Archives of Surgical Research | Invited Review

Colonic Polyps – What A Surgeon Needs To Know

Iftikhar Ahmed, Faisal Fayyaz, Syed Habib, Manuele Furnari

IMPORTANCE Colorectal polyps are protuberance of the tissue mass into the colonic lumen arising from the colonic mucosal layer. Although mostly benign, some types of colorectal polyps (especially adenoma) are considered to follow a histological pathway called adenoma-carcinoma transition sequence, which leads to the development of colorectal cancer. Up to 80% of colorectal cancers develop from initially benign adenomatous polyps that subsequently undergo such transition. Colonoscopy is considered to be an efficient method of detecting and removing the polyps, thus reducing the incidence of colorectal cancer. Several important characteristics of a polyp can be assessed during endoscopy such as the gross morphology, superficial glandular pattern, vascular pattern and appearance under chromoendoscopy, which help deciding the most suitable type of polypectomy technique and subsequent surveillance examination. This article reviews the histological characteristics and classifications of colorectal polyps, and discuss the traditional and modern endoscopic polypectomy techniques in light of recent scientific data.

KEYWORDS Polyp, Colonoscopy, Polypectomy, Adenoma, Endoscopic mucosal resection

ABBREVIATIONS CRC- colorectal cancer, HP– hyperplastic polyp, Adenoma carcinoma sequence ACS,

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Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author:
Dr Iftikhar Ahmed MRCPGI MD FRCP, Consultant Gastroenterologist & Associate Professor of Medicine
Sulaiman Al Habib Hospital Takhussusi, Riyadh, KSA
Al-Fasial University Riyadh KSA
University of Southampton, NHS Foundation Trust UK
Iftikhar.ahmed5@nhs.net
00966 546718235
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The word polyp, derived from a Greek word 'polypous' (meaning a morbid lump), describes a clump of tissue arising from the colonic mucosal layer protruding into the lumen of the colon. The incidences of colorectal polyps are on the rise worldwide[1] and where majority of these polyps are benign, only certain types are considered to be the precursor lesion of colorectal cancer (CRC), which is a leading cause of cancer related death in the western countries[2-4]. Although thought to be a rare disease in the Asian regions, rising trend in the incidence of CRC has been observed lately, which may be attributed to rapidly changing socio-economic demographics along with influence of the genetic and biological factors of the Asian population[5,6]. The advances in the endoscopic technology and molecular science have increased our knowledge about the transition of a benign polyp into a malignant one through a histological pathway called adenoma-carcinoma sequence (ACS)[7,8]. ACS is considered to be an integral concept to understand the pathophysiology of colorectal cancer (Figure 1) as up to 80% of colorectal cancer are caused by this transition pathway [9,10]. Majority of individuals with these adenomatous polyps are often asymptomatic hence growing emphasis on the need of screening colonoscopy to detect and remove these polyps to prevent their potential evolution to adenocarcinoma. It is widely accepted that removing adenomas in the early stages will reduces the incidence of colorectal cancer; and for that reason, screening colonoscopy to detect and remove colonic polyp is considered to be the most efficient method of CRC prevention[11,12].

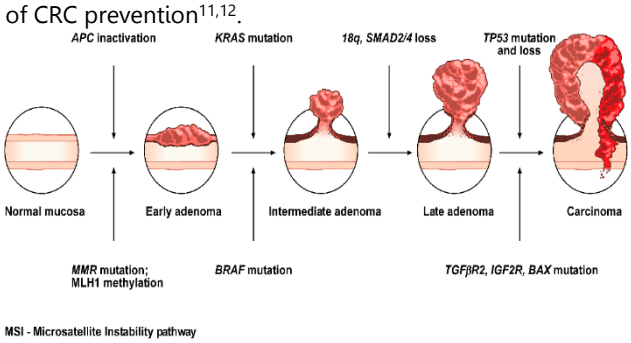


Figure 1: Diagrammatic Illustration of adenoma-carcinoma sequence Adapted from GI Atlas[10]

In the recent decades, the advancements in the endoscopic technologies coupled with growing expertise in the endoscopic skills has expanded the field of endoscopic diagnosis and therapies; subsequently endoscopic polypectomy techniques have also risen to another level. Better characterisation of colorectal polyps with advanced imaging has led to the formulation of robust classifications of colorectal polyps in term of their malignant potential. Additionally, development of new endoscopic therapeutic

tools has extended the possibilities of resecting bigger and complex polyps [13,14].

