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Difficult Bile Duct Stones: A Review of Current Endoscopic Treatments
by Patrick J. Laing, Douglas G. Adler

Difficult stones are more than just large stones. Altered biliary anatomy, common bile duct (CBD) stone angulation and CBD to stone diameter ratio are factors that make stones more difficult to remove. This review will describe the endoscopic therapeutic options that are currently used for the treatment of difficult CBD stones, with a focus on success rates and complication rates.

Nephrolithiasis and Gastrointestinal Tract Diseases: Can Diet Intervention Help?
by Antonio Nouvenne, Andrea Ticinesi, Tiziana Meschi

The interconnections between diet, nephrolithiasis and gastrointestinal disease are complex. Here we discuss epidemiologic and physiopathologic aspects of intestinal disease-associated nephrolithiasis and the role of diet in contrasting onset and relapses of kidney stones.

Pancreatic Enzyme Table
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Elective Upper Gastrointestinal Endoscopy in an Outpatient Endoscopy Center: Impact on Patient Management

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Here we present a study evaluating the records of 100 consecutive patients coming to an ambulatory endoscopy center for outpatient esophagogastroduodenoscopy (EGD). The purpose was to determine whether or not elective outpatient EGD influenced patient management outcomes. Older age (>60 years) plays a significant predictive role as does recent NSAID/ASA use. These may be important factors in predicting those whose treatment will change after EGD.

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Difficult Bile Duct Stones: A Review of Current Endoscopic Treatments

INTRODUCTION AND OVERVIEW OF DIFFICULT BILE DUCT STONES

Choledocholithiasis has been primarily managed by therapeutic endoscopic retrograde cholangiopancreatography (ERCP) for decades with a very high success rate; however, occasionally, the endoscopist may encounter a so-called “difficult stone”. Although there is no consensus on what makes a stone difficult, most agree that stone size is an important factor. Stones greater than 10-15mm have typically been considered to be more difficult to remove. Stone size is an important variable, but the ratio of stone diameter to common bile duct (CBD) diameter may be more clinically relevant. Intrahepatic stones, and stones above strictures are also commonly considered to be “difficult stones”.

A prospective study by Kim et al. on factors influencing the technical difficulty of endoscopic stone clearance in 102 patients with difficult stones showed that age greater than 65, acute distal CBD angulation, previous gastrojejunostomy, and shorter length of distal CBD segment were independent contributors to situations that make stone removal problematic.

This review will describe the endoscopic therapeutic options that are currently used for the treatment of difficult CBD stones, with a focus on success rates and complication rates.

Endoscopic Sphincterotomy with Stone Clearance by Sweeping Basket and Balloons

Endoscopic sphincterotomy (ES) is widely accepted as the first step in CBD stone clearance. Endoscopic sphincterotomy was first performed in 1974 by Classen and Demling of Germany, and Kasai et al. of Japan. After localization of the papilla with a side viewing duodenoscope, the papilla is cannulated with the sphincterotome. The sphincterotome is equipped with a cutting wire that allows the actual sphincterotomy to be performed using electrocautery. The size of the sphincterotomy can be tailored to the size of the stone, the duct diameter, and other factors.

The conventional method for removing CBD stones is by performing biliary sphincterotomy followed by simple extraction using occlusion balloons. Conventional techniques can usually remove small to medium sized stones in a single procedure. In a study of 100 patients with CBD stones, Lauri et al. found that 100% of stones less than 10mm in size were successfully cleared, while only 12% of stones greater than 15mm were cleared using conventional methods.
This emphasizes that as stone diameter increases past 15mm, clearance rates using conventional methods drop dramatically necessitating stone fragmentation techniques. The decision to stop simple stone clearance methods and move on to more aggressive treatments is made by the endoscopist on a case-by-case setting.

**Endoscopic Papillary Balloon Dilation**

Endoscopic papillary balloon dilation (ESPD) was first described in 1982 by Staritz et al. The goal is similar to ES, to dilate the sphincter of Oddi (SOD) for stone passage or for instrumentation of the bile duct. In modern practice, ESPD is almost always done after a biliary sphincterotomy. (Figure 1)

Following sphincterotomy, a dilating balloon is passed through the working channel and across the sphincter over a guidewire. The balloon is then inflated with water and/or contrast material. The size of the dilation balloon can be selected based on the size of the stone to be removed and the surrounding common duct. Various inflation times are used, and a study comparing inflation times of 30 and 60 seconds found no significant difference in stone clearance rates or complications. Some bleeding following ESPD in patients who have undergone ES is common, but is usually mild and self limited. Significant bleeding following ESPD is rare. The effect of the balloon dilation is usually relatively short lived, on the order of several minutes during which other tools and techniques can be used to remove stones through the dilated distal common bile duct.

A main advantage of ESPD following sphincterotomy is that it can often allow the rapid removal of very large CBD stones. The proposed advantages that ESPD has over ES in patients who do not undergo sphincterotomy first are preservation of the SOD function, decreased rates of stone recurrence, and reduced bleeding rates and severity when compared to sphincterotomy alone. The majority of the data that supports the safety and efficacy of ESPD comes from small retrospective studies conducted in North-East Asia where gabexate is widely used. Gabexate, which has been reported to reduce the incidence of post ERCP pancreatitis, is rarely used in North America; therefore, the generalization of these results to a North American population is controversial. Additionally, very little ESPD data has focused specifically on large or difficult CBD stones.

The significance of the abovementioned benefits is controversial. A small randomized prospective study conducted in Asia using manometry to measure the SOD function following either ESPD or ES showed only a marginal benefit with regards to preservation of SOD function. Another study that compared pancreatic enzyme levels drawn from the CBD before
and after ESPD or ES, found no significant difference between the two groups. An animal study by Mac Mathuna et al. examined SOD tissue 6-12 weeks after ESPD. They observed mild chronic inflammation with moderate to severe submucosal follicular hyperplasia but no smooth muscle disruption or fibrosis. A human study that examined surgical and postmortem biopsies from ten patients at 2-64 months after ESPD, found mild to moderate inflammation in nine patients and fibrosis in eight. No smooth muscle disruption or architectural distortion was observed. Whether or not fibrosis and inflammation following ESPD predisposes the patient to future papillary stenosis remains controversial.

Hemorrhage rates have been reported to be significantly lower with ESPD alone compared to ES. Lin et al. reported a single bleeding event in 48 cirrhotic patients who underwent ESPD for CBD stones, compared to 14 bleeding events in 53 patients treated with ES.

Stone recurrence rates were originally thought to be lower with ESPD; however, multiple studies have shown no difference in recurrence rates between ESPD and ES.

In 2006, a Cochrane review comparing ESPD to ES highlighted the lack of quality data on this topic. Of fifteen randomized trials that met their inclusion criteria, less than half reported adequate randomization, and only two trials were blinded. ESPD was statistically less successful for stone removal, required higher rates of mechanical lithotripsy, and had higher risk of pancreatitis but significantly lower hemorrhage rates than ES.

A novel technique uses large dilating balloons (up to 20mm) without preceding ES to remove difficult CBD stones. Although several studies report that this technique has similar outcomes to ES and has reduced bleeding rates, a study by Park et al. revealed four deaths and one delayed massive hemorrhage in a group of 946 patients who underwent large balloon dilation. In practice large balloon dilation without prior ES is not commonly performed in the west.

Endoscopic papillary balloon dilation is more often done following a limited ES. This technique has the theoretical advantage of dilating the CBD beyond what ES can achieve alone while potentially applying less trauma to the pancreatic duct. In this method, the balloon can be dilated up to 20mm (and sometimes even greater sizes). This method has been proposed as a safe and effective alternative treatment in patients with difficult CBD stones that are refractory to conventional stone removal methods, with final duct clearance rates of 94% to 100% and complication rates of 4% to 7%.

Large balloon dilation with ES is being applied with increasing frequency in the west, with studies from referral centers in the US reporting similar outcomes as the abovementioned studies from Asia.

A landmark study comparing ESPD to ES for
Difficult Bile Duct Stones

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the extraction of CBD stones was published in 2004 by Disario et al. This was a blinded, randomized, prospective study of high quality conducted in North America. The authors reported significantly higher rates of overall morbidity (mainly due to pancreatitis) and severe morbidity (with death in two patients) in the ESPD group compared to the ES group (17.9% vs. 3.3%; and 6.8% vs. 0% respectively), and the study was stopped early due to the deaths. The authors recommended against the routine use of ESPD without a prior ES. As a result, many endoscopists in North America favor ES or ESPD following ES as opposed to ESPD alone.32

Mechanical Lithotripsy

Mechanical lithotripsy refers to a variety of techniques that utilize endoscopic devices to physically break and/or crush large stones into smaller pieces to facilitate removal. Mechanical lithotripsy was first described in 1982 by Riemann et al. to facilitate the removal of large CBD stones.33 Special wire baskets, referred to as lithotripter baskets (as opposed to simple retrieval baskets) were developed that feature stronger, braided wires and metallic sheaths to allow stones to be crushed in the CBD itself.

Mechanical lithotripsy is the first line therapy when conventional methods cannot extract stones. After endoscopic sphincterotomy is performed, a closed lithotripsy basket is passed through the working channel into the CBD (often over a guidewire) and past the stone. The basket is then opened and its position adjusted to capture the stone. It may be difficult to pass the basket beyond the stone, or to trap the stone within the basket in patients with impacted stones, but as a rule most stones can be captured in modern baskets. Twisting and vigorously shaking the basket are helpful techniques to enhance stone capture. Once the stone is captured a control knob is twisted or a handle is compressed to create tension on the basket wires, pulling the wires themselves into a metal sheath, (functionally reducing the volume created inside the wire basket) and the stone is crushed. The stone fragments can be swept out using the same lithotripter basket and/or a balloon. (Figure 2) Large stone fragments may require repeat lithotripsy to be performed in the same manner.

Several different mechanical lithotripter basket systems are available. Through the scope (TTS) single-piece disposable units offer ease of use and are available from several manufacturers; these are the most commonly used devices. These disposable lithotripter devices come in sizes up to 3cm in diameter and are usually of the 4-wire basket design with the wires themselves being braided for increased strength. The

Figure 2c. Stone fragments in the duodenum following mechanical lithotripsy and stone clearance.

