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## Causes of gross rectal bleeding in children : (a review of sixty-eight cases)

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CAUSES OF GROSS RECTAL BLEEDING IN CHILDREN

(A REVIEW OF SIXTY-EIGHT CASES)

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Submitted in Partial Fulfillment for the Degree of  
Doctor of Medicine

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00923

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## INTRODUCTION

Gastrointestinal bleeding with gross blood passed by rectum in the pediatric patient is a relatively common condition seen by the general practitioner, pediatrician, and surgeon. In these cases, the history and clinical findings are frequently adequate to make a diagnosis, however, occasionally they are not, and rarely the etiology is not established even after celiotomy. The information in this thesis is presented to suggest diagnosis to be considered when a case of gross rectal bleeding presents itself.

The data was obtained by examination of charts at Children's Memorial Hospital in Omaha, Nebraska. These charts were pulled on the basis of etiologies known to cause rectal bleeding which occurred during the five-year period from 1954 through 1958 and were read with specific questions to be answered such as, the character of the blood, relation of passage of blood to passage of stool, and length of time since bleeding started. Associated findings such as diarrhea,

constipation, pain, family history of rectal bleeding, and physical findings were also studied. Laboratory findings such as the hemoglobin and hematocrit were noted as well as radiographic reports and information from operative procedures (proctoscopy and celiotomy).

Information obtained from review of the charts will be presented along with a review of the literature under specific headings for each condition which was studied.

A total of two hundred sixty-three charts were studied. The following table summarizes these patients:

TABLE I

<u>ETIOLOGY</u>	<u>BLED</u>	<u>TOTAL</u>
Meckel's Diverticulum	3	7
Colonic polyps	7	8
Intussusception	10	25
Gastroenteritis	7	50
Rectal fissure	14	20
Volvulus	1	7
Peptic ulceration	6	24
Ulcerative colitis	3	6

(Table I con't.)

<u>ETIOLOGY</u>	<u>BLED</u>	<u>TOTAL</u>
Rectal fistula	1	6
Hemorrhagic diseases		
Hemophilia	2	8
Leukemia	1	7
Henoch's purpura	1	1
Scurvy	1	4
Hemorrhoids	2	2
Prolapse of the rectum	0	2
Foreign bodies	1	51
Esophageal varices	0	0
Complicated inguinal hernia	1	27
Etiology not determined	<u>8</u>	<u>8</u>
	TOTAL 69	263

Other conditions which are known to produce gastrointestinal bleeding are uremia,<sup>4</sup> regional enteritis,<sup>8</sup> mesenteric thrombosis,<sup>2</sup> malrotation,<sup>31</sup> duplication of the bowel,<sup>14</sup> and primary non-peptic ulceration of the small bowel.<sup>30</sup> These conditions were not reviewed in this series.

## INTUSSUSCEPTION

Intussusception was the most common cause of rectal bleeding of a serious nature. The literature varies concerning the percentage of cases which bled, this being from 20% to 95%.<sup>1,3,15</sup> Classically the bleeding is seen as a current-jelly stool, however, it can be a thin, bloody fluid (prune-juice stool) or bright red.

The passage of blood by rectum is only one of the symptoms of intussusception, and it occurs relatively late in the course of the disease. Typically, abdominal colic is the first symptom. This is followed by vomiting and recurrent colicky pain. Abnormal bowel movements may follow. After the colonic contents are evacuated, only blood and mucous are passed. Ileus gradually develops along with other signs of intestinal obstruction. The intussusception is frequently palpable as a sausage-shaped mass, most often located in the right upper quadrant of the abdomen. Eighty-five per cent of the reported intussusceptions occur before two years of age.<sup>13</sup>



In the twenty-five cases seen at Children's Memorial Hospital for the selected period, ten bled. Of these, black stools were described in 3, bright red in four, and mixed black and red in one. No description was given as to the stool color in two cases. Nine of the patients who bled were male while only one was female compared to a 3:2 male:female ratio in the literature reviewed.<sup>26</sup> In none of the cases reviewed was diarrhea reported as an associated symptom, however, constipation was seen in five of the ten cases. Pain or signs of abdominal discomfort were noted in all of the cases. The ages of the patients ranged from three weeks to three years. Seven of the ten who bled were under one year of age.

In several reviews of the subject, it was stated that as awareness of intussusception and clinical experience with the condition increased, the incidence of associated rectal bleeding decreased. This is probably due to earlier diagnosis and definitive treatment.

