Gastrointestinal problems in the elderly

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Improvements in nutrition and health care have led to increased life expectancy in our country, which occasioned this review of gastrointestinal problems in the elderly. Some gastrointestinal symptoms may be secondary to age-related physiological changes (e.g., presbyoesophagus). Certain diseases (e.g., diverticulosis) may be more common in the elderly. On the other hand, the elderly may have unusual presentations of common diseases (e.g., complicated peptic ulcer disease). Each of these types of problems has been detailed in this review. Included is a preliminary analysis of hospitalised elderly patients which illuminates serious gastrointestinal problems affecting the elderly in India.

Key words Colon - elderly - gastrointestinal - intestine - liver - pancreas - stomach

Ageing is an inevitable part of the cycle of life. Improvements in health care and facilities, and drugs to combat disease, have brought about longevity which is one of the greatest achievements of the 20th century. The ratio of older persons has changed dramatically from approximately one in 14 in the mid-forties and fifties to about one in four at present. It is estimated that, by the year 2025, there will be more than 750 million persons older than 65 throughout the world¹. In the USA, disorders of the gastrointestinal tract form the second most common group of hospital discharge diagnoses in older people². As the elderly population expands and its demand for medical care grows, knowledge of the effects of ageing on the gastrointestinal tract and related disorders assumes increasing importance³. This article discusses gastrointestinal disorders of particular importance to this population.

Effects of ageing on gastrointestinal structure and function

The causes of ageing are still poorly understood. All ageing changes have a cellular basis, and theories of causation are generally grouped into either 'stochastic' or 'developmental genetic' categories⁴. The ageing process affects all organ systems, with varying functional sequelae that can negatively impact upon the elderly patient's response to different disease processes. It is important to understand alterations of physiology associated with ageing for two reasons. Firstly, this will help to separate the age-related changes from those true symptoms of disease. Secondly, errors in management of elderly patients may occur if gastrointestinal symptoms are wrongly attributed to the ageing process. In general, ageing of the organs of the gastrointestinal tract is manifested by decrease in motility, secretion and absorptive capacity.

Presbyoesophagus, a term given to oesophageal motor dysfunction attributed to ageing, is characterised by a generalised disorganised response to deglutition and a defect in the relaxation of the lower oesophageal sphincter⁵. A host of other motility changes have been described in the elderly. These changes may result in a number of complications in the elderly including increased risk...
of aspiration and problems of dysphagia.

Both basal and stimulated gastric acid secretions diminish with age in humans, due to a decrease in parietal cell mass. The effect of ageing on serum gastrin in humans remains controversial. Mild decrease in pepsinogen and intrinsic factor secretion occurs with ageing.

A general reduction in the villous height in the small bowel begins by age 60 in most individuals. This probably contributes to decreased absorption of certain substances including calcium and iron. There is also an age-related deterioration of fat and carbohydrate absorption. Protein absorption is well maintained, and intestinal transit remains essentially unchanged.

Colonic changes with ageing include mucosal atrophy, morphologic abnormalities of the mucosal glands, cellular infiltration of the lamina propria, hypertrophy of the muscularis mucosae and an increase in connective tissue. Despite anecdotal evidence to the contrary, manometric studies of the colon and anorectal region in the elderly fail to identify an age-related change in motility.

The liver has great reserve capacity, and even if there are changes with ageing, there is very minimal loss of liver function. Studies have documented an actual decrease in liver size, while the remaining hepatocytes show compensatory hypertrophy. Blood flow to the liver decreases with advanced age. As a consequence, the metabolism of drugs which are cleared by first pass mechanism is impaired. Normal values of liver function tests are not altered with increasing age. Processes like detoxification, demethylation, conjugation and hepatic extraction remain unaffected barring acute stress, where the liver may not be able to increase its synthetic and metabolic functions.

The kinetics of the gallbladder and its absorptive functions do not change with age. Some studies suggest an increase in cholesterol secretion in bile and decrease in bile acid secretion. The gallbladder loses its sensitivity to cholecystokinin.

The pancreas shows significant structural and functional changes with advancing age, including metaplasia of the duct epithelium, slight increase in diameter of the main pancreatic duct, nuclear atrophy, increase in nucleolar substance, and dilatation of acini and ducts, which lead to flattening of epithelium and small cysts. Stimulated secretion of amylase and trypsin is decreased in elderly patients. The absorption of fat in elderly subjects may be slightly impaired owing to a decrease in pancreatic lipase.

Most changes in hormone action that occur in advanced age have been described at the end-organ cellular level. In older humans, serum gastrin concentrations may be increased because of achlorhydria or the presence of Helicobacter pylori infection. The serum concentrations of pancreatic polypeptide, cholecystokinin and motilin are higher in the elderly than in the young. The physiological causes and the clinical consequences of these changes in gastrointestinal hormone levels and in receptors have not been elucidated.