CLASSIFICATION OF COLONIC POLYPS

Certain characteristics of a polyp (such as mucosal surface and the vascular pattern) play a vital role in deciding the most appropriate polypectomy technique and further surveillance in order to prevent colorectal cancer[15]. Advanced endoscopic technology such as Narrow Band Imaging (NBI), enables to enhance certain distinguishing features of the polyp such as superficial mucosal pattern, colour and microvascular architecture [16]. Based on these particular characterisations, several classification protocols have been developed [17, 18].

According to these parameters, polyps can broadly be classified as benign and malignant polyps. Benign polys can be sub-divided into adenomatous and non-adenomatous polyps, the former with risk of evolution to carcinoma. Malignant polyps with invasion of the submucosal layer require therapies beyond endoscopic resection such as surgery or palliative treatment. Certain small polyp (<5mm-called diminutive polyps) are considered to be of very low risk where a "resect and disregard" approach can be safely adopted to save time and resources [19].

Benign Polyp			Malignant Polyp
Adenomatous	Non-Adenomatous Polyp		
	Mucosal Polyp	Submucosal Polyps	
Tubular adenoma	Hyperplastic polyp (including serrated polyps)	Colitis cystica profunda	Non-invasive carcinoma
Tubulovillous adenoma	Mucosal polyp (normal mucosa in a polypoid configuration)	Pneumatosis cystoids coli	Carcinoma in situ
Villous adenoma	Juvenile polyp (retention polyp)	Lymphoid polyps	Intramucosal carcinoma
	Peutz-Jeghers polyp	Lipoma	Invasive carcinoma (through muscularis mucosae)
	Inflammatory polyp	Carcinoid	Metastatic neoplasms
		Other rare lesions	

Table 1: Polyp Classification

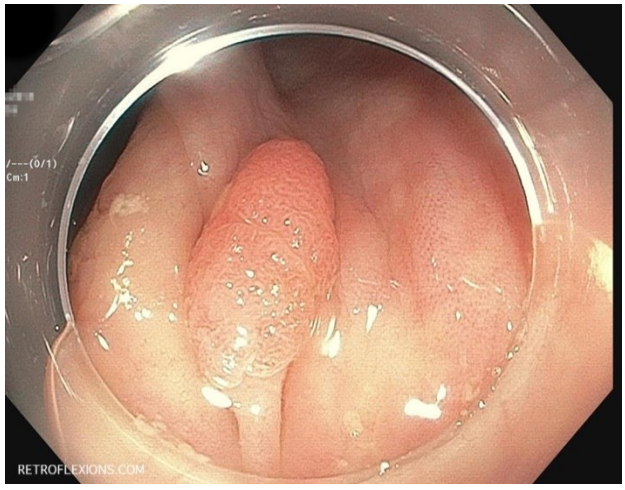
ADENOMATOUS POLYP

Adenomatous polyps are the commonly identified colonic polyps in general population and comprise approximately10-25% of all polyps [20]. Where approximately 90% of these adenomatous polyps are small (usually less than 1 cm in diameter) and carry a little potential for malignancy, the remaining 10% of larger adenomas (1cm or bigger) approach a 10% chance of containing invasive cancer [21]. Adenomatous polyps typically extend into the lumen of the colon and can be divided by histology into three types, namely Tubular Adenoma, Villous Adenoma and Tubulovillous Adenoma. There is a fourth category which is recently recognised as a separate entity called Serrated adenomatous Polyp.

Tubular adenomas: These are the most commonly occurring polyps in the rectal area although can be found anywhere in the colon. Tubular adenoma tends to be larger than the other two types, and are usually nonpedunculated, velvety, or cauliflowerlike in appearance [22].

Villous adenomas: are considered to have the highest morbidity and mortality rates of all polyps. These are the villous adenoma which cause hypersecretory syndromes characterized by hypokalaemia and profuse mucousy diarrhoea and discharge and can harbour carcinoma in situ or invasive carcinoma more frequently than other adenomas [23].

