The Optimal Polypectomy - Planning and Execution

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If better is possible, good is not enough
[Benjamin Franklin, 1706-1790]

Take-Home Points

- Avoid using cold biopsy for removal of polyps >1-2mm
- Consider cold snare polypectomy for polyps ≤ 5 mm
- Use stiff snares for flat polyps
- Position polyp and patient appropriately
- Don't start a polypectomy unless you intend to do a complete resection
- Place india ink tattoos at least 2-3cm away from the polyp and use <3cc ink
- Thermal ablation should not be used as a primary technique for polyp removal
- Use NICE and Paris classifications to assess and describe polyps
- Schedule complex polypectomies separately - consider informed consent, staffing, equipment, time issues
- Toolbox for complex polypectomies should include: different snares, coag-grasper, clips, india ink, high viscosity solution for submucosal injection, distal scope attachment cap
- Know your electrosurgical generator settings and limit thermal injury

The major role of colonoscopy with polypectomy in reducing colorectal cancer (CRC) incidence and mortality has been firmly established. Most of us perform this service and believe we are doing pretty well. But there is always room for improvement, and doing better in detecting and removing polyps saves lives!

Here are some numbers to consider:

- A systematic review of tandem colonoscopy studies found that adenomas are missed in as many as 22% of exams [1]. Other studies suggest a greater than > 3-fold difference in adenoma detection rates among individual endoscopists of the same group [2].
- For each 1% increase in adenoma detection rate, there is a corresponding 3% decrease in the patient's risk of developing cancer [3].
- Post-colonoscopy CRC ("interval cancers", defined as the development of CRC within three years of an index colonoscopy) are not rare, with approximately 8% of CRC patients having had a colonoscopy within 3 years of diagnosis [4,5].
- It has been estimated that missed polyps account for 50-70% of such cases of interval cancer, followed by incomplete removal of polyps (15-30%) and occurrence of new aggressive neoplasia in genetically susceptible patients accounting for the rest [6,7].

This presentation will focus on polyp removal and provide tips to optimize polypectomy.

The following reflects my subjective choice of 10 tips for removal of small and large polyps. We will no doubt find more during this breakfast session:

1. Avoid using cold forceps biopsy for polyp removal

- Studies using EMR after cold biopsy polypectomy show rates of incomplete polyp removal of 25-50% (as high as 61% in one study), thereby exposing the patient to increased rates of polyp recurrence and interval cancer [8].
- This may be in part because bleeding and edema after the first bite can obscure the visual field.
- Consider using snares whenever possible. With some practice, loosing polyp fragments after snare polypectomy can be avoided in most cases.

2. Use <u>cold</u> snare polypectomy (CSP) more often

- A study comparing CSP with cold biopsy showed CSP to have a significantly better histologic eradication rate (93.2% vs 75.9%) [9].
- Three studies comparing CSP with hot snare polypectomy all concluded that CSP was superior for small polyps [for example, reference 10]. No significant difference in terms of polyp removal rates and retrieval was observed. Intra-procedural bleeding was more frequent with CSP in two studies, but resolved spontaneously without requiring further intervention. Delayed bleeding, post-procedure pain, longer procedure times were all associated with hot polypectomy.
- CSP may be most useful for polyps less than 5-10 mm in diameter and in patients who are not on multiple anticoagulants.
- A snare with a thin cutting wire works best for CSP.
- Retracting the snare catheter into the endoscope and applying suction while cutting through the polyp helps retrieve the dissected polyp into the endoscope channel immediately.
- The European Society for Gastrointestinal Endoscopy (ESGE) now recommends CSP as the preferred technique for polyps 9mm and smaller [11].

3. When removing flat polyps, stiff/braided snares should be used

- Downward pressure of the opened snare onto the polyp is needed to avoid sliding off the polyp when the snare is being closed. Large snares with a floppy wire often bend/buckle in this situation and will not allow such downward pressure
- Air/CO2 should be suctioned from the colon immediately prior to closing the snare, to allow the captured area of the colon wall to be flexible enough to be captured and transected.
- If a flat polyp keeps sliding out of the snare, try a transparent cap at the end of the endoscope. Put the scope tip with cap onto the polyp, open the snare around the polyp, suction the tissue into the cap, then close the snare.
- Snares of 10mm or 20mm diameters are sufficient for most polypectomy work. Larger polyps will usually have to be removed in piecemeal fashion anyway.

