

# Colonoscopy Education Day: October 25, 2017

## Polypectomy Technique – Cold, Hot, Inject?

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**FORZANI & MACPHAIL** COLON CANCER  
SCREENING CENTRE



**UNIVERSITY OF CALGARY**  
CUMMING SCHOOL OF MEDICINE

# Faculty/Presenter Disclosure

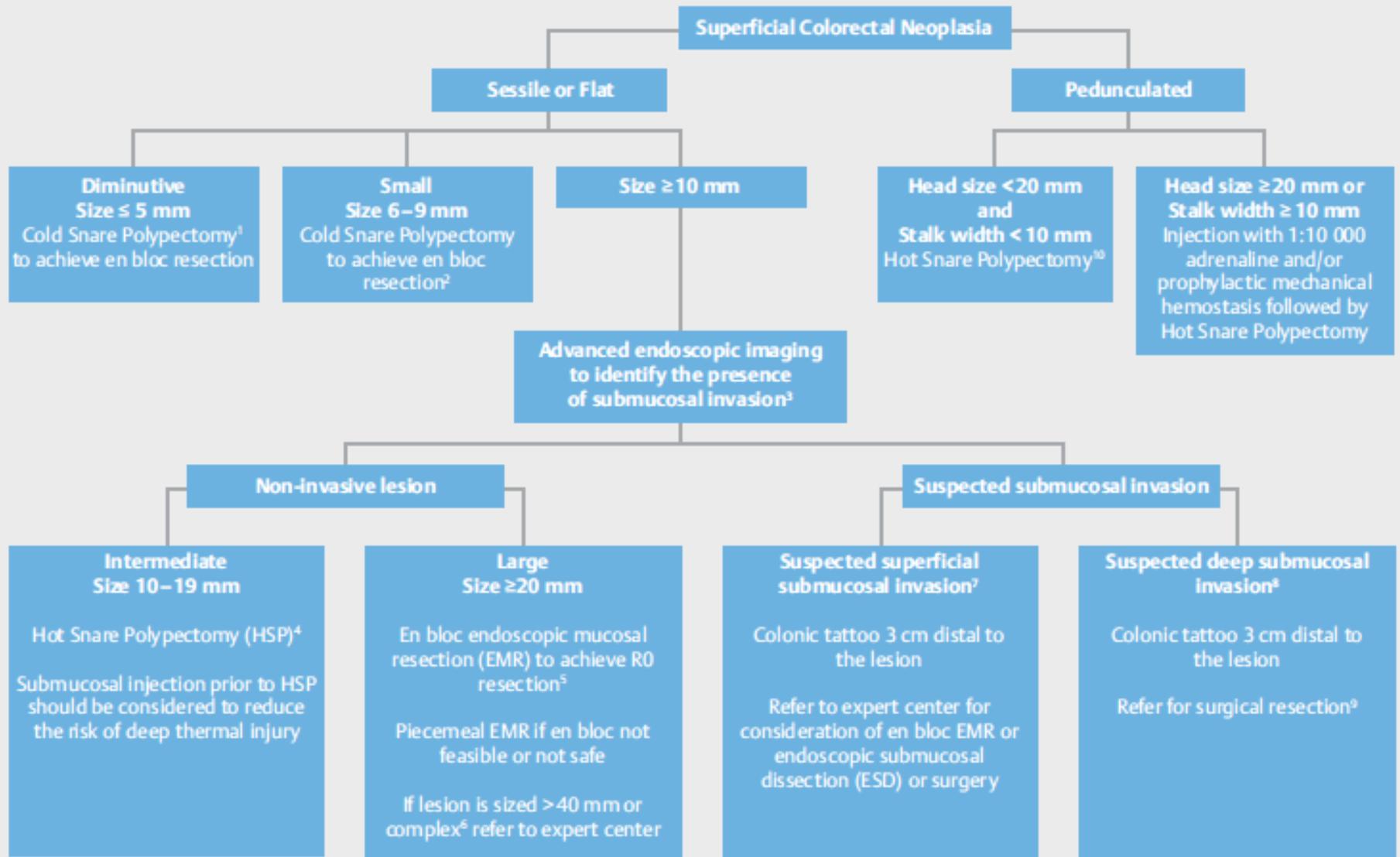
- Faculty: Steven Heitman
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  - Other: None

# Acknowledgement

- Michael Bourke and the Westmead Hospital GI Unit in Sydney, Australia
  - A few slides and videos
  - Some photos

Polypectomy Technique – Cold, Hot, Inject?

It depends on the lesion.



# Objectives

- To discuss the critical importance of lesion assessment which enables effective and safe polyp management
- To review the fundamental concepts of electrosurgery and the importance of the electrosurgical unit (ESU) during polypectomy
- To present the technical aspects of cold snare polypectomy and endoscopic mucosal resection

# Do I fully appreciate the nature of the lesion?

- Is there a significant risk of submucosal invasive cancer (SMIC)?
  - Is surgery required?
- **size, morphology, site and access (SMSA)**

Bourke MJ, *Techniques in Gastrointestinal Endoscopy* 2011

Gupta et al. *Frontline Gastroenterol* 2013

Klein A, Bouke MJ *Gastroenterology* 2017

Heitman et al. *Curr Treat Options Gastro* 2017

ESGE Clinical Guideline *Endoscopy* 2017

# Should I attempt to resect the lesion now?

- Am I capable of resecting the lesion?
- Do I have enough time?
- Do I have all the necessary support and equipment to resect the lesion and manage my complications?
- Should it be done later or by someone else?

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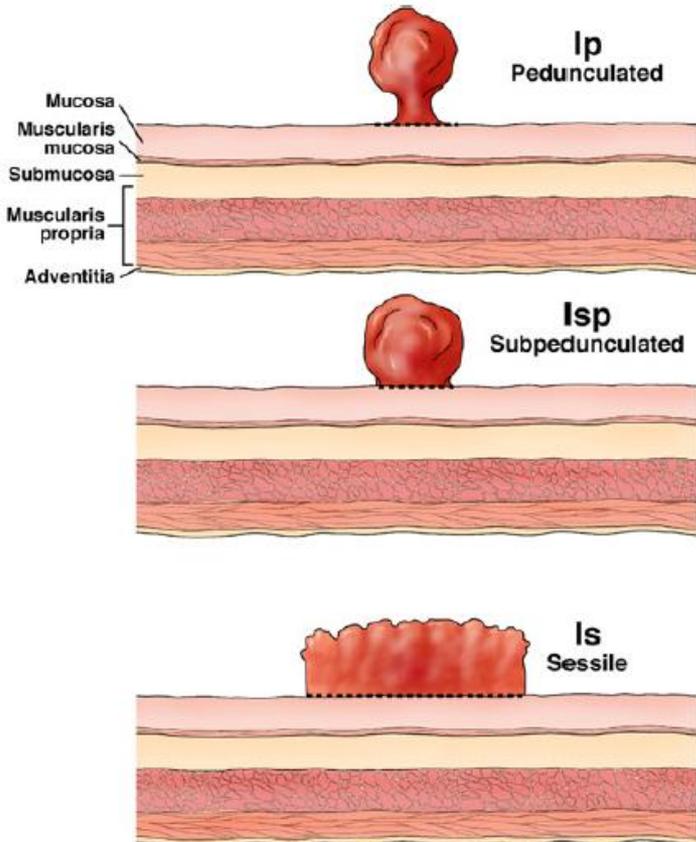
Heitman et al. *Curr Treat Options Gastro* 2017

