In view of the previous cases and the fear that the lesion would progress further and cause a collapse, oral cortisone was given, starting with 50 mg. on the first evening, followed by 25 mg. six-hourly the next day. The drug was continued for the next 10 days in gradually diminishing doses.

On the day after starting treatment several new areas of peeling had occurred. This was to be expected, as they arose from the erythematous wrinkling area of the previous day. This was also noticed around the eyes. He was given prophylactic "neo-cortef" eye drops.

On the following day his impetiginous lesions had gone, the throat was clean, and he said that he felt a good deal better. Although his skin condition was still painful he was more tolerant of examination. His temperature had fallen to normal.

His improvement was maintained; the tenderness of the skin disappeared two days later and there were no new areas of peeling, although the epidermis in the old areas continued to come away. A new epidermis grew in these regions without any evidence of scarring or depigmentation.

He was discharged from hospital 12 days after admission.

Comment

This syndrome is well defined, so that the diagnosis is fairly suggestive. Conditions such as dermatitis herpetiformis, pemphigus, pemphigoid, Stevens-Johnson syndrome, and erythema multiforme are usually well differentiated on clinical and histological grounds. If it be claimed to be a drug eruption in all the reported cases, there seems to be nothing common at all in the medicaments taken before the onset of the illness. In the above case the only drugs known to have been used were pyridoxine hydrochloride and meclozine hydrochloride by mouth, plus local neomycin ointment.

In the South African cases the Bantu man had taken (for roundworm infestation) oil of chenopodium, which is known to be toxic to the liver but not to the skin, and local methyl salicylate plus capsicum, as a counter-irritant for lumbar backache. It was interesting to note that the erythema and vesiculation did not occur over these locally treated areas. Two other South African cases had phenolphthalein as an aperient before the epidermolysis occurred. In other cases recorded by Lang and Walker (1956) and by Lyell (1956) drugs such as penicillin, Dover's powder, aspirin, and phenylbutazone had been taken. Three other cases gave no history of having taken drugs (Lang and Walker, 1956; Lyell, 1956; Rook, 1957).

The nature of the toxin has yet to be discovered. The toxæmia must be responsible for the prodromal symptoms. In Rook's case there was a sore throat with vomiting the day before onset; other symptoms being diarrhoea for one day, low backache for a week (Lang and Walker), sore throat (Lang and Walker; Lyell), and pain in left groin for some hours only (Lyell). In the above case the boy had bilateral girdle pains on the night before the appearance of the blisters. The history of vomiting 14 days before blistering could be explained either as a premonitory symptom or as an attack of cyclical vomiting, similar to that of his brother aged 2. As in the adult cases, the eruption reached its greatest extent in 24 hours.

Corticosteroids have been tried in several cases (Lang and Walker, 1956, 1957; Lyell, 1956), including the above case. The part they play is difficult to evaluate, and whether they shorten the course of the illness is unknown. If this is an immunity reaction the corticosteroids will certainly interfere with the process. They should be used at least in severe cases, as the reports suggest. It was probably wise to use the drug

in the above case as the child had gone downhill so quickly, and seeing him now fit makes one realize how ill he was on admission. As in the other cases, antibiotic therapy was advisable to combat any toxæmia due to infection.

The histology in the present case, as in the others, shows the epidermis as the target for the toxic onslaught. This is the essential abnormality with epidermal necrolysis. The nearest resemblance to this condition is scalding of the skin (Lyell, 1956; Rook, 1957). There are slight differences in the depth of the epidermal necrosis. Lang and Walker claim epidermal-dermal cleavage in their cases which went to histology, the bullae having been formed in this plane. Lyell described a similar change in one of his cases. In the above case the cleavage was intra-epidermal, as described in reports of one other of Lyell's cases and one of Rook's. There were inconspicuous inflammatory changes in the corium, as in the other cases. The resemblance of the skin condition to scalding suggests that its recognition may have an important bearing in forensic medicine.

