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Role of Colonoscopy in Management of Lower Gastrointestinal Disorders: Diagnostic & Therapeutic

Dr. Pushkraj Baswant Birajdar[*1], Dr. Sanjeev S. Thakur[2], Dr. Pradeep N. Bafana[3]

[1]M.S. Gen. Surgery, DNB Neurosurgery, B. J. Medical College & Sassoon Hospital, Pune-01, Maharashtra, India
[2]M.S. Gen. Surgery, Professor & Head Surgery Department, B. J. Medical College & Sassoon Hospital, Pune-01, Maharashtra, India
[3]M.S. Gen. Surgery, Mch Neurosurgery, B. J. Medical College & Sassoon Hospital, Pune-01, Maharashtra, India

Abstract:

A flexible colonoscope has opened the door to the better understanding of the lower gastrointestinal tract. Even to this date people keep on analyzing the usefulness, application, advantages, disadvantages, complications, newer technologies and therapeutic applications of the colonoscope.

The endoscopist and industry are working hand in hand to give us fascinating gadgets to learn, investigate and apply to the benefit of our patients. As endoscopy itself is being transformed from the first fiberscope to the modem CCD Video-colonoscope of the 1990s, so has its influence on how gastroenterology is practiced, taught and perceived.

The application of lower Gastrointestinal endoscope i.e. colonoscope has been spanned from adults to paediatric age group. The indications are being enlarged, complications are being reduced and the concepts of management are being changed. In open access colonoscopy, the implications of rapid and easy access to endoscopic evaluation is being studied for diagnosis of common but disturbing disorders like per rectal bleeding , chronic pain lower abdomen. The early diagnosis of colonic malignancy to improve the survival rates is well established with the help of colonoscopy.

Keywords: ***Colonoscope, Endoscopy, Pain, Per Rectal bleeding, Malignancy.***

Introduction

The ever-expanding development of new endoscopic interventions continues to offer new therapeutic options for diseases conventionally treated with trans-abdominal surgery. Apart from treatment of piles; colonoscopy is beneficial in foreign body removal from lower GIT, stricture dilatation, endoscopic polypectomy, stenting for palliation of malignant obstruction. The purpose of this study is to understand the full capabilities of endoscopy particularly from the point of view of the general surgeon, with an interest in gastroenterology. Advances in endoscopic imaging have dramatically altered our ability to visualize mucosal lesions in gastrointestinal tract.

Both the rate of complete colonoscopies (overall 75%), and the proportion of colonoscopies performed by experienced endoscopists increased over time. The annual number of barium enemas was relatively constant up to 1992, but then decreased. Completion rates decreased by female sex and by age, and increased by previous colonic surgery or long-standing colitis, but remained unchanged by time period or presence of diverticulosis. Completion rates were influenced by endoscopist's experience and to some extent by intensity of colonoscopy. There was a large inter-endoscopist variation, at each level of experience, in the ability to perform complete colonoscopy, implying substantial differences in individual learning curves.

The overall morbidity was 0.4%, diagnostic morbidity 0.2% and therapeutic morbidity 1.2%. Most frequent complications were bleeding (0.2%) and perforation (0.1%), with no colonoscopy-related mortality. Bleeding was confined to therapeutic colonoscopy and occurred immediately, mostly after removal of large thick-stalk polyps. Perforations at diagnostic colonoscopy occurred in the left colon; they were diagnosed sooner than at therapeutic colonoscopy, at which the caecum was the most frequent perforation site. Bleeding complication rate was correlated to experience of the endoscopists. The mean completion rate for the endoscopists was lower in patients with undetected cancers. Coexisting inflammatory bowel disease was more common in patients with late diagnosis. The sensitivity was 96.7%, higher when the indication was bleeding, cancer or unclear X-ray, and lower when the colonoscopy was performed on other indications.