A



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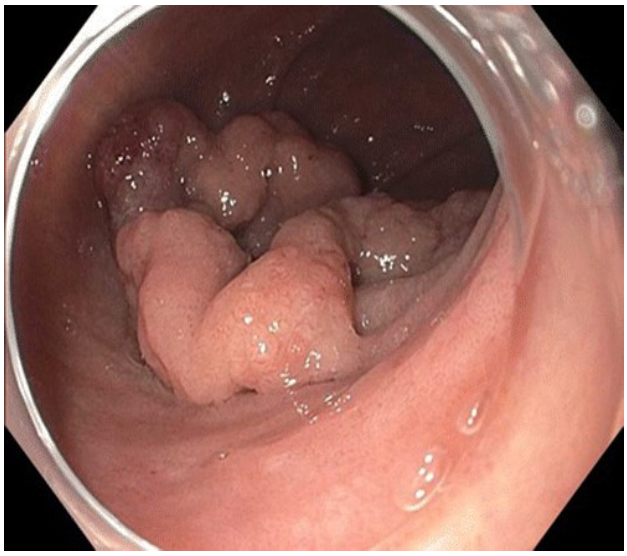

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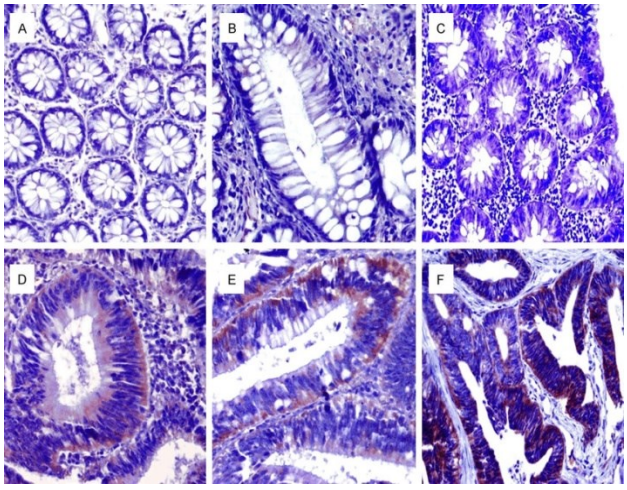

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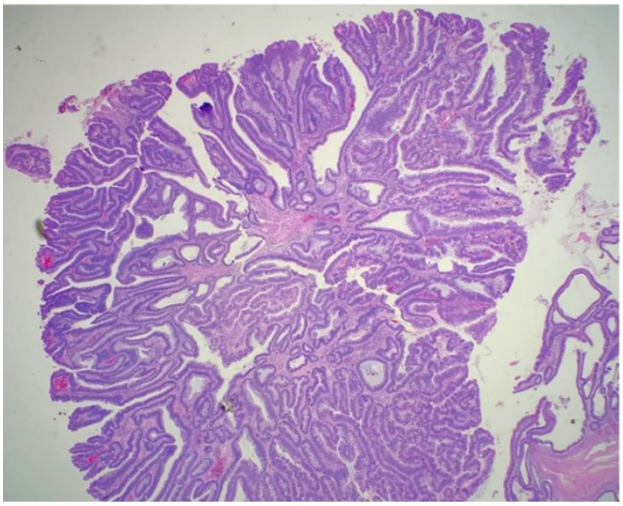

Figure 2: A- tubular adenoma B- Tubulovillous adenoma C-Villous adenoma D- Tubular and Tubulovillous adenoma histology E-Villous adenoma histology. Images adapted from Gastrointestinal Atlas (24)

Tubulovillous adenoma: show a histological pattern of a combination of tubular and villous architecture with villous component usually greater than 25%. The risk of progression to carcinoma is related to both the size and the histology of the adenoma. Adenomas that are greater than 1 cm, contain a substantial (>25%) villous component, or have high-grade dysplasia are commonly referred to as advanced adenoma and carry an increased cancer risks[24, 25].

NON-ADENOMATOUS POLYPS

Hyperplastic Polyps: Among the non-adenomatous benign polyps, hyperplastic polyps (HP) are the most commonly occurring polyps in the colon. These are small (few mm to as large as 5mm) polyps, and are considered to be formed when mature epithelial cell migrating to colonic crypts are failed to detach physiologically and continue to pile up leading to formation of a polyp [26]. Although previously thought to be completely benign, the larger HPs are now considered to have some malignant potential, in particular, larger HPs (>10 mm) were shown to be associated with increased risk of developing into advanced adenoma with some malignant potential [27].

Serrated Polyp: Previously considered to be a type of HPs, serrated polyps are more recently described as sessile serrated adenomas and recognised as a separate entity with a varying degree of malignant potential. These exhibit a mixture of adenomatous and hyperplastic features, with regions of saw-toothed, serrated-surface epithelium. However, in contrast to HPs, these polyps have certain differences, namely prominent nucleoli, goblet cell immaturity, and absence of a thickened basement membrane [28]

Other classifications were based on the visual parameter such as shape or gross structure of the polyp, which are also considered significant especially when it comes to the choice of polypectomy techniques. Those polyps which have a head and a stalk are called pedunculated polyps while the ones without a stalk are called sessile polyps. Based on these structural parameters, a robust and widely accepted classification, called Paris Classification, was developed by a working group including endoscopists, surgeons and gastroenterologists to standardise the nomenclature of the polyp in 2000 [29]. This classification is based on the morphology of the polyps as it appears during endoscopy assessment as described below in the table.

