Inflammatory Bowel Disease

Chapter 4

Role of surgery for idiopathic inflammatory bowel disease with a focus on postoperative events and their management

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1. Spectrum of Inflammatory Bowel Disorders [IBD]

The inflammatory disorders of bowel are very common in gastrointestinal clinics. These are characterized by intermittent relapsing and remitting course or chronic inflammatory course affecting the gastrointestinal tract and comprise of a spectrum of disorders as shown in **Figure 1** [1].

In this chapter, the focus is on understanding idiopathic IBD, especially ulcerative colitis (UC) and crohn's disease (CD) from a surgeon's perspective with specific focus on life after surgery for this IBD.

2. Natural History of the Disease and its Relevance to Clinical Practice

Idiopathic IBD is relapsing and remitting or chronic progressive disease wherein the disease natural history can be divided into 4 phases based on the disease activity.

Phase I: Detection/diagnosis of disease based on clinical presentation: Active or complicated disease

Phase II: Initiation of treatment and achieving the phase of remission

Phase III: Phase of monitoring to maintain remission and early detection of relapse/complica-

tions

Phase IV: Treatment of relapse and monitoring for progression of disease or complications [2].

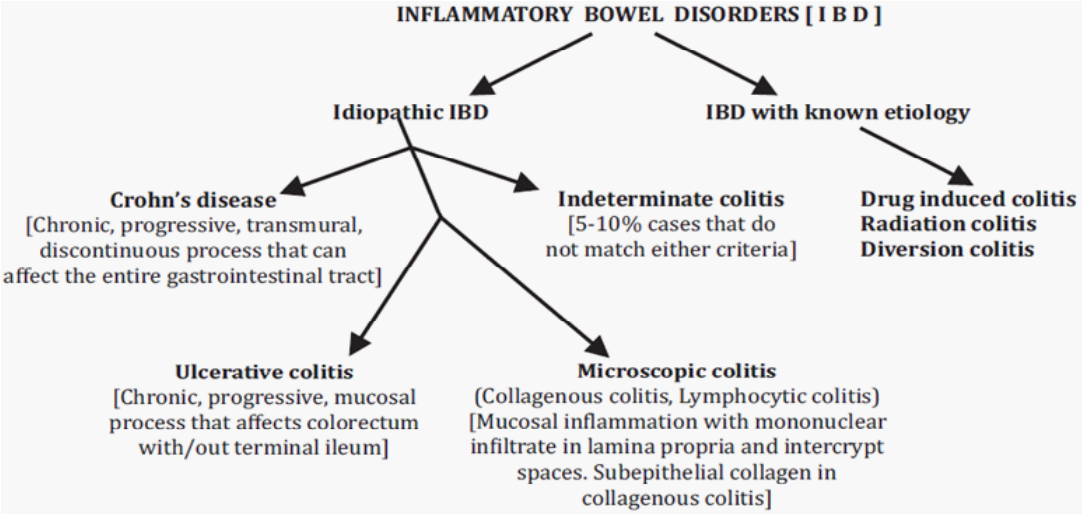

Figure 1: Spectrum of inflammatory bowel disorders

Crohn's disease is often misdiagnosed initially. Nearly 25% of the patients are labeled as irritable bowel syndrome and mean time to diagnose CD often reached upto 2 years from the first symptom. It is progressive in upto 75% patients and as per the Vienna classification, can be inflammatory, stricturing or penetrating. It progresses in the segment where it began and hence, disease location is an important consideration. Progression to neoplasia is now known to be as significant part of natural history as in UC [3].

Ulcerative colitis, on the other hand, progresses as a chronic inflammatory disease state affecting the large intestine and has no other subtypes. Stricturing disease in UC is more suggestive of malignancy. Risk of malignancy is a well known phenomenon in UC. The natural history, its clinical significance and the effect on postoperative complications is shown in **Figure 2** [4].

In both these IBDs, progression to colorectal malignancy is known and the natural pathway of progression to malignancy is different from the sporadic colorectal cancer [CRC]. This is shown in **Figure 3**. Apart from this, Crohn's disease also has chronic fistulae which can result into squamous cell carcinomas at those sites and also has an increased risk of lung cancer and small intestinal adenocarcinoma. Also, the autoimmune, genetic and environmental factors that affect the gastrointestinal tract, also affect the extra-intestinal tissues and produce the extra-intestinal manifestations of the disease [5,6].