Aims and Objectives:

Diagnostic:

- To study diagnosis in patients of weight loss / dyspepsia / irritable bowel syndrome
- To diagnose various causes of per rectal bleeding
- A part of screening programme to detect malignancy earlier & also a part of follow up to access course of disease in interval period
- As a part of Pan-Endoscopy for unknown primary with secondary lymph node in neck
- To diagnose various benign & malignant disorders of lower GIT
- Syndromic approach study like in Peutz-Jegher's syndrome

Therapeutic

- For tissue diagnosis via biopsy in chronic diseases like TB/ IBD/ Neoplasms/ Malabsorption Disorders
- For removal of foreign body in colon or rectal region
- For treatment of volvulus/ intussusception
- For polypectomy in c/o FAP/PEUTZ JEGHERS syndrome
- For treatment of angiodysplasia like bleeding disorders
- For stenting; as a palliative care in end stage malignancy causing obstruction
- **For recent modality:** perforation closure/TTS (through the scope) balloon dilatation for stricture/tube placement in OGILIVE syndrome/ debulking of tumour as palliative care.

A: Colonoscopy

A Colonoscopy is the endoscopic examination of the colon and the distal part of the small bowel with a CCD camera or a fiberoptic camera on a flexible tube passed through the anus. It may provide a visual diagnosis (e.g. ulceration, polyps) and grants the opportunity for biopsy or removal of suspected lesions.

Virtual colonoscopy, which uses 2D and 3D imagery reconstructed from computed tomography (CT) scans or from nuclear magnetic resonance (MR) scans, is also possible, as a totally non-invasive medical test, although it is not standard and still under investigation regarding its diagnostic abilities. Furthermore, virtual colonoscopy does not allow for therapeutic maneuvers such as polyp/tumour removal or biopsy nor visualization of lesions smaller than 5 mm. If a growth or polyp is detected using CT colonography, a standard colonoscopy would still need to be performed.

B: General Principles & Techniques

Fibreoptics:
The heart of a colonoscope lies in its fibre-optic bundles also described as "highly flexible pieces of illuminated spaghetti".

The viewing bundle of a standard fibre colonoscope is 2-3 mm in diameter and contains 20,000-40,000 fine glass fibers each of 10 µm in diameter.

Principle of working is based on total and repeated internal reflections. First proposed by Huygens in the seventeenth century to explain refraction and reflection of light. Faithful transmission of image depends on spatial orientation of the individual fibers being the same at both ends of the bundle. In spite of all these bundles the fiber-optic image carrying system is extremely flexible and an image can be transmitted even when the bundle is tied in a knot.

Video Colonoscopes:

Video colonoscopy is the display of an endoscopic image on a monitor screen. The image is transmitted via a CCD chip. The CCD chip is an array of 33000 to 100,000 individual photo cells (picture elements or pixels) receiving photons reflected back from the mucosal surface, and producing electrons in proportion to the light received. Image is converted into appropriate signals and transmitted to viewing screen where they are recognized and appear as color picture.

Our Institute Colonoscope & Endoscopy Trolley:

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Contraindications:

- Toxic fulminant colitis
- Perforation of abdominal viscous(fecal contamination)
- Severe coagulopathy
- Acute diverticulitis
- Acute or recent myocardial infarction
- Patient refusal

High Risk Situations Include:

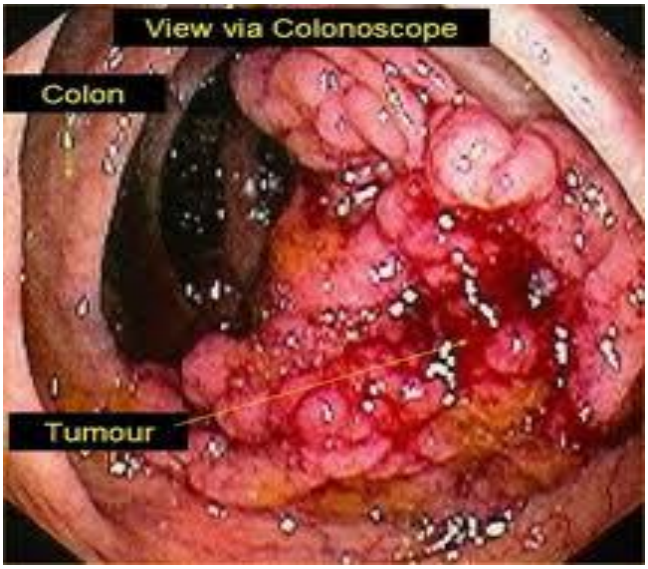
- Uncontrolled lower GIT bleeding
- Recent colon surgery
- Multiple abdominal & pelvic surgeries in the past with adhesions
- Severe chronic obstructive pulmonary diseases(COPD),atherosclerotic heart disease (ASHD)
- Pregnancy in second or third trimester

