Endoscopic Gastrointestinal bleeding treatment

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Tehran, 2024

Therapeutic endoscopic control of GI bleeding

- During the early years of gastrointestinal endoscopy, endoscopic examination was primarily a diagnostic tool.
- As technology advanced and procedural skills developed, the endoscope became a therapeutic instrument.
- Acute gastrointestinal hemorrhage is an indication for therapeutic endoscopic intervention, but emergent gastrointestinal endoscopy is associated with an increased risk of complications.

Patients with hemorrhage can be categorized by severity into four classes based on the percent loss of blood volume

Class I: hemorrhage occurs with acute loss of up to 15% blood volume.
Minimal physiologic changes are evident and patients usually respond well to crystalloid fluid replacement.

Class II: hemorrhage results from 15 to 30% blood loss.
Physiologic changes include mild tachycardia and tachypnea with narrow pulse pressure, slightly delayed capillary refill, decreased urine output, and mild anxiety.
Patients can usually be stabilized with crystalloid solution, although they may require blood products.

Class III: hemorrhage is the result of an acute blood loss of 30 to 40%.
Signs of shock (including tachycardia, tachypnea, hypotension, delayed capillary refill, altered mental status, and oliguria) are present.
Prompt resuscitation with crystalloid solution is necessary; most patients will need blood products as well.

Class IV: hemorrhage occurs with more than 40% acute blood loss.
Signs of shock are obvious and immediately life-threatening.
Patients are usually cold and pale with profoundly depressed mentation, marked tachypnea and tachycardia, and anuria. Children should quickly receive blood products. Operative intervention is often necessary to control hemorrhage.

Many children with class II hemorrhage and all of those with classes III and IV are in shock.

Classification of hemorrhagic shock in children

	Class I, very mild	Class II, mild	Class III, moderate	Class IV, severe
Percent blood volume loss	**< 15%**	**15 – 30%**	**30 - 40%**	**> 40%**
Heart rate	Normal	Slightly increased	Moderately increased	Markedly increased
Respiratory rate	Normal	Slightly increased	Moderately increased	Markedly increased, markedly decreased, or absent
Blood pressure	Normal or slightly increased	Normal or slightly decreased	Decreased	Decreased
Pulses	**Normal**	Normal or decreased peripheral	Weak or absent peripheral	Absent peripheral, weak or absent central
Skin	Warm and pink	Cool extremities, mottled	Cool mottling extremities, or pallor	Cold extremities with pallor or cyanosis
Capillary refill	Normal	Prolonged	Markedly prolonged	Markedly prolonged
Mental status	Slightly , anxious	Mildly anxious, confused, combative	Very anxious, confused, or lethargic	Very confused, lethargic, or comatose
Urine output	Normal	Slightly decreased	Moderately decreased	Markedly decreased or anuria

Sheffield scoring system to predict need for endoscopic therapy

Important predictors of the need for endoscopic hemostatic intervention include the presence of

- Liver disease, portal hypertension
- Requirement for volume support or blood products,
- Tachycardia (heart rate >20 bpm above mean for age)
- Increased capillary refill time of greater than 2 seconds
- The presence of significant hematemesis or melena,
- A decline in Hb greater than 20 g/L from baseline

Acute upper GI bleeding

- Variceal
  - Esophageal ,
  - Gastric
- Non-variceal
  - Gastric ulcer with evidence of active bleeding
  - Duodenal ulcer with evidence of active bleeding
  - Dieulafoy's lesion
  - Sentinel clot
  - Mallory Weis
  - Hemorrhagic gastritis
  - Foreign body
  - Caustic injury

five well-established types of therapeutic intervention for acute gastrointestinal bleeding:

- Injection
- Coagulation or thermal therapy, including argon plasma coagulation (APC)
- Laser therapy
- Endoscopic hemostatic devices
- Ligation therapy, as well as the
- Newer technique of application of hemostatic powder