4. Position both patient and polyp appropriately prior to polypectomy

- One often overlooked detail relates to positioning the patient such that "down" is opposite to the polyp location, i.e. fluid pools on the opposite wall. If significant bleeding is encountered, this will result in blood flowing away from the resection site and pooling on the opposite side of the lumen, thereby keeping the resection site visible and accessible for endo-therapy. For pedunculated polyps, this also helps to elongate/straighten the stalk which often facilitates snare capture and subsequent transection.
- Prior to polypectomy, the endoscope should be torqued such that the polyp ends up in optimal position relative to the position of the accessory channel of the scope (usually in 5 o'clock or 7 o'clock position).

5. Do not start a polypectomy unless you intend to complete the resection

- Application of cautery causes intense submucosal fibrosis which can make subsequent lifting and resection of the remaining polyp piece during a second procedure very difficult if not impossible. Previous intervention has been shown to be an independent predictor of resection failure [12].
- Taking biopsies from very flat lesions can also cause submucosal fibrosis. Therefore, avoid taking biopsies of flat polyps if you are planning to schedule a follow up procedure for polypectomy anyway, and biopsy results would not change management.
- If necessary, target a slightly 'bulkier' area for biopsy, and avoid the edges of a polyp.

6. Place india ink tattoos appropriately

- India ink also causes significant submucosal fibrosis and should NOT be deposited underneath a polyp.
- If there are natural landmarks nearby (e.g. cecum, IC valve), there is no need for ink injection.
- If marking is necessary, inject the ink at least 2-3 cm away from the polyp and describe the location relative to the polyp (and document both in a single photo if possible) [13].
- Carefully target the submucosal layer to inject the ink. If you are not confident you can hit that layer, inject saline first, find the correct layer, then switch syringes and inject the ink.
- Use no more than 3cc of ink for marking, less is better. Ink will diffuse along the wall layers and may get close to the polyp even if initially injected at a distance.

7. Thermal ablation should not be used as a primary technique for polyp removal

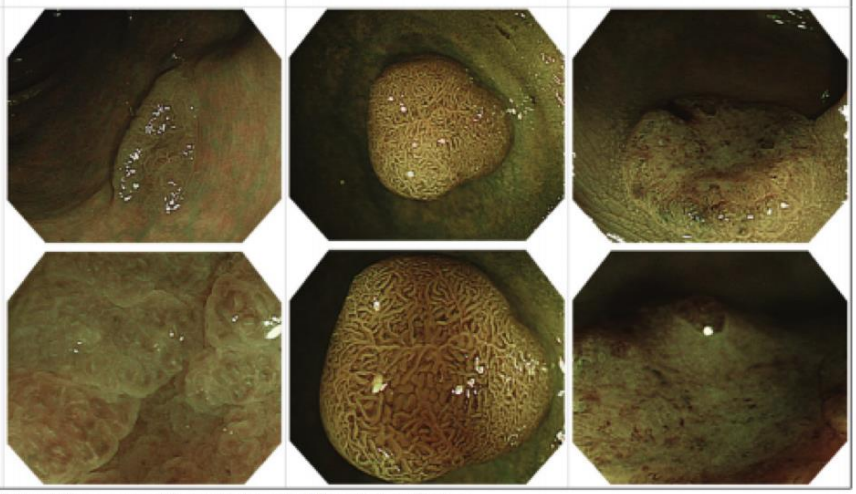
- Does not work at all for bulky lesions, and works poorly (if at all) for flat lesions
- Studies show the use of thermal ablation to be an independent risk factor for adenoma "recurrence" [12].
- Snare tip coagulation, or argon plasma coagulation (APC), if available, can be used to treat resection edges if there is concern regarding residual adenomatous tissue. Avoid prolonged cautery application and downward pressure with the snare tip on the resection base to avoid perforation.

8. Use NICE and Paris classifications to assess and describe polyps

More than half of segmental colon resections for neoplasia performed yearly in the U.S. involve benign colorectal lesions. The vast majority of these lesions are endoscopically removable [14]. Surgical resection is associated with an approximately 1% mortality and a 15% rehospitalization rate in the first year for management of complications. By comparison, polypectomy/EMR is associated with much lower costs, morbidity and mortality [15].

