CME

Endoscopy in the Elderly

Anne C. Travis, MD, FACG[1], Daniel Pievsky, MS, RD[2] and John R. Saltzman, MD, FACG[1]

With increasing age, the incidence of both benign and malignant gastrointestinal (GI) disease rises. Endoscopic procedures are commonly performed in elderly and very elderly patients to diagnose and treat GI disorders. There are a number of issues to contemplate when considering performing an endoscopic procedure in an elderly patient, including the anticipated benefits of endoscopy as well as the increased risks associated with procedural sedation and some endoscopic procedures. This review will focus on the yield and safety of endoscopic procedures in older adults.

INTRODUCTION

According to the 2010 World Health Organization Report, life expectancy has increased in both the United States and throughout most of the world (1). The World Health Organization defines elderly as 65 years of age and older and very elderly as 80 years of age and older. With increasing age, the incidence of gastrointestinal (GI) disease increases. As an example, between 2004 to 2008, the elderly constituted the greatest proportion of new colorectal cancer diagnoses, with an incidence rate of 247.6/100,000 population, compared with 18.2/100,000 population in those younger than 65 years of age (2). Similarly, elderly patients had increased rates of esophageal cancer (23.3/100,000 population vs. 1.8/100,000 population, respectively) and gastric cancer (40.8/100,000 population vs. 3.0/100,000 population, respectively). The elderly also have increased incidences of pancreatic and biliary disease (3), with gallstones affecting nearly one-third of patients aged 70 years of age and older (4). Many of these conditions are detected and/or treated using GI endoscopy.

Overall, endoscopic procedures are both safe and effective in appropriately chosen elderly patients (5,6). However, care must be taken and adjustments made to ensure successful and safe endoscopic procedures in the elderly. This review will discuss some of the issues of particular importance in the performance of endoscopic procedures in the elderly, including upper endoscopy, percutaneous endoscopic gastrostomy (PEG) tube placement, colonoscopy, endoscopic retrograde cholangiopancreatography (ERCP), and endoscopic ultrasound (EUS).

PREPROCEDURE CONSIDERATIONS

As with all patients, elderly patients need to be evaluated to determine if they are at increased risk when undergoing an endoscopic procedure. This includes an assessment of the patient's cardiopulmonary status, evaluation of comorbid illnesses that may complicate procedural sedation or performance of the procedure itself (e.g., an elevated international normalized ratio (INR) in a patient requiring a sphincterotomy), and determination of the patient's ability to provide informed consent.

Particular attention should be given to determining whether special precautions are required before performing the endoscopy. Such precautions may include administration of preprocedure antibiotic prophylaxis and management of implanted cardiac devices.

Prophylactic antibiotics

Prophylactic antibiotics are no longer recommended for most endoscopic procedures, regardless of patient age. Recommendations regarding the use of prophylactic antibiotics have been outlined in guidelines from the American Heart Association and the American Society of Gastrointestinal Endoscopy (7,8). For ERCP, antibiotics are recommended in patients with biliary obstruction, especially if the obstruction is unlikely to be drained at ERCP. In addition, antibiotics are routinely recommended before ERCP in post-liver transplantation biliary strictures. During EUS, antibiotics are recommended only for patients undergoing aspiration of a cystic lesion. Finally, antibiotic prophylaxis is routinely recommended before a patient undergoes PEG tube placement.

Implanted cardiac devices

Many elderly patients have implanted cardiac devices, such as pacemakers and defibrillators. These devices have the potential for electromagnetic interference during electrocautery (9). It is recommended that continuous rhythm monitoring be used during the procedure (10). In addition, pacemakers should be set

[1]Department of Gastroenterology, Hepatology and Endoscopy, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA; [2]College of Osteopathic Medicine, University of New England, Biddeford, Maine, USA. **Correspondence:** John R. Saltzman, MD, FACG, Department of Gastroenterology, Hepatology and Endoscopy, Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, Massachusetts 02115, USA. E-mail: jsaltzman@partners.org

to automatic pacing and defibrillators be turned off with a magnet during the use of electrocautery devices.