Summary

This is believed to be the first description of toxic epidermal necrolysis in a child, a boy aged 3. There were premonitory symptoms of toxæmia followed by tenderness of the skin, which loosened and later peeled. Recovery was complete. It is thought that the syndrome is due to a toxæmia of unknown origin, and no other common factor linking other cases can be suggested. The use of antibiotics and corticosteroids is recommended.

I thank Dr. F. J. S. Bowman, family doctor, for permission to report this condition in one of his patients, and Dr. A. Lyell for his helpful advice and constructive criticism.

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FOOD OBSTRUCTION OF THE SMALL INTESTINE

A REVIEW OF 15 CASES

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Obstruction of the small intestine by food has been described on many occasions. Some predisposing factors and numerous causative foodstuffs have been reported. Fifteen cases are reviewed, with special reference to the aetiological factors found and the modes of treatment adopted.

Obturation of the bowel is an important consideration when a case of intestinal obstruction is clinically assessed. Uppermost in the mind of the surgeon is the bizarre clinical picture which may result from the halting passage of a gall-stone through the intestine. In addition to food boluses and gall-stones, other possible causes of obturation include intestinal parasites, faecaliths,

enteroliths, concretions, bezoars, foreign bodies, and meconium in the newborn (Storck, Rothschild, and Ochsner, 1939).

In the case of food boluses, although instances of impaction have been reported throughout the alimentary tract, by far the commonest site has been the small bowel. In all of our cases impaction has occurred in this region. It is becoming evident that, as the number of reports increase, more complete recognition may be given to the condition, which in some cases is capable of diagnosis before treatment. It is further submitted that in dealing with the condition several courses of action, involving little risk to the patient, may be clearly advised.

The main features of a series of cases are shown in the Table. These represent the total occurring during a four-year period in two general hospitals, and most of them were personally observed and treated. Taking into account all types of intestinal obstruction admitted, but excluding strangulated external herniae, food boluses were the cause in 4%. All the patients made uneventful recoveries apart from Case 13, in which wound infection prolonged the stay in hospital.

Clinical Features

Various aspects have previously been described by Elliot (1932), Storck *et al.* (1939), and Ward-McQuaid (1950). Many other authors have recorded specific points of interest.

Sex and Age.—No particular sex or age incidence was noted. Males and females were more or less equally affected, the age range being from 7 to 71. There seemed to be a greater incidence in the fourth and fifth decades, and this concurred with the finding of Elliot in his review of 39 collected cases.

Symptoms.—All the patients had abdominal colic, and often it was severe. There was associated vomiting, and, while in most cases bowel action had been normal, two complained of severe diarrhoea. The symptoms were of rapid onset, with a short duration before arrival in hospital. In nine patients admission was within 12 hours, and in no case was it longer than 36 hours, from the onset of symptoms.

Signs.—These tended to present in two groups: (1) those having abdominal distension with visible peristalsis, palpable coils of bowel, and increased bowel sounds—indicative of typical small-bowel obstruction, and (2) those having abdominal tenderness and guarding, more often localized to the right and thus giving rise to a pre-operative diagnosis of acute appendicitis. In the second group distension of a minor degree was often noted, as was associated increase in bowel sounds. However, since the predominant signs were tenderness and guarding in the right iliac fossa, the diagnosis of acute appendicitis was preferred.

Site of Obstruction.—Impaction of the bolus at all levels from the upper jejunum to the ileo-caecal valve has been described, and in some instances multiple boluses have been found. This was exemplified in the present series, though impaction in the ileum was commonest. Furthermore, it usually occurred in the lower ileum, but in no case at the ileo-caecal valve. A noteworthy point was the firmness of the impaction. So much was this so in Cases 6 and 9 that necrosis of the wall of the bowel had occurred. Indeed, in Case 6

perforation of the proximal ileum had been produced, with peritonitis.