ESGE Clinical Guideline *Endoscopy* 2017

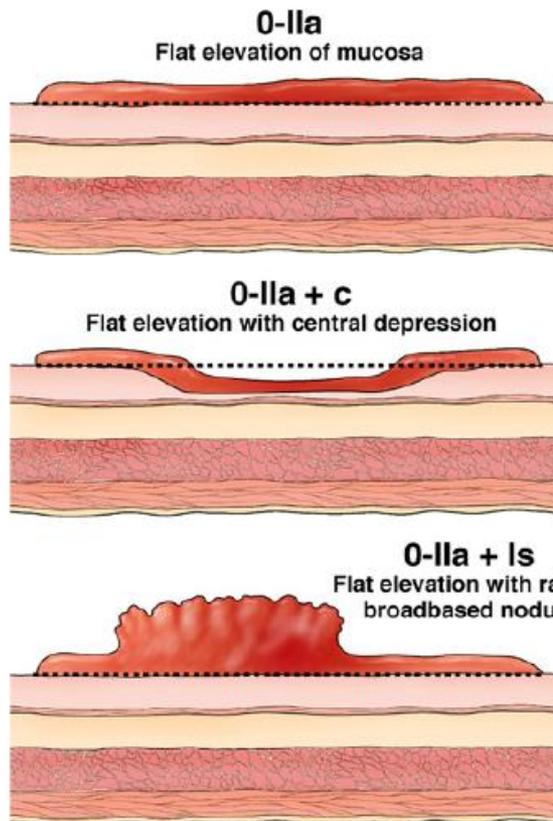
# Paris Classification



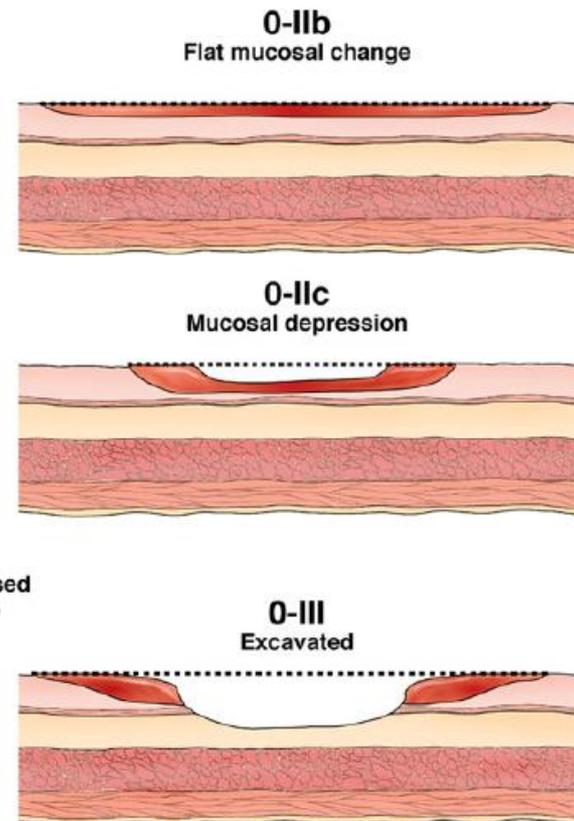
## Protruded lesions



## Flat elevated lesions

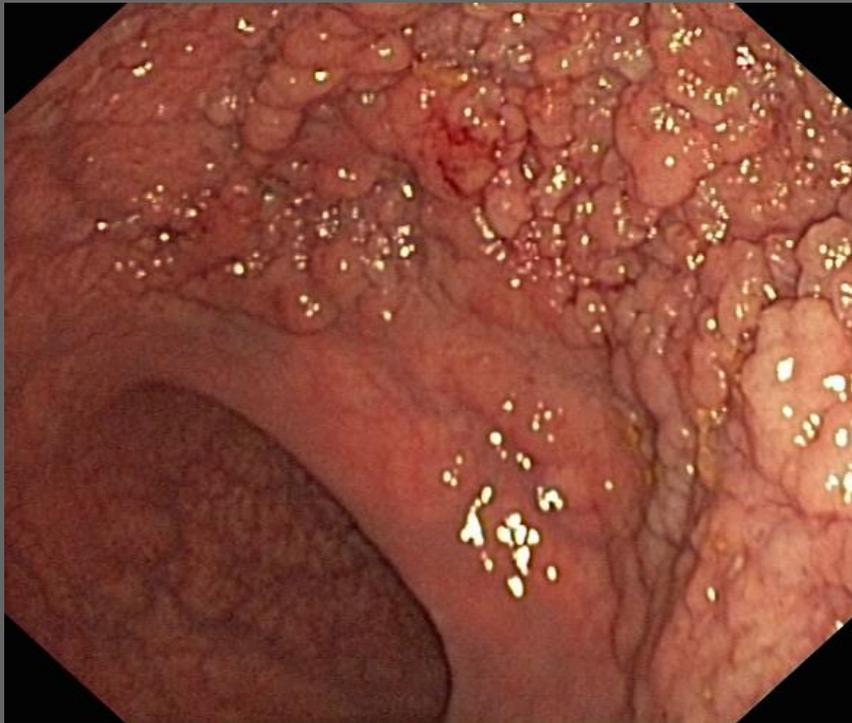


## Flat lesions



# “Not All Polyps Are Created Equal.”

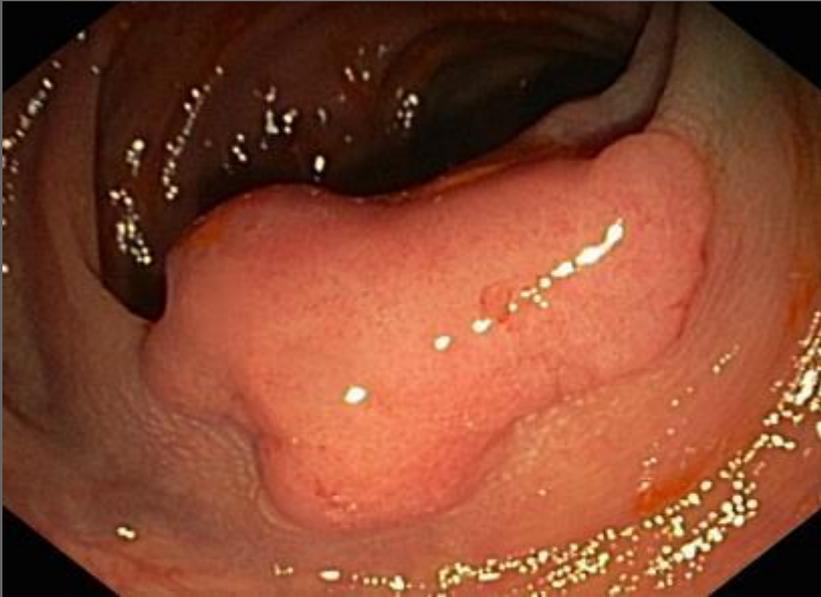
## Granular Lesions



### Granules are good!

- SMI ~3%
- Size not a major factor
- Moss Gastroenterology 2011

# Non-Granular Lesions



Non-granular is bad!

- SMI ~15%
- Moss Gastroenterology 2011

# Depressions (“Potholes”) Are Really Bad!



SMI risk:

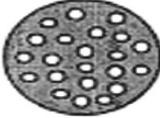
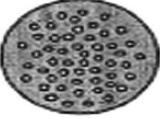
- 0-IIc or IIa + c ~ 30%

**Multiple Factors:**

**Paris 0-IIa + c NG ~45%**

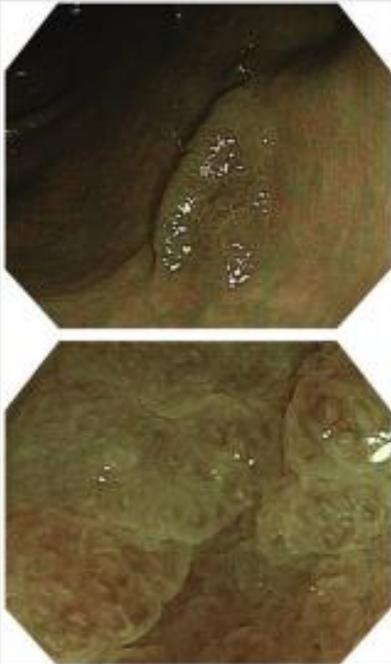
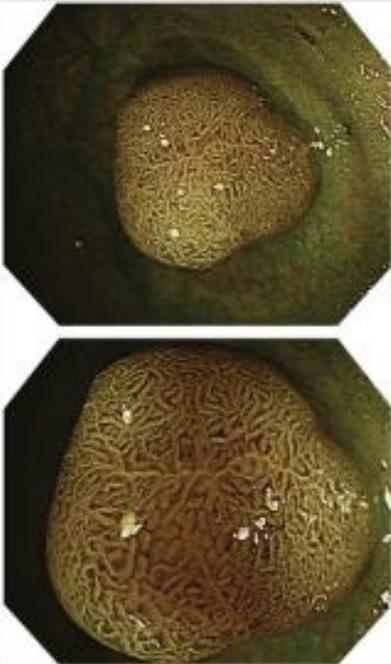
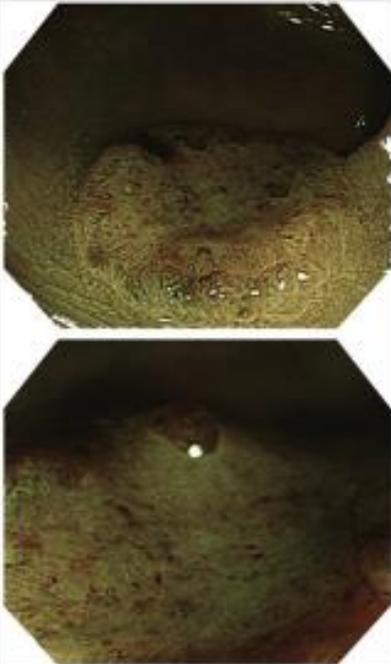
# Kudo Pit Pattern