Figure 2d. Final cholangiogram showing stone clearance and excellent drainage of bile and dye to the duodenum. There is some pneumobilia.
baskets are mounted in catheters with a metal external sheath.

The Soehendra lithotriptor device usually functions as a “rescue device” for several difficult situations. The device is most commonly employed when the physician has been able to capture a stone but cannot crush it or if the basket/stone complex has become trapped in the bile duct. In these situations, the basket’s overlying catheter is physically separated from the basket itself and its handle (usually with a wire cutter) and the duodenoscope is removed from the patient. This leaves only the basket/stone complex and the trailing wires of the basket device in the patient, with the wires exiting the patient’s mouth. The Soehendra lithotripter is a heavy-duty metal sheath that is affixed to a large mechanical crank. The basket wires are passed through the metal sheath and onto the main axle of the crank handle, which when turned, advances the sheath over the wires and eventually, down into the CBD to the level of the basket. When the device is fully deployed, the metal sheath is used to crush the stone/basket complex. In practice, this has the effect of both crushing the stone and destroying the basket itself. The basket can then usually be removed, which is especially helpful if the basket had previously been trapped in the duct. The physician can then re-intubate the patient with the duodenoscope and proceed with stone fragment removal using standard devices, including other baskets.34

When mechanical lithotripsy was initially being developed, it was frequently unsuccessful due to basket wire fracture. After the introduction of stronger (“hard wire”) baskets with breaking strengths of up to 125kg, Schnieder et al. reported a 92% clearance rate for stones measuring 20 to 25mm, and an 85% clearance rate for stones greater than 25mm.35 Other studies report successful extraction of difficult stones in 92 to 94.4% of cases using mechanical lithotripsy.36,37

A single center study by Chang et al. in Taiwan enrolled 304 patients with difficult CBD stones (>15mm) for mechanical lithotripsy using TTS lithotripters. The authors reported a stone clearance rate of 90%, with 22% of patients requiring multiple lithotripsy sessions. Pancreatitis, cholangitis, and bleeding complicated mechanical lithotripsy in up to 3.3%, 1.4% and 0.4% of the patients, respectively. These rates typically increase if repeat lithotripsy is required.38

Complications that are unique to mechanical lithotripsy include lithotripsy basket impaction or entrapment within the duct, fracture of the basket wires or the main lithotripsy cable, and gastric laceration from out-of-scope lithotripter metal catheters. Ductal injury, pancreatitis, cholangitis and bleeding can also occur. A retrospective review of 643 difficult CBD stone cases treated by mechanical lithotripsy reported
Difficult Bile Duct Stones

Endoscopic management techniques for the treatment of complications associated with mechanical lithotripsy, most notably basket entrapment within the duct, include electrohydraulic lithotripsy (to fracture the stone in the trapped basket), Soehendra lithotripsy (to crush the stone/basket complex), sphincterotomy extension (to help remove the stone/basket complex), extracorporeal shockwave lithotripsy or the placement of a biliary stent to allow for biliary drainage while other options are considered. Surgical excision may be required if endoscopic salvage techniques fail.

In a retrospective study of 102 patients who underwent mechanical lithotripsy for difficult CBD stones, an impacted stone, stone size >30mm, and stone diameter to bile duct diameter ratio >1.0 were predictive of mechanical lithotripsy failure with odds ratios of 17.8, 4.3 and 5.4, respectively. Another study reported that impacted stones are the most relevant predictor for failed mechanical lithotripsy.

Mechanical lithotripsy remains the “go-to” technique for difficult CBD stones that are refractory to conventional removal techniques and is widely employed in modern ERCP practice. When stones remain refractory to mechanical lithotripsy, laser lithotripsy or electrohydraulic lithotripsy can be considered.

Laser Lithotripsy

The use of endoscopic laser lithotripsy in humans was first described by Ell et al. in 1988 for the treatment of CBD stones that were refractory to mechanical lithotripsy. Laser lithotripsy applies pulsed laser energy via a fiber to the stone, resulting in its fragmentation and/or obliteration. The Nd:YAG laser, holmium laser, and pulsed dye laser are some of the available technologies that are used to fragment CBD stones, although the holmium laser is the most widely used. Laser lithotripsy is traditionally performed using a cholangioscope that is passed through the working channel of a duodenoscope for direct cholangioscopic visualization and control. Single and dual operator cholangioscopes are available, with the single operator device being the most commonly used in current practice. Alternatively, laser lithotripsy can also be done under fluoroscopy with a radio-opaque marker or balloon to guide the laser probe. Lasers have the technical capacity to differentiate tissue from stone, reducing the chance of damaging the duct.

The lasers apply different techniques to fragment stones. The holmium laser, which was first used for CBD stones in 1998, creates a vapor bubble, which in turn vaporizes the stone. The Nd:YAG laser creates a shockwave that destroys the stone. A modified version of the Nd:YAG laser, called the frequency doubled, double pulsed Nd:YAG laser (FREDDY), creates a plasma bubble around the stone, that readily absorbs the lasers light resulting in a powerful shockwave. In comparison to FREDDY, the holmium laser has a longer pulse duration and higher pulse energy. This results in more energy being released into the bile duct, potentially causing thermal tissue damage. This theoretical advantage has not been defended in literature.

Laser lithotripsy has been shown to have good overall outcomes for treating refractory stones. Complications associated with laser lithotripsy include pancreatitis, cholangitis, duct trauma, hemobilia, fever, and pain. Successful stone extraction rates for holmium laser lithotripsy range from 83% to 90%, with most patients requiring 1-2 procedures to achieve duct clearance. Holmium laser complication rates range from 7%-13%. The success rate and mean number of interventions for FREDDY are comparable (88% to 92% and 1.4 to 1.7 respectively); however, the complication rate ranges from 6% to 23% which is slightly higher than holmium laser lithotripsy.

Electrohydraulic Lithotripsy

Electrohydraulic lithotripsy (EHL) is an advanced therapeutic technique typically performed at referral centers. Electrohydraulic lithotripsy and laser lithotripsy share the same indications; the removal of stones refractory to mechanical lithotripsy, intrahepatic stones, and stones above a stricture. The same cholangioscopes that are used for laser lithotripsy are used for EHL. The development of single user cholangioscopes with irrigation channels and multiple working channels has greatly improved the feasibility of this technique. As with laser lithotripsy, the EHL probe is passed through one of the cholangioscope’s working channels and into the bile duct. The bile duct is then irrigated, and the EHL probe generates an electric spark that creates a shock wave that travels through the aqueous medium of the bile duct.
duct and fractures the stone. (Figure 3)

Success rates with EHL are very similar to laser lithotripsy, making this technique a useful method for stone extraction. In general, stone extraction rates with EHL range from 77% to 98%. Complications associated with EHL are very similar to those associated with laser lithotripsy. Delayed ductal injury from EHL is always a possibility, but is relatively uncommon in practice.

**Stenting**

Biliary stents were first used in the early 1980s for the treatment of CBD stones that could not be removed by conventional techniques. Stenting is generally reserved for refractory stones and is not a first line therapy. This technique may also be used as a temporizing measure in high-risk patients. Stenting is usually done by placing a retrievable plastic stent into the CBD. The stent should be placed with its proximal end above the stone and the distal end in the duodenum. Metal stents can also be used in patients who wish to minimize future endoscopy as they have longer patency rates than plastic stents but this is an off-label use of these devices.

In addition to draining the CBD, biliary stents may also grind the stone down, thereby permitting stone passage. Chan et al. showed a significant reduction in stone size from 24.9mm to 20.1mm in 46 patients with a median stenting period of 63 days. Another study of 45 patients with difficult CBD stones refractory to conventional methods who underwent stenting for 3 to 6 months showed that stone size decreased from 23.1mm to 15.4mm. They also found that stones dissolved in 10 patients and that 43 patients underwent successful stone removal by conventional techniques after stenting. That being said, stents should generally not be placed to “grind” stones. If this occurs it should be viewed as a beneficial side effect.

Long-term placement of biliary stents has proven to be effective for the treatment of difficult CBD stones, with stone clearance rates ranging from 44% to 94.2%. However, the rates of cholangitis, stent migration and death are significantly higher than with conventional methods, limiting its widespread application. For example, in a prospective assessment of 49 patients with mean follow up time of 39 months, late complications occurred in 40.8% of cases, with 3 cases of biliary-related sepsis. Another study assessing 58 elderly patients who received permanent biliary stents for CBD stones revealed that over a 36-month period, 40% had complications (with cholangitis being the most frequent), and there were 9 deaths due to biliary related causes. The high complication rates associated with long term biliary stents for the treatment of CBD stones restricts the use of this therapy for high-risk patients with a short expected life span who cannot undergo surgical treatment.

The supplementary use of ursodeoxycholic acid with stenting offers minimal additional benefit compared with stenting alone. Therefore medical management of stones is, in general, not recommended.

**CONCLUSION**

Endoscopic management of CBD stones has been considered to be the first line therapy for decades. Occasionally, the endoscopist will encounter stones that are refractory to conventional techniques. Difficult stones are more than just large stones. Altered biliary anatomy, CBD angulation, and CBD to stone diameter ratio are factors that make stones more difficult to remove.

Conventional stone extraction methods (sphincterotomy and sweeping baskets or balloons) should be attempted before considering more advanced techniques. If conventional methods fail, additional, more aggressive endoscopic therapies should be attempted prior to consideration of surgery.

In patients who require anticoagulation or those at increased risk for bleeding (cirrhosis), ESPD can be considered to dilate the sphincter of Oddi without performing biliary sphincterotomy, although in North America this practice is relatively uncommon. Endoscopic papillary balloon dilation after sphincterotomy appears to be safe and is becoming more widely performed.

Mechanical lithotripsy is successful in 90% of cases and is the “go-to” method if conventional techniques fail. When stones cannot be removed via mechanical lithotripsy, either laser lithotripsy or electrohydraulic lithotripsy can be attempted. Both of these techniques have good success rates but are technically demanding and are therefore typically done at referral centers.