## MECKEL'S DIVERTICULUM

Meckel's diverticulum is a remnant of the omphalo-mesenteric duct. It is a common cause of rectal bleeding in children. The blood which is passed varies from bright red to a melena stool in color, from small amounts to massive hemorrhage, and from being spread on the surface to mixed in the stool. The rectal bleeding is frequently the presenting complaint and only symptom. Bleeding usually occurs from ulceration in the ileum secondary to ectopic gastric mucosa located in the diverticulum. These secrete hydrochloric acid and pepsin. The mucosa of diverticulum and ileum becomes ulcerated and bleeds. Pain, intussusception, umbilical fistula, intestinal obstruction, and infection with perforation are other ways in which the diverticulum may cause symptoms.

There were seven cases of Meckel's diverticulum in this series. Three were found to have bled, two of these had dark blood while one had bright red bleeding. The stool of the case which presented with bright red blood was entirely blood, while in the dark stools,

the blood and stool were mixed. The remaining four cases did not bleed. One of these was an incidental finding at post-mortum examination. It had become gangrenous and was associated with a volvulus of the ileum about the omphalomesenteric vessels. The remaining two cases presented with an acute abdomen and were thought preoperatively to be acute appendicitis. Previous reports have described a preponderance of Meckel's as having occurred in males.<sup>28</sup> This finding held true in this study where five of the seven cases were in males.

When the clinical diagnosis of a bleeding Meckel's diverticulum is made, immediate operation after blood replacement may be indicated because exsanguinating hemorrhage can occur at any time.<sup>26,28</sup>

#### RECTAL POLYPS

Rectal polyps are not common in children, but when present are likely to cause bleeding. The bleeding is bright red, on the surface of the stool, and usually in small amounts. Most polyps are found

from 1 to 4 inches (2.54 to 10.16cm.) from the anorectal junction.<sup>7</sup> Frequently, the polyp is palpable on rectal examination. This explains the bright red color of the blood. In addition to the bleeding which is the most common symptom, other findings are prociencia of the polyp, diarrhea, passage of mucous, and less commonly, pain, intussusception, and prolapse of the rectum.

Eight of the nine cases of polyps which were studied were found to have bled. All of these had bright red blood which was minimal in amount and located on the surface of the stool. In addition, one case described the blood as being mixed as well as on the surface. The children's ages varied from two to five years with most of the lesions seen in the three-year age group. This agrees roughly with ages in other studies which were reviewed.<sup>22</sup> Polyps were seen in four males and three females, this agrees with the 2:1, boy:girl ratio reported in the literature.<sup>22, 29</sup> One polyp was found at 15 centimeters, however, the remainder were 11 centimeters or below.

In one case, the polyp was passed spontaneously. This is considered by some, to be a relatively common occurrence.<sup>20</sup> Pathological examination of the polyp which was passed showed some evidence of malignancy. However, after a two year follow-up, no primary site has been found. This emphasizes an important point about rectal polyps in children. There is a great deal of disagreement on the status of these lesions as to whether they are premalignant<sup>12,27</sup> or not.<sup>7,19,22,29</sup> Most agree that juvenile polyps are not premalignant, and should be treated conservatively.

There were no cases of malignant tumors, familial polyposis, or Peutz-Jeghers syndrome which occurred within the time period reviewed. These rare conditions will also cause rectal bleeding from their associated polyps.

#### ULCERATIVE COLITIS

Ulcerative colitis is a cause of rectal bleeding in children. Its reported incidence varies a great deal from one area of the country to another. The

usual complaint is recurrent and persistent diarrhea. The stools are often accompanied by large amounts of mucous and blood. The bleeding may be the first symptom which is seen. The blood varies from red to black in color and may be massive. Associated symptoms include abdominal cramps, failure to gain and grow properly, and rectal tenesmus. Constipation may occur between intervals of diarrhea. Histories of psychosomatic and psychiatric disorders have been reported in ninety per cent of the people with ulcerative colitis.<sup>11</sup>

At Children's Hospital from 1954 through 1958, six cases of ulcerative colitis were seen. Of these, three bled. In one of the three, the blood was bright red and in another both red and black blood mixed with mucous were passed. No description was given of the color of the third case. Diarrhea was a complaint in all three cases. Pain and constipation occurred in all three. All of these patients were above the age of eleven years which agrees with other

reported series in which the disease was uncommon before eight years of age.<sup>6</sup>

#### FISSURE-IN-ANO

Rectal fissures are the most common cause of rectal bleeding seen in children. The blood is almost always on the surface of the stool and small in amount. It is often accompanied by pain especially with bowel movements. The etiology is probably the passage of a bulky hard stool or explosive diarrhea.