<b>I</b>		<b>Round pit (normal pit)</b>
<b>II</b>		<b>Asteroid pit</b>
<b>IIIs</b>		<b>Tubular or round pit that is smaller than the normal pit</b>
<b>III<sub>L</sub></b>		<b>Tubular or round pit that is larger than the normal pit</b>
<b>IV</b>		<b>Dendritic or gyrus-like pit</b>
<b>V<sub>I</sub></b>		<b>Irregular arrangement and sizes of III<sub>L</sub>, III<sub>s</sub>, IV type pit pattern</b>
<b>V<sub>N</sub></b>		<b>Amorphous or non-structural pit pattern</b>

} HYPERPLASTIC  
 } ADENOMATOUS  
 } CANCEROUS

## NBI International Colorectal Endoscopic (NICE) Classification\*

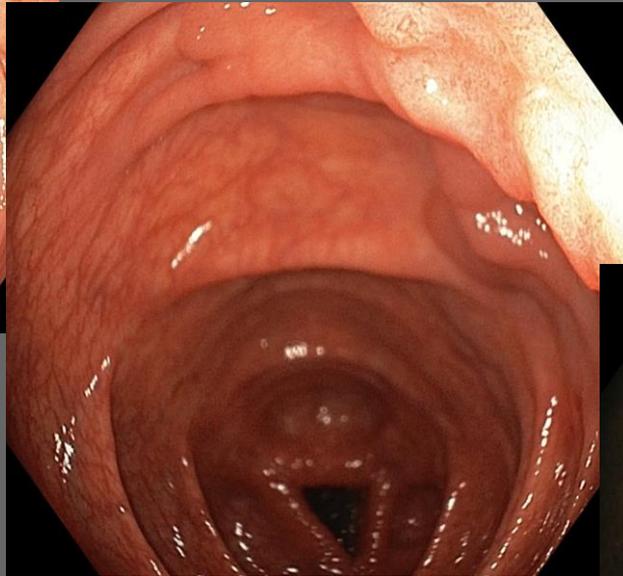
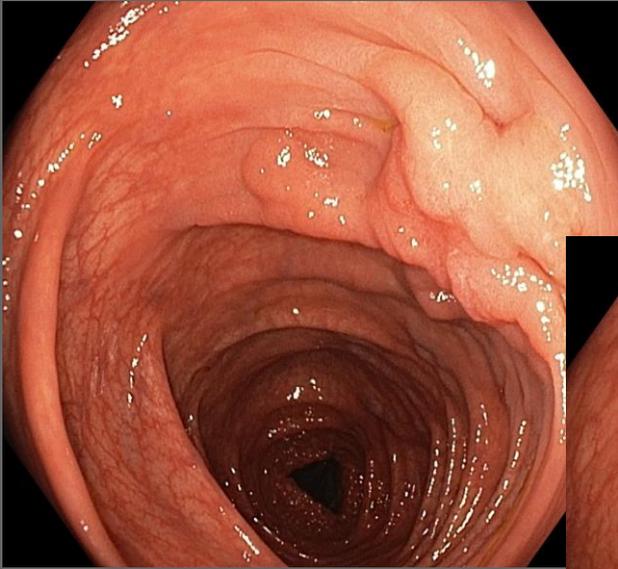
	Type 1	Type 2	Type 3
Color	Same or lighter than background	Browner relative to background (verify color arises from vessels)	Brown to dark brown relative to background; sometimes patchy whiter areas
Vessels	None, or isolated lacy vessels coursing across the lesion	Brown vessels surrounding white structures**	Has area(s) of disrupted or missing vessels
Surface Pattern	Dark or white spots of uniform size, or homogeneous absence of pattern	Oval, tubular or branched white structure surrounded by brown vessels**	Amorphous or absent surface pattern
Most likely pathology	<b>Hyperplastic</b>	<b>Adenoma***</b>	<b>Deep submucosal invasive cancer</b>
Examples			

\* Can be applied using colonoscopes with or without optical (zoom) magnification

\*\* These structures (regular or irregular) may represent the pits and the epithelium of the crypt opening.

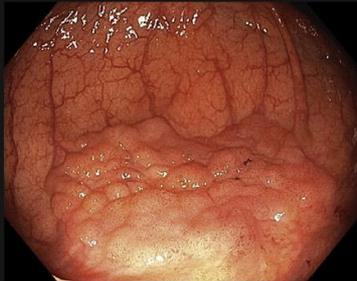
\*\*\* Type 2 consists of Vienna classification types 3, 4 and superficial 5 (all adenomas with either low or high grade dysplasia, or with superficial submucosal carcinoma). The presence of high grade dysplasia or superficial submucosal carcinoma may be suggested by an irregular vessel or surface pattern, and is often associated with atypical morphology (e.g., depressed area).

# Meticulous General Assessment Followed by Focal Interrogation



# Risk of Occult Submucosal Invasive Cancer (SMIC) According to Gross Morphology and Location

n = 1712



A typical proximally located 0-Ila Granular Lesion.  
Overall risk of SMIC 0.7%

**0-Ila G**



**SMIC Risk 0.8%**

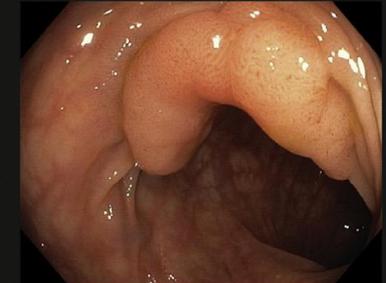
Proximal 0.7% **Very Low Risk**      Distal 1.2% **Low Risk**

**0-Ila NG**



**SMIC Risk 4.2%**

Proximal 3.8%      Distal 6.4%



A proximal 0-Ila Non-Granular Lesion.  
Overall risk of SMIC 3.8%

**0-Ila+Is G**



**SMIC Risk 7.1%**

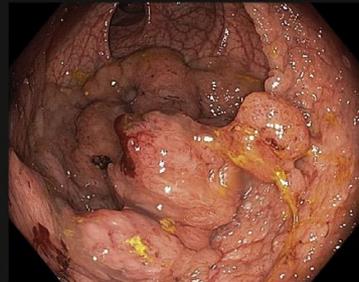
Proximal 4.2%      Distal 10.1%

**0-Ila+Is NG**



**SMIC Risk 14.1%**

Proximal 12.7% **High Risk**      Distal 15.9% **High Risk**



A rectal (distal) 0-Ila+Is Granular Lesion.  
Overall risk of SMIC 10.1%



A transverse colon (proximal) 0-Ila+Is Non-Granular Lesion.  
Overall risk of SMIC 12.7%

**0-Is G**



**SMIC Risk 3.7%**

Proximal 2.3% **Low Risk**      Distal 5.7%

**0-Is NG**



**SMIC Risk 15.3%**

Proximal 12.3% **High Risk**      Distal 21.4% **Very High Risk**



A sigmoid colon (distal) 0-Is Granular Lesion.  
Overall risk of SMIC 5.7%



An ascending colon (proximal) 0-Is Non-Granular Lesion.  
Overall risk of SMIC 12.3%

# Best Practice in Polypectomy Starts with Careful Assessment and Characterization of Polyps

- “Precision Medicine”: Provision of treatment tailored to the individual patient.
- Endoscopic resection strategy should be individualized according to the likely underlying pathology.