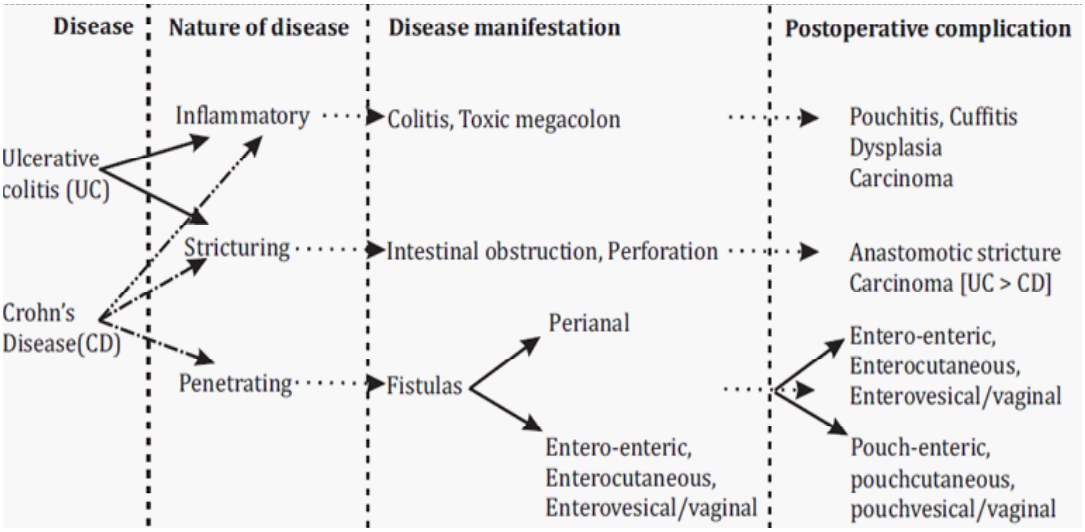

Figure 2: Natural history of disease, pathophysiological basis of clinical presentations and complications after surgery

3. Disease Classification and Measurement of Severity Indices

Classification of CD is based on the Montreal classification or the Paris classification [7,8]. The disease subdivision in either of these is based on age at diagnosis, disease location and behaviour [inflammatory/stricturing/penetrating] and whether there is growth retardation or not. Also, attempts to gauge the severity of disease by using different scoring systems such as Crohn's disease activity index, Harvey Bradshaw index, Oxford index etc., have been made [9].

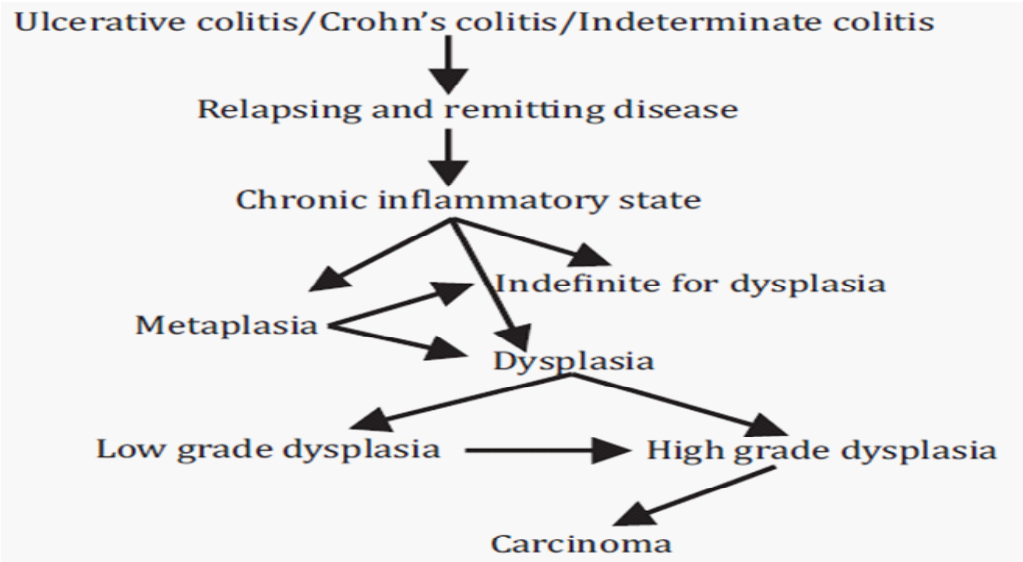

Figure 3: Disease progression to carcinoma in IBD

Ulcerative colitis is classified on the basis of disease extent and severity by Montreal classification. Severity grading has also been attempted using Truelove and Witts classification into mild, moderate and severe disease as well as by Sutherland index. However, the severity gradings are more academic and don't actually guide the treatment pathways. Clinical relevance of these classifications and severity scorings is not yet identified [10].