Paris classification	Characteristics	Description
0-Ip	Polypoid	Protruded, pedunculated
0-Is		Protruded, sessile
0-IIa	Nonpolypoid	Superficial, elevated
0-IIb		Flat
0-IIc		Superficial shallow depressed
0-III	Nonpolypoid and excavated	Excavated

Table 2: Paris classification of colonic polyps

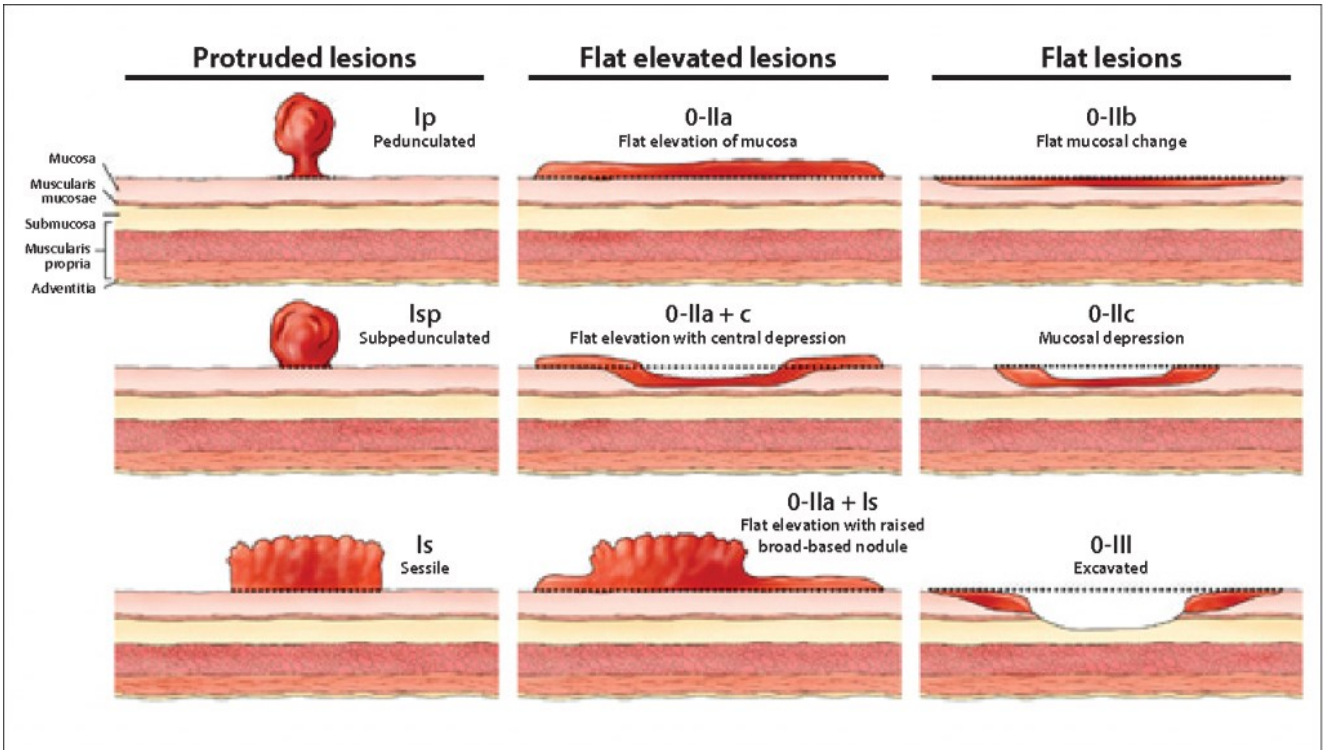

Figure-3: Paris classification, diagrammatic illustration. Adapted from GIE Journal [29]

In addition to the gross appearance of polyp, Pit Pattern (glandular pattern) and Vascular Pattern are two important features which require careful assessment during endoscopy. Regarding the observation of the glandular pattern, the pit pattern classification of colonic polyps, called Kudo Classification, is the most important and widely adopted [30].