## SOUNDING BOARD

### **Precision Medicine — Personalized, Problematic, and Promising**

J. Larry Jameson, M.D., Ph.D., and Dan L. Longo, M.D.

# Electrosurgical Unit (ESU)

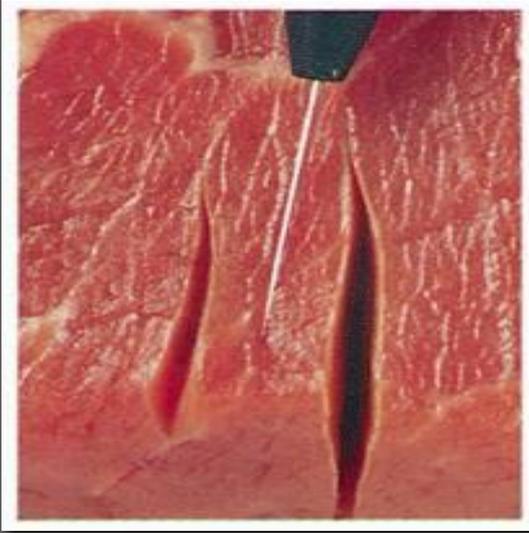


# ESU – The Basics

- ESUs convert energy from high frequency current (> 300 kHz) into heat.
- Current at point of contact between snare wire and tissue causes sharp rise in tissue temperature.

# Modes of Thermal Effects

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## The CUT Effect

- *Voltage quickly raises intracellular water temperature to boiling point (sparks)      Cutting: > 100° C*
- *Cell water turns to steam*
- *Cell wall explodes, separating from adjoining cells*
- *Cleavage plane is created = “CUT”*

# Modes of Thermal Effects

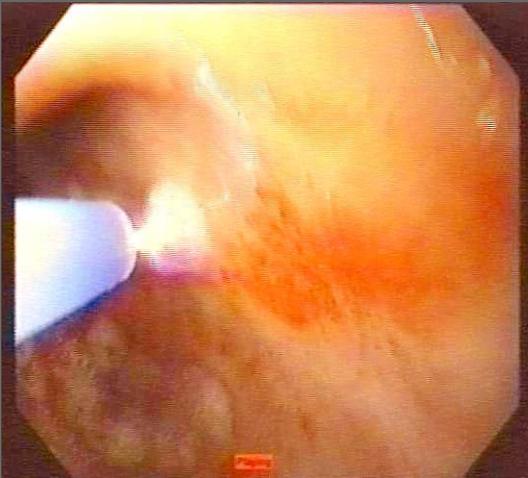
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## The Coagulation Effect

- *Cell destruction by denaturing of protein (dehydration of cell)*

**Coagulation: > 70-100° C**

- *Extreme drying of cell membranes causes cell shrinkage*



# What to use for polypectomy?

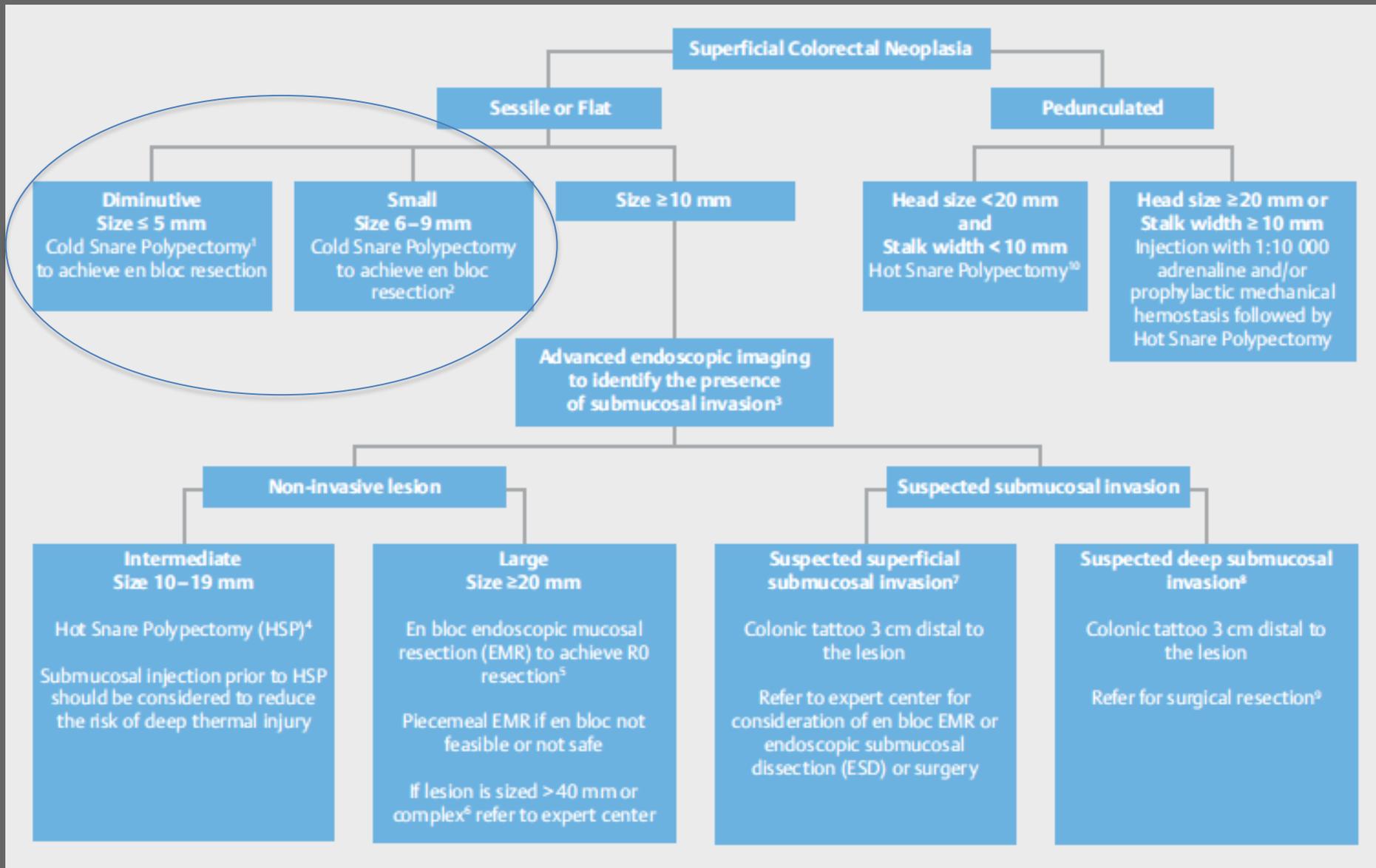
- European Society of Gastrointestinal Endoscopy Guidelines:
  - Suggests use of a microprocessor-controlled ESU for polypectomy
  - Microprocessor technologies enable controlled tissue cutting by providing an appropriate blend of cutting and coagulation currents.
    - enough coagulation to maximize hemostatic effect while minimizing risk of perforation
  - Avoid pure coagulation current during EMR
    - Higher risk of deep mural injury, perforation and delayed bleeding
    - Pure coagulation OK for pedunculated polyps

# Optimal Polypectomy Method

- Time effective
- Cost effective
- Safe
- Complete lesion resection, minimizing recurrence/residual polyp
- Accurate histopathological assessment

# Cold Snare Polypectomy (CSP)

- CSP recommended as the preferred technique for diminutive polyps ( $\leq 5\text{mm}$ ) and is suggested for sessile polyps 6-9mm.
  - high rates of complete resection
  - favourable safety profile