The Narrow-band imaging International Colorectal Endoscopic (NICE) classification is a guide to the prediction of conventional adenomas versus serrated class lesions, such as sessile serrated adenomas or hyperplastic polyps. With appropriate training, high interobserver agreement can be achieved [16]. A disruption of the normal vascular pattern (NICE type 3 features) is often accompanied by overt morphologic changes including depression and ulceration and indicates deep submucosal invasion [17]. If detected, an attempt at endoscopic resection can be avoided and the lesion is best biopsied and the patient referred for surgical resection.

NBI International Colorectal Endoscopic (NICE) Classification*

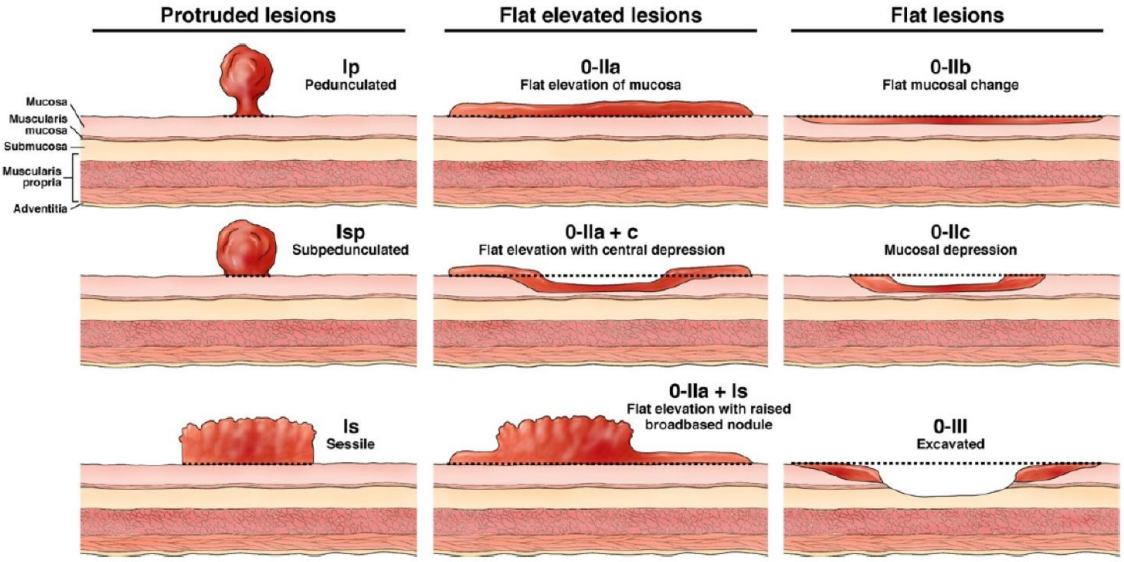
	Type 1	Type 2	Type 3
Color	Same or lighter than background	Browner relative to background (verify color arises from vessels)	Brown to dark brown relative to background; sometimes patchy whiter areas
Vessels	None, or isolated lacy vessels coursing across the lesion	Brown vessels surrounding white structures**	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	**Hyperplastic**	**Adenoma*** **	**Deep submucosal invasive cancer**
Examples			