PROCEDURAL SEDATION IN THE ELDERLY

One of the main risks of performing endoscopy in the elderly is the sedation used during the procedure. Studies suggest that there is an increased risk of hypotension, hypoxia, arrhythmias, and aspiration in the elderly undergoing procedural sedation compared with younger patients (11–18). Most studies have evaluated the use of a benzodiazepine (often midazolam) with or without the addition of a narcotic (often fentanyl).

In 2006, the American Society of Gastrointestinal Endoscopy issued guidelines regarding the use of sedation in elderly patients undergoing endoscopic procedures (10). Because of physiological changes with aging, the guidelines recommend using fewer sedative agents at lower doses than used in younger patients, and to administer the medications using slower infusion rates.

An alternative to procedural sedation with a benzodiazepine and a narcotic is propofol, which appears safe in the elderly population (12,18–21). However, as is the case for standard procedural sedation, a reduction in the dose of propofol is recommended. Another alternative to procedural sedation is to perform unsedated endoscopy, a practice that is more common outside the United States (22). Compared with younger patients, the elderly may have a better tolerance for undergoing upper endoscopy or colonoscopy with little or no sedation (23).

YIELD OF ENDOSCOPIC PROCEDURES IN THE ELDERLY

As GI disease is common among the elderly, endoscopic procedures in this age group are often high-yield, particularly for upper GI and biliary complaints. However, factors such as poor colonoscopy preparations are a bigger problem in the elderly and can compromise diagnostic and therapeutic efficacy.

Upper endoscopy

Upper endoscopy for the evaluation of upper GI symptoms in elderly patients frequently provides useful diagnostic information (24,25). The largest study to examine the yield of upper endoscopy in elderly patients was a retrospective study of 3,147 patients between the ages of 65 and 99 years (25). Alarm symptoms/features were present in 40% and included anemia (16%), dysphagia (8%), weight loss (7%), GI bleeding (11%), vomiting (5%), and a family history of gastric cancer (1%). Epigastric pain without alarm features was present in 42% and other epigastric symptoms without alarm features were present in 20%.

Findings that were determined to be relevant (i.e., findings that directly impacted therapeutic decisions and prognosis) were found in 1,559 patients (50%). When taking into account the indication for the endoscopy, the frequency of relevant findings was highest for patients with GI bleeding and lowest for those asymptomatic

patients with a family history of gastric cancer. The yield by indication was:

- GI bleeding: 74% (253/340)
- Reflux symptoms: 53% (340/642)
- Weight loss: 52% (109/207)
- Dysphagia: 50% (128/254)
- Anemia: 49% (249/507)
- Vomiting: 48% (82/172)
- Epigastric pain: 46% (600/1,308)
- Atypical reflux symptoms: 35% (28/80)
- Family history of cancer: 6% (2/34)

While relevant findings overall did not increase with age, the frequency of finding malignancy or peptic ulcer disease did increase. Malignancy or peptic ulcer disease was detected in 6% of 65- to 69-year-olds, 8% of 70- to 84-year-olds, 11% of 75–80-year-olds, 14% of 80- to 84-year-olds, and 17% of patents aged 85 years and older.

On multivariable analysis, relevant findings were associated with male sex (odds ratio (OR) 1.4; 95% confidence interval (CI) 1.2–1.5), weight loss (OR 1.4; 95% CI 1.03–1.9), bleeding (OR 2.2; 95% CI 1.6–3.1), and reflux (OR 1.7; 95% CI 1.4–2.1). Factors that were associated with an increased risk of malignancy included dysphagia (OR 5.1; 95% CI 3.0–8.7), weight loss (OR 4.8; 95% CI 2.9–7.9), anemia (OR 1.8; 95% CI 1.1–3.1), and male sex (OR 1.9; 95% CI 1.2–3.0). Factors associated with an increased risk of peptic ulcer disease included nonsteroidal anti-inflammatory drug use (OR 2.2; 95% CI 1.02–4.9) and bleeding (OR 6.7; 95% CI 4.2–10.6).