In the elderly, the gastrointestinal immune response may be impaired. There is a decline in helper and killer T cell numbers, a slight change in B cell function and little or no change in antigen-presenting cell function. Salivary immunoglobulin A (IgA) and IgM and jejunal IgA-bearing plasma cells are increased in healthy elderly subjects. Intraepithelial lymphocyte counts are reduced. These data indicate that advanced age may alter the gut-associated lymphoid system.

Variations in the gut flora may also occur in the elderly. There is a tendency to increased numbers of bacteria being found in the stomach and proximal small bowel of elderly subjects, reflecting a greater incidence of hypochlorhydria and achlorhydria in the population. In general, studies of faecal flora in the elderly have revealed only modest changes. Elderly subjects tend to have a mild increase in aerobic Gram-negative bacteria and fungi and a decrease in anaerobic organisms compared to younger individuals.

Clinical manifestations and decision-making in the elderly

There are often significant differences in the incidence of specific diseases between the young and the old. In addition, clinical manifestations of disease may be different in the elderly. In the elderly,
symptoms of disease often tend to be more insidious, nonspecific and atypical. More than 50 per cent of elderly patients suffer from two or more medical problems. The existence of multiple diseases or disabilities may also influence or modify the symptoms of a newly occurring disease. Finally, the inability of patients to provide an accurate history or to cooperate with physical and diagnostic examinations makes the diagnostic evaluation of physical diseases in elderly patients difficult. Acute abdominal pain appears to be muted with age, perhaps because endogenous opiate secretion is increased, nerve conduction fails, or the patient becomes depressed.

Physical signs are often subtly altered in the elderly patient. For instance, in acute perforation of a viscus, chemical peritonitis induced by gastric hydrogen ions may be absent in the elderly patient because of hypochlorhydria. Elderly patients pose a greater anaesthetic and surgical risk because of associated diseases, not age alone. Severe cardiovascular and respiratory disease increase risk from abdominal surgery at any age.

**Evaluation of gastrointestinal disease in the elderly**

For motility disturbances, manometry with or without barium studies including cine examination are preferred. In the elderly, barium studies can be used to evaluate certain upper gastrointestinal tract complaints if endoscopy is contraindicated because of medical conditions that make sedation hazardous, recent myocardial infarction or an inability to cooperate. Upper gastrointestinal endoscopy can be performed safely in older patients. However, it is mandatory to monitor oxygen saturation in these patients. In one study, oxygen desaturation occurred in more than 50 per cent of patients undergoing colonoscopy, usually during the premedication phase. Pulmonary function testing did not help to delineate which patients would desaturate. Low flow oxygen may be advisable as a routine during endoscopy.

**Nutrition in the elderly**

Protein energy malnutrition is common in the elderly. Approximately 10 per cent of acute geriatric patients are malnourished on admission. The prevalence is approximately 3 per cent in free-living people aged over 65 yr, although most of these people have co-existing disease. Unless the possibility is considered, malnutrition is underdiagnosed as even in grossly undernourished patients, haematological and biochemical parameters can be normal. Ageing is associated with a decrease in lean body mass and resting metabolic rate as well. The healthy elderly man needs fewer calories to maintain energy balance, whereas he needs more protein per unit body weight to maintain nitrogen balance. Earlier cross-sectional studies suggested a fall in energy intake with ageing. Nutritional imbalances in older individuals related to illness may also be compounded by other factors affecting eating habits including loneliness, depression, disability and a physiologic decline in the desire to eat.

**Oesophageal disorders in the elderly**

These patients are susceptible to all the disorders that commonly affect younger adults. Some oesophageal disorders are uniquely associated with age and must be specifically considered to avoid missed or delayed diagnosis (Zenker’s diverticulum, cervical osteophytes, dysphagia due to other compression and intramural oesophageal pseudodiverticulosis). The perturbations in oesophageal function become manifest as the four classic symptoms of oesophageal disease: dysphagia, heartburn, effortless regurgitation and chest pain.

Oropharyngeal dysphagia results from problems with oropharyngeal motility, making it difficult to propel solids or liquids from the mouth into the oesophagus. Common symptoms include dysphagia for liquids and solids, aspiration, nasal regurgitation, chronic cough, inability to handle saliva, chronic dehydration, weight loss and recurrent pulmonary infections. Oropharyngeal dysphagia appears to be relatively common among the debilitated elderly. In a study of nursing home residents, 30-40 per cent were noted to have eating and swallowing difficulties. This disorder may be due to central nervous system disease, neuromuscular disorders, myopathies, local structural lesions, upper oesophageal sphincter dysfunction or pharyngeoesophageal diverticulum. Studies using a sophisticated transducer system demonstrate a decrease in
resting pressure and a delay in relaxation of the upper oesophageal sphincter after deglutition in patients over 62\textsuperscript{53}. A prominent posterior cricopharyngeal bar may be seen at barium swallow, whether or not dysphagia is present. Treatment involves sectioning of the cricopharyngeal muscle. Occasionally, careful oesophageal dilatation may be successful\textsuperscript{1}.