Complications:

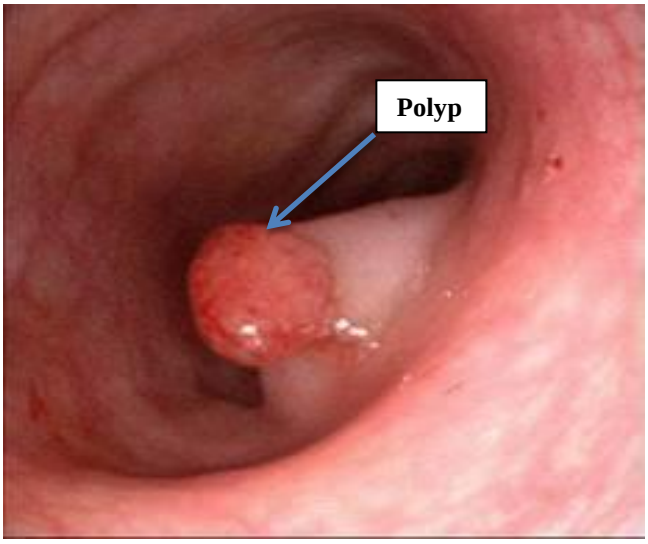
- Perforation
- Bleeding
- Infection
- Abdominal distension
- Postpolypectomy coagulation syndrome
- Splenic rupture
- Small bowel obstruction
- Medication effects

[A] Colonoscopic DIAGNOSIS of Different Conditions:

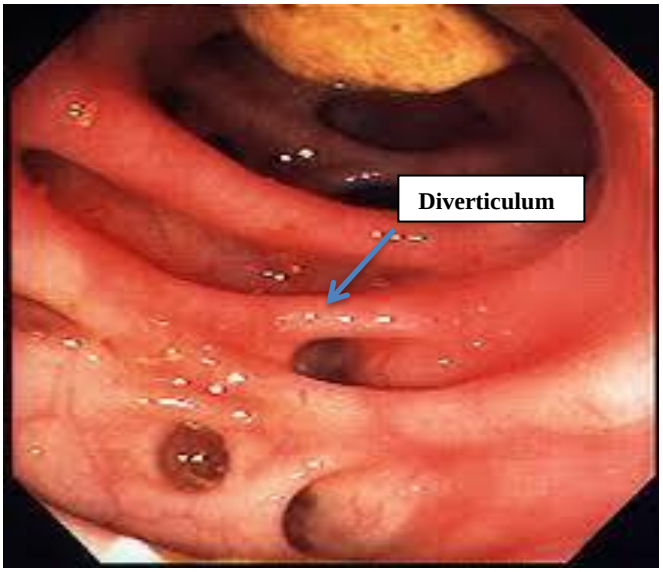
1. Malignancy



2. Polyp



3. Diverticulum



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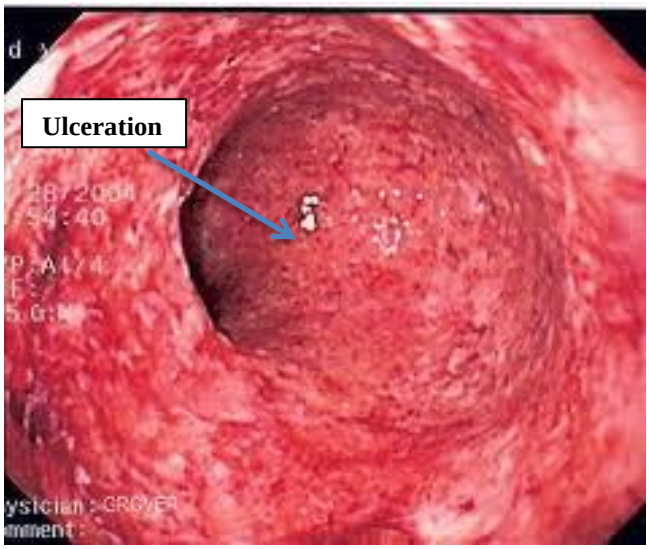
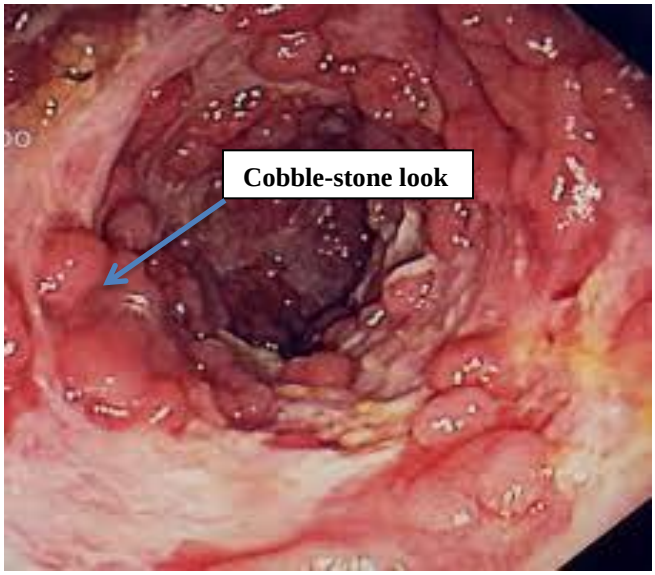
4. Inflammatory Bowel Disease

a. Ulcerative colitis



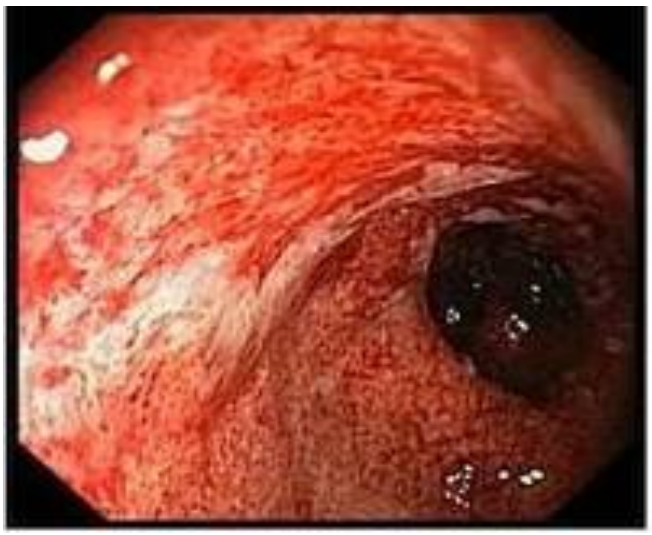
b. Crohn's Disease



5. Adenoma

6. Ischemic colitis

7. Infectious colitis



[B] THERAPEUTIC use of Colonoscopy:

1. Lower GIT Bleeding Control:

- Thermocoagulation (With and Without Tissue Contact);
- Injection Therapy (Of Various Agents);
- Mechanical Method

2. Polypectomy:

Methods of polypectomy:

1. Hot biopsy forceps
2. Thermal devices:

a. Heat probe
b. Bipolar electrode
c. Argon plasma coagulator

3. Loops & Clips: snare
4. Submucosal injection: The fluid injected may be saline (normal or hypertonic) with or without methylene blue to enhance visualization and with or without epinephrine.

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3. Cancer Treatment (Laser/Tumor Probe):

Chrstie et al established five criteria for determining colonscopic cure of small cancerous polyps by polypectomy:

- The stalk was uninvolved with carcinoma;
- No lymphatico- vascular invasion was present;
- The adenomas contained a well-differentiated or moderately differentiated malignancy;
- Early follow-up colonoscopic examination (3 months) showed no recurrence of cancer at the polypectomy site; and
- The carcinoma was confined to the head of the adenoma.

If these **five criteria** were met, he felt that colonoscopic polypectomy would be adequate treatment for the malignant adenoma.

In general, colonoscopic removal of sessile adenomas was not deemed curative when the margins of resection were involved with cancer.