This large study shows that in elderly patients, the yield of upper endoscopy performed for common upper GI symptoms is high. In particular, it suggests that patients with dysphagia, anemia, GI bleeding, and epigastric pain, especially if male, should be considered for upper endoscopy given the increased risk of malignancy or peptic ulcer disease in this population.

PEG tube placement

The role of PEG tube placement in the elderly, particularly in the setting of dementia, is a controversial topic and has been covered in detail elsewhere (26). Although PEG tubes can be successfully placed, the mortality post placement is high, especially in the very elderly. Although this mortality is not typically due to the PEG tube itself, the ethical issues of quality of life at the end of life must be carefully considered when evaluating an elderly patient for PEG tube placement. In general, it is not recommended to place a PEG tube unless a patient is expected to survive for >30 days after the placement (27).

Colonoscopy

Colonoscopy is accepted as the gold standard for the detection of and screening for colorectal cancer. The incidence of colorectal cancer increases with age, and the detection of these cancers comprise a major role of colonoscopy in the elderly population (2). However, colonoscopy in the elderly may be more difficult, as elderly patients are more likely than younger patients to have poor preparations.

A prospective study with 2,000 patients compared the success rates and yield of colonoscopy in the elderly (65 years or older) with those in younger patients (17). While there was no significant difference in crude completion rate between the two groups, there was a significantly higher overall diagnostic yield in the elderly group (65% vs. 45%, $P < 0.001$). A second study assessed minorities over the age 85 years of age undergoing colonoscopy (28). While there was a relatively low yield in asymptomatic patients, the detection of colorectal cancer was high among symptomatic patients.

On the other hand, a study that compared octogenarians undergoing colonoscopy with those less than 80 years of age found that octogenarians had significantly lower completion rates than those less than 80 years (90% for octogenarians and 99% for those <80 years of age) (29). The difference in completion rates was attributed to preparation quality, with poor colonic preparations being significantly more common in the octogenarian group (16%) compared with the non-octogenarian group (4%).

The issues related to colonoscopy preparation in the elderly have been examined in a recent review (30). The importance of an adequate colonoscopy preparation cannot be overstated, as a poor preparation may result in missed lesions, procedure failure, prolonged procedure time, and increased procedural complications (31). Two of the most widely studied colonic preparations are polyethylene glycol and oral sodium phosphate. Guidelines caution against using sodium phosphate preparations in the elderly, especially those with renal or cardiac dysfunction, as sodium phosphate has been associated with hyperphosphatemia, hypernatremia, and hypokalemia (10). Regardless of the type of preparation, age has been shown to be an independent risk factor for a poor colonic preparation (29,32). Diabetes is another factor that has been found to contribute to a poor preparation (32–34) and affects >25% of the elderly in the United States (35). It is not clear if there is a synergistic effect between diabetes and age on the quality of bowel preparation. Such an effect was not seen in a study that compared preparation quality among diabetics >70 years of age with diabetics <70 years of age; however, the study excluded patients >85 years of age (33).

In addition to the issues of technical efficacy, there is also the question of screening efficacy in the elderly population. Whether or not to screen and when to stop screening with advancing age are controversial issues. At the heart of the issue is the question of when the burdens associated with screening outweigh the benefits. The current recommendation of the US Preventative Services Task Force advises against routine colorectal cancer screening of patients 76 to 85 years of age and against all colorectal cancer screening in patients >85 years of age (36).

The benefits and burdens of colonoscopy in patients 70 years old and older after a positive fecal occult blood test were examined in a study of 212 patients (37). A benefit was defined as follows: if a patient had a significant adenoma and/or colorectal cancer found on colonoscopy and lived at least 5 years, regardless of complications or additional procedures. Colonoscopies were performed in 118 patients (56 percentage). Six cancers were detected (5% of those undergoing colonoscopy) along with 34 significant adenomas (29%). However, 12 patients (10%) suffered a complication of colonoscopy or cancer treatment. The study also found that, among the patients who did not undergo colonoscopy, nearly 50% died from causes other than colorectal cancer within 5 years. Thus, while the yield of colonoscopy was high, the overall benefit to the patients was harder to quantify.