Zenker's diverticulum is a pseudo-diverticulum, developing in a transitional area between the inferior constrictor muscle and the upper oesophageal sphincter, usually on the left side\textsuperscript{49}. It seems likely that a motility disturbance is the causative mechanism\textsuperscript{44}. Excellent results have been obtained by performing myotomy and diverticulectomy or diverticuloscopy under local anaesthesia in high risk elderly patients\textsuperscript{55}. There are also reports of successful endoscopic treatment of pharyngo-oesophageal diverticula in elderly debilitated patients\textsuperscript{66}.

Motor disorders of the oesophagus causing dysphagia can occur in the elderly. Soergel et al\textsuperscript{15} described decreased peristalsis and increase in non-propulsive contractions after a swallow in patients over the age of 90. This abnormality was termed presbyoesophagus. Achalasia is a motor disorder, usually affecting younger individuals, which however is not uncommon in older patients\textsuperscript{57}. Recognition of the disease is important because aspiration and malnutrition may be complications. In elderly patients, it is necessary to make the distinction between true achalasia and secondary achalasia due to malignancy at the gastro-oesophageal junction\textsuperscript{58}. Treatment options for achalasia in the elderly are similar to those in other age groups, and include pneumatic dilatation, medication or surgical myotomy. A review of 17 studies comprising 1365 patients suggests that pneumatic dilatation has excellent or good results in about 69 per cent of patients\textsuperscript{59}.

Carcinoma of the oesophagus is typically a disease of the elderly\textsuperscript{60}. Unfortunately, presentation is usually at an advanced stage of the disease. Resection provides the best chance for cure and frequently offers the best form of palliation\textsuperscript{61}. The ability of elderly patients to withstand resection with either curative or palliative intent has been questioned\textsuperscript{62}. Several more recent studies suggest that oesophageal resection may be performed on elderly patients with the same or slightly increased operative mortality\textsuperscript{63,64}. Other palliative measures are endoscopic dilatation\textsuperscript{65}, radiation therapy\textsuperscript{66}, stent placement\textsuperscript{67} and laser therapy\textsuperscript{68}.

Gastro-oesophageal reflux (GER) is very common in the elderly, and a review found an incidence of this condition in more than 20 per cent of individuals over the age of 62\textsuperscript{69}. GER may be more difficult to diagnose in the elderly for several reasons, including increased pain tolerance, increased gastric pH and the fact that symptoms are often attributed to known underlying disease such as coronary artery disease\textsuperscript{70}. The increased incidence of GER in the elderly may be due to several minor factors. There is a tendency for a decrease in the amplitude of oesophageal peristalsis with age, thus delaying the acid clearance from the oesophagus\textsuperscript{71}. The elderly have a decreased salivary, bicarbonate response to oesophageal acid infusion\textsuperscript{72}. The frequency of sliding type hiatus hernia increases with age\textsuperscript{73}. Medications also may induce decreases in lower oesophageal sphincter pressure. Elderly people experience asymptomatic reflux more commonly and are probably at higher risk for developing the complications of prolonged GER such as stricture, Barrett's oesophagus and respiratory problems\textsuperscript{74}. The medical or surgical management of GER in the elderly is similar to that in younger patients\textsuperscript{75}.

Infections of the oesophagus occur most commonly in patients with underlying illnesses such as diabetes, infection with the human immunodeficiency virus, malignancies or malnutrition; they may also occur in patients on antibiotics, corticosteroids, or cytotoxic agents\textsuperscript{75}. The most common oesophageal infections are caused by Candida albicans and Herpes simplex. Endoscopy with brushing and biopsy is usually diagnostic.

Oesophageal injury associated with the intake of medicines, usually pills, may be more common in the elderly because of delayed pill transit\textsuperscript{76}. Although pre-existing oesophageal disease constitutes an increased risk for this kind of injury, many people with pill-induced injury have no history of oesophageal disease. Tetracycline is one of the more common agents involved, although many medications including ferrous sulphate, potassium chloride, vitamin C, aspirin and quinidine have been implicated\textsuperscript{77}.
Gastroduodenal disease in the elderly

Western statistics show that the incidence of peptic ulcer in the elderly is rising, to the point where 80 per cent of peptic ulcer-related deaths in the United States occur in the over-65 age group. Factors responsible for this include increase in life span and numbers of the elderly, smoking, poor nutrition, use of histamine \( H_2 \) receptor antagonists, the increasing use of non-steroidal analgesics, and the increased clinical recognition of the problem. The presenting complaints of elderly patients with ulcer are typically vague. There may be prominent anorexia or weight loss, and pain may be absent. In one study, 65 per cent of older patients compared to 8 per cent of younger patients had no pain on presentation. Instead, older patients may come to the physician’s attention because of systemic manifestations of anaemia such as chest pain, dyspnoea or syncope. Following a bleed, rebleeding rate is higher in the elderly compared to younger patients. Transfusion requirements are usually higher in this group of patients.

