosis, which constitute to-day the splenic anaemia-Banti's disease group.

Banti unquestionably described a syndrome produced by various pathological processes, which may be classified as follows:—

1. VASCULAR ABNORMALITIES OF THE PORTAL SYSTEM.

(a) Thrombophlebitis of the portal or splenic veins (Warthin¹⁵) has frequently been found at autopsy, but opinion is still undecided whether they are primary or secondary features. It is doubtful if these conditions can be diagnosed during life, unless they occur in massive form, when a fatal result will inevitably ensue.

(b) Persistence of the umbilical vein has been described as a condition producing Banti's syndrome.

(c) Pressure on the splenic vein by adhesions—such as occur in old tuberculous peritonitis.

2. SPECIFIC INFECTIONS.

(a) Syphilis can produce Banti's syndrome to perfection, and responds to some extent to anti-syphilitic treatment.

(b) Malaria. Many of the cases reported by Osler^{9, 10} had a definite history of malaria—the splenomegaly of which probably disordered the portal circulation, causing Banti's syndrome.

3. NO KNOWN AETIOLOGY.

This group contains cases which Banti probably had in mind, since he emphasized the lack of etiological factors and the absence of organisms in the spleen; but he admitted occasional changes in the veins of the portal system at autopsy.

Smith and Howard¹³ and Wallgren¹⁴ described cases of haematemesis without warning in young children, in whom no spleen was palpable and secondary anaemia was the only abnormal finding. This syndrome they attributed to obstruction of the splenic vein either from thrombophlebitis within it or pressure from without. Banti's disease was differentiated by its almost constant leucopenia, because its haemorrhages were preceded by malaise and occurred later in life, and because there was no decrease in size of the spleen after haematemesis—a feature which they considered to occur characteristically in thrombophlebitis of the splenic vein.

Case reports.

Four cases showing Banti's syndrome will be described and discussed. In cases 1, 2 and 3 the Wassermann reaction was negative, and the fragility of red cells, bleeding time and coagulation time normal.

Case 1.—J. S., a girl aged 6 years, was admitted to the Middlesex Hospital on February 13, 1936, with a history of having vomited undigested food and dark blood while at school the previous day; she had no other symptoms beyond some vague abdominal pain and nausea for two days prior to the haematemesis.

ON EXAMINATION she was pale, but her general condition was good. Slight epigastric tenderness was the only abnormal clinical finding. The liver and spleen were not palpable. There were no enlarged glands. Immediately after examination she vomited four ounces of dark blood.

BLOOD COUNTS: FEBRUARY 14, 1936. Hb. 68 per cent., red cells 3,420,000 per c.mm., colour index 1.0, white cells 6,450 per c.mm., polymorphs. 45 per cent., lymphocytes 52 per cent., monocytes 3 per cent. Film appearance: red cells showed slight anisocytosis and poikilocytosis. No immature red or white cells seen. Platelets appeared in normal numbers. FEBRUARY 24, 1936: Hb. 65 per cent., red cells 3,280,000, colour index 1.0, white cells 9,800, in normal proportions. Platelets 192,150.

There were no further symptoms while in hospital. She was discharged on March 4, 1936, and attended as out-patient. She was last seen April 16, 1936, having had no further symptoms. The liver and spleen were not palpable.

BLOOD COUNT APRIL 8, 1936: Hb. 87 per cent., red cells, 4,950,000, white cells 6,000.

This case comes under the heading of splenic anaemia, due to a vascular disturbance—possibly thrombophlebitis of the splenic vein as described by Smith and Howard. The haematemesis without warning, impalpable spleen and no definite leucopenia fit in with their description although the spleen had not become palpable two months after the haematemesis. The fact that the usual leucocytosis did not occur after a haemorrhage strengthens the view that the case is one of splenic anaemia. The case illustrates the point that haematemesis occurs in the absence of hepatic cirrhosis and associated gastric or oesophageal varices, of which there was no evidence; the source of bleeding is presumably leakage from distended vasa brevia. Time alone will show whether the diagnosis is correct and whether the full syndrome develops after a presumed vascular accident in the portal system.