The question of when to stop screening in the elderly requires individualized assessment based not only on patient age but also on the patient's health, life expectancy, and goals of care (30,37,38).

Endoscopic retrograde cholangiopancreatography

ERCP is the primary endoscopic procedure used for the evaluation and treatment of pancreaticobiliary diseases in older patients, with high diagnostic and therapeutic success rates in appropriately selected patients. Studies have found that successful cannulation of the bile duct is achieved in 88 to 98% of elderly patients (12,13,15,39), with diagnostic yields of 82% (19), and therapeutic yields of 85 to 87% (12,13).

The high yield of ERCP in elderly patients is illustrated by a prospective study with 118 patients aged 80 years or older who underwent 195 ERCPs (19). In the majority of cases, EUS or magnetic resonance cholangiopancreatography was performed before ERCP. Biliary obstruction was the indication for the procedure in 87 of the octogenarians (74%). In 23 patients (17%), the procedure was done for an emergency indication (biliary pancreatitis, acute cholangitis, bile leak after cholecystectomy, or hemobilia). Only eight patients (7%) underwent a diagnostic procedure. Findings at ERCP included bile duct stones (42%), malignant bile duct stenosis (22%), benign bile duct stenosis (8%), and papillary adenoma (3%), whereas no pathological finding was identified in 21 patients (18%). Therapeutic procedures performed during ERCP included sphincterotomy of the bile duct (58%) or pancreatic duct (3%), stent placement in the common bile duct (48%) or pancreatic duct (3%), and endoscopic papillectomy (3%). In the 87 patients with biliary obstruction, reversal of jaundice was achieved in 81 (93%) following one or more endoscopic interventions.

A similar study examined the efficacy of ERCP in 97 patients who were 80 years of age or older (12), and compared those patients with 405 patients under the age of 80 years. The most common clinical features were cholestasis (92% of octogenarians and 84% of younger patients) and pain (53% and 59%). The clinical features were similar between the two groups with the exception of cholangitis, which was more common among the octogenarians (29% vs. 16%, $P = 0.001$). The groups were similar with regard to cannulation success rates (88% vs. 86%). Stenoses due to pancreatic cancer were more common in the octogenarians (14% vs. 4%, $P < 0.001$), whereas other findings were similar between the groups and included choledocholithiasis (53% vs. 49%) and cholangiocarcinoma (4% vs. 3%). Overall, the proportion of ERCPs that were therapeutic was similar for the two groups (85% vs. 75%).

These studies demonstrate that in patients with symptoms that are suggestive of biliary disease, ERCP is a high-yield procedure, both with regard to diagnostic and therapeutic capability.

Endoscopic ultrasound

EUS, with or without fine-needle aspiration (FNA), has many applications, including the evaluation of extraluminal cystic and solid lesions, staging of malignancies such as esophageal and rectal cancer, and evaluation of dilated common bile ducts. Studies suggest that the yield of EUS is high in elderly patients, particularly in patients with pancreatic cancer. In addition, EUS and magnetic resonance cholangiopancreatography have largely replaced ERCP for the diagnosis of common bile duct stones in patients without evidence of biliary obstruction. While magnetic resonance cholangiopancreatography is noninvasive, many patients have contraindications to the procedure, such as implanted cardiac devices. In such patients, EUS can be used, as it is both sensitive and specific for the diagnosis of choledo-cholithiasis.