Giant gastric ulcers are predominantly a disease of the elderly. The peak incidence of giant gastric ulcers (>3 cm diameter) is 60-70 yr in men and 70-80 yr in women. These ulcers are usually benign and symptoms are usually of short duration. About 50 per cent of giant gastric ulcers will bleed. In one report, 37 per cent of patients with haemorrhage from a giant gastric ulcer died. Perforation is uncommon, occurring in about 5 per cent of patients.

The gastric proton pump inhibitors have been established as a very effective short term therapy for acid-peptic disease. No side effects of the use of this drug have been reported that are specifically applicable to the elderly. Helicobacter pylori infection should be treated in all patients with peptic ulcer and \( H. pylori \) infection. Between 40-50 per cent of regular users of non-steroidal analgesics are elderly. Approximately one-fourth of all upper gastrointestinal bleeding occurs in patients taking non-steroidal analgesics. In these patients, therapy consists of withdrawing the drug if possible, modification of associated risk factors, and the use of \( H_2 \) blocker therapy.

Gastric volvulus is an uncommon condition that occurs most often after the age of 50 yr, because of age-related degeneration and stretching of the gastric ligaments. It usually requires surgical repair.

Atrophic gastritis has been found in 31.5 per cent of healthy persons over 60. Gastric polyps develop in these patients, but the long-term gastric malignancy risk is low and not more than three to four times that of the population at large. Gastric hypochlorhydria increases the pH of the proximal intestine, and predisposes to infection with Salmonella, cholera, Giardia species and perhaps Clostridium difficile.

Adenocarcinoma of the stomach is more common with advancing age and most published series report a mean age of 62-70 yr. The most important carcinogens appear to be the nitrates and nitrites found in foods. Other risk factors include the presence of chronic gastritis, adenomatous polyps and a prior Billroth II resection. Most current series report a proximal migration of gastric cancer location, especially in men. Gastric cancer consists of two main types. The intestinal type is seen in high incidence areas of the world, predominates in men and the elderly and has a better prognosis. The diffuse type is seen in low incidence areas, predominates in the young and women, and has a worse prognosis. Early gastric cancer, limited to the mucosa or muscularis propria, has high cure rates after surgery and is associated with a 95 per cent five year survival. In the absence of distant metastases, aggressive resection is warranted, since gastric cancer is primarily a regional disease.

Small and large bowel problems in the elderly

Diarrhoea and malabsorption

Diarrhoea is common in the elderly and an important cause of morbidity and potential morbidity. The elderly are more susceptible to diarrhoea due to weakness or compromise of immunological and non-immunological defences, gastrointestinal surgery, drug therapy or institutionalization. Spurious diarrhoea, a consequence of faecal impaction, is a common problem in the elderly. Faecal incontinence is a vexing problem for both patients and staff, more so in patients with organic brain damage with a prevalence of 10-20 per cent. It may be misdiagnosed as true diarrhoea. The management
consists of treating constipation and preventing its recurrences. Antibiotic therapy is the most common cause of drug-induced diarrhoea due to change in bacterial flora. However other mechanisms are alteration in motility, and mucosal damage. In one study, digitoxin toxicity was the next common cause of diarrhoea in 100 patients over 70 yr of age. The other drugs which are implicated as the cause of diarrhoea are cimetidine, neomycin, colchicine among many others.

Infectious diarrhoea due to toxin-producing organisms, invasive bacterial infection, or food poisoning occurs in the elderly as in other age groups. Invasive bacterial pathogens include Salmonella, Campylobacter, Shigella flexneri and C. difficile. An Australian study emphasized the importance of Yersinia enterocolitica as a cause of diarrhoea in adults. In the elderly, septicaemia is a serious complication. Viral causes of diarrhoea are not limited to young children and may affect the elderly as well.

Small bowel bacterial overgrowth, in the absence of systemic disease or anatomical abnormalities of the small bowel, is a condition peculiar to the elderly which may cause malnutrition and diarrhoea. Studies based on the glycocholate breath test in the elderly have questioned the clinical significance of such a finding by demonstrating abnormal results without weight loss. Factors promoting small intestinal bacterial colonization in such subjects remain speculative, such as lowered gastric acid secretion and age-related motility changes. H. pylori related changes in duodenal mucus may also be relevant in view of the increased prevalence of this organism in elderly subjects. A number of systemic diseases can give rise to small intestinal bacterial overgrowth and its sequelae. These include diabetic autonomic neuropathy, amyloidosis, scleroderma, dystrophic myotonica, and damage following small intestinal radiation therapy.