Variceal upper GI bleeding

- Rubber band ligation
- Sclerotherapy
- Combination

➢ After the initial bleeding episode has resolved,

➢ Prophylactic endoscopic band ligation is performed in patients who cannot tolerate, have a contraindication to, or fail to respond to β-blockade;
in patients with large varices and high-risk stigmata of potential bleed (red wale marks)

in those who may not be able to tolerate the initial bleeding episode

Endoscopic methods for hemostasis

Injection

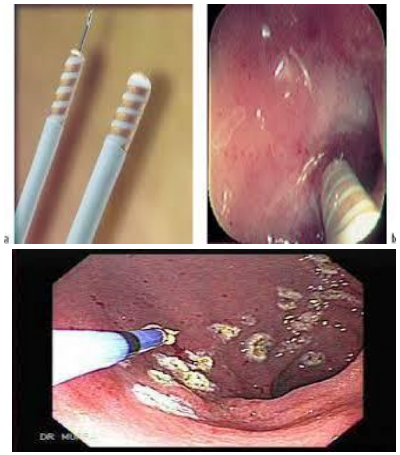
saline
Epinephrine
Polidocanol
Fibrin Glue
Histoacryl

Thermal therapy

- Contact
- Non contact

Argon plasma coagulation

Heater probe
Monopolar
Bipolar(Gold, Silver, BICAP)

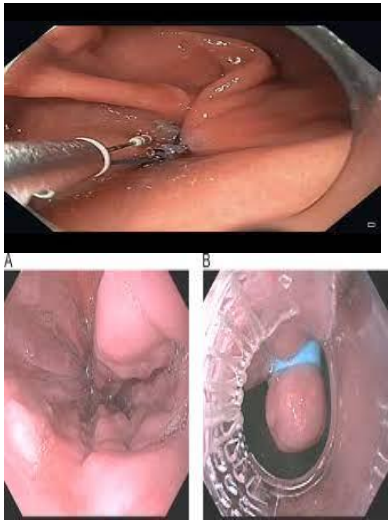


Mechanical

TTS clips

OTC clips

Band ligation

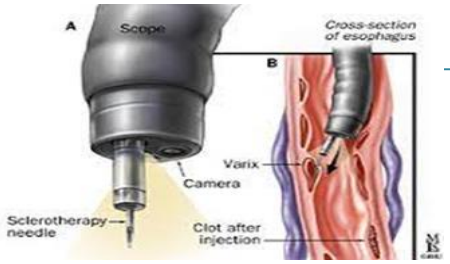


Contact

Hemospray
Starch
Oxidized
Cellulose
Ankaferd
Polyglycolid Acid

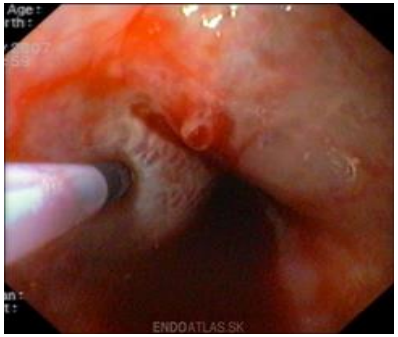
1. Sclerotherapy

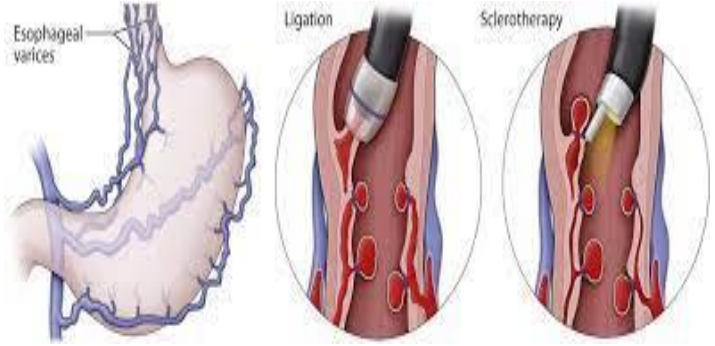
- Injection therapy is used for both variceal and nonvariceal bleeding.
- Nonvariceal injection therapy is usually performed by injecting a hemostatic agent at **three to four sites around** an exposed bleeding Vessels
- **First,** except under unusual circumstances, injection therapy should be confined to a single solution (single agent or a combination agent) during a given injection episode.
- Utilizing two sequential solutions may increase the risk of complication with smaller volumes of agent than would be required by using a single agent alone.
- **Second,** the injection site (into vessel vs. surrounding vessel vs. submucosal) is specific for certain agents.
- **Third,** the risks with injection therapy include increased bleeding, rebleeding, bowel ischemia, and perforation
- **Fourth**, precise volumes of injection are required.
- **Fifth**, optimal volumes of injection of a number of agents to achieve hemostasis have not been established for