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13. Lauri A, Horton RC, Davidson BR, Burroughs AK, Dooley JS. Influence of endo-


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Nephrolithiasis and Gastrointestinal Tract Diseases: Can Diet Intervention Help?

Nephrolithiasis is a disease whose prevalence is continuously rising in Western countries. The most common type is idiopathic calcium nephrolithiasis (80%), but gastrointestinal disease, especially inflammatory bowel disease (IBD), may represent a significant risk factor. Nephrolithiasis is indeed a frequent long-term extraintestinal complication of IBD. Dietary habits have a direct effect on urinary lithogenic risk factors and on the onset of kidney stones. The main dietary features that can help preventing and treating nephrolithiasis are high fluid intake, high consumption of fruit and vegetables, low intake of salt and proteins and a balanced amount of calcium, lipids and carbohydrates. In this review we briefly describe epidemiologic and physiopathologic aspects of intestinal disease-associated nephrolithiasis and the role of diet in contrasting onset and relapses of kidney stones.

INTRODUCTION

Nephrolithiasis is a disease whose prevalence is continuously rising (10% of the population), with a total cost in the United States of about 2 billion dollars/year for hospital stays. In some cases it is the consequence of well-known hereditary or acquired diseases, such as cystinuria, primary hyperoxaluria, medullary sponge kidney, primary hyperparathyroidism, and also infections or anatomical malformations of kidneys or urinary tract. However, the most frequent type is idiopathic calcium nephrolithiasis (ICN). There are several types of kidney stones even if the most common (80%) are those containing calcium (calcium oxalate, calcium phosphate, mixed calcium-oxalate/calcium-phosphate). The pathogenesis of ICN encompasses both genetic and acquired factors, resulting in urinary biochemical abnormalities that lead to stone formation. Important risk factors for urinary stone formation are hypercalciuria, hyperoxaluria, hyperuricosuria, hyperphosphaturia, hypocitraturia, alkaline pH and low urine volume. Among these, hypercalciuria is the most frequent. The distribution among genders shows a slightly higher incidence in males with two peaks of incidence (between the age of 20 and 30 and between 50 and 60).
A higher risk and incidence of kidney stones are well described in patients with concurrent gastrointestinal (GI) diseases, particularly in patients with malabsorption, enteric resections and inflammatory bowel disease (IBD).\(^5\) In this paper we briefly review epidemiological and physiopathological features of GI disease-associated nephrolithiasis and the role of diet in contrasting onset and relapses of kidney stones.

**Nephrolithiasis and Gastro-intestinal Disease Epidemiology**

An association between GI disease and kidney stones has been reported in many studies.\(^5\) Diseases and medications that are more closely related to nephrolithiasis are listed in Table 1. There are also other associations, though indirect, such as some cases of peptic ulcer in Zollinger-Ellison syndrome, that may effectively be associated to a Multiple Endocrine Neoplasia Type 1 (MEN1) syndrome including hyperparathyroidism and nephrolithiasis.

The prevalence of GI disease-related nephrolithiasis has been studied, especially in patients with IBD, and varies from 4 to 34%. These percentages are twofold the ones of normal subjects with the same age and sex. The stone formation rate seems to be higher in patients with Crohn’s disease than in patients with ulcerative colitis. Moreover, patients with an involvement of both ileus and colon have higher prevalence. Finally, patients who underwent an intestinal resection have even higher prevalence of nephrolithiasis (about 30%), particularly if an ileal resection was performed. To confirm for the role of abdominal surgery, it is interesting to point out that similar prevalence data were obtained also in obese subjects who underwent bariatric surgery (intestinal bypass).\(^6\)

The most common type of nephrolithiasis in patients with gastroenteric disease is calcium nephrolithiasis, similarly to general population. However, up to 30% of these patients may form mixed calcium-uric acid stones. Uric acid stones are more frequent in patients who also underwent colectomy. The age of kidney stone onset varies between 30 and 50 and generally the peak of incidence follows the diagnosis of IBD by 6-12 years.

**Etiopathogenesis**

Diarrhea, malabsorption, steatorrhea, surgery and pharmacotherapy (particularly steroid drugs) play an important role in the onset of kidney stones during a

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gastroenteric disease. These occurrences may actually lead to: 1) loss of water, sodium, potassium, bicarbonate and magnesium; 2) lower citrate absorption; 3) increased oxalate absorption. Table 2 shows the prevalence of these factors related to the type of stone. Many studies have confirmed these pathogenetic hypotheses, showing significant differences between urine composition of IBD patients and controls as regards urinary factors of lithogenic risk.5

THE ROLE OF DIETARY HABITS IN PREVENTION AND TREATMENT OF NEPHROLITHIASIS

Diet plays an important role in kidney stone onset; some authors affirm that dietary changes in industrialized countries over the last decades may have substantially contributed to the rise of the prevalence of nephrolithiasis. The basis of an anti-lithogenic diet must be founded, as we explain below, on an adequate intake of water, proteins, salt, fruit and vegetables, milk and dairy products, carbohydrates, fats and vitamins. These aspects are particularly important in an intestinal disease setting, both for the dietary prescriptions gastroenterologists make in some disease stages (for example, low-fiber diets) and for some spontaneous habits of patients. Regarding the latter aspect, for instance, it has been demonstrated that IBD patients are prone to restricting their dietary intake thinking that certain foods can lead to symptom onset.7

Role of Water

With a diuresis < 1 L/day, even the urine of a normal subject reaches extremely high supersaturation levels; promoting spontaneous crystallization of the lithogenic salts.8 On the other hand, if the volume is maintained > 2.5 L/day, the urine becomes undersaturated for calcium phosphate and uric acid and only slightly supersaturated for calcium oxalate, making spontaneous crystallization impossible.9,10 The rise in urinary volume, moreover, does not modify the activity of lithogenesis inhibitors. The ability of crystal aggregation after an oxalate load is lower in diluted urine than in concentrated urine.11,12 Even if for many years the only advice given to patients with nephrolithiasis was to raise their water intake, there is only one randomized controlled study that addressed this practice. It demonstrated a significant reduction in relapse rate and a prolongation of the relapse interval in patients whose urinary volume was constantly > 2 liters/day.13,14 However, big epidemiologic studies have stated that a high urinary volume is an effective measure for prevention in general population, able to diminish the risk by 29-39%.15-17

Role of Other Beverages

There is no full consensus in the literature on the role of hydration with other beverages. Most studies have actually evaluated a surrogate end-point (i.e. urinary lithogenic risk factors) and there are very few data from epidemiologic studies evaluating the impact on the onset or relapse of kidney stones.18

We can generically say that some beverages have a positive effect as they make pH and/or citrate and/or volume rise, such as juices, lemonade, coffee, green tea, beer and wine. A beverage that is particularly useful in infectious nephrolithiasis is cranberry juice, also for its acidifying ability.19 On the other hand, there are some beverages that raise the oxalate intake, such as tea, or act as pro-lithogenic factors with a not fully understood mechanism, such as grapefruit juice, apple juice, cola. To this end, for their diffusion, we must cite soft drinks: recent studies have identified a higher risk of stones, probably because of their content in fructose, sucrose and phosphoric acid.20-23 Sports and

Table 2. Physiopathological Factors for Nephrolithiasis in GI Diseases

<table>
<thead>
<tr>
<th>Type of Stone</th>
<th>Physiopathological factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium oxalate &amp; Calcium phosphate</td>
<td>Low urine volume, Hypocalciuria (steroid use)</td>
</tr>
<tr>
<td>Calcium phosphate</td>
<td>Low urine pH, Hypercalciuria, Hypocitraturia, Hyperoxaluria</td>
</tr>
<tr>
<td>Uric acid</td>
<td>Low urine volume, Mild metabolic acidosis due to bicarbonate loss, Sodium and potassium loss, Low urine pH</td>
</tr>
<tr>
<td>Any</td>
<td>Urinary tract infections, Bowel obstruction</td>
</tr>
</tbody>
</table>
energy drinks deserve a separate discussion. There are only few data in literature, often contradictory.24, 25 These beverages, especially the ones with a higher content of sodium, carbohydrates and caffeine, may raise the risk of nephrolithiasis. However, more studies are needed.

Role of Proteins
The results of big epidemiologic studies are conflicting: while in a large cohort of healthy males a protein intake higher than 76 g/day lead to a 33% increase in risk,15 in NHS-II study, (about 100,000 healthy women), a daily protein intake higher than 78 g lead to a 16% risk reduction. The effect of animal proteins is different from those of vegetable proteins. The prevalence of nephrolithiasis in vegetarians is half than in general population.26 There are two randomized controlled trials that addressed the effects of a low-protein diet with a long follow-up: the first27 studied 99 stone formers for 4 years, randomized to receive only water therapy or low-protein, high-fibre diet. The relapse rate was surprisingly higher in the latter group than in controls. Nevertheless, this study presents some biases, such as a higher fluid intake in the control group, a scarce compliance to the low-protein diet and some differences in the calcium and fiber intake in the two groups. The second study,28 by our research group, followed 120 patients for 5 years. They were randomized to receive a low-calcium diet or a low-protein low-salt normal-calcium diet; in the latter group the relapse rate was significantly lower (40% vs. 20%); however, in this study it is not possible to distinguish the protective effect of reduction of protein intake from the rise in calcium or the reduction in sodium intake.