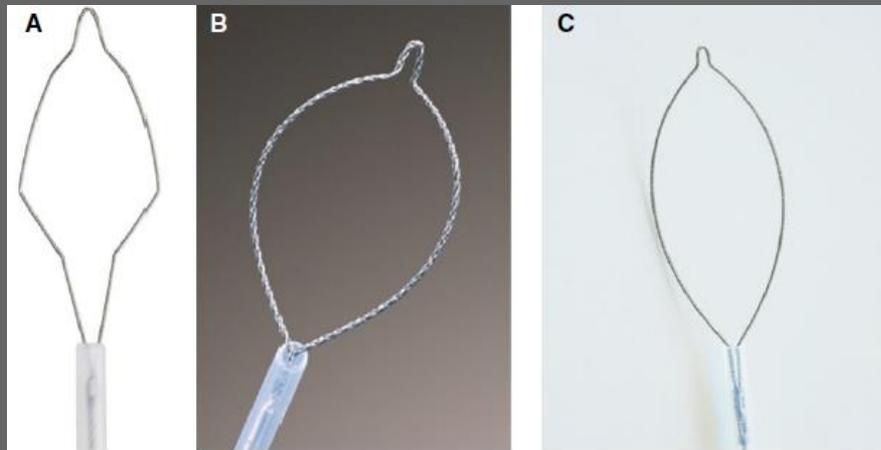


# CSP Technique

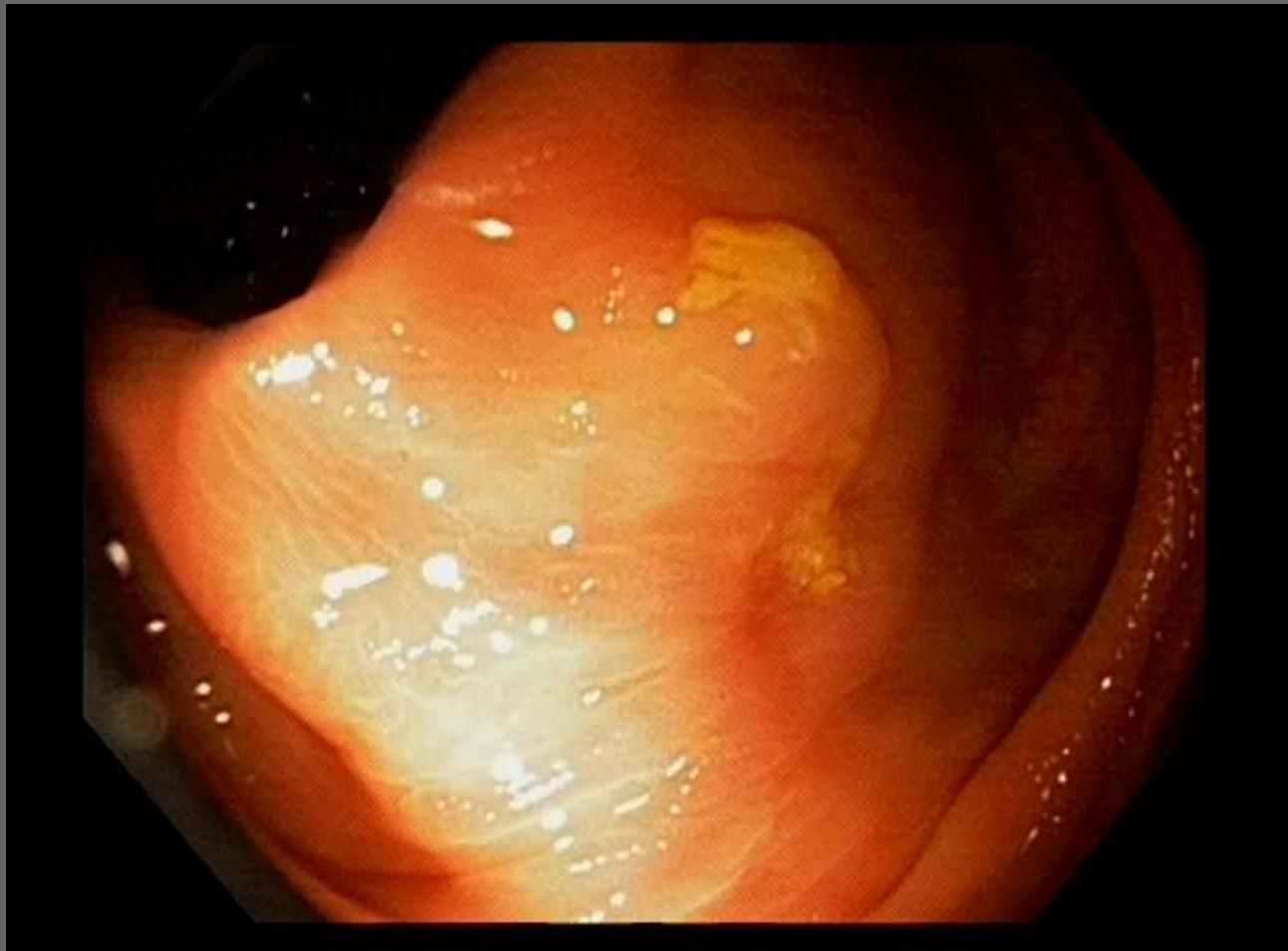
- Polyp positioned at the 5 or 6 o'clock position
- Snare opened and positioned over the polyp
- Gentle suction to reduce colonic distention
- Tip of endoscope deflected down to facilitate 'sink-in of the snare'
- Closure ensnaring 2-3mm or normal mucosa around polyp
- Polyp retrieval
- Expansion of defect using water irrigation

# CSP Snare Selection

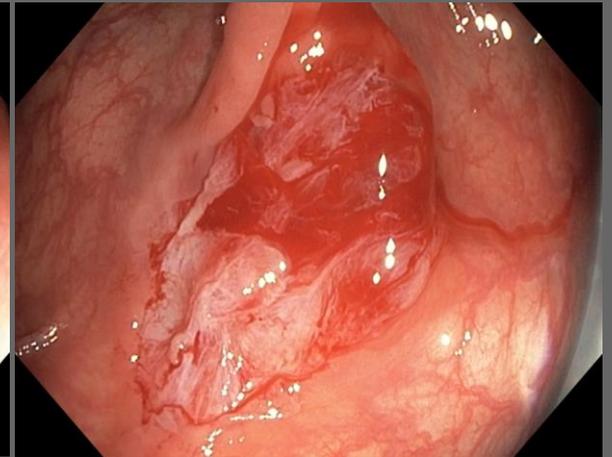
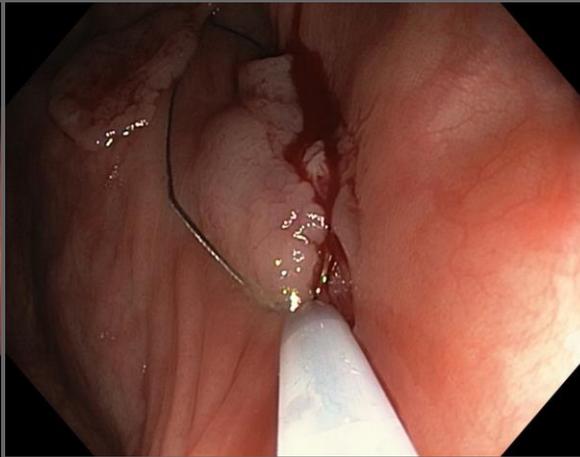
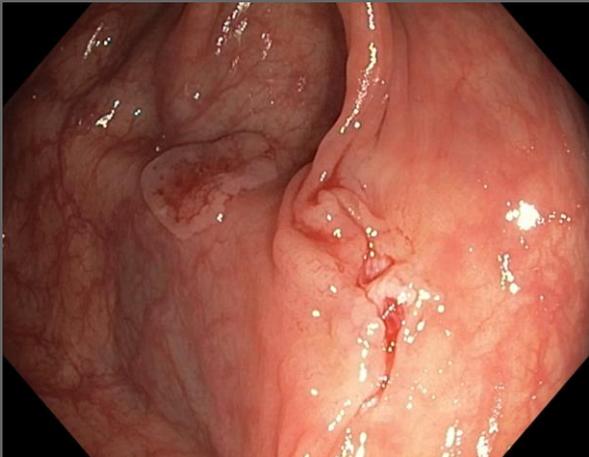
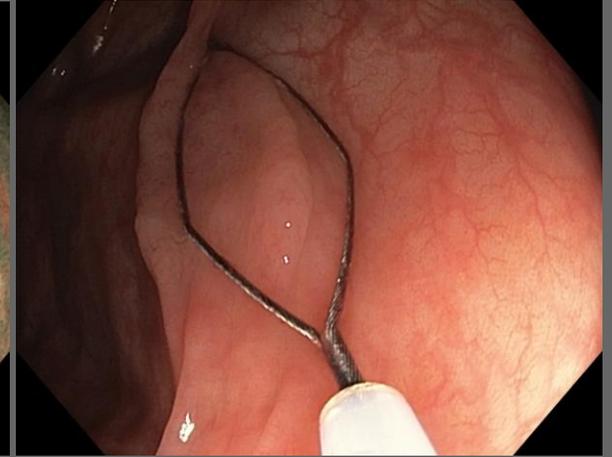
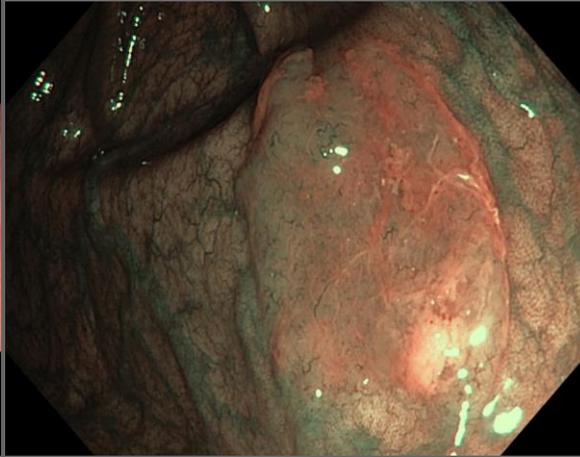
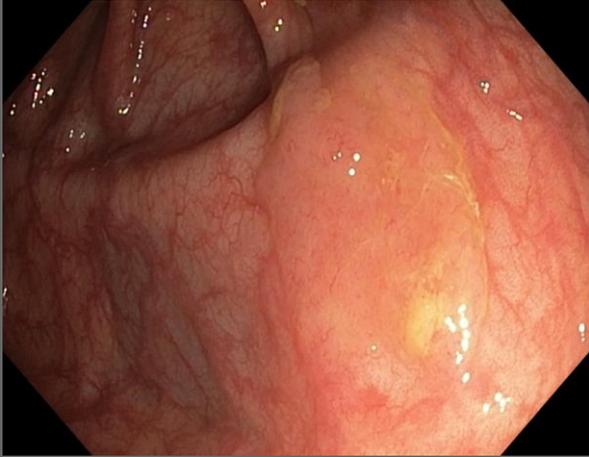
- Choice of snare?
  - Small size (10-13mm)
  - Thin wire