1. Endoscopy sclerotherapy

- ES involves injection of a sclerosant solution into the varices using an injection needle that is passed through the accessory channel of the endoscope.
  - Para variceal
  - Intravariceal
- A number of sclerosant solutions are available that are all effective.
- The volume and frequency of injections vary widely among endoscopists.
- Sodium morrhuate 5%, 1 to 2 mL of per injection for a total of 12 to 20 mL per session or cyanoacrylate.
- Ethanolamine 5%, 1 to 2 mL injections, commonly used as alternative.





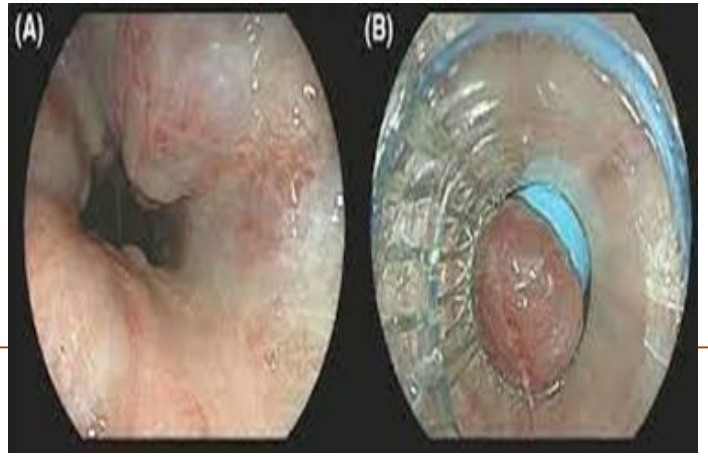
Sclerosants for Nonvariceal Bleeding

Solution	Concentration	Volume/No. of Injections/Location	Maximum Volume	Comments
Epinephrine with normal saline	1 mL 1:1000 epinephrine + 9 mL normal saline	0.5–2.0 mL injected in multiple sites around bleeding vessel and into bleeding point itself	10 mL or more*	Range 1.5–10 mL; larger volumes in range for spurting vessels
Absolute ethanol	99.5% ethanol	0.5–1 mL/injection at 3–4 sites surrounding bleeding vessel and 1–2 mm away from vessel	4 mL total	Inject via tuberculin syringe slowly (0.2 mL/3 s); extension/perforation significant risk if maximum volume exceeded; may be technically more difficult to control volume
Epinephrine with normal saline for submucosal injection†	1 mL 1:1000 epinephrine + 9 mL normal saline	1.0–2.0 mL per injection injected in multiple sites (3–4) around the polyp to be raised up	30 mL	Goal is lack of vascular markings within injection site

Current guidelines suggest that in patients with ulcer bleeding with high-risk stigmata, epinephrine injection should not be used alone but rather used in combination with another modality such as thermos coagulation or clipping and is discussed below

2. Endoscopic variceal Band Ligation

- EVL is the treatment of choice for control of variceal hemorrhage in appropriately sized pediatric patients.
- For variceal obliteration in secondary prophylaxis that is, in patients who cannot tolerate or have a contraindication to β-blocker use
- Those who do not have an adequate drop in hepatic venous pressure gradient in response to β-blocker therapy
- Other indication:
- This technique has subsequently been used for the management of
  - Management of bleeding gastric and intestinal varices, Dieulafoy lesions,
  - Bleeding Mallory-Weiss tears
  - Angioectasis including GAVE
  - Duodenal ulcers