Role of Salt
In literature there are contrasting data about the role of salt in nephrolithiasis. However, a direct relation between calciuria and sodiuria has been demonstrated and there is also a summation effect with proteins. We ourselves demonstrated that a mildly low-salt diet might correct hypercalciuria in hypercalciuric idiopathic calcium stone formers.30 On the other side, the same salt reduction can normalize urinary oxalate excretion in patients with mild hyperoxaluria.31

Role of Fruit and Vegetables
Fruit and vegetables may exhibit an antilithogenic activity. The beneficial effects are linked to the particular physical, chemical and nutritional features. Fruit and vegetables in fact show a high water, potassium and magnesium content, a low content in sodium chloride and proteins and a high alkalinizing power due to the presence of citrate and bicarbonate. It has been well demonstrated that a high intake of potassium and magnesium may lower the risk of nephrolithiasis by 50%.16,17

We ourselves demonstrated in 2004 that fruit and vegetable deprivation causes a significant

<table>
<thead>
<tr>
<th>Table 3. Dietary Considerations in Patients with GI Disease Associated Nephrolithiasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Correct sodium, potassium and magnesium losses</td>
</tr>
<tr>
<td>2. Maintain urinary volume over 2 liters/day</td>
</tr>
<tr>
<td>3. Do not exceed 3-4 serving per week of red meat and poultry</td>
</tr>
<tr>
<td>4. Eat at least 40 grams per day of vegetable proteins</td>
</tr>
<tr>
<td>5. Eat fruit and vegetables every day avoiding those rich in oxalate</td>
</tr>
<tr>
<td>6. Consume milk and dairy products to target a 1000 mg/day calcium intake</td>
</tr>
<tr>
<td>7. Follow guidelines for carbohydrate intake</td>
</tr>
<tr>
<td>8. Consume fresh or frozen foods avoiding parboiled or preserved foods</td>
</tr>
<tr>
<td>9. Limit saturated fatty acid intake, substituting long-chain triglycerides with middle-chain triglycerides</td>
</tr>
<tr>
<td>10. Evaluate pyridoxine (vitamin B6) status and consider supplementing if deemed deficient</td>
</tr>
</tbody>
</table>
reduction in citraturia and a rise in calciuria, while the supplementation with fruit and vegetables in hypocitraturic stone formers can correct the deficit.

Two big cohort studies have recently confirmed this experimental evidence. Taylor and colleagues have studied the dietary habits of almost 240,000 subjects enrolled in three large cohorts: Health Professionals

(continued on page 34)
**Role of Milk and Dairy Products**

It is well known that calcium intake causes an 8% rise in calcium in controls and a 20% rise in stone formers. However, a dietary calcium restriction is not advisable in stone formers because a low calcium intake increases oxalate intestinal absorption and oxaluria rise. Finally, imposing a reduction of milk and dairy product intake may lead patients to raise their protein intake. Curhan and colleagues in the NHS-II study database evaluated almost 100,000 healthy women and documented a 35% reduction in risk of nephrolithiasis if the calcium intake was higher than 1098 mg/day. In our study cited above, we showed that the relapse rate was significantly lower in patients on a normal-calcium low-protein low-salt diet than in patients that were only on a low-calcium diet, both in high-risk and low-risk calcium stone formers.

**Role of Carbohydrates, Fats, and Vitamins**

It is well known that a glucose load leads to a rise in urinary calcium and the size of this rise is higher in stone formers and in their relatives than in healthy controls. The intake of simple carbohydrates has been linked to a rise in nephrolithiasis risk in women but not in men. It is possible that insulin plays a role in tubular calcium reabsorption. Insulin resistance, metabolic syndrome and type 2 diabetes have been associated to kidney stones, particularly from uric acid. Insulin resistance may cause a decrease in pH with concurrent citrate reduction and uric acid crystal precipitation. An optimal glycemic control in diabetic subjects may actually lead to a calciuria reduction.

A relationship between lipid intake and nephrolithiasis has also been suggested. Steatorrhea in chronic pancreatitis is linked to a high oxaluria. On the other hand, a good intake of fish oil, omega-3 fatty acids, may lower calciuria and oxaluria. There are also some vitamins which have been suggested to be involved in lithogenic risk, such as vitamin D, vitamin C, vitamin B6 and vitamin A. It has been demonstrated that some subjects with idiopathic hypercalciuria show high levels of 25-hydroxy-vitamin D in blood with an increase in intestinal calcium absorption. However, epidemiologic studies with a long follow-up have not shown an association between intake of vitamin D and lithogenic risk; in Western countries a deficit of vitamin D is actually more common, due to the short time spent in the open air.

In last decades vitamin C supplementation has become a widespread practice in Western countries. Ascorbic acid is indeed an oxalate precursor; therefore an excessive intake should be banned in nephrolithiasis patients. In a 2010 paper, Taylor and co-workers found that a DASH-style diet was associated with an increased urinary output, independent of fluid intake. They speculated that higher urinary volumes were a result of the higher food water content and they reported that a high dietary intake of fruits and vegetables was linked to increased urinary citrate levels and raised urine pH.
**FDA-APPROVED PANCREATIC ENZYME REPLACEMENT THERAPY**

As of April 28, 2010, all pancreatic enzymes on the market were required to obtain FDA approval or be removed from the market. The following table provides those pancreatic enzymes that obtained FDA approval as of February 2013.\(^a\)

**Note:**
- Creon®, Pancreaze®, Pertzye®, Ultresa™ and Zenpep® are oral, delayed release capsules.
- Pertzye® contains bicarbonate-buffered enteric coated microspheres.
- Viokace™ is a non-enteric coated tablet and should be taken in combination with a proton pump inhibitor (PPI) to help prevent the drug from breaking down in the stomach.

### Pancreatic Enzymes: FDA Approved\(^b\)

<table>
<thead>
<tr>
<th>Name</th>
<th>Lipase Units</th>
<th>Protease Units</th>
<th>Amylase Units</th>
<th>Approximate Cost per 10,000 Units of Lipase(^c)</th>
<th>Manufacturer and Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creon®</td>
<td>3,000</td>
<td>9,500</td>
<td>15,000</td>
<td>$4.30</td>
<td>Abbott Laboratories, <a href="http://www.creon.com">www.creon.com</a> (800) 241-1643</td>
</tr>
<tr>
<td></td>
<td>6,000</td>
<td>19,000</td>
<td>30,000</td>
<td>$2.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12,000</td>
<td>38,000</td>
<td>60,000</td>
<td>$2.11</td>
<td></td>
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<td></td>
<td>24,000</td>
<td>76,000</td>
<td>120,000</td>
<td>$2.02</td>
<td></td>
</tr>
<tr>
<td>Pancreaze®</td>
<td>4,200</td>
<td>10,000</td>
<td>17,500</td>
<td>$2.36</td>
<td>Janssen Pharmaceuticals, Inc., <a href="http://www.pancreaze.net">www.pancreaze.net</a> 1-800-775-5514</td>
</tr>
<tr>
<td></td>
<td>10,500</td>
<td>25,000</td>
<td>43,750</td>
<td>$2.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16,800</td>
<td>40,000</td>
<td>70,000</td>
<td>$2.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21,000</td>
<td>37,000</td>
<td>61,000</td>
<td>$2.09</td>
<td></td>
</tr>
<tr>
<td>Pertzye®</td>
<td>8,000</td>
<td>28,750</td>
<td>30,250</td>
<td>$2.54</td>
<td>Digestive Care, Inc., <a href="http://www.digestivecare.com">www.digestivecare.com</a> 1-877-882-5950</td>
</tr>
<tr>
<td></td>
<td>16,000</td>
<td>57,500</td>
<td>60,500</td>
<td>$2.49</td>
<td></td>
</tr>
<tr>
<td>Ultresa™</td>
<td>13,800</td>
<td>27,600</td>
<td>27,600</td>
<td>$2.06(^d)</td>
<td>Aptalis Pharma US, Inc., <a href="http://www.ultresa.com">www.ultresa.com</a> 1-800-950-8085</td>
</tr>
<tr>
<td></td>
<td>20,700</td>
<td>41,400</td>
<td>41,400</td>
<td>$2.11(^d)</td>
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<td>23,000</td>
<td>46,000</td>
<td>46,000</td>
<td>$2.25(^d)</td>
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</tr>
<tr>
<td>Viokace™</td>
<td>10,440</td>
<td>39,150</td>
<td>39,150</td>
<td>$2.71(^d)</td>
<td>Aptalis Pharma US, Inc., <a href="http://www.viokace.com">www.viokace.com</a> 1-800-950-8085</td>
</tr>
<tr>
<td></td>
<td>20,880</td>
<td>78,300</td>
<td>78,300</td>
<td>$2.60(^d)</td>
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</tr>
<tr>
<td>Zenpep®</td>
<td>3,000</td>
<td>10,000</td>
<td>16,000</td>
<td>$4.59</td>
<td>Aptalis Pharma US, Inc., <a href="http://www.zenpep.com">www.zenpep.com</a> 1-800-950-8085</td>
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<tr>
<td></td>
<td>5,000</td>
<td>17,000</td>
<td>27,000</td>
<td>$2.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10,000</td>
<td>34,000</td>
<td>55,000</td>
<td>$2.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15,000</td>
<td>51,000</td>
<td>82,000</td>
<td>$2.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20,000</td>
<td>68,000</td>
<td>109,000</td>
<td>$2.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25,000</td>
<td>85,000</td>
<td>136,000</td>
<td>$2.37</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)For informational purposes only. Not meant to endorse or recommend any certain brand or product. Always read full prescribing information before using any product.

\(^b\)Information compiled from product websites and the FDA website accessed on Feb 14, 2013: [www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm204745.htm](http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm204745.htm)

\(^c\)Cost based on average cash price quote from three national pharmacies in the central Virginia area. Cost and availability may vary. Cost to patient may also vary based on insurance coverage and other factors. Some companies offer programs to help patients with payment. Check manufacturer website for details.

\(^d\)At time of publication, product not yet available at all three pharmacies surveyed.

Compiled by Stacey McCray, RD, University of Virginia Health System, Charlottesville, VA
Elective Upper Gastrointestinal Endoscopy in an Outpatient Endoscopy Center: Impact on Patient Management

Tabassum Waheed

Alfred L. Hurwitz

The records of one hundred consecutive patients referred to a free-standing outpatient endoscopy center for upper gastrointestinal (UGI) complaints were analyzed for the influence of esophagogastroduodenoscopy (EGD) on patient management outcomes. In 52 patients, management was changed, while in 48 patients it was not. Statistical analysis of the patients’ demographic and clinical data demonstrated that age over 60 was the single most important predictor of a change in patient management and treatment outcome. Therefore, patients over the age of 60 with UGI complaints should be referred by their primary caregiver to a gastroenterologist for clinical evaluation and for strong consideration for performance of an outpatient EGD. Selected patients under age 60 may be monitored, with EGD being reserved for persistent complaints or clinical findings.