Histology	Description	Pit pattern	Treatment selection
Nonneoplastic	Normal mucosa (normal round crypts, regular)	I	No treatment
	HP lesion (enlarged stellar crypts, regular)	II	
Neoplastic, adenomatous	Neoplastic lesion (elongated, sinuous crests)	IIIL	Endoscopic resection
	Neoplastic lesion (narrowed round pits, irregular)	IIIS	
	Neoplastic lesion (branched or gyrus-like crests)	IV	
Neoplastic, cancer	Malignant lesion (irregular surface)	Vi	Endoscopic resection
	Malignant lesion (amorphous surface)	VN	Surgery

Table 3: Kudo Classification based on pit patterns and associated histological features

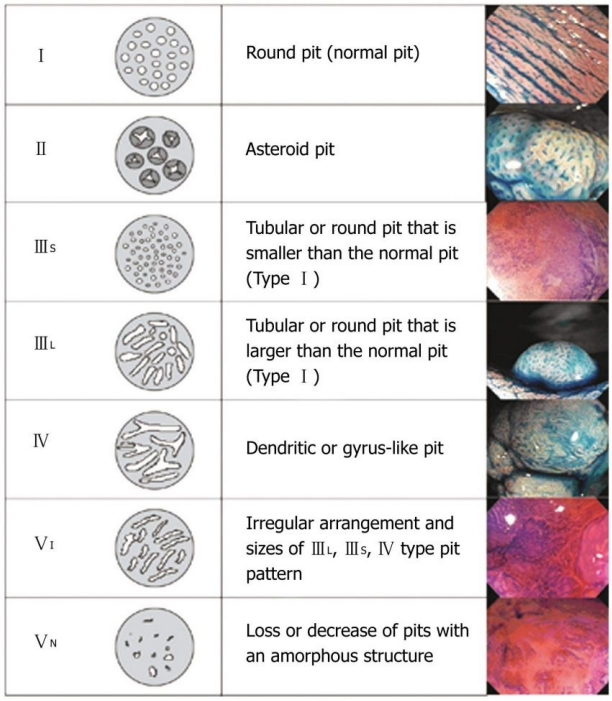

Figure 4: Diagrammatic illustration of Kudo classification. Adapted from Tanaka et al [30]

Several studies, majority of which were conducted by the Japanese authors, demonstrated that the visualisation of the superficial architecture of large bowel mucosa determined by the spatial disposition of glandular orifices is able to predict the histologic nature of the lesion and therefore be able to guide towards the appropriate therapeutic approach [31].

POLYPECTOMY TECHNIQUES

A wide variety of endoscopic techniques are available for polypectomy these days depending on the local expertise and hospital facilities. The choice of a preferred polypectomy technique is depended on the characteristics of the lesion such as optical diagnosis, size and morphology of the polyp. Several endotherapeutic techniques are included under this category; the simpler endoscopic polypectomy techniques which are commonly performed by almost all level of endoscopists usually encompasses the use of biopsy forceps and different types of polypectomy snares [32]. However, in the presence of a large, flat or locally advanced polyp, more advanced polypectomy techniques are required, i.e., endoscopic submucosal dissection, underwater mucosectomy and cup-assisted mucosectomy. Where these advanced endotherapeutic techniques offer curative options, these are also associated with higher risks of complications and, therefore, should only be restricted to be performed by a highly trained endoscopist. The goal of most appropriate polypectomy technique is to obtain a complete resection of the lesion with the best safety profile [33].

GASTROENTEROLOGIST VS SURGEON

When it comes to the advanced endoscopic polypectomy techniques, whether gastroenterologists or surgeons have better endoscopic skills remains a topic of much debate. A number of studies have shown a range of variability in the endoscopic skills among Surgeon and Gastroenterologists for detecting and characterising colon polyp, and endoscopic polypectomy expertise [34,35]. Such variabilities in skills might be due to non-uniform training curriculum and assessment parameters for endoscopy in Gastroenterology and Surgical training programs in different regions. With advancing endoscopy training and standardisation of colonoscopy practice, especially in the western countries, several quality parameters have been adopted to ensure the high quality of colonoscopy [36,37]. One of the most important measure of colonoscopy quality is adenoma detection rate (ADR). The higher degree of ADRs is directly proportionate to the quality of colonoscopy, and adoption of ADR as quality marker of colonoscopy has been considered to lower the risk of colorectal cancer [38].

Contrary to previous believes, recent studies have shown that Surgeons are as good as Gastroenterologist and advanced Endoscopist at detecting polyps through colonoscopy [39]. Despite this debate about the variability in endoscopic expertise of Gastroenterologist vs. Surgeon, it remains vitally important that an endoscopist is able to recognise and characterise the polyp accurately and understand his limitations of endoscopic skills before attempting polypectomy [40,41].