We feel that polypectomy is thus adequate and appropriate if:

- There is adequate excision macroscopically;
- There is adequate excision microscopically;
- The cancer is confined to the head of the adenoma microscopically and does not invade the stalk;
- The cancer is well or moderately well differentiated; and
- There is an absence of vascular and lymphatic invasion.

Thus colon cancer in early stage with good histopathological picture can be removed with tumour probe or laser probe or simply by polypectomy

4. Dilatation of Stricture or Stoma

In today's era, most of strictures in colon are seen in Inflammatory bowel disease mainly in Crohn's disease & rest are due to post-surgical or malignancies. Now we are trying to dilate them by Endoscopically resulting less morbidity & high outcome with early recovery time as compared to surgical intervention for it.

Methods of dilatation:

1. Balloon catheter dilatation
2. Hydrostatic balloon use
3. Hydro-pneumatic balloon use

5. Reduction of Volvulus of Sigmoid Colon/Caecum:

The sigmoid colon is the most frequent site for a volvulus. The success rate of endoscopic derotation for sigmoid colon volvulus with a flexible colonoscope (60%) was higher than with a rigid rectosigmoidoscope (42%). In the absence of clinical, laboratory or radiological signs of bowel necrosis or perforation, colonoscopic volvulus derotation is recommended in all cases of acute colonic volvulus, followed by semi-elective single-stage colonic resection. The success rate of decompression of sigmoid volvulus is more than cecal volvulus.

6. Decompression of Colon:

Flexible fiberoptic endoscopy has an integral role in the management of colonic pseudo-obstruction and volvulus. Colonoscopic decompression is the primary method for diagnosis and treatment of colonic pseudo-obstruction.

7. Removal of Foreign Body:

Until recently removal of objects above the rectosigmoid junction has required laparotomy. But now with help of colonoscope these higher level foreign bodies removal become quite easier one. The colonoscopic retrieval of foreign bodies is technically feasible, safe, less morbid, and less costly than laparotomy. This technique should be considered as the first step in management of these patients by endoscopic surgeons.

8. Surveillance:

The surveillance for mass lesions present in colon can be screened with help of colonoscopy over long period.

9. Palliative Care in Malignancy (Stenting):

Malignant colon obstruction is a medical emergency and endoscopic decompression, achieved by self-expandable metal stent placement, has been broadly used for both palliations in patients with advanced, non resectable carcinoma and as a bridge to surgery in those patients with resectable disease. We propose stent insertion assisted by a side-viewing endoscope, in sharply angulated and remarkably stenotic lesions located at the distal sigmoid. Expandable metal stents have been shown to be effective in the management of malignant large-bowel obstruction.

Success is defined as > **50%** dilatation of stent with subsequent symptomatic improvement.

Types:

1. Enteral wall stent (EW): complication more so less used
2. Precision colonic ultra-flex (PCU): better than EW so commonly used

Materials and Methods

- **Study design and study period:**

The present cross sectional study was carried out during December 2015 up to July 2017 to study the diagnostic and therapeutic uses of Lower Gastrointestinal Endoscopy i.e. colonoscopy in our hospital.

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- **Study population:**

200 patients were examined. Registration of patients in the endoscopy clinic was according to the open access method. Cases were screened in our surgical O.P.D and appointments were given for colonoscopy with written informed consent. We used to admit our patients & then do colonoscopy. Similarly referrals from other surgical and medicine units were screened, but by and large all were given appointments.

- **Sample size:**

Universal sample that is all patients who were registered in our endoscopic clinic, between December 2015 to July 2017 were enrolled in our study.

❖ **Inclusion criteria:**

Registration to our endoscopic clinic was on open access basis and all were included in the study. Their informed consent was taken before the colonoscopy.

❖ **Exclusion criteria:**

All those who refused to give consent were excluded from the study.

Proforma as shown below was filled for each patient and collected for record keepings sake.