Previous Attacks.—In four of the cases there were reasonable grounds to suppose that a previous attack, not amounting to frank obstruction, had occurred. It is known that in Case 9 the offending foodstuff, parts of a lemon, had been eaten two months before, and in the period prior to admission the patient had suffered frequent attacks of colic and distension. Temporary self-resolving obstruction is probably a common occurrence, and is dismissed by patient or doctor as being a simple stomach upset. It is likely that in only a very small proportion does impaction with overt small-bowel obstruction occur.

Subsequent Attacks.—One patient (Case 3) was readmitted to hospital two years later with similar though less marked symptoms and signs. She confessed to having swallowed a whole small onion in spite of advice given regarding the importance of proper mastication of food. The attack resolved rapidly after admission, and operation was not thought to be necessary. In this case the previous history influenced the decision to adopt a "wait and see" policy.

In a follow-up, 13 out of the 15 cases were traced. Apart from Case 3, no patient had had a further attack. In most of these a period of from two to five years had elapsed since operation.

Aetiology

Type of Food.—Ward-McQuaid (1950), in a review of the accumulated literature, cites 45 different foodstuffs causing obstruction in 178 patients. Since this time many more foods have been added to the list by other writers. Foods largely consisting of fibre or pith, surrounded by indigestible skins, feature prominently. In our series the main culprit has been the orange (nine cases). This fruit, or rather the internal supporting pithy part of it, has often been reported as the cause of obstruction in this country (Latchmore, 1940; Jones and Davies, 1945; Radclyffe, 1945; Aird, 1949). Geographical location and the social conditions prevailing may influence the type of foodstuff available. In the U.S.A., obstruction due to the persimmon seems most common (Newburger, 1941). In Argentina, according to Delrio, Paz, and Carpanelli (1944), oranges and peaches have been incriminated. In the first world war, when famine was rife in Germany and Russia, a number of cases occurred due to conglomeration of ingested oat husks. Thirty-six cases of this nature were reported by Tigi (1922).

Eating Habits.—In the otherwise normal person with a full set of teeth, mere inadequate mastication may be the only contributory factor. This can occur as the result of hurry, accident, drunkenness, or even politeness. In children, food may be bolted without thought of chewing.

Teeth.—Absent or poor natural teeth and ill-fitting dentures will be found to be a factor in most cases. This was evident in all the adult cases where the state of the teeth was known. In some there were a few natural teeth which had little function in mincing food into smaller particles. This was also apparent when complete or incomplete inefficient dentures were worn. A poor fit or a lack of comfort when eating prompted patients to remove them. As a result compressed rather than fragmented food was swallowed. In both of the

cases occurring in children, dentition was normal and bolting was probably the major fault.

Previous Operations.—Operations on the stomach which permitted food to leave the organ more quickly than usual had been performed in five cases. It is suggested that such food, not having been subjected to the normal gastric juices and milling effect in the stomach, passes rapidly into the small intestine, swelling *en route* and later impacting. Four of these patients (Cases 1, 2, 4, and 5) had had a full-width Polya-type reconstruction after partial gastrectomy for duodenal ulcer. Norberg (1955, 1956a, 1956b) has the largest reported experience of this type (15 cases). There have been other accounts by Baumeister and Darling (1947) and Rowling (1956). From our own observations, bolus obstruction is commoner after gastrectomy than the various types of "loop" obstruction as described by Stammers (1952, 1954). The remaining patient of the five (Case 8) had obstruction after a gastro-jejunostomy

Segments of tomato skin found causing obstruction in Case 6.

performed 17 years previously. Orange pith was responsible, as in the only other case we have been able to trace in the literature (Delrio, *et al.*, 1944).