3. THERMOCOAGULATION

- A second method of establishing hemostasis is thermocoagulation, utilizing the heater probe, monopolar probe, or multipolar electro coagulator (MPEC), previously commonly referred to as the bipolar probe

Method	Site	Setting	Application Time	No. of Applications	Technique	Notes
Heater probe	Upper GI tract	30 J		2–4	Firm tamponade, then coagulate around bleeding point, then on it	Decreased setting/time of application in colon or thinner gut wall
Multipolar electrocoagulator	Upper GI tract	15 W	8–10 s/pulse	Multiple	Firm tamponade, then coagulate	Difficult angulation in lesser curve or deformed duodenum
Argon plasma coagulator	Upper GI tract	30–50 W 0.8–1.0 L/min	0.5–2 s	Multiple	Operative distance 2–8 mm	Paint confluent or near-confluent areas; avoid tissue contact with probe tip; surface should be free of liquid

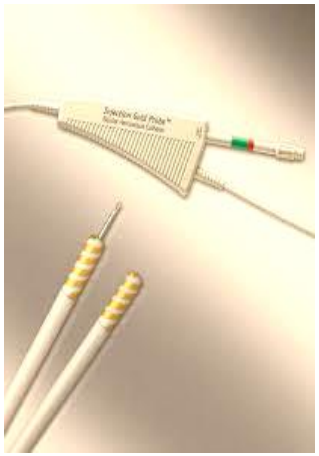
4. Argon plasma coagulation

- It is a noncontact method.
- The major benefit of this technique is that it is a quick method of therapy deliverable over a large treatment area.
- The principle of APC is that high-frequency monopolar current is conducted to target tissues through ionized argon gas (argon plasma)
- For hemostasis of superficial vascular ectasias such as GAVE, for hemostasis of peptic ulcers, and for tissue ablation
- **Factors that influence tissue effect include 1. duration of APC application to a specific area, 2. Power setting, 3. distance between the probe and tissue**.
- Superficial vascular lesions are typically treated by low power (30 to 50 W) and gas flow rates (0.7 to 7 L/min), with an operative distance between the tissue and the probe of 2 to 8 mm

5. The heater probe

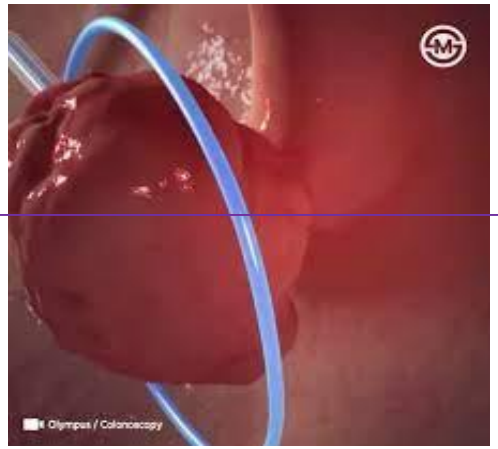
- The heater probe is a contact thermal device composed of (PTFE) polytetrafluoroethylene coated hollow aluminum cylinder with an inner heater coil and a maximum internal temperature.
- The probe is water perfused to prevent tissue adherence, an advantage over monopolar coagulation, and heat is delivered via conduction to the tissue
- The mechanism of coagulation is direct heat transfer
- Coagulation is performed by tamponading the bleeding vessel by direct firm pressure using the heater probe and then coagulating the vessel
- Coagulation is usually performed in adults with **sequential pulses of 30 J**
- **Coagulation should be around the bleeding point first, and then directly on it**

The greatest **success appears to be with firm tamponade** on the ulcer bleeding point or nonbleeding visible vessel, and four pulses for a total of 120 J in succession before the probe position is changed.



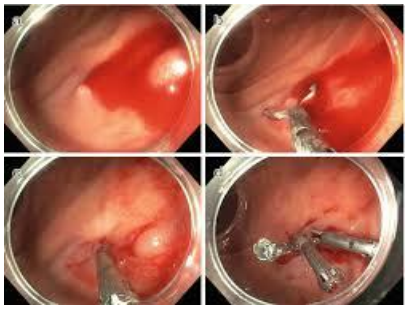
6. Endo loops

- Endoloops are utilized primarily for the management of potential or actual post polypectomy hemorrhage.
- Detachable loops have also been used in the management of gastric varices.