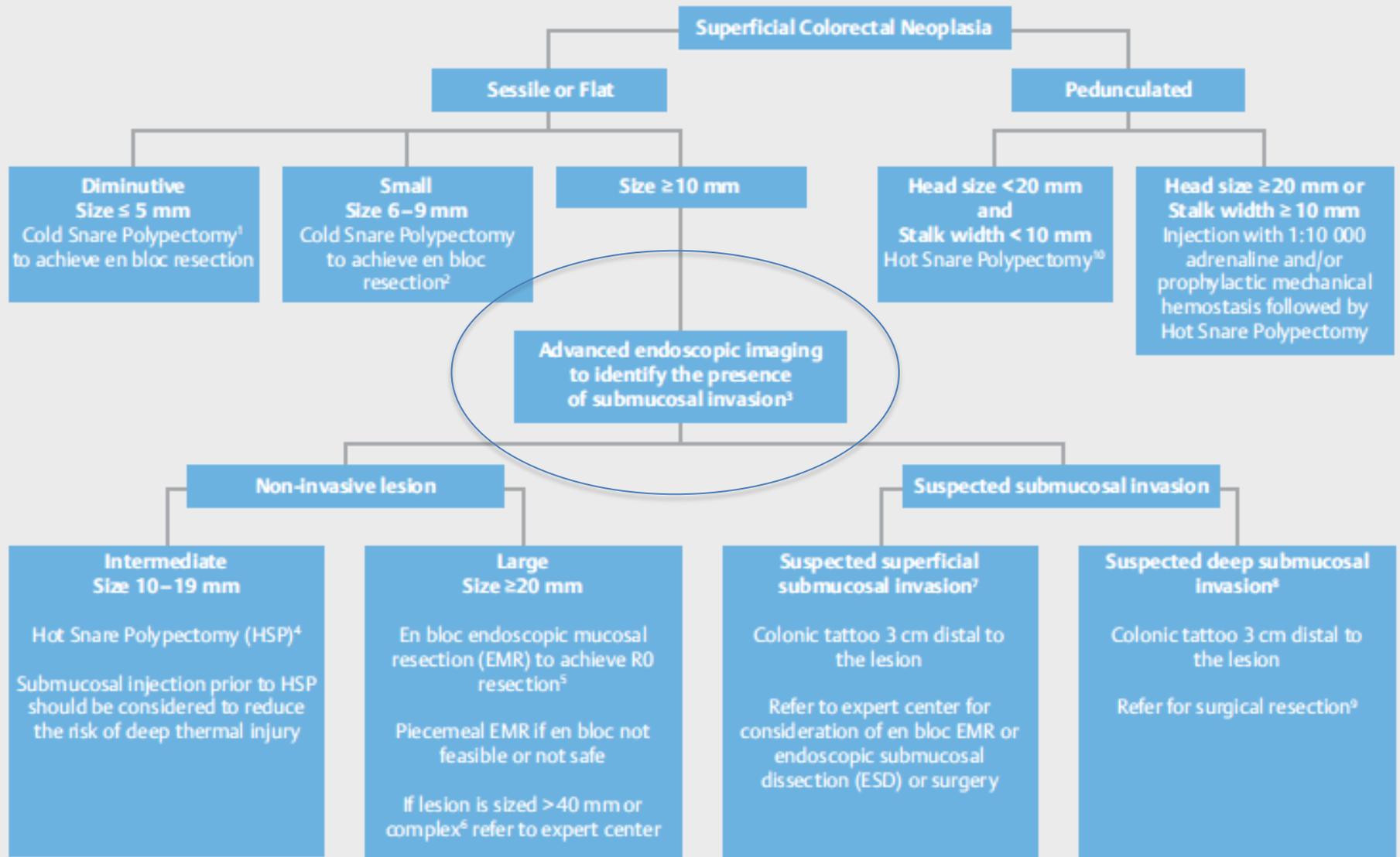






## Wide-Field Piecemeal CSP of SSPs





# Modern Day EMR

- Careful optical assessment for features of SMIC
- Dynamic injection followed by systematic inject-and-resect technique
- Effective management of intra-procedural bleeding
- Meticulous examination of the post-EMR defect for signs of deep mural injury with intervention as required
- Treatment of the post-EMR margin with snare tip soft coagulation
- Appropriate post-EMR surveillance with an ability to endoscopically manage recurrent or residual adenoma

# Optimizing Resection of Large

## Box 9: Technical Tips for Endoscopic Mucosal Resection

- Ensure the endoscope is straight without a loop in the insertion tube
- Position the patient so that the endoscopic view is optimized, preferably with any fluid pool opposite the lesion. This may require right lateral or supine positioning.
- Carefully examine the lesion for evidence of submucosal invasion and consider aspects that may increase difficulty: submucosal fibrosis, ileocecal valve or appendiceal involvement, difficult positioning. If the lesion is complex consider referral to a tertiary endoscopic resection service
- Align the area for resection at 6 o'clock in the endoscopic view
- Begin submucosal injection:
  - Deploy the needle tip and prime the injector needle.
  - Gently touch touch the lesions surface with the needle tip. Commence injection just prior to needle puncture of the mucosa
  - When submucosal lifting is confirmed, lift and manipulate the needle and colonoscope (using the Up/Down wheel whilst gently pulling back on the needle) whilst continuing infiltration to control the direction and form of the submucosal cushion to optimize elevation and access.
- Apply the snare to ensure a rim of normal tissue is captured in addition to the polyp
- Apply firm downward pressure using the Up/Down wheel to anchor the snare
- Suction gas to decrease colonic wall tension and facilitate tissue capture
- Use a 3 stage snare closure technique:
  - Initially, close until the target tissue is seated within the snare and the loop of the snare has just started to enter the snare sheath. (there may be the sensation of a small "jolt" experienced by the endoscopist within the snare catheter at that point).
  - Aspirate gas again (sometimes even to the point of complete lumen collapse for lesions resistant to snare capture), whilst pushing down firmly and closing the snare to resistance.
  - Re-insufflate, confirm that the target tissue and margins are ensnared. Excessive puckering may indicate muscularis propria (MP) capture.
  - Move the snare sheath back and forth to assess mobility. The ensnared tissue should move independently of the colon wall. Fixation may indicate MP capture
  - If there is concern at this point for MP capture or inaccurate snare placement, the snare may be released and reapplied. Alternatively, gentle release of resistance whilst elevating the tissue with the Up wheel may allow excess tissue or entrapped MP to be excluded.
  - If the endoscopist is confident snare capture is optimal, then the snare should be closed fully and tightly. (video 1)
  - With full snare closure, using fractionated current minimal electrocautery should be required to completely resect the tissue. Resection should be complete in 1-3 pulses, 1-2 seconds
- Following resection, irrigate the defect and then carefully inspect for evidence of deep mural injury
- For piecemeal resection, continue the resection in a sequential manner, aligning the snare with the edge of the advancing mucosal defect. Snare capture should incorporate the resected mucosal edge and submucosa to avoid leaving tissue islands.