INTRODUCTION

There have been major diagnostic and therapeutic impacts of esophagogastroduodenoscopy (EGD) in the management of upper gastrointestinal (UGI) disorders, particularly in the acute inpatient setting. However, there is a paucity of information regarding the influence of this procedure on outpatient management outcomes when the examination is performed in ambulatory surgery or free-standing endoscopy centers. In recent years, much of the medical literature regarding EGD has related to endoscopic therapeutics in a wide variety of disorders (Barrett’s esophagus, UGI malignancy, and UGI hemorrhage). The present study evaluated the records of 100 consecutive patients coming to an ambulatory endoscopy center for outpatient EGD. The purpose of the study was to determine whether or not elective outpatient EGD influenced patient management outcomes.

Materials and Methods

From April 2008 to August 2008, the records of 100 consecutive patients who had undergone EGD at a free-standing outpatient endoscopy center (South Bay Endoscopy Center, San Jose, California) were evaluated. Eighteen of the 100 study patients had undergone prior...
Table 1. Baseline Characteristics of the 100 Patients

<table>
<thead>
<tr>
<th>Baseline Data</th>
<th>All Patients (100)</th>
<th>Patients with Management Change (52)</th>
<th>Patients without Management Change (48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>59</td>
<td>60</td>
<td>58</td>
</tr>
<tr>
<td>Age Range</td>
<td>18-87</td>
<td>18-84</td>
<td>28-87</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>50/50</td>
<td>23/29</td>
<td>27/21</td>
</tr>
<tr>
<td>NSAID/ASA Use</td>
<td>39/100</td>
<td>24/52</td>
<td>15/48</td>
</tr>
<tr>
<td>Recent PPI Use</td>
<td>73/100</td>
<td>29/52</td>
<td>44/48</td>
</tr>
</tbody>
</table>

Table 2. EGD Diagnosis of 100 Patients

<table>
<thead>
<tr>
<th>EGD Diagnosis</th>
<th>Patients with Management Change</th>
<th>Patients without Management Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagitis</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Hiatal Hernia</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Esophageal Stricture</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Barrett’s Esophagus</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Irregular Z-line at EGJ</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Paraesophageal Hernia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Gastritis</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Gastric Polyps</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Gastric Ulcer</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Deformed Fundus</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Prior Billroth II Gastrectomy</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Endoscope Not Passed</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Antral Deformity</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Duodenitis</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Flattened Duodenal Folds</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

EGDs for a variety of conditions, including Barrett’s esophagus, gastric ulcer, helicobacter pylori (H. pylori) infection, gastric cancer, celiac sprue disease, and esophageal polyp. Colonoscopic examinations had also been performed in 42 of the 100 study patients either previously or on the same date as the EGD,
Elective Upper Gastrointestinal Endoscopy

A SPECIAL ARTICLE

Table 3. Pathological Diagnosis of 100 Patients

<table>
<thead>
<tr>
<th>Pathological Diagnosis</th>
<th>Patients with Management Change</th>
<th>Patients without Management Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagitis</td>
<td>29</td>
<td>27</td>
</tr>
<tr>
<td>Barrett's Esophagus</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Gastritis (No H. pylori)</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Gastritis (H. pylori positive)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Fundic Gland Polyp</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Gastric Antral Fibrosis</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Gastric Siderosis</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Duodenitis</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Results

The baseline characteristics of the patients are summarized in Table 1. The patients in the management change group and non-management change group are closely matched in terms of age and sex. Proton pump inhibitor (PPI) use was significantly statistically higher in the non-management change group (p-value < 0.001). Conversely, there was a higher (albeit not statistically significant) nonsteroidal/aspirin (NSAID/ASA) use in the management change group (p-value = 0.153).

A complete endoscopic examination of the esophagus, stomach, and duodenum was performed in all but two individuals; in one a severe esophageal stricture precluded endoscopic evaluation distal to the stricture, while in the other patient a large paraesophageal hiatal hernia prevented a complete endoscopic examination. No endoscopic complications occurred in any of the study patients. Tables 2 and 3 display the endoscopic and pathological diagnoses in the 100 study patients. Table 4 summarizes the immediate post-EGD recommendations of the attending physician endoscopist, as he felt appropriate prior to obtaining the pathology report.

There was a change in treatment (outcome change) in 52 patients (52% of the entire group), whereas 48 patients (48%) required no change in treatment or follow-up. Figure 1 displays the management changes that occurred in the 52 patients. As this figure shows, the majority of the patients (34) underwent a

(continued on page 42)
change in medication. Within this particular group 28 received a proton pump inhibitor (PPI), two received antibiotic therapy for helicobacter pylori infection, two received promotility agents (e.g. metoclopramide) to enhance gastric and UGI motility, and two patients were instructed to discontinue nonsteroidal anti-inflammatory agents (NSAID’s) and to modify diet and lifestyle. Five patients underwent intraoperative endoscopic intervention in the form of esophageal dilatation for stricture formation. Five patients had a significant modification of their follow up protocol, due to the discovery of Barrett’s esophagus and its requirement for endoscopic surveillance. None of the patients with Barrett’s esophagus had low grade or high-grade dysplasia (LGD or HGD). Finally, three patients were referred for surgical intervention: one for a non-healing gastric ulcer, one for severe esophagitis and a stricture which could not be traversed by the endoscope and one for repair of a large paraesophageal hernia. One patient required referral for capsule endoscopy of the small bowel, since the study EGD and a separately performed colonoscopy had failed to demonstrate an etiology for iron deficiency anemia. In four patients, more than one management change occurred, usually dilatation of an esophageal stricture, accompanied by the initiation of PPI therapy. None of the study patients was referred for esophageal motility studies or 24 hour ambulatory esophageal pH testing.

Figures 2 and 3 display the indications for performing EGD in the patients who had a management change compared with those who did not have a management change. The indications for EGD are similar in both groups. Gastroesophageal reflux (GERD) was statistically more frequent in the non-management change group than the management change group (p-value=.002). There was also a significant influence of age in determining whether or not referral for EGD to our center resulted in a management outcome change. Figures 4 and 5 display age based histograms for patients with and without management change. Patients with management change (Figure 4) displayed a highly

Table 4. Recommendations at the Time of EGD

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Patients with Management Change</th>
<th>Patients without Management Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet Instructions</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Continue same Medication</td>
<td>0</td>
<td>44</td>
</tr>
<tr>
<td>Change of Medication</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Follow-up Office Appointment</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>(Biopsy Results)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refer for Colonoscopy</td>
<td>26</td>
<td>16 (Routine colon cancer screening)</td>
</tr>
<tr>
<td>Refer for X-Ray Study</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Refer for Capsule Endoscopy</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Refer for Esophageal Manometry or pH Study</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Follow-up Monitoring Required</td>
<td>5</td>
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significant tendency to older age. Thirty-eight of the 52 patients (73%) were over the age of 50 years, and thirty of the 52 patients (58%) were over the age of 60 years. By contrast, in those without management change (Figure 5), the histogram appears as a bell-shaped curve, indicating a peak in middle age. Using the Fisher two-tailed test, there was a highly statistically significant difference in the number of patients over age 60 in the management change group than in the non-management change group (p-value=0.029, with 95% confidence level).

In summary, there was a statistically higher number of patients with GERD and PPI use in the non-management change group, and a statistically higher number of patients over the age of 60 in the management change group.

**DISCUSSION**

EGD provides clinicians an opportunity to diagnose, treat, and monitor a wide variety of UGI conditions, including gastroesophageal reflux (GERD), Barrett’s esophagus, acid-peptic disease, H. pylori infection, neoplastic disease, inflammatory bowel disease, and malabsorption disorders. Its role in shortening the duration of hospitalization in UGI hemorrhage has been well documented, and it has been a valuable adjunct in the treatment of benign and malignant obstructing lesions of the UGI tract and in the endoscopic therapy of Barrett’s-induced esophageal dysplasia.

Little information, however, is available on the role of EGD and its influence on patient management outcomes in the ambulatory setting. We evaluated the records of 100 consecutive outpatients referred for EGD to a free-standing ambulatory endoscopy center. Noteworthy was the fact that 52% of these patients had a therapeutic change in their management. While the majority of this group underwent medication modifications, other important management changes occurred (Figure 1). The data highlight the fact that over 50% of our patients referred for EGD in an ambulatory setting had modification of their treatment. The converse position (noted by other observers) is that approximately 50% of patients referred to an endoscopy center for non-specific dyspeptic symptoms will have a normal EGD, while 15-20% will demonstrate reflux esophagitis, and approximately 20% will display active peptic ulcer disease. In general terms, nonspecific UGI dyspepsia is a benign condition with half the patients having normal endoscopic exams and most requiring

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**Figure 1. Clinical Outcomes in the 52 Patients with Management Change**

**Figure 2. Indications for EGD in the 52 Patients with Management Change**

**Figure 3. Indications for EGD in the 48 Patients without Management Change**
Elective Upper Gastrointestinal Endoscopy

A SPECIAL ARTICLE

Figure 4. Histogram of the Ages of the 52 Patients with Management Change

Figure 5. Histogram of the Ages of the 48 Patients without Management Change

medical therapy and sage guidance to ameliorate their complaints.

A number of the study patients had already undergone a prior UGI series, and that examination could provide additional insight into the patients’ complaints. Furthermore, other data suggest that a “test and treat” approach to many patients with GERD or epigastric pain (e.g. supplementing the clinical evaluation with an H. pylori antibody test) may be more cost effective than immediate endoscopy. While not performed in the present group of study patients, transnasal office endoscopy without the need for IV conscious sedation might be an “intermediate” option to evaluate such low risk patients in a less invasive more cost-effective fashion (particularly those patients who

(continued on page 46)
require additional reassurance about their symptoms). Traditional EGD with IV conscious sedation could then be reserved for those patients with more threatening symptoms (e.g. dysphagia, odynophagia, early satiety, weight loss, or GI bleeding), or for those who do not respond to empiric therapy. Finally, as stated above, approximately half of patients referred for outpatient EGD have benign conditions not requiring any change in treatment. In that circumstance, EGD may serve to reassure patient and clinician that no serious pathology exists.