- **PROFORMA**

This consists of a detailed history taking, clinical examination etc. depending on the patient's condition, laboratory investigation, X-ray study and in necessary cases ultra-sonogram study of the abdomen. The Proforma gives the history, mode of onset, duration of bleeding, quantity of blood loss through gut, previous similar history etc. of complaints of pain, site, intensity, duration, any radiation, relation to food, drugs etc. Other complaints asked for include chronic pain in abdomen, per rectal bleeding, intake of drugs like NSAIDs, steroids, changes in bowel habits etc. along with recent treatment history. History of alcoholism and smoking were specifically asked for history of blood transfusion for severe per rectal bleeding with severe anemia were asked along with previous hospitalization history.

The examination consists of a detailed general physical examination for evidence of intensity of pallor, jaundice and pulse with special attention to blood pressure monitoring. Abdominal examination consists of area of maximum tenderness, any palpable mass any hepato-spleenomegaly, ascites and other abnormalities. Other systems also were examined thoroughly to assess the patient condition and to find out co-existing diseases.

The laboratory investigations included Hb%, blood grouping, peripheral blood smear, stool examination for occult blood, ultrasound.

The endoscopy was done by our Professor of Surgery. It was done as an emergency or elective procedure in all patients with lower gastrointestinal bleeding. In necessary cases biopsy were taken and in cases with polyps immediate endoscopic snaring was done which controlled bleeding. In such cases depending on the severity of bleeding, blood transfusion and other intravenous fluid therapy were instituted. In some rebleed cases of postpolypectomy another sitting and second time bipolar coagulation as necessary was done at periodical intervals.

All the cases of suspected lesions of colonic mucosa were subjected to biopsy and were studied for possibility of malignancy so as to plan the treatment.

- **Material &Cleaning and Disinfection**

Scope: Fujinon EG – 265 WR

Disinfectant: Glutaraldehyde (Cidex)

Biopsy channel forceps
Guide wire driven and balloon dilators.
Colonic stents (metallic and polyflex)

As the scope is a potential source of patient to patient transfer of infection, cleaning and disinfection of the scope was carried out vigorously.

Flexible endoscopic equipment is inevitably damaged by any form of sterilization other than ethylene oxide.

Observations & Results:

Table 1: Outcome of Our Colonoscopy Study-

Sr.no.	Distribution	No. of patients
1	Diagnostic	75
2	Therapeutic	88
3	Normal	37
Total		200

Figure 1: Indication of Colonoscopy

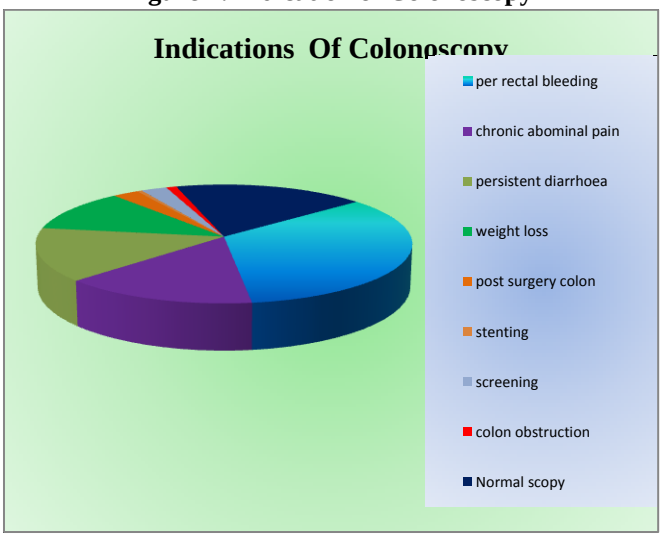

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Figure 2: Causes of Lower GIT bleeding