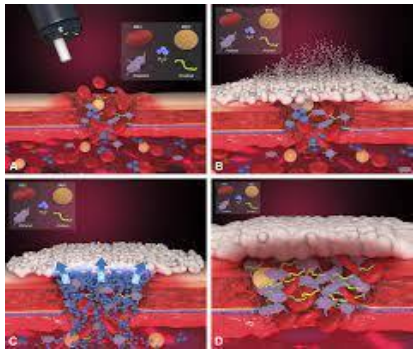
7. Hemostatic Clips

- Developed in the 1970s
- Significantly increased in popularity and ease of use in the last 10 years or more
- Rotatable clips, TTS clips and OTS clips
- For hemostasis upper GI- bleeding: include gastric and duodenal ulcers with high-risk stigmata, Mallory-Weiss tears, and Dieulafoy lesions
- Clips have also been used for lower GI bleeding
- For binding tubes or catheters to the gastrointestinal wall (stent, feeding tube, manometry catheter); closure of fistulas, leaks, and perforations; and marking anatomic landmarks for subsequent therapy or surgery
- Associated with a high primary hemostatic rate (85% to 100%), and a low recurrent bleeding rate (2% to 20%)
- **The first clip is placed on the bleeding point, and subsequent clips may be placed around the bleeding point to occlude the submucosal vessel (opposite to the technique of heater probe applicant**



8. Hemostatic Powders

- Hemostatic powders have recently been approved for use in adults.
- Used to treat significant GI- bleeding from diffuse mucosal lesions and lesions such as tumors that are unresponsive to conventional therapy



- There are three types of hemostatic powders available:
  - Hemospray
  - Ankaferd Blood Stopper
  - EndoClot
- They are derived from plants, minerals.
- Hemospray, currently the most frequently utilized agent via a handheld device consisting of a pressurized CO2 canister, a through-the-scope (TTS) delivery catheter, and a reservoir for the hemostatic powder cartridge.

The powder is delivered via push button activation in 1- to 2 second bursts until hemostasis is achieved.

- When the powder is in contact with moisture in the GI tract, a coherent and adhesive hemostatic barrier may form.
- No adverse events in the hemospray
- Initial hemostasis response in 100% with a rebleeding rate of 18%

9. Laser Photocoagulation

- Previously used to achieve endoscopic hemostasis in endoscopy.
- There are two main types of laser:
  - Argon
  - Nd:YAG laser is the most popular
- Used in the small bowel for congenital vascular lesions as well as superficial vascular lesions,
- Including angiodysplasia, telangiectasia, and AV- malformations.
- Asymptomatic, Non-bleeding angiodysplasia are usually not treated.
- Complication:
- Like the heater probe can also provoke bleeding, which can usually be stopped with further laser coagulation.
- Increased chance of full-thickness perforation of the gut wall.
- Currently the laser offers little advantage over other coagulation.
- Techniques, and because of its increased cost and decreased portability,
- Other modalities have now replaced laser photocoagulation.

Treatment failure

- Any of the following criteria defines treatment failure if it occurs within 120 hours of time zero:
- Fresh hematemesis or >100 mL of blood in the nasogastric aspirate >2 hours after the start of a specific drug or endoscopic treatment
- Development of hypovolemic shock
- Drop in hemoglobin of ≥3 g within a 24-hour period
- Early rebleeding that occurs >120 hours but <6 weeks from time zero, provided initial hemostasis was achieved and maintained for at least 24 hours.
- Late rebleeding – Bleeding that occurs ≥ 6 weeks from time zero.

Surgical intervention

Indication:

- If endoscopic therapy fails
- Severe active hemorrhage
- More than 85/ml/kg blood transfusion

include trans jugular intrahepatic portosystemic shunt (TIPS) placement or creation of a surgical shunt.


Thank you for your attention
MaDonna