It was difficult to determine which clinical parameters would predict EGD findings and alter management in our patients. This could in part be due to the fact that a moderate number of these patients were already on ideal therapy prior to their endoscopy (e.g. PPI treatment for GERD or dysphagic symptoms). In precise terms, 44/48 patients in the non-management change group had received recent or ongoing PPI therapy, and PPI use was significantly more frequently utilized in this group when compared to the management change group (p-value<0.001). This fact might be due to a significantly higher number of GERD patients in the non-management change group who were already receiving a PPI prior to the EGD. Most of those individuals would simply remain on PPI therapy, and the EGD would not alter treatment.

The fact that more than half (58%) of the change in management group of patients was over the age of 60 years makes intuitive sense. Complications of GERD, such as stricture and Barrett’s esophagus (with or without dysplasia), UGI malignancy, and chronic complications of peptic ulcer disease occur in older patients due to the number of years for these complications to evolve. Buri et al have noted that age and warning symptoms are effective predictors of significant endoscopic findings, particularly UGI malignancy. In addition, older individuals are often on UGI irritating medications for chronic conditions, including aspirin or other platelet inhibiting drugs for coronary artery disease, biphosphonates for osteoporosis, or NSAID’s for arthritis. In the present study, of note, 24/52 patients in the group with management change had been on an NSAID or ASA. Finally, mucosal resistance to the injurious effects of hydrochloric acid and irritating medications is known to be decreased in older patients making them more susceptible to UGI tract mucosal tract injury.

CONCLUSION

We have demonstrated that outpatient EGD influences patient management outcomes in over 50% of patients. In trying to ferret out those variables predicting management change, older age (>60 years) does play a significant predictive role. Recent NSAID/ASA use may also be an important factor in predicting those whose treatment will change after the EGD. Patients over the age of 60 with UGI complaints should definitely be referred by their primary caregiver to a gastroenterologist for clinical evaluation and for strong consideration for diagnostic EGD. Patients under the age of 60, without evidence of dysphagia, odynophagia, early satiety, weight loss, or GI blood loss can be checked for H. pylori infection, treated with empiric therapy, and observed. EGD may be reserved for non-responsiveness in this latter group. Such an approach is not only efficient, but also highly cost effective.

Acknowledgements

The authors wish to thank Melissa Hurwitz, MD, for her extensive review of the manuscript and thoughtful suggestions; Abdul Waheed, PhD, for assistance with the statistical analysis; Jay Raju, MD, who performed many of the EGDs; and lastly, the entire staff of South Bay Endoscopy Center, A Medical Corporation, San Jose, CA, for their cooperation in retrieving medical records and with assistance in our efforts to compile the data for this manuscript.

References

A Rare and Fatal Case of Nasogastric Tube Intubation Causing Gastric Perforation

by Steven Guttmann MD, Robert Aaron MD, Rabin Rahmani MD, Ira Mayer MD

CASE

A 79-year-old female with a history of chronic obstructive pulmonary disease presented to our hospital with a chief complaint of difficulty breathing. She developed worsening respiratory failure, ultimately requiring emergent intubation. Four attempts to pass a soft, 12-French enteral feeding tube with stylet were made. Eventually, placement was successful. Proper placement of the feeding tube was confirmed by auscultating borborygms over the epigastrium as air was injected into the tube with the catheter-tip syringe. A chest radiograph revealed the feeding tube with the tip overlying the stomach (Figure 1). Enteral feeding was subsequently started. Two hours later, the patient’s abdomen was noted to be rigid and an emergent computed tomography (CT) scan was ordered. The CT scan demonstrated pneumoperitoneum with the tip of nasogastric tube (NGT) appearing to be outside of the stomach with associated pneumoperitoneum (Figure 2).

A surgical consultation was obtained, however, no intervention was recommended given the patient’s high risk of surgical mortality. The patient subsequently developed septic shock and expired. Upon autopsy, the cause of death was attributed to peritonitis due to perforation of the stomach during nasogastric tube insertion.

DISCUSSION

Enteral tube feeding is the preferred method of alimentation in the acute or chronically ill patient. Minor complications of nasogastric intubation include sinusitis, epistaxis and sore throat. More serious complications include esophageal perforation, aspiration, pneumothorax and rarely intracranial placement.1,2 There have been reports by Tsung of small bowel perforation caused by NGT placement.3 However, the cases reported were instances of low birth weight- neonates or patients with atypical anatomy. In contrast, the autopsy in our case revealed normal gastric anatomy, with no mention of ulceration. Furthermore, a less rigid NGT was used for placement. Despite these factors, the nasogastric tube perforated the gastric wall.
CONCLUSION

Nasogastric tube placement is very commonly performed in hospitals, however, it is a procedure that can have severe associated complications. Visualization of the descent of the tube below the diaphragm provides proper placement of the NGT. Radiographic evidence of the above is strongly recommended before enteral feeding is started. However, as in our case, radiographs can be misinterpreted. Although NGT placement is a common procedure, healthcare providers must maintain a high level of vigilance for potential complications at all times.

References

Ulcerative Colitis in Australia: Is IBD in Children Increasing?

Previous studies have suggested that inflammatory bowel disease (IBD) incidence is increasing worldwide, and in particular, the incidence of ulcerative colitis (UC) in Victoria, Australia is one of the highest in the world. The authors of this study evaluated the incidence of pediatric UC from 1950 to 2009.

Pediatric UC was determined from ICD coding, medical records prior to use of ICD coding, individual files kept by physicians, endoscopy lists, and the Australian pediatric and adolescent IBD database. The diagnosis of UC was made by standard criteria. In total, 1310 children with UC (16 years of age or less) were diagnosed during this study period. The median duration of symptoms prior to UC diagnosis was 16 weeks, and both weight and height z-scores were significantly less than the general pediatric population. It was noted that 66% of pediatric UC patients had extensive colitis while 25% had left-sided colitis and 9% had proctitis.

Patients were then divided into three study groups consisting of the periods of 1950-1969, 1970-1989, and 1990-2009; additionally, the first 40 years of data were compared to the last 20 years of data. Over the duration of the study period, the incidence of pediatric UC increased 11-fold (from 0.15 per 100,000 children to 1.61 per 100,000 children). The mean age at diagnosis significantly increased while the duration of symptoms before diagnosis significantly decreased during the study period. Laboratory testing for inflammatory markers was not significantly different throughout the study except for a significantly elevated platelet count noted in the last 20 years of the study. The methods for UC diagnosis had expectedly changed over this 60-year study period. Barium enema and rigid sigmoidoscopy were the most common diagnostic tools for UC diagnosis prior to 1980 although colonoscopy was the predominant diagnostic method after 1989. Extensive colonic involvement was noted in the later time periods as was concomitant liver disease.

This study provides further evidence that pediatric IBD, specifically pediatric UC, is becoming more common over time. Extensive colonic disease is now a more frequent presentation although diagnostic techniques, such as flexible colonoscopy, are currently commonplace and may explain these findings. Regardless, the incidence of pediatric UC is increasing, and its presentation appears to be changing suggesting a need to identify genetic and environmental factors.


Functional Abdominal Pain and Behavioral Therapy

Functional abdominal pain (FAP) is a common cause of referral to pediatric gastroenterologists, and treatment for this disorder is limited. The authors of this study evaluated the effectiveness of social learning and cognitive behavioral therapy (SLCBT) one year after intervention for FAP treatment. These same authors have published prior data showing improvement of FAP symptoms 6 months after SLCBT intervention.

The study utilized 200 parent-child FAP dyads which were placed in a randomized controlled trial from clinics in 2 regions of North America. FAP in children was defined as 3 or more episodes of recurrent abdominal pain during a 3-month period, and clinical assessments were obtained at baseline, 1 week, 3 months, 6 months, and 12 months. Dyads were separated into two groups. One group consisted of three one-hour weekly SLCBT sessions with trained therapists which entailed using therapy dealing with abdominal pain in relation to maladaptive beliefs in relation to abdominal pain. The other group received education and support (ES) which simply provided information regarding the gastrointestinal system and nutrition and served as a control. Several measurements were made during this study including the Faces Pain Scale – Revised and Children’s Somatization Inventory (completed by both parents and children), the Functional Disability Inventory, the Adults’ Responses to Children’s Symptoms, the Pain Beliefs Questionnaire completed by parents, and the Pain Response Inventory completed by children.

The mean age for children in this study was 11.2 years. Demographics between the SLCBT and ES groups did not differ significantly. Parents in the SLCBT group reported significantly greater reductions in their children’s pain at 6 and 12 months compared to the ES group. Functional disability decreased from baseline (continued on page 52)
to 12 months in both treatment groups, and children in both treatment groups reported less gastrointestinal symptoms after intervention although the children in the SLCBT had significantly greater improvement. Parents in the SLCBT group reported greater reductions in solicitousness (anxiousness) in their children compared to parents in the ES group at 12 months with significantly greater reductions in the perceived threat of a child’s pain. The children in the SLCBT group also had improved coping skills to minimize pain compared to the ES group.

The study demonstrates the benefits of SLCBT in treatment of pediatric FAP. SLCBT is a relatively low cost intervention for a common pediatric gastrointestinal somatic complaint, and this study raises the question as to if pediatric mental health specialists should be part of pediatric gastrointestinal clinic care.

Antibiotic Treatment in Patients in Septic Shock with Cirrhosis

A nested cohort study within a large retrospective database of septic shock from 28 medical centers in Canada, the United States and Saudi Arabia was carried out by the Cooperative Antimicrobial Therapy of Septic Shock Database Research Group between 1996 and 2008. The impact of initial empiric antimicrobial therapy was examined. Among 635 patients with cirrhosis and septic shock, the hospital mortality was 75.6%. Inappropriate initial empiric antimicrobial therapy was administered in 155 (24.4%) of patients. The median time to appropriate antimicrobial administration was 7.3 hours. The use of inappropriate initial antimicrobials was associated with increased mortality (OR 9.5), as was the delay in appropriate antimicrobials. Among patients with eligible bacterial septic shock, a single, rather than two or more appropriate antimicrobials was used in 226 (72.9%) patients and was also associated with higher mortality (OR 1.8). These findings were consistent across various clinical relevant subgroups.

It was concluded that in patients with cirrhosis and septic shock, inappropriate and delayed appropriate initial empiric antimicrobial therapy is associated with increased mortality. Monotherapy of bacterial septic shock is also associated with increased mortality. The process of selection and implementation of empiric antimicrobial therapy in this high-risk group should be restructured.