Case 2. D. L., a girl, aged 11 years, had attended the Hospital for Sick Children, Great Ormond Street, since July 30, 1935, complaining of bilious attacks for the previous two to three years and capricious appetite. At that time the spleen was enlarged by two fingers breadth and the liver was not palpable. She was admitted for investigation in October, 1935.

BLOOD COUNT: Hb. 85 per cent., red cells 5,000,000, colour index, 0.85, white cells 5,000, in normal proportions.

The Wassermann and van den Bergh reactions were negative. Fragility of red cells and test meal were normal. She was discharged November 11, 1935, and attended as out-patient.

She continued to attend as an out-patient and in December, 1935, the spleen was noticed to be larger. There were no more 'liverish' attacks. In February, 1936, the spleen was a little larger. In March, 1936, the liver was noticed to be definitely enlarged, especially the left lobe. She was admitted to the Middlesex Hospital.

ON EXAMINATION. She had a good colour. The spleen was greatly enlarged extending down left loin almost to iliac crest. The liver was enlarged and firm. There were no other abnormal findings.

BLOOD COUNT, MAY, 12, 1936: Hb. 110 per cent., red cells, 5,420,000, white cells 5,950, polymorphs. 41 per cent., lymphocytes 54 per cent., monocytes 2 per cent., eosinophils 3 per cent., platelets 210,000, reticulocytes 2 per cent. Film appearances: red cells were regular in size and shape but showed some polychromasia. No immature red or white cells were seen.

MARCH 29, 1936. Splenectomy by Mr. D. H. Patey. The spleen was much enlarged, with adhesions to the diaphragm. The liver was seen to be enlarged and hard and its surface had a red and yellow mottled appearance but was not nodular. There was no ascites. The weight of the spleen was 274 gm. A small post-operative blood transfusion was given.

HISTOLOGY OF SPLEEN. There was relative diminution of lymphoid tissue associated with thickening of the walls of the sinusoids and hyaline degeneration of arterioles. Diffuse fibrosis of splenic pulp was present.

Convalescence was eventful. The patient was discharged June 19, 1936, with a blood count of Hb. 102 per cent., red cells 4,980,000, white cells 11,600 and platelets 519,000.

This case is classified under Banti's disease, since there is no known etiological factor present. There is reliable evidence of marked splenomegaly associated with 'bilious attacks,' followed by progressive enlargement of the liver—from being impalpable in July, 1935, to being much enlarged in May, 1936. At operation the liver was considered to be in a pre-cirrhotic state; the spleen showed the histological appearance of Banti's disease and sections of the splenic vein revealed no abnormality. The importance of this case lies in the fact that splenomegaly was present for a considerable time before the liver enlarged, thus corresponding to Banti's original suggestion of a primary splenic cause. The absence of either haemorrhage or anaemia suggests that the latter may depend more on the former than any primary splenic dysfunction.

Case 3. L. B., a girl aged 10 years was admitted to the Middlesex Hospital, May 1, 1936. She had her first haematemesis at the age of 18 months for which she was admitted to King Edward VII Hospital, Windsor. There the Wassermann was negative and she was diagnosed as a case of von Jaksch's anaemia and rickets. At the age of 5 years she had another haematemesis and she was re-admitted to Windsor, where her Hb. was 28 per cent. She had repeated haematemeses and melaena in April, 1936, for which she was re-admitted to Windsor. There her Hb. was 50 per cent. and she received a blood transfusion. She was transferred to the Middlesex Hospital after this.

ON EXAMINATION she was very pale. The spleen was firm and enlarged to two fingers breadth below the costal margin. The liver was enlarged one finger breadth. There was no ascites or enlarged glands.

