Isolated elevation of serum alkaline phosphatase and biliary disease in
the elderly

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Summary
Disease presentation is commonly non-specific in the geriatric age group. An isolated elevation of serum alkaline phosphatase concentration may be the only pointer to underlying biliary disease.

Introduction
Although gall-stones occur in over 30% of females above the age of 70 years (Bateson and Bouchier, 1975), they are often overlooked as a cause of illness in this age group. The pattern of clinical illness is often atypical in the elderly and gall-stones do not always present classically with biliary colic, jaundice, cholecystitis or cholangitis.

Four patients are presented who had different forms of gall-stone disease, and in whom the only abnormality of routine liver function was an isolated elevation of serum alkaline phosphatase concentration.

Case histories
Case 1
An 86-year-old woman was admitted with a left, fractured neck of femur. This was treated with a McKee pin and plate operation. Two years previously she had suffered an attack of acute pancreatitis, which had been managed by surgical drainage and cholecystostomy. She drank only occasionally and took a diuretic regularly for ankle oedema. Three weeks after admission she suffered an attack of acute, upper abdominal pain with vomiting. She was pyrexial and her abdomen was distended, and tender in the epigastrium. The bowel sounds were normal. Investigations revealed an elevation of the white blood cell (WBC) count and serum amylase concentration. The serum alkaline phosphatase was 158 i.u./l (normal <75 i.u./l), but the serum bilirubin and aspartate transaminase concentrations were normal. She was treated with a naso-gastric tube and by intravenous fluids and antibiotics. An ultra-sound examination revealed stones in the gall-bladder without dilatation of the biliary tree; the pancreas was normal.

Over the next 3 weeks she suffered recurrent attacks of abdominal pain associated with elevation of the WBC and serum alkaline phosphatase and amylase concentrations. Endoscopic-retrograde-cholangio-pancreatography (ERCP) revealed a normal pancreatic duct, but the common bile duct was dilated and contained numerous small stones. Duodenoscopic sphincterotomy was performed and subsequently she has suffered no further attacks of pain. The WBC count, serum amylase and alkaline phosphatase concentrations have returned to normal.

Case 2
A woman of 78 years was admitted with a 10-day history of loss of mobility and of feeling unwell. In the past, her health had been good, although she had suffered a fractured, left neck of femur 2 years previously. On admission she was complaining of lower abdominal colicky pain. She was apyrexial and examination was unhelpful. Investigations showed a normal haemoglobin, but the erythrocyte sedimentation rate was 100 mm/hr. The WBC count was elevated to 19 x 10^9/l. Blood cultures were sterile, but a mid-stream urine specimen (MSU) grew a coliform organism. The serum alkaline phosphatase concentration was raised to 165 i.u./l, but the serum bilirubin and aspartate transaminase concentrations were normal. The following day her temperature rose to 38°C and she was given ampicillin with some improvement. One week later she developed further abdominal pain now more localized to the right hypochondrium and ultrasound-examination showed an empyema of the gall-bladder with abscess cavities in the gall-bladder bed. Metronidazole was also added and she was referred for surgical opinion. At operation the gall-bladder and abscess cavities were drained. Subsequently, she made a good recovery and both the leucocytosis and serum alkaline phosphatase concentration returned to normal.
Case 3
An 80-year-old woman was admitted from the out-patients clinic. Over the previous month she had suffered 4 episodes of rigors. On one occasion an MSU had shown growth of a coliform organism. She had not suffered any abdominal pain or urinary symptoms. On examination she looked well and was afebrile but the liver was smoothly enlarged 5 cm below the costal margin. Her blood count, blood urea and electrolytes were all normal. An MSU showed increased white cells but no growth on culture. An intravenous pyelogram was normal. Liver function was normal except for a raised serum alkaline phosphatase concentration (765 i.u./l). The serum gamma-glutamyl transpeptidase (y-GT) was also elevated to 1442 i.u./l (normal <33 i.u./l). Ultra-sound examination of the biliary area showed stones in the gall-bladder but a normal biliary tree. She remained well over the next 3 months, but the serum alkaline phosphatase and y-GT concentration remained elevated and she was admitted for further investigations. On examination she was anicteric but her gall-bladder was palpable. Repeat ultra-sound examination showed a large gall-bladder with a stone in the neck. At operation a large gall-bladder was removed. A peroperative cholangiogram demonstrated a stone in the common bile duct. Following surgery her liver function tests returned to normal.

Case 4
A woman of 83 years was admitted having failed to cope at home. She had a long history of rheumatoid arthritis extending over 30 years and was now wheel-chair bound. She had received a large number of anti-inflammatory drugs, most of which had been associated with iron deficiency anaemia. In 1969, she had suffered a single attack of abdominal pain associated with signs of obstructive jaundice. Since 1976, she had experienced intermittent dysphagia. Investigations then had shown a benign peptic stricture which had been dilated endoscopically on several occasions. At the present time she was able to maintain normal body weight by eating a semi-solid diet. The serum alkaline phosphatase concentration had been modestly elevated since 1976 (range 87 to 111 i.u./l). On admission she was afebrile but the WBC count was raised to 19 x 10^9/l, with a neutrophil leucocytosis. A chest X-ray, MSU and blood culture were all negative. The serum alkaline phosphatase concentration was elevated to 135 i.u./l. Ultra-sound examination showed a dilated gall-bladder and common bile duct containing stones. Following duodenoscopic sphincterotomy several small stones were removed and the serum alkaline phosphatase concentration and WBC count have returned to normal.

Discussion
Disease presentation is commonly non-specific in the geriatric age group and may lead to delay in diagnosis, particularly when a relevant history of previous biliary disease is overlooked. One of the patients presented with acute pancreatitis, which should always prompt a search for gall-stones (Trapnell and Duncan, 1975). Two of the remaining patients were initially thought to be suffering from urinary tract infection.

Physical signs and investigations may be confusing. Three of the patients were afebrile and in one the total WBC count was normal. Blood cultures should always be performed in sick, elderly patients (Denham and Goodwin, 1977), but were unhelpful in the present cases.

In the 4 cases presented the only abnormality of routine liver function was an elevation of serum alkaline phosphatase concentration. In elderly patients, as in younger cases, this elevation is always due to disease (Hodkinson and McPherson, 1973). Measurement of serum y-GT or 5-nucleotidase is helpful in indicating a biliary cause (Whitfield et al., 1972). Grey scale ultrasonography accurately detects stones in the gall-bladder, but may fail to show those in the common bile duct (McKay et al., 1979). Choledochal stones are readily demonstrated by ERCP (Cotton, 1977). The mortality rate for surgical removal of choledochal stones is highest in elderly patients (Vellacott and Powell, 1979) and these are more appropriately removed by duodenoscopic sphincterotomy (Cotton, 1980).

Biliary stones are an important and treatable cause of illness in the elderly. Their presence may be indicated by an isolated elevation of serum alkaline phosphatase concentration.

References
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