One Year Mortality in Patients with Hypoxic Hepatitis and Jaundice

This study was aimed to evaluate the incidence and clinical effect of jaundice in critically ill patients with hypoxic hepatitis (HH). A total of 206 consecutive patients with same were screened for the development of jaundice during the course of HH. Individuals with preexisting jaundice or liver cirrhosis at the time of admission (N=31), were excluded from analysis. Jaundice was diagnosed in patients with plasma total bilirubin levels greater than 3 mg/dL.

One-year survival infections, cardiopulmonary, GI, renal, and hepatic complications were prospectively documented. New onset of jaundice occurred in 63 of 175 patients with HH (36%). In patients who survived the acute effects of HH, median duration of jaundice was 6 days. Patients who developed jaundice (group 1), needed vasopressor treatment, renal replacement therapy, and mechanical ventilation more often and had a higher maximal administered dose of norepinephrine, compared with patients without jaundice (group 2).

One year survival rate was significantly lower in group 1, compared with group 2 (8% vs. 25% respectively). Occurrence of jaundice was associated with increased frequency of complications during follow-up (54% in group 1 vs. 35% in group 2). In particular, infections as well as renal and GI complications occurred more frequently in group 1 during followup.

It was concluded that jaundice is a common finding during the course of HH and leads to increased rate of complications and worse outcome in patients with HH.


Adequacy of Colon Polyp Resection

To determine the rate of incompletely resected neoplastic polyps in clinical practice, a prospective study on 1427 patients who underwent colonoscopy at two medical centers and had at least one nonpedunculated polyp (5 to 20 mm), was carried out. After polyp removal was considered complete macroscopically, biopsies were obtained from the resection margin. The main outcome was a percentage of incompletely resected neoplastic polyps (incomplete resection rate – IRR) determined by the presence of neoplastic tissue in post polypectomy biopsies.

Associations between IRR and polyp size, morphology, histology, and endoscopists were assessed by regression analysis.

Of 346 neoplastic polyps removed by 11 gastroenterologists, 10.1% were incompletely resected. IRR increased with polyp size and was significantly higher for large (10 to 20 mm) than small (5 to 9 mm) neoplastic polyps (7.3% vs. 6.8%), and for sessile, serrated adenomatous polyps than for conventional adenomas (31% vs. 7.2%). The IRR for endoscopists with at least 20 polypectomies ranged from 6.5 to
22.7%. There was a 3.5-fold difference between the highest and lowest IRR after adjusting for size and sessile serrated histology.

It was concluded that neoplastic polyps are often incompletely resected, and the rate of incomplete resection varies broadly among endoscopists. Incomplete resection might contribute to development of colon cancers after colonoscopy (interval cancers). Efforts are needed to ensure complete resection, especially of larger lesions.


**Congenital Hepatic Fibrosis in Autosomal Recessive Polycystic Kidney Disease**

To describe congenital hepatic fibrosis in patients with autosomal recessive polycystic kidney disease (ARPKD), confirmed by detection of mutations in PKHD1, patients with a combination were evaluated at NIH from 2003 to 2009, analyzing clinical, molecular, and imaging data from 73 patients (age 1 to 56 years), with kidney and liver involvement.

Initial symptoms were liver-related in 26% of patients and others presented with kidney disease. One patient underwent liver and kidney transplantation, and 10 others received kidney transplants. Four presented with cholangitis and one with variceal bleeding. A total of 69% of patients had enlarged left lobes on MRI, 92% had increased liver echogenicity on ultrasonography, and 65% had splenomegaly which started early in life. A total of 60% of children younger than 5 years had enlarged spleens.

Spleen volume had an inverse correlation with platelet count and prothrombin time, but not with serum albumin level. Platelet count was the best predictor of spleen volume, and spleen length corrected for patient’s height correlated inversely with platelet count.

Spleen volume did not correlate with renal function or type of PKHD1 mutation. A total of 22 of 31 patients who underwent endoscopy were found to have varices. Five had variceal bleeding and two had portosystemic shunts; 40% had Caroli syndrome and 30% had an isolated dilated common bile duct.

It was concluded that platelet count is the best predictor of the severity of portal hypertension, which has an early onset, but is underdiagnosed in patients with ARPKD and 70% of patients with ARPKD have biliary abnormalities. Kidney and liver disease are independent and variability in severity is not explainable by the type of PKHD1 mutation.


**Tenofovir in Chronic Hepatitis B in Adolescents**

To evaluate the safety and efficacy of tenofovir DF in adolescents with chronic hepatitis B (CHB), a double-blind, placebo-controlled trial was carried out on adolescents 12 to less than 18 years of age. It was randomized to 52 patients with 54 patients receiving placebo once daily for 72 weeks. The primary endpoint was virologic response (HBV DNA less than 400 copies per ml at week 72). A total of 106 patients were enrolled, 101 patients completed 72 weeks of treatment.

At baseline, 91% of patients were hepatitis Be antigen-positive and 85% had prior exposure to HBV therapy. A virologic response was observed in 89% (46/52) of patients who received tenofovir DF and 0 of 54 patients who received placebo. Treatment response was not affected by prior HBV treatment and no resistance to tenofovir DF developed through week 72. Among patients with an ALT level greater than upper limits of normal at baseline, normalization of ALT occurred in 74% of patients receiving tenofovir DF and 31% of patients receiving placebo.

Grade 3/4 adverse events were higher among patients treated with placebo (24%) than patients treated with tenofovir DF (10%). No patients met the safety endpoint of a 6% decrease in spine bone mineral density at week 72.

It was concluded that tenofovir DF therapy in HBV-infected adolescents was well tolerated and highly effective at suppressing HBV DNA and normalizing ALT values in both treatment-naïve adolescents and those with prior exposure to HBV therapy.


Murray H. Cohen, D.O., “From the Literature” Editor, is on the Editorial Board of Practical Gastroenterology.
BEVERLY HILLS DOCTORS HOST SCOPEFEST 2013 FOR COLON CANCER AWARENESS

BEVERLY HILLS, CA. March, 2013 — In honor of Colorectal Cancer Awareness Month, fourteen doctors and nurses from La Peer Health Systems underwent colonoscopies as part of Scopefest, an event designed to boost awareness about colon cancer and lessen anxiety surrounding the screening process.

“Many people hesitate to schedule this life-saving procedure because they fear the preparation process,” said Dr. Ari Nowain, a gastroenterologist at La Peer and one of the two surgeons who performed colonoscopies on his colleagues. “The goal of Scopefest was to allow our doctors to practice what they preach, while showing people that a colonoscopy isn’t as bad as they might think.”

In an effort to lighten the mood about this dreaded exam, La Peer made Scopefest into a fun-spirited event lasting all weekend. The night before the doctors and nurses underwent screening, they attended a bowel preparation cocktail party at the Montage Hotel. An anesthesiologist, who doubles as a mixologist, created signature cocktails combining the standard Suprep bowel preparation drink with sparkling lemonade and other clear beverages.

“A good prep allows for a more effective procedure by letting your gastroenterologist and colorectal surgeon identify even the smallest polyp, and even the smallest polyp can be significant,” said Liza Capiendo, MD, a surgeon in La Peer’s Department of General and Colorectal Surgery and one of the doctors who underwent a colonoscopy at the event.

Colonoscopies are diagnostic exams in which doctors utilize a flexible tube known as a colonoscope to view the lining of the rectum and intestine and detect polyps. By removing these potentially pre-cancerous tumors early, surgeons can often prevent colon cancer from developing. Scopefest also featured screenings using the revolutionary new Third Eye® colonoscopy procedure, which provides doctors with a retrograde (“backward”) view of the colon. According to clinical trials, the Third Eye® colonoscopy aids in the detection of pre-cancerous polyps hidden behind the folds and turns of the colon.

All fourteen doctors and nurses underwent colonoscopies on Saturday, March 9th at La Peer Health Systems’ outpatient surgical facility in Beverly Hills. Following the screenings, everyone involved in Scopefest attended a dinner and awards presentation at Via Alloro. Participants received light-hearted awards such as Best Prep, Biggest Polyp and Most Curvaceous Colon. Various media organizations and outlets, including My Fox LA, covered the event.

“Overall, Scopefest 2013 was a huge success,” said Dr. Siamak Tabib, a gastroenterologist at La Peer and one of the doctors who administered the exams. “Not only did the event help lighten the mood about bowel preparation, but it also provided patients with valuable information about when to undergo screening.”

According to Dr. Tabib, patients should begin undergoing regular colonoscopies at age 50. Those with a family history of colon cancer should begin screenings at age 40 or 10 years before the relative was diagnosed. For those experiencing symptoms of colon cancer, it’s important to undergo an evaluation right away. Patients interested in scheduling a colonoscopy can contact La Peer at 310.360.9119.

“Having a colonoscopy is the best way both to prevent colon cancer and detect existing cases early, when treatments are more effective,” said Dr. Tabib.

La Peer Health Systems is an outpatient surgery center in Beverly Hills, founded by doctors and focused on providing excellent patient care alongside the most cutting-edge medical treatments available. With 47 world-renowned physicians in 13 specialties, we offer comprehensive medical treatment that takes patients from consultation to diagnosis, treatment, surgery, and ultimately aftercare. Our 13 medical departments include orthopedics & sports medicine, gastroenterology, head & neck surgery, colorectal & general surgery,
MINIMALLY INVASIVE SURGERY FOR COLORECTAL CANCER YIELDS OPTIMAL OUTCOMES FOR PATIENTS
SAGES Shares Patient Information Guidelines as Part of National Colorectal Cancer Awareness Month

LOS ANGELES, CA. March, 2013 – Colon and rectal cancer together comprise the nation’s second-leading cause of cancer deaths. Every year, about 140,000 Americans are diagnosed with colon or rectal cancer and more than 50,000 people die from it. Fortunately, the death rate from this disease has steadily been decreasing for the last 20 years due to preventative screening and more sophisticated surgical approaches.