Diarrhoea complicates a variety of gastrointestinal surgical procedures. Mild post-vagotomy diarrhoea occurs in about 70% of patients, and severe diarrhoea in 5–20% per cent. Small intestinal diarrhoea can also occur after colonic resection depending on the length of the colon removed. Diarrhoea may also occur after cholecystectomy, although there is no clear link to secretion induced by bile acids.

The elderly may present with apathetic thyrotoxicosis with diarrhoea as the only manifestation. Steatorrhoea occurs in a significant number of cases. Rarer endocrine causes of diarrhoea are the Zollinger-Ellison syndrome, the carcinoid syndrome and VIP secreting tumours such as ganglieneuroma, ganglioblastoma and phaeochromocytoma.

Age-related changes in the pancreas are insufficient in themselves to produce steatorrhoea, since 90 per cent of the secretory capacity has to be lost. Pancreatic insufficiency was the most common cause of steatorrhoea in patients over the age of 65, and some of these patients had a pancreatic carcinoma. Abdominal pain may not be present always in these cases.

Coeliac disease is not confined to children. The incidence of lactase deficiency in the elderly is not known. It is likely that secondary lactose intolerance is more common than the primary. Diarrhoea can also be caused by the over-indulgence of fruit and vegetables. The overload of long-chain carbohydrates may result in incomplete digestion.

Functional bowel disorders and constipation

The elderly may manifest major psychosocial stress in somatic complaints related to the gastrointestinal tract. In a large study of patients over 65 yr in an urban clinic, complaints in 58 per cent were believed to have a psychosomatic basis. Given the major life changes encountered by ageing individuals, with retirement, changes in the living situation, loss of agility, and so forth, it is not surprising that these factors have a significant impact on health. The primary symptoms of functional gastrointestinal disease may be dyspepsia, intermittent diarrhoea or most commonly constipation.

Age per se does not increase constipation except in very old people. In reality, constipation remains a common and important problem, particularly in the elderly, and may be extremely difficult to manage. Factors such as bowel habits, dietary fibre, liquids and long-term laxative use contribute to chronic constipation.

The usual definitions of constipation is a chronic condition (longer than 2 wk) of hard stools or a
frequency of bowel movements less than three times per week\textsuperscript{131}. Decrease in frequency of bowel movements can be due to the inability of the stool to reach the rectum in a timely fashion (colonic inertia). Other causes include normal amplitude but unco-ordinated colonic contractions; focal or pancolonic hypomotility; mechanical problems such as tumours, volvulus or strictures; loss of central or peripheral neuronal function\textsuperscript{132,133}; and pharmacologic or metabolic abnormalities. Some patients may experience constipation secondary to anorectal dysfunction\textsuperscript{134}.

Owing to the complexity of this disorder, all patients complaining of severe constipation must undergo orderly and thorough evaluation: history, physical examination, blood tests for metabolic diseases, colonoscopy, cineradioactivity, transit studies, anorectal manometry and rectal biopsy using silver staining techniques\textsuperscript{132,135,136}.

Proper bowel management includes ensuring a balance of adequate fluids and fibre, providing adequate time for evacuation during high gut motility periods and encouraging exercise to help stimulate gut motility with gut hormones\textsuperscript{137}. Irritant laxatives, unless indicated, should be discouraged because of potential long-term detrimental effects on gut motility\textsuperscript{137}. One possibility for the future for extreme cases of refractory constipation is the use of opioid antagonists\textsuperscript{138}.

In patients with severe chronic idiopathic colonic constipation, definite surgery is reserved for cases truly refractory to medical management. Subtotal colectomy with ileorectal anastomosis has given a very good success rate in patients with normal anorectal manometry findings\textsuperscript{139}. More recently, a method of biofeedback for pelvic floor dysfunction has been reported\textsuperscript{134}.

\textbf{Intestinal ischaemia}

Vascular atheromatous changes are almost universal in the elderly. Since the splanchnic circulation is a high capacitance, low resistance vascular bed, low flow states such as hypotension and congestive heart failure render the mucosa susceptible to anoxic damage. However, abdominal angina and anoxic strictures of the small and large bowel are extremely rare.

Acute mesenteric vascular occlusion is often embolic in origin and carries a mortality rate of 10-90 per cent\textsuperscript{140}. Other causes are atherosclerotic occlusion of two major vessels, dissecting aortic aneurysm\textsuperscript{141} and mesenteric venous occlusion\textsuperscript{142}. Non-occlusive intestinal infarction can occur in the setting of heart failure, anoxia or shock\textsuperscript{141}. Boley and associates\textsuperscript{143} identified several clinical characteristics that place the patients at increased risk for intestinal ischaemia, including age more than 50 yr, valvular or atherosclerotic cardiac disease, cardiac arrhythmias, recent myocardial infarction, intractable congestive cardiac failure, hypovolaemia and hypotension of any cause and patients taking digitalis. The treatment protocols starts with immediate arteriography, followed by surgery for occlusive ischaemia or continuous infusion of vasodilating agents, such as papaverine, through angiocatheter, for non-occlusive cases\textsuperscript{143}.