BLOOD COUNT, MAY 4, 1936: Hb. 25 per cent., red cells 1,780,000, colour index 0.7, white cells 2,200, polymorphs. 56 per cent., lymphocytes 40 per cent., monocytes 3 per cent., eosinophils 1 per cent., platelets 84,700. Film appearances: red cells showed marked anisocytosis, poikilocytosis and polychromasia. No immature red or white cells seen.

MAY 13, 1936. Splenectomy by Mr. E. L. Pearce Gould. The spleen was much enlarged with many adhesions to the diaphragm. Definite coarse cirrhosis of the liver was observed. The weight of the spleen was 310 gm. A drip-blood transfusion during and after operation was given.

HISTOLOGY OF SPLEEN. Some diminution of lymphoid tissue was present with dense fibrosis of the walls of the sinusoids and periarterial fibrosis of the Malpighian arterioles. Diffuse fibrosis of the splenic pulp was also noted.

Her convalescence was uneventful. She was discharged June 4, 1936.

BLOOD COUNT, AUGUST 29, 1936: Hb. 84 per cent., red cells 4,330,000, white cells 5,020. The mother stated that the child had passed black motions occasionally since discharge.

This case, in which there is also no known etiological factor, illustrates fully-developed Banti's disease with the exception of ascites. The repeated haematemeses over a period of eight-and-a-half years are typical as regards length of time, but must be almost unique in having started at the age of eighteen months. It is possible that some vascular accident occurred in

the portal system at that time, but no histological evidence of it remains in the splenic vein, and the appearances of the spleen are typical of Banti's disease. A secondary anaemia is to be expected after recent severe haematemesis—despite transfusion—while the leucopenia, even after haemorrhages, and the thrombocytopenia are typical. The fact that the child was diagnosed as von Jaksch's anaemia at eighteen months suggests that she had splenomegaly if not hepatomegaly, at that time. The subsequent course of this patient will be interesting from the aspect of possible haematemesis after splenectomy, and whether operation will have prevented advance of the cirrhosis and onset of ascites or not.

Case 4. W. F., a girl, aged 8 years, was admitted, January, 1935, to Addenbrooke's Hospital, Cambridge, under Dr. Leslie Cole, complaining of jaundice and abdominal enlargement. She had had 'yellow jaundice' two years before admission, which had persisted since.

ON EXAMINATION there was a definite icteric tint of skin and conjunctivae. The spleen was enlarged three finger breadths, and the liver was enlarged two finger breadths below the costal margin. Eversion of umbilicus was present and distension of abdomen by ascites. Three small glands were palpable in right axilla and a few in both sternomastoid chains. There were several carious teeth.

BLOOD COUNT: Hb. 70 per cent., red cells 4,460,000, colour index 0.79, white cells 8,400, polymorphs 28 per cent., lymphocytes 68 per cent., monocytes 3 per cent., eosinophils 1 per cent. Film appearances—red cells regular in size and shape, no immature red or white cells seen. Fragility of red cells (Dr. C. H. Whittle) 'Haemolysis commences at 0.38 per cent. saline and is only 60 per cent. complete in 0.28 per cent. saline, i.e., less fragile than normal.' The van den Bergh reaction was indirect positive. The Wassermann reaction was 0/±000. The child was then given a provocative dose of 0.18 gm. sulpharsenol intramuscularly and one week later the reaction read 0/+++0. She was discharged and attended as an out-patient for anti-syphilitic treatment. The child was shown at a meeting of the Section for the Study of Disease in Childhood of the Royal Society of Medicine at Addenbrooke's Hospital, Cambridge, on June 27, 1936, seventeen months later. Her general condition was good, she had been at school since discharge from hospital and had had no further attacks of jaundice. On examination there was no ascites, the liver was just palpable only, while the spleen was about the same size. The Wassermann reaction was 0/0000.

BLOOD COUNT, JUNE 9, 1936: Hb. 70 per cent., red cells 4,350,000, colour index 0.8, white cells 8,600, polymorphs 53 per cent., lymphocytes 41 per cent., monocytes 4 per cent., eosinophils 2 per cent.