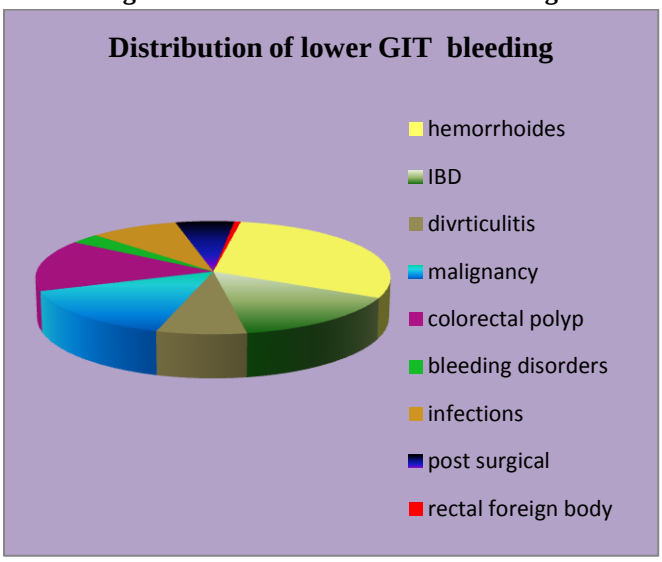
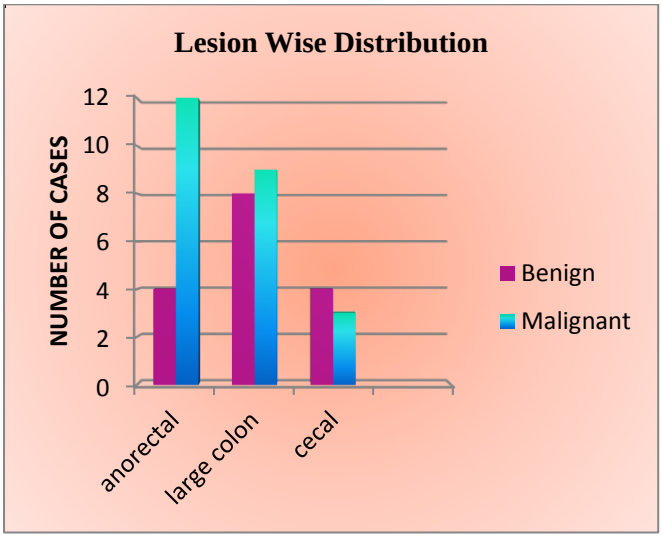


Figure 3: Lesion Wise Distribution



Above table suggests that anorectal malignancies are most common throughout. Most of the lesions are benign which can be confirmed with Histopathogy study after biopsy. The adenocarcinoma variant was found to be most common in malignancies among them.

Table 2: Types of therapeutic procedures with their respective number of cases

No.	Name of procedure	No. of cases (%)
1	Sclerotherapy for hemorrhoids	20 (25)
2	Polypectomy	10 (12.5)
3	Biopsy of suspected lesions	50 (62.5)
4	Stricture dilatation	02 (2.5)
5	Foreign body removal	01 (1.25)
6	Stenting as palliative care	01(1.25)
7	Colon obstruction treatment	04(5)
	Total	88

Table 3: Colonoscopic assessment of lower GIT bleeding after treatment

Sr.no.	Categories	No. of patients
1	No. of cases of lower GIT bleeding Elective Emergency	 20 15
2	Recurrences of lower GIT bleeding	05
3	Follow up still	10
4	Complication	Nil
5	Death	Nil

Discussion

The colonoscopy both for diagnostic & therapeutic purposes, is routinely done in our institute with the arrival of FUJINON END VIEWING COLONOSCOPE. This data is collected from last two & half year colonoscopy examinations done in our institute. In our set up every week 10-12 colonoscopies are done regularly. The patients are selected by Open Access Method from OPD basis as well as from references from other units & primary health centers. We have an appointment book, on the basis which patients has been called with fulfillment of required prerequisites as discussed above for examination in scopy room.

It is found that most common complaints in our study are per rectal bleeding, weight loss with unknown reason, chronic lower abdominal pain, irregular bowel habits, severe anemia with unknown reason, persistent diarrhoea, etc.

All patients are examined thoroughly before colonoscopy with proper history taken as per Performa given in Appendix. The available radiological & hematological investigations are carefully studied. Then with proper detailed explained consent of patient & one close relative, colonoscopy has been performed under required anesthesia.

Advantages of Open Access System:

1) It facilitates the treatment of lower GIT bleeding & chronic lower abdominal pain. Also it explains the response along with diagnosis of pathology of lesion causing above complaints.
2) Exclusion of colonic malignancies allows other physicians to manage non-specific colitis resembling malignancy.
3) Radiology of post-operative colon is so difficult that colonoscopy is now considered essential before future surgery is planned.
4) Persistent weight loss, decreased appetite, persistent diarrhoea are most common complaints which after colonoscopic examination, are

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diagnosed as Inflammatory Bowel Disease, Infectious causes & Malignancies.