Colonic p

Nicholas G  
Sydney, New

Adv  
and

Amir Klei

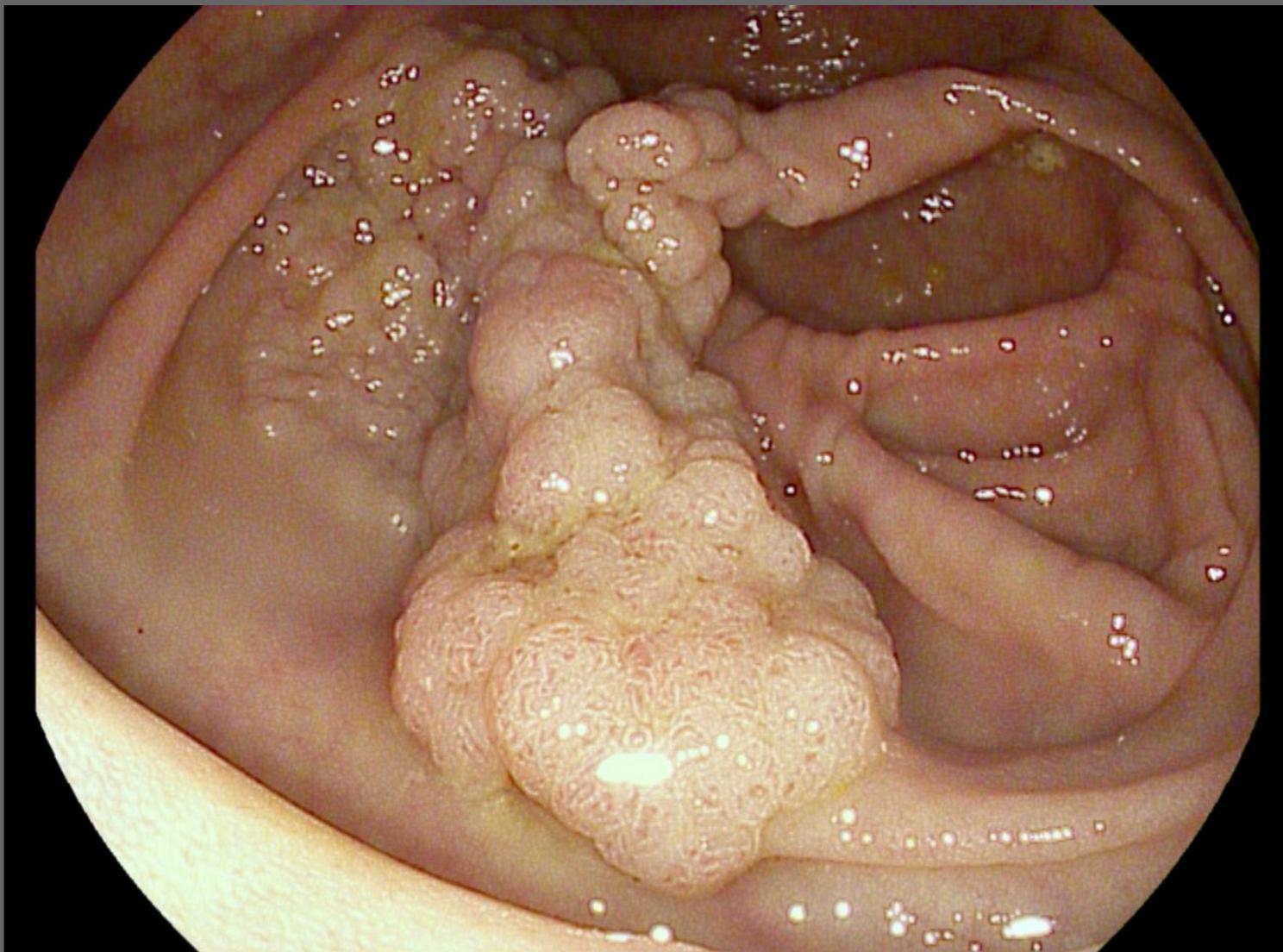
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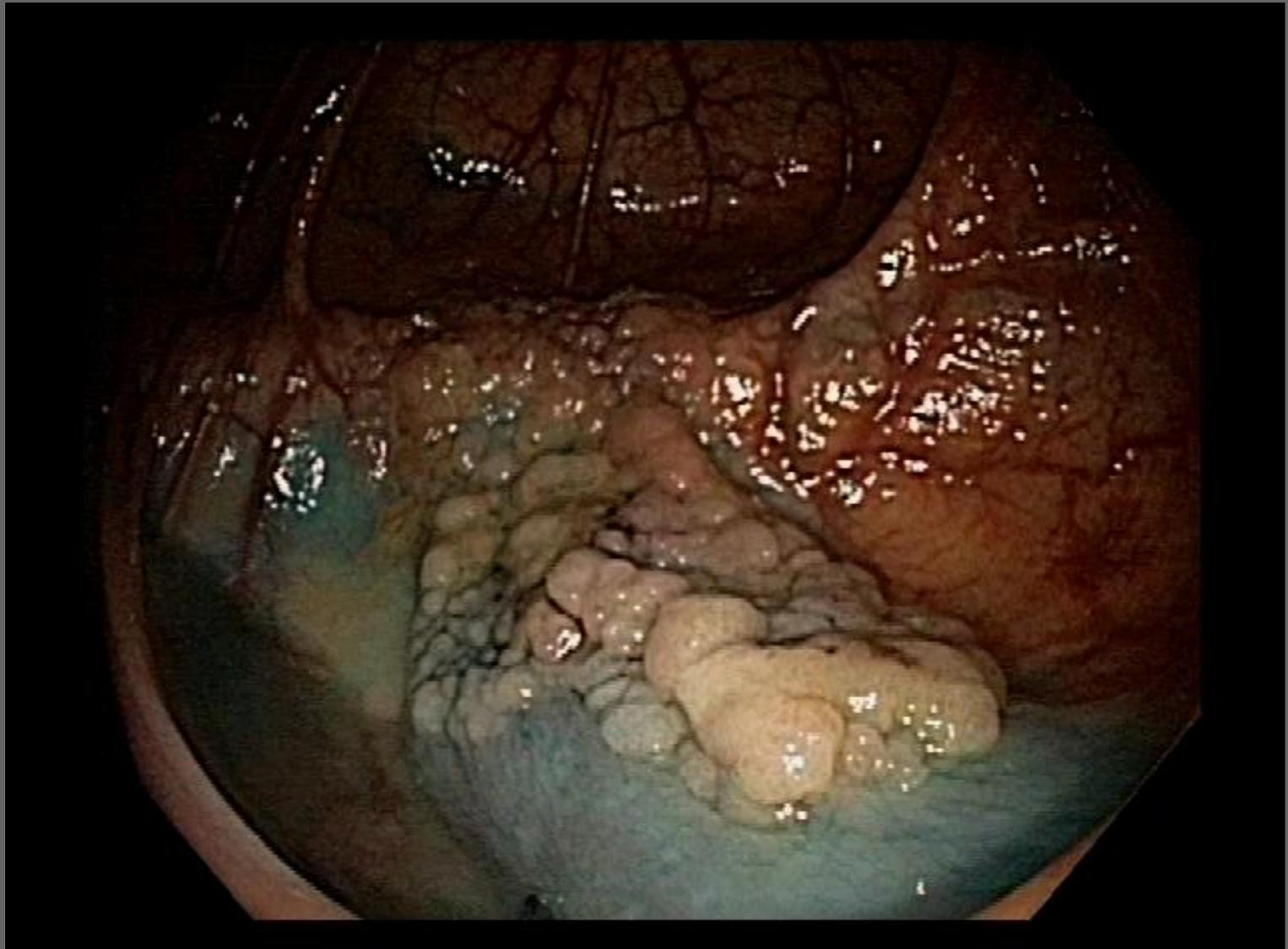
Michael Bourke, MBBS, FRACP