One of these approaches is minimally invasive surgery. Minimally invasive laparoscopic colorectal surgery allows surgeons to perform many common colon and rectal procedures through small incisions. Depending on the type of procedure, patients may leave the hospital in a few days and return to normal activities more quickly than patients recovering from open surgery. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) has issued “Patient Information Guidelines for Colonoscopy” for those focusing on prevention, and “Patient Information Guidelines for Laparoscopic Colon Resection” for those undergoing cancer treatment, highlighting the advantages of minimally invasive procedures and other pertinent information.

“Early screening is key to prevention, and it is worth remembering that colorectal cancer is the only one of the five most common cancers that can actually be prevented by screening – i.e. by removing colorectal polyps before they can turn into cancer. However when patients have to make a decision about treatment, they should be aware that minimally invasive operations are an option in many cases, as easier recovery can often be achieved through minimally invasive surgery (MIS),” said Dr. Scott Melvin, SAGES President and Professor and Chief of Gastrointestinal Surgery and Professor at Ohio State University. “We want patients to know that under the right circumstances, choosing laparoscopic surgery will allow for a more comfortable recovery than an open procedure would and due to briefer recovery times, when necessary, chemotherapy treatment may take place sooner rather than later,” Dr. Melvin said.

Dr. Tonia Young-Fadok, Professor of Surgery at the Mayo Clinic College of Medicine and Chair of SAGES Humanitarian task force added, “Through guidelines such as these SAGES is committed to encouraging patients to be more informed about the options available to them. Patients should feel comfortable asking their surgeon if a minimally invasive procedure is an option, and if not they may wish to seek a second opinion from a surgeon experienced with these operations.”

Guidelines are available at the links above or also at: www.sages.org/publications/patient_information

SAGES has been at the forefront of best practices in colorectal cancer surgery by researching, developing and disseminating the guidelines and training for standards of practice in surgical procedures. SAGES 2013 annual conference will be held this year April 17th-20th in Baltimore, Maryland.

About SAGES
The mission of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) is to improve quality patient care through education, research, innovation and leadership, principally in gastrointestinal and endoscopic surgery. SAGES is a leading surgical society, representing a worldwide community of over 6,000 surgeons that can bring minimal access surgery, endoscopy and emerging techniques to patients worldwide. The organization sets the clinical and educational guidelines on standards of practice in various procedures, critical to enhancing patient safety and health. For more information, visit:

www.sages.org
THIRD EYE RETROSCOPe TO BE EXHIBITED AT DIGESTIVE DISEASE WEEK (DDW 2013) IN ORLANDO

SUNNYVALE, CA, April 12, 2013 – Avantis Medical Systems, Inc., manufacturer of the Third Eye Retroscope, is again participating in Digestive Disease Week (DDW), which will be held May 18-21, 2013 in Orlando, FL.

This year’s focus will be on the extensive clinical data showing that use of the Third Eye Retroscope can substantially enhance the quality of colonoscopy by improving the ability to view areas behind folds in the wall of the colon.

Colonoscopy is generally considered the best available method for detecting and removing adenomas and other lesions in the colon. However, due to limitations of the technology, even careful colonoscopy exams by experienced endoscopists can miss approximately 21-24% of adenomas and 12% of large adenomas, those measuring at least 1 cm in diameter. These large adenomas are considered the most dangerous, as they are estimated to transform into adenocarcinoma at a rate of 2-5% per year, depending on the age of the patient.

Adenomas are especially likely to be missed if they are located behind folds, where they are hidden from the forward-viewing colonoscope. The Third Eye Retroscope provides a second, retrograde (backward) video image that allows endoscopists to see the areas behind folds and flexures.

Multiple studies of the Retroscope have demonstrated improved adenoma detection rates. The largest and most recent was “TERRACE,” a randomized, controlled trial that provided a head-to-head comparison with standard colonoscopy. Each subject underwent two complete colonoscopies, one with and one without use of a Retroscope. The net additional adenoma detection rate for Third Eye colonoscopy was 23.2% for all subjects and 40.7% for subjects with higher risk for colorectal cancer – those having colonoscopy for surveillance or diagnostic workup.

The investigators also looked at miss rates for large adenomas, which were 11.8% for standard colonoscopy and 0.0% for Third Eye colonoscopy. Details of this and other studies are available at: http://avantis.thirdeyecolonoscopy.com/clinical-results

The Third Eye Retroscope is the only available device that can safely and effectively provide a retrograde view throughout the length of the colon. The device is used in conjunction with a standard colonoscope, and is compatible with systems manufactured by Olympus, Fujinon and Pentax.

In support of colorectal cancer awareness activities, the Third Eye Retroscope was recently featured on the Emmy Award-winning daytime series “The Doctors” in a special segment called “Headline News Affecting Your Health Right Now.” The episode, which aired on National Colorectal Screening Day (March 8), highlighted Third Eye colonoscopy as a significant improvement to standard colonoscopy and can be viewed at: http://www.thedoctorstv.com/videolib/init/8769

About the Third Eye Retroscope and Avantis Medical Systems, Inc.

Avantis Medical Systems, Inc., a technology leader in developing novel catheter-mounted digital imaging devices, markets the Third Eye Retroscope, an FDA-cleared, disposable, catheter-based camera that is inserted through the instrument channel of a standard colonoscope to provide a retrograde (backward) view simultaneously with the forward view of the colonoscope.

Clinical evidence shows that two-thirds of the adenomas that are missed during colonoscopy are located behind folds in the wall of the colon, where they are often unseen in the forward view of the colonoscope, even during the most meticulous examinations. The retrograde view provided by the Third Eye Retroscope allows physicians to see more of the colon and can reveal lesions that are hidden behind folds.

For more information, visit: www.ThirdEyeColonoscopy.com
For additional information about products and services that appear in *Practical Gastroenterology*, check the appropriate boxes on this coupon, fill in your name and address and send it to:

**Practical Gastroenterology**
99B Main Street, Westhampton Beach, NY 11978
Or send your form via fax to: (631) 288-4435

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</tr>
</tbody>
</table>

Although every effort has been made to ensure the accuracy of this index, we cannot absolutely guarantee against the eventuality of last minute changes or omissions.

**NAME**

**HOSPITAL/COMPANY**

**ADDRESS**

**SUITE/APT #**

**CITY**

**STATE**

**ZIP**

**AREA CODE**

**PHONE**

PLEASE PLACE ONE LETTER OR NUMERAL IN EACH BOX PROVIDED.
MEETINGS CALENDAR

May 17–22, 2013 SGNA 40th Annual Course
Austin, TX – Celebrating 40 years of Annual Course education, The Society of Gastroenterology Nurses and Associates brings together the best and brightest GI/endoscopy professionals to drive the future of our field. For more information visit: www.sgna.org

May 18–21, 2013 Digestive Disease Week
Orange County Convention Center, Orlando, FL – Digestive Disease Week® (DDW) is the largest and most prestigious meeting in the world for the GI professional. Every year DDW attracts approximately 15,000 physicians, researchers and academics from around the world. Choose from over 400 sessions, including clinical and research symposia, state-of-the-art lectures and research and topic fora, covering a wide array of topics and presented by a world-renowned faculty unsurpassed in their field. For more information visit: www.ddw.org

September 20-22, 2013 Neurogastroenterology & Motility Scientific and Clinical Meetings
Huntington Beach Resort & Spa, Huntington Beach, CA – The American Neurogastroenterology and Motility Society (ANMS) invites you to participate in its 17th Neurogastroenterology & Motility Scientific Meeting, 8th Postgraduate Course on Gastrointestinal Motility & Neurogastroenterology in Clinical Practice and Young Investigator Forum.
For more information and registration, contact us at: Tel.: +1 (734) 699-1130 Fax: +1 (734) 699-1136
http://www.motilitysociety.org

September 21-24 2013 GASTRO 2013 APDW/WCOG
SHANGHAI, Asian Pacific Digestive Week 2013, World Congress of Gastroenterology
Shanghai Expo Center, Shanghai, China – A World Congress in Asia! Submit your abstract and register today and take advantage of Early Bird Registration fees. The Early Bird Registration deadline is April 15, 2013. The Regular Registration deadline is August 15, 2013. For further information regarding the upcoming Congress, visit the Gastro 2013 APDW/WCOG Shanghai website at: www.gastro2013.org

October 24–26, 2013 Annual Probiotic Symposium
Probiotics: Current Perspectives and Controversies
San Antonio, TX – Attend the 7th Annual Probiotic Symposium for a unique opportunity to learn about the current perspectives and controversies in probiotics research and use in clinical practice. CME Credit for Physicians and other Healthcare Professionals will be available. Save $100 – Register before October 6, 2013. For more information visit: www.ProbioticSymposium.com
1. The C in PBC
6. Endoscopy classification used in gastroenterological studies
9. Result, medically
10. Series of treatments, for example
11. Many many years
12. Liquid quantity
13. Vitamin B3
14. Decompose
15. Neatly
18. ___rotonin
19. Colder
22. Major operation
24. Natural Killer Gene Complex, for short

25. ___operative
26. Group of individuals sharing a common characteristic and observed over time as a group
27. Methanethiosulfonate, for short
28. Actigall is a brand of it
29. Aka glycolaldehyde
30. Symptom of some physical hurt or disorder
31. Solidify
32. Lymphokine, for short
33. Medical professional, in slang
34. Drug used to prevent bowel movements
37. Hosp. test
38. Acid prefix
40. Soak (up)
42. Increased production of this occurs in many adenocarcinomas
43. Malignant growths
48. Tiny sac in the lungs

DOWN
1. Condition in which little or no bile is secreted or the flow of bile into the digestive tract is obstructed
2. Quercetin-3-O-rutinoside; it has been studied in relation to hemorrhoid treatment
3. Bone at the base of the tongue
4. Any of a group of natural steroid alcohols
5. Bursae
6. Skin irritation in the rectal area
7. Organ removal
8. Somatostatin, for short
13. Negative
14. Complex of enzymes produced in the stomach
16. It plays a major role in breathing
17. Surgical tool
20. Form of cancer
21. Antileukoprotease, for short
23. Where the radius is
28. Actigall is a brand of it
31. Pancreas, e.g.
34. Drug used to prevent bowel movements
37. Hosp. test
38. Acid prefix
40. Soak (up)
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(Answers on page 52)