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

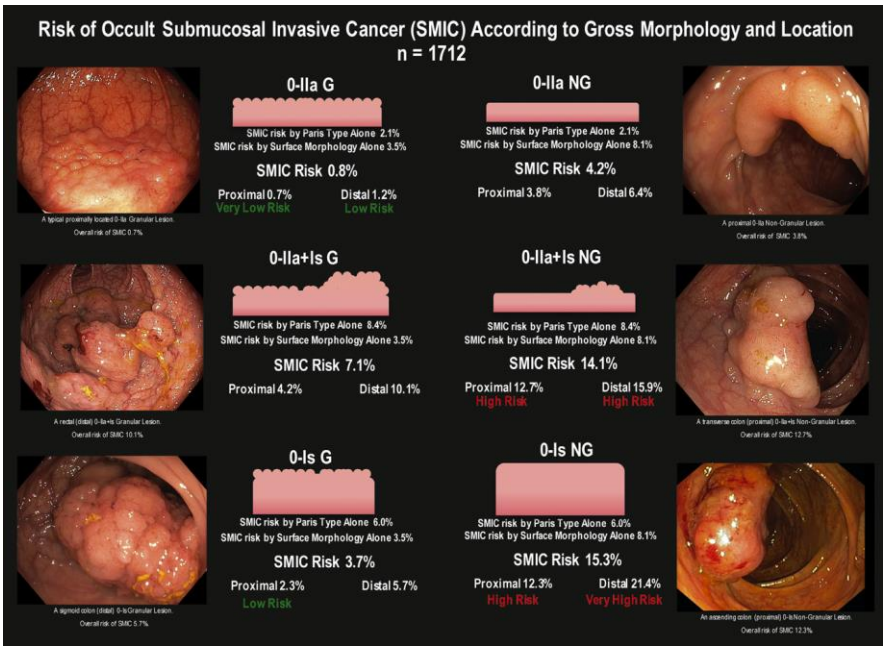
** These structures (regular or irregular) may represent the pits and the epithelium of the crypt opening.

*** 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).

The Paris classification [18] has been widely used for morphologic assessment of large (>1cm) polyps, and distinguishes between protruded or polypoid lesions (0-I), either sessile (0-Is), pedunculated (0-Ip) or semipedunculated (0-Isp), excavated lesions (0-III) and nonprotruding, non-excavated, or nonpolypoid lesions (0-II), and either slightly elevated (0-IIa), flat (0-IIb), slightly depressed (0-IIc), or their combination.



Large 0-IIa lesions (>10mm) are also called lateral spreading tumors (LST) and are divided into granular LST and nongranular LST types, based on their surface appearance. Using these classification systems allows a precise description polyps. Most importantly, recent studies show that the Paris classification allows fairly precise risk stratification of polyps in regards to the presence or absence of invasive cancer [18].



9. Schedule complex polypectomies as a second procedure (or refer them to a colleague)

- Sparing the patient a second procedure (and a second colon prep) is a laudable goal, but removal of large polyps carries a higher risk of complications, and is therefore best discussed with the patient before proceeding with the intervention. A new informed consent document can then be generated.
- Informing patients prior to their first colonoscopy that a second procedure may be needed in the event a large polyp is detected will minimize subsequent frustrations and complaints.
- Performing complex polypectomies separately also allows for scheduling into a longer procedure slot and for making appropriate equipment and staffing preparations.

10. Keep a complete toolbox for complex polypectomies

- Snares: I use a 10mm stiff snare and a 20mm braided snare for removing polyps >5mm, and a dedicated thin-wire snare for cold polypectomies.
- A transparent cap is useful for removing polyps that are partially located behind large mucosal folds.
- A "coag-grasper" (coagulation forceps) is indispensable to stop immediate bleeds post-polypectomy.
- Endo-loops ("detachable snares") come in handy if removing large pedunculated polyps with thick stalks. Compress the stalk first by ensnaring it with an endo-loop, then dissect it. (if no endo-loops available, consider beginning to transect the stalk with an only partially tightened snare and/or coagulation current to apply some coagulation prior to cutting through the stalk)
- Clips: Become familiar with the type of clip you use, they all perform somewhat differently. Avoid placing clips across polyp stalks before the resection - they tend to get in the way. Use them after polypectomy if bleeding occurs.
- Injectable solution: A variety of solutions can be used for submucosal injection:

  - Normal saline (NS) mixed with methylene blue (MB) is useful but diffuses quickly, making repeat injections necessary if large polyps are being removed in piecemeal fashion.

  - If using NS/MB, the goal is to mix a few drops of MB with 100-500cc of NS to result in a light blue color (resembling "Windex" window cleaning solution). Too much MB obscures the field, not enough blue color results in a poor outline of polyp margins.

  - High-viscosity solutions are preferable for complex polypectomies. Hydroxyethyl starch is available in 500ml bags as a plasma expander, can be mixed with MB and when injected submucosally, creates a mound that dissipates much more slowly. More recently, a viscous fluid premixed with a MB-type color, Eleview^{R} (manufactured by Aries Pharmaceutical), has been approved for use as an injectate for polypectomies in the U.S.

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