The efficacy of EUS in elderly patients was examined in a study of 232 patients aged 80 years or older (40). Indications for EUS included a pancreatic mass or cystic lesion (78 patients), pancreatitis (10 patients), dilated common bile duct (40 patients), evaluation of luminal GI tract pathology (87 patients), evaluation of subepithelial GI tract lesions (28 patients), and evaluation of mediastinal pathologies (14 patients). The procedure was successful in all cases. FNA was performed on 95 of the lesions and revealed malignancy, dysplasia/atypical cells, or findings suspicious for malignancy in 48 (51 percent). Among the subset of patients with pancreatic masses who underwent EUS with FNA, the yield for malignancy or findings suspicious for malignancy was 63%.

In the patients with biliary dilation, the yield was 100% (20/20) if there was evidence of cholestasis or a biliary stricture on pre-procedure testing. A pancreatic mass was the most common finding (eight patients), followed by a common bile duct mass (five patients), and pancreatitis. Other findings included ampullary masses and choledocholithiasis. However, among the patients with a dilated common bile duct without evidence of cholestasis or a stricture, the yield was only 35% (7/20), all of whom had stones or sludge in the common bile duct and were referred for ERCP. The remainder of the patients did not have evidence of stones and were thus able to avoid ERCP.

No other studies have been published to date that exclusively focus on EUS in the elderly, but several do approach this age range. One study evaluated the therapeutic impact of EUS on 700 consecutive patients (41). The average age of the cohort was 59 ± 16 years. They found that in the opinion of the endoscopist, the EUS provided new information not previously seen on any other diagnostic evaluation in 89% of the patients. Based upon clinical course, the EUS information affected treatment in 67% of the patients.

Similarly, another study found that EUS provided valuable information in the evaluation of patients with cholangiocarcinoma. The study included 81 patients with a mean age of 70 ± 12 years (42). It found that EUS was able to identify a bile duct mass in 94% of cases compared with 30% for triphasic computerized tomography scan ($P < 0.001$) and 42% for magnetic resonance imaging ($P = 0.07$). EUS correctly predicted 38 of 39 resectable tumors and 8 of 15 unresectable tumors.

These studies demonstrate that EUS and EUS with FNA have a significant impact on the diagnosis and clinical management of patients with both malignant and benign biliary disease. It can help identify patients who require additional therapy/surgery, while also identifying patients who do not require additional procedures or who are unlikely to benefit from surgical procedures.

SAFETY OF ENDOSCOPIC PROCEDURES IN THE ELDERLY

Endoscopic procedures are generally safe in elderly patients, with complication rates that are similar to those seen in younger patients (**Table 1**). An exception is colonoscopy, which is associated with higher perforation rates in patients over the age of 65 years and with higher rates of cardiovascular, pulmonary, and total complications in patients aged 80 years and older compared with younger patients.

Upper endoscopy and PEG tube placement

Multiple studies have demonstrated the safety of upper endoscopy in the elderly (**Table 1**) (11,43,44). One study examined 64 upper endoscopies performed on patients 85 years of age or older (11). There was no procedure-related mortality and only one complication was seen (a tachyarrhythmia during an emergent procedure). Similarly, there was no difference in post-procedure complications between elderly and non-elderly subjects in a study of 259 patients undergoing upper endoscopy (43). Finally, a third study of upper endoscopy in 100 patients aged 70 years or older reported only three minor procedure-related complications (transient bradycardia, brief confusion, and bronchospasm) (44).

Reports of the safety of PEG tube placement in the elderly are variable, owing in part to inconsistent definitions of various complications, such as aspiration, and because of the inability of many elderly PEG tube recipients to fully express problems related to the gastrostomy tube. Complications associated with PEG tube placement in the elderly include diarrhea (16–23%), constipation (16–25%), local infections (16%), and aspiration (8–17%) (45,46). In addition, deaths owing to PEG tube placement have been reported (1–2% of elderly patients in two studies) (45,47).

In guidelines on enteral nutrition in the elderly, the European Society of Enteral and Parental Nutrition notes that the prevalence of complications in the elderly related to enteral nutrition is similar to that seen in other age groups, but there are no studies specifically detailing complications based upon age (25).