Of the twenty cases reviewed, fourteen bled, the remaining six were incidental findings with no symptoms mentioned in the history. The reason for the relatively few cases of fissures is undoubtedly due to the fact that the condition is most often treated as an out-patient in the physician's office, and thus not on the hospital record. The blood was described in all these cases, as red, streaked on the surface, and small in amount. Diarrhea was mentioned as a symptom in eight of the fourteen cases. Constipation was seen only once. Three of the patients experienced pain. The constipation

diarrhea, and pain must be considered in light of the fact that only four of the patients were above two years of age (ages 2, 3½, 4, and 10 years) and seven of the fourteen were under two months of age making a good history hard to obtain.

#### ANAL FISTULA

The condition of fistula-in-ano usually does not bleed. There is frequently a history of drainage, sometimes purulent, but rarely is the drainage bloody. Six cases were hospitalized in Children's Hospital from 1954 through 1958 and only one of these bled. The chart on this patient states only that the material passed was blood and mucous. The blood when present is most frequently red and minimal in amount. It is often seen associated with a bowel movement due to pressure on the fistula forcing out the blood from the fistula.



## ANORECTAL ABSCESS

Abscesses in the anal region occasionally bleed so that they should be considered as a cause of rectal bleeding. From six cases reviewed, only one bled. This was bright red blood which followed a bowel movement and was located on the surface of the stool. The abscess was accompanied by a "slight rectal prolapse" so it is difficult to attribute the bleeding directly to the abscess.

## PROLAPSE OF THE RECTUM

Rectal prolapse is an infrequent occurrence, but usually causes some rectal bleeding when it occurs. Trauma to the mucosa of the rectum is the cause for the bleeding, and the diagnosis is readily made by inspection. The condition causes bright red bleeding which generally is on the surface of the stool and is associated with pain. The prolapse is frequently a sign of increased abdominal pressure, and suggests the necessity for further evaluation for its etiology.

These include straining from another condition such as phimosis or excessive vomiting.

Of the two cases reviewed, neither bled.

#### HEMORRHOIDS

Hemorrhoids are very rarely seen in children. When they do occur they are most often due to chronic constipation. When associated bleeding is seen, it is bright red and on the surface of the stool. Occasionally, it is not related to a bowel movement. In two cases reviewed for the time period, both bled bright red blood.

#### VOLVULUS

Volvulus rarely causes massive rectal bleeding in children. Seven cases were reviewed and in only one of these was rectal bleeding seen. The stool became black after thirty-six hours of symptoms. As is generally true of volvulus, there was associated malrotation and high intestinal obstruction.

The bleeding in this case was severe enough to require transfusion of 275 c.c. of blood.

#### PEPTIC ULCERATION

Peptic ulceration, a condition seen so frequently in adults, is seen much less commonly in children. It is still a disease process which must be ruled out when melena occurs. When seen in the younger age groups, ulcers often present with hemorrhage (melena and hematemesis) or perforation. With increasing age, stenosis and pain become the chief complaint. Rectal bleeding from peptic ulceration is almost always seen as a dark stool.

There were twenty-four cases of ulcers diagnosed which fell into the group studied. Of these, six bled black tarry stools. One additional case showed a positive test for occult blood in the stool. In four of the patients, the hemoglobin was below 10.5 gm. Four of the older patients complained of abdominal pain. In two cases, the ulcers were diagnosed as Curling or as Stress ulcers. These commonly occur

with burns or other conditions of stress.<sup>24</sup> One of these, was associated with third-degree burns which the patient sustained by turning hot water on in the bathtub at eighteen months of age. He died seven days later and at postmortum examination, two duodenal ulcers were found, one of which was eroding into the head of the pancreas. This patient's stools were black and tarry. He had a hemoglobin of 16 gm. and a red cell count of 7.45 million probably on the basis of hemoconcentration. The other case was a Curling ulcer seen in a male, age one and one-half years, who had been surgically treated several times with shunt procedures for internal hydrocephalus secondary to chronic subdural hematoma. Following the last operation, he developed melena and later expired. At autopsy, an ulcer was found in the duodenum with red blood in the small bowel and dark blood in the large bowel.

All of the twenty-four cases reviewed which included bleeders and non-bleeders showed the ulcer to be located in the duodenum. This is consistent with

the literature on the subject where gastric ulcers in children are stated to be seen only rarely.<sup>10</sup> Leix and Greaney<sup>24</sup> feel that peptic ulceration occurs "more frequently than is generally recognized" in children.

#### GASTROENTERITIS

Gastroenteritis can be due to a number of different infectious causes. Some of these are salmonellosis, amebiasis, bacillary dysentery, and parasitic infestations; and in other cases, the etiology may be viral.