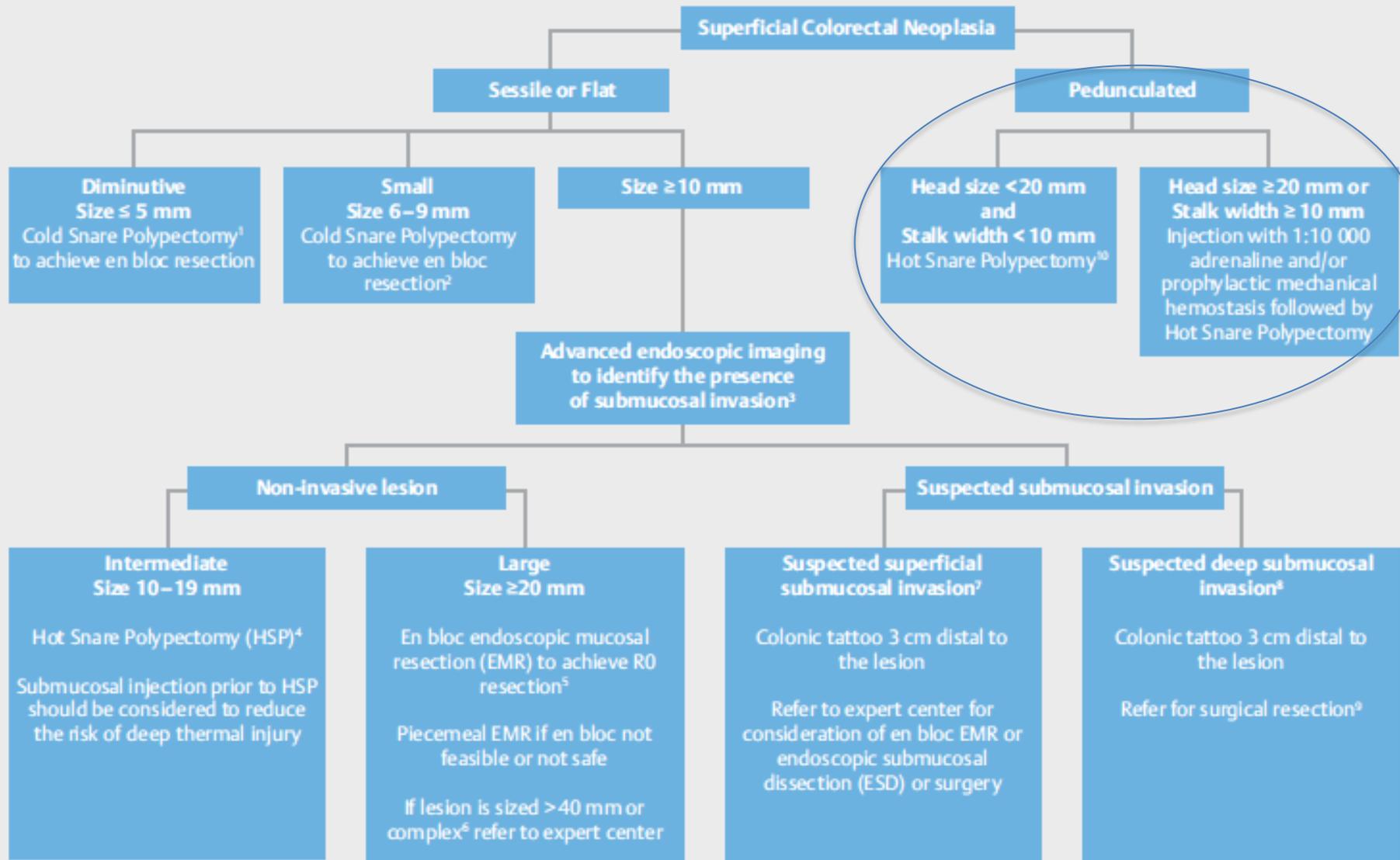
MBBS, FRACP  
GASTROSCOPY 813

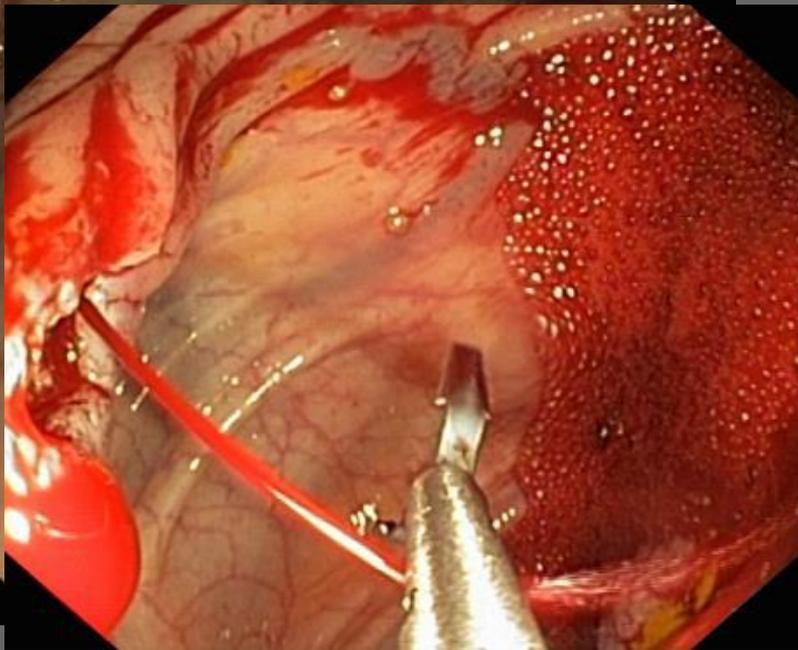
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50 mm Paris 0-IIa granular, Kudo IV LSL in the cecum



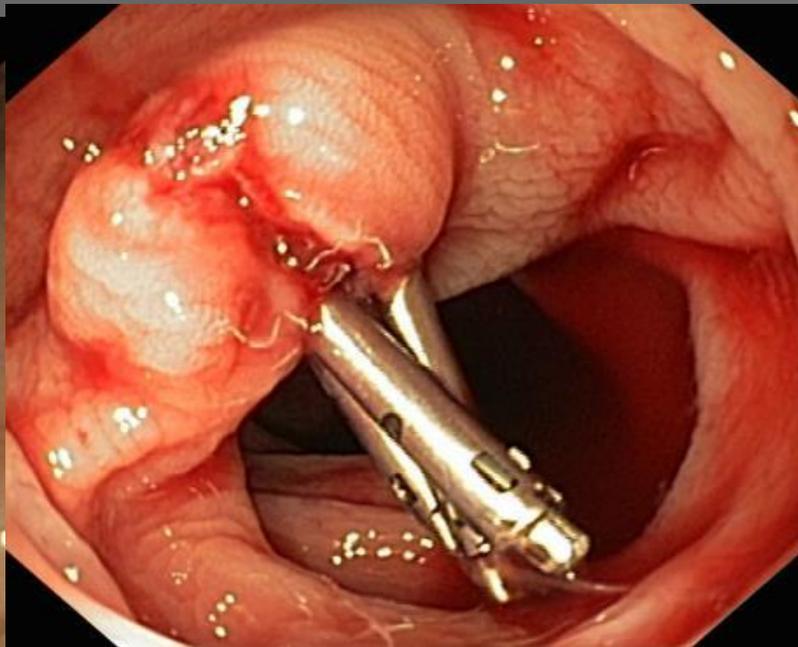






Gravity helps determine optimal positioning of the lesion:

The point of stalk attachment should be opposite the fluid pool.



1. Elongates the stalk increasing the target area for snare (+/- ligation) placement
2. Ensures access and avoids fluid (or blood) pooling in case of bleeding or perforation

# Prophylactic Endoloop