Chronic mesenteric ischaemia is an uncommon disorder that accounts only 5 per cent of all intestinal ischaemic diseases\textsuperscript{144}. It presents as abdominal angina when at least two of the three major splanchnic vessels are occluded by the atherosclerotic process\textsuperscript{144}. If angiography with lateral views demonstrates at least two vessel disease in a patient with postprandial pain and weight loss and no other source of symptoms, most agree that vascular re-construction is indicated\textsuperscript{145}.

\textbf{Ischaemic colitis}

Ischaemic colitis can be due to occlusive or non-occlusive vascular disease\textsuperscript{146}. 60 per cent of the patients are over 70 yr of age\textsuperscript{147}. It has three main presentations\textsuperscript{148} - an acute reversible ischaemic event, chronic or recurrent acute ischaemic changes (which most often present as symptomatic colonic stricture) and acute irreversible ischaemic changes. The latter requires acute surgical exploration with resection of the diseased bowel, whereas the first one needs a conservative approach. Ischaemia as a cause must come to mind when older patients present with their first episode of colitis\textsuperscript{148}.

\textbf{Gastrointestinal bleeding}

A difficult clinical problem is the approach to acute gastrointestinal bleeding in the elderly in whom mortality rates are high. The sources of upper gastrointestinal bleeding do not differ. Peptic ulceration is commonly found\textsuperscript{149} and oesophageal bleeding is
frequent. The incidence of haemorrhagic gastritis is relatively low. In the case of lower gastrointestinal bleeding, the colonic vascular ectasias or angiodysplasia are considered more important.

Small intestinal bleed constitute a third of those that are classified as obscure and are responsible for 1 to 2 per cent all gastrointestinal haemorrhages. It has been observed that in patients under 30 yr of age, Meckel's diverticulum is the most common source, whereas in older patients, tumours or angiodysplastic lesions predominate. The type of investigation to be employed depends upon the urgency or rate of G1 bleed. Arteriography demonstrates the site of rapid haemorrhage anywhere in the G1 tract in at least two-thirds of patients, with excellent specificity. For slower or more chronic bleeding, upper gastrointestinal endoscopy should be followed by colonoscopy, then scintigraphy. If these are negative, small bowel contrast studies should be performed. However, the overall diagnostic yield of enteroclisis in cases of small intestinal bleeding is only 10 per cent. Sonde-type small bowel enteroscope has made direct visualisation of the entire small bowel possible outside of the operating room. In our experience, surgical exploration with intraoperative enteroscopy is quite useful in cases where pre-operative diagnosis was not possible.

Lower gastrointestinal bleeding in patients over 60 yr of age occurs primarily as a result of angiodysplastic lesion, arteriovenous malformations, or diverticular disease. Boley et al theorized that angiodysplasia are caused by intermittent low-grade obstruction of the submucosal veins. These are usually located in the right colon and are often multiple. Heuverzwyn et al described the angiographic findings in patients with bleeding angiodysplasia - early opacification of the draining vein, dilatation and tortuosity of vessels and capillaries, abnormal clusters of small arteries, extravasation of contrast and persistent opacification of the draining veins. Colonoscopy has occasionally shown visible telangiectatic lesions but may be most useful to rule out other lesions as a cause of bleeding. The management includes surgical resection, endoscopic laser photocoagulation and hormone therapy.

Prior to the discovery of angiodysplasia, diverticulosis was considered the major cause of lower GI massive bleed. Diverticular disease of the colon is strikingly related to the age of the patient, with postmortem examinations revealing diverticula in more than 50 per cent of persons in the eighth or ninth decade of life. Dietary factors as well as abnormalities in colonic motility may be responsible. Diverticulitis is a result of microperforation of a diverticulum which is then walled off by the neighbouring mesentery and adjacent bowel, leading to pericolic. There are data showing disproportionate incidence of diverticular bleeding from the right colon, whereas left sided diverticuli are more common.

Inflammatory bowel disease (IBD)

The peak incidence of onset of IBD is in the third decade. Studies, however, support the concept of a second significant peak of incidence around age 70, for both ulcerative colitis (UC) and Crohn's disease. This second peak represents approximately 17 per cent of all ulcerative colitis cases and approximately 14 per cent of all Crohn's disease cases. Brandt and Dickstein believe that the frequency of IBD in the elderly has been over estimated in the past because of a failure to recognize ischaemia and infection as possible causes of colitis in this age group. Even after careful exclusion of other causes like ischaemia and infections, the incidence of IBD in older patients appears to have increased.