The bleeding which is seen in gastroenteritis is usually associated with diarrhea. Occasionally a blood-streaked, formed stool is passed as the first sign of gastroenteritis, but diarrhea generally follows. With the increased transit time of bowel contents in diarrhea, the blood is most often seen as red flakes mixed with the stool, however it may be black. The

bloody flakes arise from ulceration of the small and large bowel.<sup>28</sup>

Fifty consecutive cases of gastroenteritis were reviewed at Children's Hospital. Seven of these bled. In all seven cases, diarrhea preceded or was associated with the bleeding. In six of the seven patients, the bleeding was red, and the remaining one was a black liquid stool. Stool culture was attempted in four of the cases and was positive for organisms other than normal flora in three cases. *Aerobacter aerogenes* was cultured from all three. In addition, *Proteus* was cultured from one and *Streptococcus viridans* from one. All seven of the patients who bled were two years of age or younger and forty-five of the fifty total cases were under two years of age. In only one of the cases did the hemoglobin drop below eleven grams and in this case the blood was noted on the stool for two days prior to admission.

There were no cases in which a parasitic infestation was diagnosed, however, it can cause

rectal bleeding, and must be considered as a possible etiology. There were no cases of amebiasis either, but it must also be a part of the differential diagnosis when blood is passed rectally. *Salmonella*<sup>17</sup> and *Shigella*<sup>18</sup> species which are classically implicated in gastroenteritis were not found in this study.

#### HEMORRHAGIC DISEASES

Hemorrhagic diseases in children as causes of rectal bleeding are most commonly hemophilia, hemorrhagic disease of the newborn, and leukemia. Other causes are scurvy, Henoch's purpura, and thrombocytopenic purpura. Leukemia and scurvy are discussed elsewhere.

Eight cases of hemophilia were reviewed and of these, two bled rectally. In both cases, the stool was melena like. One case of purpura was studied, and there were black tarry stools associated with this case. This child presented with purpuric spots over the entire body (Henoch's purpura).

The remainder of causes stated above are to be remembered as possible etiologies of rectal bleeding, however, specific cases were not reviewed.

### SCURVY

Most cases of vitamin C deficiency in children severe enough to be classified as scurvy are seen near the end of the first year of life. It is rare before six months of age and after fifteen months.<sup>16</sup> When bleeding occurs with scurvy, it is usually small in amount and although bleeding from any mucous membrane is seen, rectal bleeding is rather uncommonly seen as gross bleeding.

Four cases of scurvy were diagnosed at Children's Hospital. One of the four cases bled rectally, and only in an amount that could be detected by a Benzidine test. The patient showed multiple evidences of bleeding with blood work all normal. There were no bone changes on radiographic examination. A blood vitamin C level was not done.



## LEUKEMIA

Leukemia as a cause of rectal bleeding occurs but is uncommon. Seven consecutive cases of leukemia were reviewed and of these, none bled. However the postmortum examination of one patient, showed black blood in the gastrointestinal tract. Bleeding from sites other than the gastrointestinal tract (except the pharynx) is commonly seen in leukemia.<sup>25</sup>

## FOREIGN BODIES

Foreign bodies in the gastrointestinal tract of children were found to be very common, as might be expected. Fifty-one cases were reviewed and of these, only one bled. This was a seven year old female who swallowed toothpicks and three days later had bright red blood mixed and on the surface of the stool. The bleeding cleared and no treatment was required.

In the remainder of the cases the foreign object was most commonly a coin, and occasionally a safety pin. Esophagoscopy was the usual method of removal,

however, in a number of cases the object was allowed to be passed by rectum.

There were no cases of foreign bodies in the rectum, however, this should be ruled out by proctoscopy if there is bright rectal bleeding, and the history suggests the possibility of a rectal foreign body.

#### ESOPHAGEAL VARICES

Esophageal varices are seen rarely in children. Possible causes of the varices are cirrhosis, portal vein thrombosis, and Banti's Syndrome. There were no cases for review in the 1954 through 1958 period, however, the rectal bleeding from varices would be expected to be mixed with the stool and black.<sup>21</sup> Hematemesis is the predominant symptom associated with melena which may be massive.