Simple Polypectomy techniques: Sessile and small pedunculated polyps of up to 1cm are expected to be removed safely and effectively by most endoscopists (whether gastroenterologist or surgeon). These are carried out by using forceps techniques in cases of small sessile polyps (<4mm) or snare polypectomy techniques in cases larger sessile polyps (>4mm) or pedunculated polyps[42].

Polypectomy for pedunculated polyp: Almost 30% of all polyps are pedunculated polyps which are usually large in size and are generally considered to be "easy" lesions to be resected by most endoscopist using snare. For successful resection of such polyps, the pedicle must be accurately evaluated in order to assess its full dimensions and its ability to be easily isolated and mobilized from the surrounding mucosa. The snare is then passed across the head of the polyp and is placed around the stalk. It is important to ensure that clear non-adenomatous tissue is visible between the snare and the head of the polyp, and then electrocautery is applied to completely resect the polyp from its stalk [43]. One of the main risks of stalked polypectomy using snare is bleeding which is proportionate

to the polyp dimension and thickness of the stalk containing feeding blood vessel. One way to avoid bleeding is by early application of energy and slow closure of the snare. There are other prophylactic measures which should be considered when the stalk diameter is more than 5 mm or the polyp head is more than 20 mm [44]. These prophylactic measures include application of detachable loops or clips on the stalk below the resection point which has been shown to effectively reduce bleeding rates. Additionally, Epinephrine injection (1:10,000 dilution) can be used to reduce the polyp size which enables less risks of bleeding using standard snare resection (epinephrine volume reduction; EVR) [45].

Polypectomy techniques for Sessile and Flat polyps: When it comes to the assessment and polypectomy of sessile polyps, these are of more concern than large pedunculated polyps, predominantly for two reasons. Firstly, the pathway for migration of invasive cells from the tumour into submucosal structures is shorter, and secondly, the complete endoscopic removal is more challenging and more difficult to ascertain. [46].
Depending upon the size and nature of sessile polyps, various polypectomy techniques are used as described below:

Polypectomy using biopsy forceps: Small sessile polyps (<4mm) can be safely removed using biopsy forceps which is by far the most easy and simple way of doing small polypectomy. Where the risks of perforation with cold forceps polypectomy are negligible, it poses a challenge of incomplete resection even in expert hands, particularly when minor initial bleeding occur with adenomatous tissue being present at the site of cold forceps [47]. For these reasons, cold snare resection is preferred over biopsy forceps polypectomy and the latter should be reserved only for diminutive polyps < 3 mm in size where a complete resection can be achieved [48].

Cold snare polypectomy: For effective resection of sessile polyps larger than 3mm but smaller than 10mm, the cold snare polypectomy technique is recommended, which is safe and effective, and can be performed by most endoscopist [49]. Snares are available in different sizes and types, which can be used depending upon the characteristics and size of sessile polyps to ensure effective polypectomy. Studies have shown a higher complete resection rate using cold snare polypectomy compared to forceps polypectomy, and according to recent data, polyps of over 1cm can also be safely removed using snare polypectomy with expert hands [50].

Hot snare polypectomy: Hot snare polypectomy is more or less similar to cold snaring technique with additional use of electrocautery, which is applied by providing energy to facilitate tissue cutting and coagulation to prevent bleeding. Although hot snare polypectomy is the widely practised technique for polyps between 7 and 9 mm, it is increasingly being replaced by cold snare polypectomy for removing polyps of up to 9 mm in size for better safety profile [51]. A variety of snares (oval, hexagonal, crescent, etc.) are available, each one with specific advantages. Currently there is no evidence that one device is superior to the others and the choice is usually made by endoscopist's preference [52].

ADVANCED POLYPECTOMY TECHNIQUES

Beyond the described polypectomy techniques, there are a number of advanced polypectomy techniques for larger and complex polyps which have been introduced lately and should only be carried out by advanced endoscopist who have special training and experience of dealing with such cases.