In the elderly with UC, the diarrhoea tends to be more severe and less often associated with bleeding. Anaemia and weight loss are more prominent and hospitalisation is more frequently required. In more than 50 per cent of cases the left side of the colon, and rectum are involved. The severity of the first attack is greater and twice as many older patients die during the initial episode. Toxic megacolon and perforation occur more frequently carrying an increased mortality. Recurrence is less common. The risk of developing colon cancer is less because of the predominant left side involvement and relatively shorter duration of the disease.

Crohn's disease in the elderly is limited to the colon in nearly half of the patients, and involvement of the rectosigmoid alone is at least twice as common in older women. Extensive small and/or large bowel involvement is uncommon. Abdomi-
nal pain and an abdominal mass is found less often in the elderly. The time from onset of symptoms to diagnosis was longer in the elderly, because of failure to consider IBD as a cause of these symptoms, and concurrent presence of diverticular disease.

It is important to exclude other diseases in this patients such as ischaemic colitis, infectious colitis, carcinoma, and pseudomembranous colitis. The indications for surgical intervention are similar to the criteria used in younger patients with inflammatory bowel disease. The recurrence rate after operation in Crohn’s disease appears to be favourably influenced by the age. Sulphasalazine and the newer aminosalicylic acid agents generally are well tolerated. Steroids have a higher risk of complications. Immunosuppressive agents should be introduced early when long-term suppression of the inflammatory bowel disease is anticipated.

Colorectal cancer

The incidence of colorectal cancer increases with age. Clinical presentation does not differ significantly in the elderly. The treatment of colorectal cancer relies heavily on surgical resection of the primary disease. The risk of mortality is predicted by the stage of disease or by the type of operation required rather than by the patient’s age. Hence, there is a trend to address associated medical conditions and to manage patients more aggressively.

Pancreatic disease in the elderly

The pancreas exhibits striking morphological changes due to ageing. The endoscopist must be aware of these changes in interpreting endoscopic retrograde cholangio pancreatography (ERCP) findings while diagnosing chronic pancreatitis. Pancreatic duct width has been noted to increase with age at a rate of 8 per cent per decade. These changes are due to perilobular fibrosis and intraductal epithelial hyperplasia.

Acute pancreatitis accounts for 5-7 per cent of cases of acute abdominal pain in the elderly and is associated with increased morbidity and mortality. In large series of patients, in which gall-stones are the leading cause of pancreatitis, elderly patients make-up a much greater proportion. The mean age for patients presenting with acute gall-stone pancreatitis in a recent series was 67 versus 44 yr in patients with alcohol induced pancreatitis. In another series, 3 per cent patients with pancreatic carcinoma had clinical pancreatitis. Pancreatic carcinoma should be considered in any patient over the age of 60 with a new onset of pancreatitis in whom gall stones or biliary sludge cannot be confirmed. An issue of importance in the elderly patient is the management of gall stone pancreatitis. In this particular group, early ERCP and sphincterotomy appear to significantly reduce morbidity (18 vs 54%).

Age is one of the principal risk factors for pancreatic cancer. Most pancreatic cancers present at an advanced stage. The popular concept of painless jaundice classically ascribed to victims of pancreatic cancer is atypical. In a report of 80 elderly jaundiced patients with a mean age of 75.7 yr, malignant obstruction was the most common cause, with pancreatic cancer being the most common neoplasm.

Pancreaticoduodenectomy, the only cure for this disease, is no longer thought to be contraindicated in elderly patients.

Hepato-biliary disorders in the elderly

The liver size progressively decreases after the age of 50 yr, both in absolute terms and as a percentage of total body weight. Serum albumin levels decline by approximately 0.5 g/l with each decade of life after the age of 50. Nonspecific elevations of alkaline phosphatase may also be found in the elderly. The clinical course of liver disease in the majority of older patients does not differ from that in the young. Alcoholism is increasingly recognised as an etiologic agent in the elderly, while hepatitis is usually milder. Drug-induced hepatotoxicity is usually more severe in the elderly patient.

Gall bladder disease is the most common condition requiring abdominal operation in persons older than 60 yr. This is largely due to the progressive increase in the frequency of the gall-stones with each decade of life after age of 20 yr, the prevalence of gallstones exceeding 50 per cent in persons older than 70 yr. Higher prevalence of gall-stone complications like empyema, gangrene, and perforation of the gall bladder were also noted among the elderly. In addition, the incidence of bile duct stones
is much greater in the elderly. Secondary common bile duct stones occur in nearly 50 per cent compared with less than 12 per cent in younger patients\textsuperscript{199,200}. Further, the initial presentation may be due to complications in the elderly more often than in the young\textsuperscript{201,202}. This apparent increase in severity of gall-stone disease in the elderly is most likely due to delayed treatment\textsuperscript{203}. Although treatment of symptomatic gall stones is well accepted, the identification of symptoms may be difficult in the geriatric patient population\textsuperscript{204}. Considering the above facts and until the natural history of cholelithiasis in the geriatric age group is better defined, the practice of not treating elderly patients with asymptomatic gallstones, should be considered controversial. In such patients, it has been suggested that cholecystectomy is appropriate when laparotomy is required for other indications\textsuperscript{203}.

