The Radio-Opaque Appendicolith — Its Significance in Clinical Practice

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SUMMARY: Four cases are reported, in whom radiologically opaque appendiceal coproliths (appendicoliths) were recognised on plain abdominal radiographs. These were undertaken for diagnostic purposes, in patients with right-sided abdominal pain, in whom the diagnosis was not immediately apparent. The pathology, radiological features, and clinical significance of the phenomenon are discussed, and the association of appendicoliths with appendiceal perforation and gangrene is stressed. The fact that clinical signs and symptoms of acute appendicitis are often misleading and sometimes minimal, even in the presence of severe local peritoneal infection is of importance to physicians as well as surgeons.

Case Reports

Case 1: A Caucasian boy aged eight was admitted with a one week history of severe watery diarrhoea and vomiting, with intermittent central and right-sided abdominal pain. Immediately prior to admission he developed severe right loin and right-sided abdominal pain, and a pyrexia of 40°C. On examination, he was extremely toxic, and was markedly tender in the right renal area. Although tender elsewhere over the right side of the abdomen, there was little guarding and no rebound tenderness. There were no pus cells in the urine and a white cell count revealed a neutrophil leucocytosis of 20.2. A plain abdominal radiograph was undertaken and a classical appendicolith was discovered (Fig. 1). Due to the marked localisation of symptoms and signs, a diagnosis of perinephric abscess was made, presumed to be secondary to a high retrocaecal appendicitis. Through a loin incision, a large retroperitoneal collection of pus was drained and the patient made an uneventful recovery. Six weeks later, a retrocaecal appendix was removed at interval appendicectomy and the appendicolith was radiologically confirmed within the specimen.

Case 2: A 19 year old Chinese male, was admitted under the care of the physicians, with a 15 day history of right hypochondrial pain, nausea and diarrhoea. On admission, he was afebrile and appeared faintly jaundiced. On abdominal examination, there was right subcostal tenderness, but no hepatomegaly. Additionally, some tenderness in the right loin and right iliac fossa was noted, but there was no guarding or rebound tenderness. Liver func-

Fig. 1 A classical appendicolith. Case 1

tion tests (bilirubin 72, alkaline phosphatase 265, SGOT 119, SGPT 373) together with the abdominal findings, were felt to be compatible with a provisional diagnosis of infective hepatitis. After 24 hours, he developed a high fever and increasing pain in the right loin and right iliac fossa, together with guarding and rebound tenderness over the right side of the abdomen. A plain abdominal radiograph revealed an appendicolith (Fig. 2). At subsequent appendicectomy, a retrocaecal gangrenous, perforated appendix was found and the patient made an uneventful recovery.

Fig. 2 An appendicolith. Case 2

Case 3: A 14 year old Nepali boy, was admitted with a three day history of vague central abdominal pain, localising in the right iliac fossa. On admission, the abdominal signs were those of early acute appendicitis. A plain abdominal radiograph revealed an appendicolith (Fig. 3). At appendicectomy, an un-

Fig. 3 An appendicolith. Case 3

expectedly perforated and gangrenous preileal appendix was associated with marked local suppurative peritonitis.

Case 4: A 43 year old Chinese male, was admitted under the care of the physicians with an 18 day history of general malaise, loose stools and vague right hypochondrial and right iliac fossa pain. On examination, he had a fever of 39°C and was markedly tender in the right hypochondrium and over the right renal area. There was no guarding or rebound tenderness in the right iliac fossa. White cell count revealed a leucocytosis of 20.0. Liver function tests were normal. Clinically, he was felt to have acute cholecystitis, and was treated conservatively for 24 hours with oral fluids and antibiotics. A repeat examination revealed a vague tender mass high in the right iliac fossa, and a subsequent plain abdominal radiograph revealed a large calcified opacity, identified as an appendicolith.