Other Intra-abdominal Lesions.—Diverticula can be sites of accumulation of food debris. In Case 6, with obstruction of the ileum by tomato skins, duodenal and jejunal diverticula were present. It is reasonable to assume that the skins accumulated in one or more of the diverticula, as a later barium-meal examination demonstrated a bolus in a duodenal diverticulum. In this case there were 40 segments of skin, each rolled up and glued together to form a "faggot" (see illustration). A similar state of affairs, in which food was retained in intestinal diverticula, has been described by Wangenstein (1955). In Cases 14 and 15, a Meckel diverticulum was present. The diverticulum and the adjacent ileum were packed full of coconut and apple-pulp respectively, causing complete small-bowel obstruction. Lodgment of a food bolus at the site of a stricture in the small bowel has precipitated complete obstruction. Krecke (1929) has described this occurrence at the site of an entero-anastomosis, and Krukenberg (1930) similarly reported obstruction at the site of a tuberculous stricture. There must have been many other instances.

Treatment

By the time many of these cases reach hospital minor degrees of temporary bolus obstruction are likely to have

been overcome and no specific treatment will be called for. Evacuation of the large bowel should be promoted by suppository or enema.

In other instances the pre-operative diagnosis, as has already been suggested, will have been acute appendicitis or small-bowel obstruction of doubtful aetiology. In these, either a right "gridiron" or paramedian incision will have been performed. Gastric suction and intravenous fluids may have been started as routine measures, although dehydration and electrolyte upset is not a prominent clinical finding.

On locating a bolus as the cause of obstruction, its character can often be identified through the stretched bowel wall. It is recommended that the more desirable procedure in these circumstances should be fragmentation of the bolus by gentle manipulation and the pieces "milked" into the caecum and ascending colon. Here they may be further broken up, if necessary, to prevent possible enterolith formation and subsequent colonic obstruction. This was performed in 10 cases without harm to the bowel wall or delay in the return of gut movements.

If the "closed" fragmentation and "milking on" technique is not possible—for example, where the bolus is too hard (Case 13), too firmly impacted (Case 6), or impacted at a high level (Case 2)—enterotomy should be carried out. This may have to be done directly on to the bolus, as dislocation proximally may cause further damage to the bowel.

In all cases, when the primary site of obstruction has been located a search of the rest of the small bowel should be undertaken to exclude the presence of other boluses. This is of particular importance if enterotomy is contemplated, as all may then be removed through a suitably placed incision. If a perforation is present, it can be incorporated into the enterotomy incision or closed separately by simple suture, depending on the site of the perforation. Enterotomy introduces the factor of infection and has caused wound sepsis, with prolongation of stay in hospital (Case 13). Use of prophylactic antibiotics is a matter for personal choice. In no instance was the peritoneal cavity drained.

If a Meckel's diverticulum is found it can be simply excised after moving the bolus into the caecum. In Case 14, however, where there was considerable distension of the bowel and the diverticulum was short and wide-necked, it was considered safer to pass the bolus into the caecum and then leave well alone.

Conclusions

In reviewing all the aspects of the foregoing cases one salient fact has emerged. Provided food is adequately chewed, it is very unlikely that any one of the other factors noted will cause obstruction by food bolus.

Poor dentition led to inadequate mastication in 11 out of 12 adult patients. Therefore it is important that proper advice should be given regarding teeth, eating habits, and food, especially after partial gastrectomy and gastro-jejunostomy. The patient should know that failure to possess or use efficiently functioning dentures may be dangerous.

It is evident that the pithy residue of citrus fruits is particularly apt to become impacted. Orange and lemon pith was identified in 10 out of 15 cases. Therefore a person incapable of proper mastication should be advised to avoid these and similar fruits.