Acute acalculous cholecystitis is an often misdiagnosed and potentially lethal disorder found in 5-15 per cent of patients with acute cholecystitis. Most cases occur in men older than 65 yr, often during a postoperative period or in the setting of another major illness\textsuperscript{204}. Torsion of the gallbladder is a rare cause of acalculous cholecystitis, especially in elderly women.\textsuperscript{2} The incidence of postcholecystectomy bile duct stones is higher in elderly patients than in younger ones. The mortality rate following bile duct explorations is also higher in the elderly (29 vs 0.4\%)\textsuperscript{205}. Preoperative ERCP, sphincterotomy and CBD clearance is safe, cost effective and useful in patients undergoing open or laparoscopic cholecystectomy\textsuperscript{206}.

Gallbladder carcinoma classically presents at an advanced stage, and bile duct tumours, while often small at the time of diagnosis, may defy surgical extirpation. Because of these characteristics, these lesions are rarely amenable to cure and require a multidisciplinary approach.

**Liver transplant in the elderly**

There are increasingly reports of liver and heart transplantation in septuagenarians\textsuperscript{207}. The goals for establishing upper age limits are important and include the scarcity of donor organs, the expense, the desire to obtain best long-term survival rates possible, and quality of life issues. That all these argu-

ments may be true sometimes does not ease the task of designating a point in the individual patient’s life when age obviates organ transplantation. ‘T’ cell mediated responses are depressed in the elderly\textsuperscript{208}. This blunted immune response appears to be advantageous to older patients in terms of tolerance of the graft. At the same time, they are more prone to opportunistic infection and neoplasia in the post-transplant period. In 1991, the oldest known recipient of a liver was a 76 yr old patient who received a transplant in 1986 in Pittsburgh. The records report a total of 10 liver recipients 70 yr of age or older\textsuperscript{209}. Age in itself need not be an exclusion criterion for candidates for liver transplantation. However, as patients approach their seventh and eighth decades of life, one needs to be increasingly concerned about the co-existence of other health problems.

**The Indian scene**

Little information is available from India about gastrointestinal problems in the elderly. A literature search over a 20 yr period failed to reveal any publications dealing specifically with gastrointestinal problems in the elderly. This is probably not surprising given the age profile of the country’s population. We reviewed our departmental inpatient records for two years to determine patterns of disease in the elderly. During the period January 1, 1994 to December 31, 1995, 110 patients aged 65 yr or older (87 males) were admitted under the gastrointestinal services. Their ages ranged from 65 to 100 yr (mean 70.5 yr). The overall inpatient mortality in this group was 7 per cent.

Abdominal pain (30\%) was the commonest presentation followed by abdominal distension (22\%), gastrointestinal bleed (12\%) and jaundice (13\%). The most common problem accounting for hospitalisation was malignancy (34\%). Frequently encountered malignancies included stomach (21\%), oesophagus (19\%), primary hepatocellular carcinoma (16\%) and pancreas (13.5\%). Unlike Western series, colonic carcinoma constituted only 8 per cent of all GI malignancies. Carcinoma of the major bile ducts accounted for another 8 per cent.

Among the non-malignant disorders in the elderly, chronic liver disease was most common, accounting
for 25 per cent of all hospitalisations in this age group. As in the West, cryptogenic cirrhosis constituted more than 50 per cent of the total chronic liver disease patients. Alcohol was the leading cause in the group where an etiology could be discerned, followed by hepatitis B virus infection, hepatitis C virus infection and drug toxicity. Irritable bowel syndrome accounted for 8 per cent of total admissions under the gastroenterology service, and common bile duct stones accounted for another 8 per cent of admissions. In keeping with the literature, in our series of 110 patients, 54 (49%) suffered from associated non-gastrointestinal problems including diabetes mellitus, chronic obstructive airways disease, hypertension, ischaemic heart disease, and chronic renal failure, each of which affected the management. This preliminary analysis suffers from the drawbacks of examining only hospitalised patients, and that too only under the gastroenterology services.

This review describes various physiological changes in the gastrointestinal tract of elderly patients, and details the various gastrointestinal diseases encountered in this population. Preliminary analysis indicates that gastrointestinal problems in the elderly in our country may not differ from those afflicting the elderly in other countries, although the prevalence of specific malignancies may differ depending on local etiological factors. Given the increase in life expectancy in our population, it seems certain that much consideration will need to be given in the next decade to gastrointestinal problems in the elderly.

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