Fig. 4 Large calcified opacity. Case 4

(Fig. 4). The patient was diagnosed as having an appendix mass, and settled uneventfully on intravenous fluid replacement, ampicillin and metronidazole. At interval appendicectomy three months later, a long retrocaecal appendix containing an appendicolith was removed from a mass of fibrous tissue.

Discussion

Our small series of four appendiceal coproliths demonstrates three important characteristics of the clinical presentation of appendicolith associated appendicitis.

- (1) There is a marked association between appendicoliths and severe, complicated appendicitis.
- (2) In three of our cases, severe appendiceal inflammation in a retrocolic position produced confusing symptoms and signs. This led to a delay in the correct diagnosis of about 24 hours until plain abdominal radiographs were undertaken and the appendiceal coprolith recognised.

- (3) The symptoms and signs in the remaining case were surprisingly slight, bearing in mind the severity of inflammation encountered at operation.

Pathology

Kelly and Hurdon¹ and Wangenstein and Bowers² provided the early descriptions of the pathological processes involved. The appendix behaves as an atonic closed loop. Faecal particles within the lumen fail to return to the main stream, become inspissated and form a focus of irritation to the appendiceal mucosa. This responds by increasing mucous output, the mineral salt content of which becomes deposited on the faecal 'island.' These salts, primarily calcium and phosphorous, increase the size of the mass, thus exacerbating the irritation and thereby perpetuating the cycle. Eventually the lumen becomes blocked by the enlarging appendicolith, and clinical appendicitis supervenes.

Radiology

In Berg and Berg's series³ approximately 90% of all coproliths were demonstrated in patients under the age of 40 years, a factor having obvious significance to Army clinicians. Typically, they are round or oval. Frequently they are laminated, but may be homogenous or mottled, when they can be difficult to spot amidst faecal shadows. Rarely, they are multiple, Shahan reporting one case of 23 appendicoliths in a single appendix⁴. They are usually found in the right lower quadrant but frequently in the right upper quadrant. Occasionally they are seen elsewhere, reflecting the varying anatomical positions seen at appendicectomy. They may be confused with gall stones, ureteric or vesical calculi, phleboliths or calcified mesenteric lymph nodes, but these are rarities in very young patients. Other causes of confusion are bone islands or radio-opaque tablets.

Clinical features

Correctly identifying the presence of an appendiceal opacity may clinch the diagnosis of acute appendicitis at an early stage. In young children, in whom the diagnosis of appendicitis can be particularly difficult, it may be of great value. In their series, Wilkinson et al⁵ demonstrated appendicoliths in eight out of 41 (32%) infants under the age of two years with acute appendicitis. More significantly in this series, six out of these eight appendices were perforated at the time of surgery and this is in agreement with others who have demonstrated a high rate of perforation in appendicolith associated appendicitis e.g. 32 out of 34 in Brady and Carroll's series⁶. Williams⁷ also noted that about 50% of young

patients would not have had sufficient clinical evidence to merit exploration without the presence of an appendicolith, and this figure was identical in Berg and Berg's series³. Thus, appendicolith related perforations would appear to be a relatively silent and therefore dangerous phenomenon in some instances, a strong indication for careful scrutiny of abdominal radiographs, even in the presence of mild abdominal symptoms and signs. Indeed, Copeland and Long⁸ go so far as to state their belief that a patient with abdominal pain and a detectable calcified appendicolith has a 90% chance of having appendicitis, and on this basis they make a strong plea for elective appendicectomy for appendiceal calculus in an asymptomatic patient.

Our own small series should act as a reminder of this important radiological feature in resolving the differential diagnosis of abdominal pain. Appendicitis is sometimes a fatal disease, approximately four per million of the population of England and Wales dying of this disease in 1981. Twelve people under 35 years of age died of generalised peritonitis following perforation of the appendix, and any investigation which might reduce this toll must be well worth while. (OPCS mortality statistics 1981.)

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- 9 OPCS Mortality Statistics 1981. Series DHL Table 1.

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