This case exhibited the clinical features of Banti's ascitic stage; the few small palpable glands alone were atypical, the cervical ones were attributed to the carious teeth. The absence of a definite leucopenia at such an apparently late stage of Banti's disease in addition to the long history of jaundice was, however, a warning that the case was not entirely

typical. The diagnosis of congenital syphilis can be justifiably criticized in this case on the grounds that the Wassermann is usually more than a weak positive in congenital disease and only becomes negative after prolonged treatment; further the child showed no syphilitic stigmata and the Wassermann reactions of her mother and small brother were negative. Despite these considerations there can hardly be any other diagnosis in the face of such dramatic and rapid response to antisyphilitic treatment; namely disappearance of long-standing jaundice, and ascites associated with an enlarged liver clinically simulating hepatic cirrhosis. Although, in theory, a positive Wassermann from non-specific causes might increase in strength with non-specific provocative therapy, in practice this is not proven and a reaction raised by provocative therapy is generally accepted as evidence of syphilis. The case is a fine example of the way in which other conditions can mimic Banti's disease, and emphasizes the care needed in diagnosis, especially to avoid unnecessary splenectomy—an operation which carries a definite mortality at any age.

General discussion.

Banti's disease is said to be rare in children. Poynton, Thursfield and Paterson¹¹ doubted if it occurred before puberty and could recall few cases in which subsequent events upheld the diagnosis, either syphilis, tuberculosis or acholuric jaundice being later recognized. The diagnosis of Banti's disease is seldom made before one of the major symptoms, such as haematemesis or grave anaemia, has occurred although examination of a child with a vague epigastric pain or swelling of the abdomen may reveal an enlarged spleen and a palpable liver. All conditions associated with splenomegaly in childhood must be excluded, and it must be remembered that the haemopoietic system of a child is unstable and reacts violently to stimuli which would have little or no effect upon an adult. The reaction may take the form of splenomegaly, hepatomegaly, enlargement of lymphatic glands and varying degrees of anaemia—such as occurs typically in von Jakseh's syndrome in response to stimuli like iron deficiency, rickets and syphilis or other infections. The two most important conditions to be excluded before diagnosing Banti's disease are syphilis and acholuric jaundice. Syphilis may exactly simulate Banti's disease, as in case 4, and hepatomegaly may accompany splenomegaly in acholuric jaundice—hence the Wassermann reaction and fragility of red cells are essential investigations. Small doses of iron, as a therapeutic test, may help to exclude an iron deficiency anaemia—but massive doses should not be given in view of Davidson's⁵ successes in the treatment of Banti's disease by such doses of iron.

It is suggested, therefore, that the term Banti's disease be confined to those cases showing splenomegaly and secondary anaemia, with or without haemorrhages and hepatic cirrhosis, but in which no known etiological factor is present. Similarly splenic anaemia should be applied to cases showing Banti's syndrome where some vascular disorder or specific infection can be recognized during life. It must be conceded, however, that

the finding of portal or splenic thrombophlebitis at autopsy on a case of Banti's disease, should not nullify the diagnosis made during life, until further work has shown whether such vascular abnormality is a cause or sequel.

Summary.

1. Banti's syndrome, although uncommon, occurs in children.
2. It is suggested that the term Banti's disease be applied to cases exhibiting the syndrome with no known etiological factor.
3. Where certain etiological factors, which are described, can be found, the term splenic anaemia should be used.
4. Four cases exhibiting Banti's syndrome are described and discussed.

Appendix.

ANALYSIS OF HAEMATOLOGICAL INVESTIGATIONS.

1. RED CELLS AND HAEMOGLOBIN ON ADMISSION.

CASE	Hb. PER CENT.	R.B.C. MILLS. PER C.MM.	C. INDEX	FILM APPEARANCES.
1	68	3.42	1.0	SLIGHT ANISOCYTOSIS AND POIKILOCYTOSIS.
2	85	5.00	0.85	SOME POLYCHROMASIA.
3	25	1.78	0.7	MARKED ANISOCYTOSIS, POIKILOCYTOSIS AND POLYCHROMASIA.
4	70	4.46	0.79	CELLS REGULAR.