Endoscopic Mucosal Resection: Endoscopic mucosal resection (EMR) was first described in Japan in the early 1980s and is generally used to remove large sessile polyps or flat lesions up to 20 mm in size by appropriately trained and experienced endoscopists. In the current decade, EMR is widely practiced endoscopic modality to treat early colonic cancer limited to the mucosa [53]. During EMR, most advanced endoscopist also use a plastic cap mounted at the tip of colonoscope called cap-assisted EMR. The cap separates the endoscope tip from the colonic wall and assists in the appropriate and detailed visualization of a complex sessile polyp especially on the proximal side of a fold by stabilising the tip of colonoscope and keeping the lesion at an adequate distance. The polyp is aspirated in the cap with an inbuilt preloaded snare and saline solution is injected to separate it from underlying mucosa to minimize the risk of perforation. The polyp is then snared and pulled into the cap using the suction function of the endoscope and resected with electrocautery [54,55]. Another technique, which is called underwater endoscopic mucosal resection, offer advantage of enhanced visualisation of the superficial characteristics and margins of the polyp and does not require submucosal injection to create a fluid cushion between the mucosa and muscularis propria. Water immersion also maintains the adenomatous mucosal folds invaginated and not flattened against the muscularis propria and the lesion is resected by hot snare technique. The success rate of EMR for removing complex sessile polyp of 20mm or larger is reported to be up to 95% with limited complication and avoidance of surgery in 90% with significant reduction in mortality and cost [56]. These findings have also been replicated in other trials showing effective piecemeal removal of 90%–96% of colonic polyp larger than 20 mm in a single or multiple endoscopic session, and avoidance of surgery in more than 85% of patients with significant cost savings [57].

Endoscopic Submucosal Dissection: Endoscopic submucosal dissection (ESD) initially introduced in Japan for treating early gastric cancer, is used in expert centres now a days for removing complex colonic polyp especially those with suspicious of superficial malignancy, and require radical resection in order to decrease the risk of local tumour recurrence [58]. During ESD, the lesion is marked at the periphery using cautery, and a submucosal injection (indigo carmine) is used to create a long-lasting cushion between the lesion and the muscle layer. Using a transparent cap and under direct visualisation, the submucosal layer is then dissected using electrosurgical knives and the lesion is removed in one piece [59]. In expert hands, ESD offers more complete and accurate pathological assessment of the polyp with resection of residual adenomatous tissue with low local recurrence rates and the possibility to cure low-risk submucosal invasive cancer [60]

COMPLICATIONS OF POLYPECTOMY

Since colonic polyps are considered precursor lesion to develop colon cancer, the aim of colon polypectomy is to prevent the evolution of adenomas to carcinoma and advanced carcinoma. Although the natural history of unresected polyps and their evolution to colon cancer is not entirely known, there is now a growing body of evidence from observational studies and randomised clinical trials supporting the role of polypectomy in decreasing the incidence of colorectal cancer and reducing mortality [61]. Polypectomy procedures, on the other hands, are not risk free and even in the expert settings, are related to number of complications such as bleeding, colonic perforation and incomplete resection leading to reoccurrence of polyp and interval cancer. Munich Polypectomy Study, which is one of the largest prospective trial of colonic polypectomies, showed a positive correlation between polyp size (>10mm), type (non-pedunculated) and location (right colon) and the occurrence of postprocedural complications (i.e., bleeding rate of 25% for polyps>3cm) [62].

The most important complications of endoscopic polypectomy are bleeding and perforation. Several studies have suggested that polyp size (>1cm), morphology (sessile or thick stalk) and location (right side versus left side of the colon) are related to an increased risk of post-polypectomy complications [63].

GI bleeding: The most frequent procedure-related complication following polypectomy is GI bleeding, which can occur during polypectomy called immediate bleeding, or usually within one week of polypectomy procedure, called delayed bleeding. For small and diminutive polyps, the incidences of immediate bleeding are reported to be in the order of 0.5%–2.2%, while delayed bleeding is rarer, with overall incidence in range of 0.3%–0.6%. On the other hand, bleeding following large polyp resection is comparatively more common with an estimated incidence of 8.6% of all polypectomies [64]. Most cases of GI bleeding during polypectomy are self-limiting or can be managed successfully by endoscopic treatment alone such as with endoclips placement or adrenaline injection, whilst only a small proportion experience severe bleeding (1.6%), requiring blood transfusion or interventions other than endoscopic management (i.e. – surgery, interventional radiology).