Colonoscopy

The safety associated with colonoscopy is not as clear (**Table 1**). A large prospective study from the United Kingdom found no differences in complication rates between an elderly and non-elderly cohort (17). The overall complication rate was 0.2% (4/2,000), and all complications were minor. However, a second study that compared octogenarians with non-octogenarians found significantly more frequent desaturations in octogenarians (27% vs.

Table 1. Summary of endoscopy complications in the elderly

Author (reference)	Study type	Procedure	Total patient number (group split)	Patient age (years)	Complications
Clarke (11)	Retrospective	Mixed	214	>85	Perforation, pancreatitis, tachyarrhythmia
Benson (39)	Retrospective	Mixed	1,000	≥75 vs. <75	Cardiopulmonary, pancreatitis, bleeding[a], perforation, abdominal pain, infection, post-procedure admission, death
Lee (43)	Prospective	Upper endoscopy	134 (76 vs. 58)	≥65 vs. <65	Fever, acute coronary syndrome, pneumonia
Lockhart (44)	Prospective	Upper endoscopy	100	≥70	Bradycardia, confusion, bronchospasm
Attanasio (45)[b]	Prospective	PEG	102	Range: 11–99	Aspiration, tube dislodgement, diarrhea, constipation, tube clogging, local infection, peristomal granulations, cardiac arrest, hemorrhage, buried bumper syndrome
Callahan (46)[b]	Prospective	PEG	150 (123)	≥60	Vomiting, diarrhea, constipation, nausea, aspiration, obstruction of PEG tube, irritated PEG site, infection at PEG tube site, bleeding at PEG tube site, leakage at PEG tube site, peritonitis, intra-abdominal abscess
Karajeh (17)	Prospective	Colonoscopy	2,000	≥65 vs. <65	Tachycardia, bradycardia
Lukens (29)	Prospective	Colonoscopy	250 (100 vs. 150)	≥80 vs. <80	Hypotension, desaturation[a]
Arora (48)	Retrospective	Colonoscopy	277,434	18–50 vs. 50–65 vs. 65–80 vs. ≥80	Perforation[a]
Ko (51)	Prospective	Colonoscopy	502	≥40	Hypotension, hypertension, tachycardia, bradycardia, hemorrhage, abdominal pain, arrhythmia, fever, bloating, nausea, rash, diarrhea, constipation, bleeding
Warren (52)	Retrospective	Colonoscopy	53,200[c]	66–69 vs. 70–74 vs. 75–79 vs. 80–84 vs. ≥85	Perforation, bleeding, ileus, nausea, vomiting, abdominal pain, myocardial infarction/angina, arrhythmia, congestive heart failure, cardiac or respiratory arrest, syncope or hypotension or shock
Ko (53)	Prospective	Colonoscopy	18,271	≥40	Respiratory depression, hypotension, bradycardia, vasovagal reaction, tachycardia, hypertension, bleeding, nausea/vomiting, abdominal pain, diverticulitis, perforation, post-polypectomy syndrome
Fritz (12)	Retrospective	ERCP	502 (97 vs. 405)	≥80 vs. <80	Bleeding, pancreatitis, perforation, cholangitis, respiratory insufficiency, bradycardia
Thomopoulos (13)	Retrospective	ERCP	209	≥80	Pancreatitis, aspiration, cholangitis, cholecystitis, bleeding, retroperitoneal perforation, esophageal perforation
Katsinelos (15)	Retrospective	ERCP	413 (63 vs. 350)	≥90 vs. 70–89	Pancreatitis, bleeding, perforation, basket impaction, cholangitis, death
Salminen and Gronroos (16)	Retrospective	ERCP	35	≥90	None
Katsinelos (14)	Prospective	ERCP	600 (123 vs. 477)	≥80 vs. <80	Pancreatitis, bleeding, hypotension[a], fever, tachycardia, abdominal pain, cholangitis
Riphaus (14)	Prospective	ERCP	1,313 (118 vs. 1,195)	≥80 vs. <80	Pancreatitis, bleeding
Gronroos (50)	Retrospective	ERCP	35	≥90	Bleeding
Attila and Faigel (40)	Retrospective	EUS	232	≥80	None
Agostoni (54)	Randomized trial	EUS	54 (27 vs. 27)	NA[d]	None