Details of Cases

Case No.	Sex and Age	Symptoms	Duration in Hours	Physical Signs	Predisposing Factors		Nature and Site of Food Bolus	Operative Treatment	Previous Attacks
					Intra-abdominal	Teeth			
1	M 39	Colic and vomiting	12	Abdominal distension. Increased bowel sounds	Polya gastrectomy 2 years before	Natural lower incisors and upper molars. Upper denture often not worn	Orange pith. Upper ileum	Fragmentation. Milked into colon	Nil
2	M 64	Severe colic and vomiting	4	General tenderness. Bowel sounds + + +	Polya gastrectomy 8 years before	Upper and lower dentures	Orange pith. Upper jejunum	Enterotomy	"
3	F 44	Colic and vomiting	24	Distension. Visible peristalsis	Nil	A few poor natural teeth	? Orange pith. Upper ileum	Milked into colon	"
4	F 49	" "	6	" "	Polya gastrectomy 6 years before	Wearing upper and lower dentures	Orange pith, eaten day before. Lower ileum	Fragmented. Milked into colon	"
5	F 63	" "	8	General tenderness. Visible peristalsis	" "	Not known	Orange pith. Upper ileum	" "	"
6	F 61	" "	10	Distension. Visible peristalsis. Bowel sounds + + +	Duodenal and jejunal diverticula	False teeth, but not wearing them	Tomato skins. Eaten week before. Mid-ileum; perforation in upper ileum	Enterotomy. Closure of perforation	3 years previously
7	F 54	" "	36	" "	Nil	Not known	Orange pith. Upper ileum	Milked into colon	1 year previously
8	F 39	" "	12	Tenderness. Bowel sounds + + +	Gastro-jejunostomy 17 years before	Wearing false teeth (part plate)	Orange pith, eaten day before. Ileum	" "	Nil
9	M 54	" "	7	Tenderness. Some distension. Bowel sounds infrequent	Nil	Wearing false teeth	Half a lemon with rind in lower ileum. Bits of rest of lemon above. Near perforation	Enterotomy	Attacks of colic and distension for two months before admission
10	F 71	" "	24	Tenderness and distension. Bowel sounds infrequent	"	No teeth of any description	Orange pith, eaten week before. Lower ileum	Milked into colon	Nil
11	M 53	" "	12	Tenderness in upper abdomen	"	False	Orange pith. Upper ileum	" "	Probably two; 5 years before
12	M 68	Colic, vomiting, and diarrhoea		Tenderness in R.I.F. Abdominal distension	"	Wearing false teeth	Hard bolus of doubtful nature. Lower ileum	Crushed and milked into colon	Nil
13	F 63	" "		Tenderness in R.I.F.	"	False; top set only	Nuts from nut chocolate eaten 2 days before. Lower ileum	Enterotomy	"
14	M 10	Colic and vomiting	24	Tenderness in right abdomen. Distension. Bowel sounds + + +	Meckel divertic.	Good	Coconut in lower ileum and diverticulum	Milked into colon	"
15	M 7	" "	12	Tenderness and guarding in R.I.F.	" "	"	Apple pulp and skin at site of diverticulum	Meckel divert. resected and bolus removed	"

Diagnosis in cases presenting as small-bowel obstruction of doubtful cause will rest on detailed inquiry into the patient's previous history and a correlation of this with the symptoms and physical signs. Particular note should be made of the subject's dietary and eating habits, ability to chew, previous operations, and other known intra-abdominal conditions. A pre-operative diagnosis will thereby become possible in some cases. Treatment should be prompt and as outlined. Serious complications such as perforation, peritonitis, or even death from simple obstruction may otherwise occur. Some of the earlier cases described were found at post-mortem examination, and in 1954 an unsuspected fatal case was noted in the *British Medical Journal*.

Finally, Case 2 is related in greater detail. The events which took place are of particular interest, and serve to re-emphasize many of the points already discussed.

This patient was a theatre night porter in our own hospital, and had had a partial gastrectomy eight years before. During an emergency operating session, between transporting cases to and from the wards, he was given a portion of orange to eat by a nurse. He admits that he ate and swallowed it hurriedly, and did not have his teeth in at the time. Symptoms followed the next day, and he reached the operating table in his own theatre that night. The undigested orange pith was recovered by enterotomy from the jejunum.

Summary

Fifteen cases of food bolus obstruction of the small bowel have been described, with their method of treatment by operation without mortality.

Aetiological factors have been outlined and ways of management suggested.

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