Several techniques are used to minimise the risk of bleeding and perforation such as injection, clipping and endo-loop placement [65,66]. There is no consensus as to what technique is preferred over the other and endoscopists use a variety of measures to deal with this complication depending upon the available expertise. A recent survey of polypectomy practices has also shown a high degree of variability between endoscopist to manage the bleeding complications during or after polypectomy [67]. Some important precautions are mandatory particularly when dealing with patients on anticoagulant or antiplatelets therapy at the time of endoscopy. The current European Society of Gastrointestinal Endoscopy (ESGE) guideline stratifies post-polypectomy bleeding risk according to polyp size (< 1cm versus > 1cm) and type of antiplatelet therapy (aspirin versus thienopyridines) and recommends withholding thienopyridines whenever possible prior to polypectomy. More recently, a study has shown no increase in post-polypectomy bleeding rates with the use of prophylactic endoclips in patients with ongoing anticoagulants if the resected lesions were less than 1 cm in size [68]. The guidelines also recommend placement of a prophylactic endoloop to prevent bleeding in pedunculated polyps with a thick stalk, no recommendations are made concerning the use of endoclips or adrenaline injection. There is little data about the risk of bleeding and the safety of polypectomy in patient on oral anti-coagulant but it is generally accepted that oral anticoagulants should be withheld whenever possible [69].

Colonic perforation: Colonic perforation during colonoscopy or polypectomy is a rare but serious adverse event. For small polyp resection, the risks of perforation are practically none especially with the use of cold biopsy or cold snare resection, however, the use of electrocautery is most commonly related with colonic perforation. The data from the British Colorectal Cancer Screening Program reported approximately 0.90% incidence of colonic perforation associated with diagnostic colonoscopy [70]. Another large study of outpatient procedure showed a similar incidence of perforations after colonoscopy (0.85 per 1000 procedures), identifying an association between polypectomy and an increased risk of perforation (OR 2.96) [71]. A recent systematic review found an overall perforation rate of nearly 4% after an ESD procedure, with rates ranging from 1.5% to 10% in the literature [72]. Most cases of perforation following polypectomy can be successfully treated endoscopically using clip placement whilst only a small proportion requiring surgery. Most recently, use of

endoscopic suturing and over-the-scope clip have been introduced to manage the colonic perforation especially in high-risk complex polypectomy procedures such as ESD.

Post-polypectomy syndrome: This is a rare but recognised complication of colonic polypectomy procedure especially those which required electrocautery, and considered to be due to peritoneal irritation during prolonged polypectomy procedure. The syndrome is manifested as combination of symptoms such as fever, abdominal pain, feeling of being unwell with abnormal inflammatory markers. However, CT findings are usually within normal without any evidence of perforation. It is often self-limiting and can easily be managed with conservative and supportive treatment [73, 74].

Adenoma recurrence: One of the important complications of colonic polypectomy is incomplete resection of polyp leading to polyp reoccurrence especially adenoma, which is very important in light of cancer prevention programs and the risk of interval cancer. Incomplete resection of adenomatous tissue at the previous colonoscopy was found to be a probable cause of interval cancer in about 9% of the cases from a large British cohort, but rates of up to 26% have been cited [75]. Recent data has shown that larger lesions as well as flat or sessile lesions seem to carry risks of local recurrence as high as 27%. This is a relevant finding since advanced adenomas have a high rate of progression to invasive cancer, estimated at up to 5.6% for each additional year in some patient subgroups [76-77].

Although serious complications such as bleeding and perforation can occur after polypectomy, thirty-day mortality in these patients is extremely low in most series, suggesting that endoscopic resection is a very safe procedure in a vast majority of cases [78]. Cardiopulmonary complications arising during endoscopic procedures are usually related to sedation or anaesthesia and are not directly the result of polypectomy [79].

CONCLUSION

In conclusion, colorectal polyp, although predominantly benign, are the precursor lesion of colorectal cancer and early detection with colonoscopy and polypectomy has shown a remarkable success in preventing CRC. An effective approach to safe and efficient polypectomy would entail a thorough discussion with the patient about the benefits and risks of colonoscopy, polypectomy and related risks including those related to sedation. A detailed clinical history and review of medications, in particular, anti-coagulant treatment and appropriate assessment of the endoscopic features of colonic polyp in view of potential histology are of great importance in order to plan the proper therapeutic approach. For small polyps, cold snare polypectomy appears to be the most appropriate technique and should be preferred over hot biopsy forceps. Successful removal of large polyps either by EMR or ESD is now considered safe with high success rate with acceptably low complications. There are several suggestions from empiric experience as well as from scientific evidences that should be given thorough consideration whilst approaching a difficult and complex polypectomy, especially understanding one's limitations of skills, ability to manage complication and regular review of the expertise to perform advanced endoscopy.

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Author Affiliations: Sulaiman Al-Habib Hospital, AlFaisal University Riyadh, KSA University of Southampton UK

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