Abbreviations: ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasound; NA, not applicable; PEG, percutaneous endoscopic gastrostomy.
[a]A significant difference exists between the two noted cohorts for this complication.
[b]The study did not make any distinction between complications from PEG placement vs. PEG feeding.
[c]Total number of procedures evaluated, number of individual patients was not given.
[d]Groups were divided based on sedation type and not based on age.

19%, *P*=0.0007) (29). The desaturations were associated with higher doses of meperidine. There was no difference between the age groups in terms of hypotensive episodes (9% vs. 15%) and no adverse outcomes occurred as a result of either the desaturations or hypotensive episodes. However, other studies have found that the risk for adverse events, including perforation, increases with age (48).

A meta-analysis of studies of elderly patients undergoing colonoscopy found that patients >65 years of age were at significantly higher risk for perforation than those <65 years of age (incidence rate ratio of 1.3) (49). In addition, compared with patients under the age of 80 years, octogenarians were at increased risk for perforation (incidence rate ratio of 1.7), cardiovascular and pulmonary complications (incidence rate ratio of 1.7), and total colonoscopy complications (incidence rate ratio of 1.8).

Endoscopic retrograde cholangiopancreatography

Multiple studies have found ERCP to be safe in both the elderly and very elderly (**Table 1**) (11–16,19,40,50). Two studies found no difference in complication rates between patients aged 75 to 80 years compared with younger patients (12,39). Other studies evaluating the safety of ERCP in octogenarians have had similar results (11,13,14,19). ERCP has also been shown to be safe in those over the age of 90 years. In one study of 41 ERCPs in 35 patients over the age of 90 years, complications occurred in three patients (7%) (50). All three complications were bleeding, and none of the patients experienced hemodynamic compromise as a result of the bleeding. Several other studies have been conducted in those 90 years of age and older, all of which showed that ERCP was reasonably safe in this population (15,16).

Endoscopic ultrasound

EUS, with or without FNA, appears to be safe in the elderly, though only a few studies have evaluated its safety in this population (**Table 1**) (39,40). In a study of 400 EUS procedures with or without FNA, there was no difference in complication rates between those 75 years and older, and those <75 years (4.8% vs. 3.1%) (39). All of the complications occurred in association with FNA. However, even in the subset of patients undergoing FNA, there was no difference in complications between elderly and younger patients. Similarly, in a study of 232 EUS procedures with or without FNA in octogenarians over a 9-year period, there were no EUS- or FNA-related complications (40).

CONCLUSIONS

Endoscopic procedures are vital for diagnosis and treatment of elderly patients. As GI disease is common in the elderly, endoscopic procedures often have high yields in this population. However, some complications are more common in the elderly, so it is important to weight the risks and benefits of a procedure for a given patient. In addition, it should be kept in mind that elderly patients frequently require lower doses of the medications used for procedural sedation and are at increased risk for complications of sedation.

Endoscopic procedures are particularly high-yield for the evaluation of upper GI and biliary complaints, and the risks of upper endoscopy, ERCP, and EUS appear similar in the elderly compared with younger patients. While colonoscopy has also been shown to have a high yield for colon polyps and colon cancer, obtaining an adequate colonoscopy preparation is more difficult in the elderly and colonic preparations have a higher complication rate in the elderly owing to fluid shifts and electrolyte disturbances. Colonoscopy is also associated with increased risks in the elderly. The complication rates of colonoscopy increase with advancing age, especially for perforation. These risks must be balanced against potential benefits when performing colonoscopy, especially in the very elderly.

Overall, endoscopic procedures are both safe and effective in appropriately chosen elderly patients, but care must be taken and adjustments made to ensure successful and safe endoscopic procedures in the elderly.

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