Cases 1, 3 and 4 showed anaemia, with anisocytosis and poikilocytosis as might be expected in cases 1 and 3 after recent haematemeses.

2. WHITE CELLS ON ADMISSION.

CASE	W.B.C. THOUS. PER C.MM.	POLY. PER CENT.	LYMPHS. PER CENT.	MONO. PER CENT.	EOSIN. PER CENT.
1	6,450	45	52	3	—
2	5,950	41	54	2	3
3	2,200	56	40	3	1
4	8,400	28	68	3	1

Cases 1, 2 and 3 showed leucopenia, marked in case 3 and slight in cases 1 and 2. The polymorph percentage is low for children of these ages.

Absence of the usual leucocytosis following haemorrhage in cases 1 and 3 is a point of some importance; in a larger series of adult cases of Banti's disease the persistent leucopenia after haematemesis has been contrasted with the leucocytosis which occurs after haemorrhage from other causes. King⁸, however, emphasized a leucopenia occurring in hepatic cirrhosis and maintained that it could not be used as a differential point between Banti's disease and portal cirrhosis in adults.

3. PLATELETS.

CASE	PLATELETS ON ADMISSION PER C.MM.	14 DAYS AFTER OPERATION	26 DAYS AFTER OPERATION
1	192,150	—	—
2	220,000	519,000	—
3	84,700	290,000	553,000
4	90,000	—	—

Cases 1, 3 and 4 showed low platelet counts and cases 2 and 3, who were subjected to splenectomy, showed the striking post-operative rise described by Rosenthal¹² and Howel Evans⁶.

4. FRAGILITY OF RED CELLS.

In cases 1, 2 and 3 the fragility of red cells was normal—no haemolysis occurring at a saline concentration greater than 0.5 per cent. In case 4 the red cells were less fragile than normal—haemolysis beginning at 0.38 per cent. saline and being only 60 per cent. complete in 0.28 per cent. saline (Dr. C. H. Whittle). Whitby and Hynes¹⁶ mentioned the scarcity of literature on the subject of decreased red cell fragility, but gave particulars of four cases in which it had occurred following splenectomy for purpura haemorrhagica or acholuric jaundice. Fragility is also said to be decreased in pernicious anaemia, cachectic states and sickle-celled anaemia.

In case 4 the syphilitic infection may be the causal factor.

5. BLOOD INDICES AND ABSOLUTE DETERMINATIONS.

	NORMAL	CASES			
		1	2	3	4
VOLUME INDEX ...	0.95-1.05	1.15	0.92	0.83	0.98
SATURATION INDEX ...	0.9-1.2	0.93	1.0	0.7	0.76
MEAN CORPUSCULAR HB.	27-32 $\gamma\gamma$	34	28	18	22
MEAN CORPUSCULAR VOL.	80-94 CU. μ	99	79	72	84
MEAN CORPUSCULAR HB. CONC.	33-38 PER. CENT.	31	35	24	27
MEAN CORPUSCULAR THICKNESS	1.8-2.2 μ	2.1	2.15	1.75	2.18

6. PRICE-JONES DIAMETER-DISTRIBUTION CURVES OF RED CELLS by the technique of Hynes and Martin⁷ show no gross or characteristic departure from the normal.

Case 1.

Case 2.

Case 3.

Case 4.

	NORMAL	CASES			
		1	2	3	4
STANDARD DEVIATION	0.4-0.5 μ	0.53	0.49	0.64	0.50
COEFFICIENT OF VARIATION	5.3-7.3 PER. CENT.	6.9	7.1	9.0	6.5
MACROCYTOSIS ...	0	0	0	0	0
MICROCYTOSIS ...	0	0	0	1 PER CENT.	0
MEAN CELL DIAMETER	6.69-7.72 μ	7.73	6.86	7.25	7.53

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