5) Also open access method deals with Screening Programme for malignancy & predisposing lesions like hyperplastic polyps.
6) It helps to decrease incidence of Colorectal Cancers and morbidity & mortality caused by them.
7) It helps for deciding plan of management in various Colorectal Disorders like surgical or endoscopic treatment.

Double lesions were diagnosed in 10 patients, as follows:

1. IBD with malignancy : 2 cases
2. Polyp with malignancy : 5 cases
3. Piles with IBD : 2 cases
4. Non-specific colitis with IBD : 1 case

In case of study of both benign & malignant lesions, our study found following:

Sr.no.	Region	No. of Cases
1	Anorectal region	12
2	Sigmoid colon	04
3	Descending colon	03
4	Transverse colon	01
5	Ascending colon	01
6	Cecum	03
7	Benign lesion	16
TOTAL		**40**

With the help of above data, we can conclude that the anorectal malignancies are more common in our studies. In our study, protocol to give diagnosis is detailed history taking, physical examination & diagnostic colonoscopy with biopsy from suspected lesions. Then this biopsy were sent to Histopathogical Section with required details of history & colonoscopic findings, then after microscopic study of tissue given, final report of confirmation of Malignancy was given to patient with photographic colonoscopic report. After that patient was guided for further management with supplementary radiological investigation (CT abdomen +pelvis) & tumour marker (serum CEA level) study in form of curative care or palliative care.

Also with help of knowing details of benign lesions like polyp, IBD; we can predict future possibility of malignancy & its prevention now with treating these lesions colonoscopically or surgical or medical ways.

Conclusions & Summary:

1. The indications for diagnostic lower GI endoscopy are per rectal bleeding, significant weight loss, persistent diarrhoea, confirmation and tissue sampling of radiological abnormality, chronic lower abdominal pain & symptoms after colonic surgery.
2. No concordance between GIT symptoms and diseases could be found. Per rectal bleeding itself could be due to any number of diseases. Patients were found to have more than 2 lesions at a time. Two patients had lower abdominal pain since many years together yet with a perfectly normal radiology, colonoscopy and ultrasonography.
3. Colonoscopy has a definite role in diagnosis of complaints after colonic surgery where barium radiology often fails to interpret the distorted anatomy. Colonoscope has been established as the primary investigative modality in lower gastrointestinal bleeding. It helps in diagnosis of unsuspected lesions like varices, identifies high risk group likely to have hemorrhage. Thus there is a definite and beneficial role for emergency colonoscopy in acute per rectal bleeding in identifying accurate information about the source of bleeding and also controlling it. Most common cause of lower gastrointestestinal bleeding in our study was rectal varices i.e. hemorrhoids. Conservative line of management had good response in initial management in bleeding due to any cause.
4. Colonoscopically sclerosing these bleeding piles have been found to be most successful and safe procedure in the initial arrest of bleeding with least complications.
5. More and more colonoscopies and colonoscopic biopsies is the way of improving the 5 yrs. survival rates of colorectal malignancies. Colonoscopic biopsy provides early diagnosis and provides us with documented evidence prior to embarking on radical surgery.
6. With the advent of video-colonoscopy, the role of clinical medicine has become wider. It has become an extension of physical examination, “being to the eye what stethoscope is to the ear”. Beyond the immediate or primary visual diagnosis lie the interrelated applications of endoscopy to diagnose surveillance and therapy and to education, photography, documentation and research.
7. Therapeutic colonoscopy for lower GI bleeding, colonic stricture dilatation, foreign body removal, management of precancerous lesions & malignant lesions are already well established and were confirmed in our study.

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Corresponding Author:

Dr. Pushkraj Baswant Birajdar,

M.S. Gen. Surgery, DNB Neurosurgery
C/O B.S. Birajdar, Sakar House, Near Jaikranti College, Sitaramnagar, Latur-413512
Maharashtra, India Ph.-(+91)8698312329
Email id: *pushkrajb@gmail.com*

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