## HERNIA

There were twenty-nine cases of inguinal hernia reviewed. Seven of these were strangulated, and twenty-two incarcerated. In only one of the cases, was rectal bleeding a part of the picture. This is consistent with literature on the subject where bleeding is considered to be an uncommon accompaniment of this type of a complication of herniation.<sup>9</sup>

## ETIOLOGY UNKNOWN

Rectal bleeding occurred in eight patients on whom a diagnosis was never made. The bleeding would stop while the patient was in the hospital and dismissal would follow. Follow-up on these patients was unproductive. One of the eight cases underwent celiotomy on two occasions, the first one being for diagnosis and the second because of severe hemorrhage. On both occasions exploration revealed no source of bleeding. The picture of black stools, chronic blood loss anemia (as diagnosed on bone marrow examination) and a spastic duodenum on UGI series suggests ulcer disease.

SUMMARY

Two hundred and sixty-three cases of conditions known to bleed rectally were reviewed from the files of Children's Memorial Hospital, Omaha, Nebraska. Of these, sixty-nine were found to have bled. The most important factors to be obtained from the history were found to be the color of the blood, the amount of blood, relationship of passage of the blood to passage of the stool, and whether the blood was on the surface of the stool or mixed with the stool.

Black stools were seen in intussusception, Meckel's diverticulum, peptic ulceration, and esophageal varices. Other conditions of a less serious nature which bled were: fissure in ano, fistula, and polyp. The bleeding in these latter cases was bright blood in each instance.

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## CONCLUSION

When rectal bleeding in children presents itself to the practitioner, several points in the history should be specifically elicited. These include the color of the stool, the amount of blood, whether the blood is on the surface of the stool or mixed with the stool, and the relationship of the blood passage to the stool passage.

Stools which are black, usually indicate a moderate to heavy amount of bleeding. This should indicate to the physician a serious illness. In children, the source of the bleeding will usually be an intussusception, or Meckel's diverticulum. Other less common causes are Peptic ulceration and esophageal varices. (See Table II, page 26)

Bright red bleeding of small amount and on the surface of the stool is commonly seen in rectal fissure and rectal polyps. Less commonly it may be due to rectal abscess, rectal prolapse, rectal fistula and hemorrhoids. Inspection of the rectal region along

TABLE II

TYPE OF BLOOD SEEN AND PRESENCE OF PAIN<sup>23</sup>

dark blood	}	1. Swallowed blood	}	pain	}	
		2. Swallowed foreign body				
		3. Esophageal varices				
		4. Peptic ulcer (pain?)				
		5. Duplication of bowel				
		6. Meckel's diverticulum				
		7. Mesenteric thrombosis				
		8. Volvulus				
		9. Intussusception				
		10. Systemic disease				
pain	}	11. Polyposis	}		}	bright blood
		12. Neoplasm				
		13. Colitis				
		14. Polyp				
		15. Chronic recurrent sigmoid intussusception				
		16. Inserted foreign body				
		17. Fistula-in-ano				
		18. Fissure-in-ano				
		19. Hemorrhoids				
		20. Rectal prolapse				

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with a digital rectal examination is frequently enough to make a diagnosis in these cases.

Diarrhea associated with bleeding is seen with ulcerative colitis and gastroenteritis. Regional enteritis may present this type of picture also. The blood may be any color from red to black.

In this review, the most common causes of rectal bleeding of a severe degree were found to be intussusception, Meckel's diverticulum and gastroenteritis. Although only twenty cases of rectal fissure were included in this study, this is probably the most common cause of rectal bleeding seen in children. Very few of these cases are admitted because of the mild nature of the bleeding and, therefore, would not be involved in a hospital series such as this.

Peptic ulceration and hemorrhoids with bleeding are seen uncommonly in children as compared with adults.

(See Table III, page 28)

TABLE III

RACE AND SEX INCIDENCE IN MASSIVE  
GASTROINTESTINAL BLEEDING (ADULTS)

ETIOLOGY	Males		Female		White		Negro	
	No.		No.	%	No.	No.	%	
Duodenal ulcer	76		27	26.2	77	26	25.2	
Gastric ulcer	26		9	26.0	24	11	31.4	
Esophageal varices	54		14	20.4	64	4	5.8	
Miscellaneous	22		6	21.4	27	1	3.6	
Undetermined	53		9	14.5	57	4	6.4	
TOTAL	231		65	22.0	249	47	15.8	

The source of rectal bleeding in children can frequently be determined by a history and physical examination. After these simple maneuvers, a recommended approach to make a diagnosis is:

1. CBC, UA
2. BUN
3. Blood coagulation studies
4. Anoscopic and digital rectal examination
5. Proctoscopy
6. Barium enema
7. Upper gastrointestinal series and esophagogram

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If these procedures give negative results, exploratory celiotomy is recommended in cases where bleeding is massive or uncontrollable. For a thorough and productive work-up of this type of patient, the recommended order of tests listed above should be maintained.

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