4. A Surgeon's Understanding of the Medical Options of Management

The first episode of ulcerative colitis is mild in majority of cases and severe UC is seen on first presentation in only about 15-20% cases. More than 50% of all cases achieve remission with first line management with ASA analogues. Upto 35% of the patients relapse in the first year after treatment. If the patients do not relapse in first year, it is a marker of quiescent disease wherein the chances of relapse in the next year is around 20% [1,11].

In Crohn's disease on the other hand, relapses are seen in upto 20% patients in first year, 40% within 2 years and around 80% within 10 years of disease diagnosis. In both UC and CD, incidence of colorectal cancers is 2-5% at 10 years of diagnosis, 5-10% at 20 years of diagnosis and 12-20% at 30 years from diagnosis. In CD, nearly 28% patients may develop small bowel carcinoma and 1-2% patients are at risk for lymphoma, lung cancer and/or cervical dysplasia. Some studies have also confirmed risk of prostate cancer at a higher incidence in these patients [12].

The management of these patients is based on the clinical, radiological, endoscopic and histopathological nature of the disease in each patient. The options for managing these patients are medical, endoscopic and surgical. Complete discussion of medical and endoscopic means of managing these patients is out of scope of this chapter and only the clinically and surgically relevant points are discussed further in these two options.

The **goals of the management** in these patients are

- Achieve the correct diagnosis as the management of different IBDs is different
- To induce and maintain remission – Remission can be defined clinically or in terms of mucosal healing
- Assess for disease progression, complications and carcinoma
- Ensure a good quality of life [QOL] while treating these patients [13].

Salient features of the various medical options for IBD are as shown in **Table 1.**

5. Algorithm of Medical Management of IBD at Our Centre

Our algorithmic approach for the medical management of these patients is summarized in **Figure 4** [14,15,16,17,18].

Table 1: Salient features and role of different medical agents for treatment of IBD

AGENT	SALIENT FEATURES	ROLE IN MANAGEMENT
5- ASA analogues **(Sulfasalazine, mesalazine)** [19,20]	• Does not help in CD for maintaining remission • Has a dose dependent action • Topical + oral is more effective than either alone. Oral and topical alone are equally effective • 15% patients cannot tolerate it • Does not alter the surgical outcomes • Male infertility is a concern with sulfasalazine	Induction and maintenance therapy in UC. Induction therapy in CD. Not for maintenance.
Glucocorticoids [21]	❖ Does not help in maintenance therapy ❖ Steroid resistance* - 20% ❖ Steroid dependence** - 40% ❖ The remaining have a long term response on steroids ❖ **Affects surgical outcomes adversely**	Induction therapy in UC
6-Mercaptopurine (6 MP)/ Azathioprine(AZA) [14,17]	• Take nearly 6 months to show response – need cover during that time with steroids/methotrexate/cyclosporine. • Steroid sparing for steroid dependent patients [better outcomes in combination with infliximab]. • If more than 2 courses of steroids are required in a year or if parenteral steroids are required to achieve remission, these are indicated. • **Reduce colectomy rates** in these patients with severe, refractory disease. • TPMT (Thiopurine methyltransferase enzyme) mutation needs to be ruled out before starting treatment – More chances of cholestasis, bone marrow suppression, pancreatic toxicity and nodular regenerative hyperplasia in these cases. • Mild leucopenia is a good indicator of response and is desirable. • Mantainance therapy is usually continued upto 3.5 years. • 10% patients cannot tolerate it • Relapse rate is 8% • **Does not affect surgical outcomes**	Induction and maintenance therapy in UC and CD
Infliximab [15,16]	❖ Mucosal healing is better than any other agents ❖ Effective option for steroid refractory as well as immunomodulator refractory severe UC/CD cases for induction as well as maintenance ❖ Screening required for tuberculosis, Hepatitis B/C, HIV as well as risk of lymphoma needs to be discussed ❖ For maintenance therapy, it is used with steroid or immunomodulators to prevent the development of Anti-drug antibodies ❖ **Positive influence on surgical outcomes**	Induction and maintenance therapy in CD > UC **<u>In CD -</u>** Early aggressive medical therapy is the paradigm shift
Other biological agents [22,23]	• Adalimumab • Natalizumab – Not used due to risk of progressive multifocal leukoencephalopathy [PML] • Certolizumab/Vedolizumab • Ustekinumab – Subcutaneous drug active against Il-12 and Il-23	May become front line in future

* - Active disease persists despite giving a steroid dose of 0.75mg/kg/day prednisolone equivalent , ** - Inability to reduce steroid dose to < 10 mg/day prednisolone equivalent within 3 months of starting steroid without a disease relapse within 3 months of stopping the therapy.

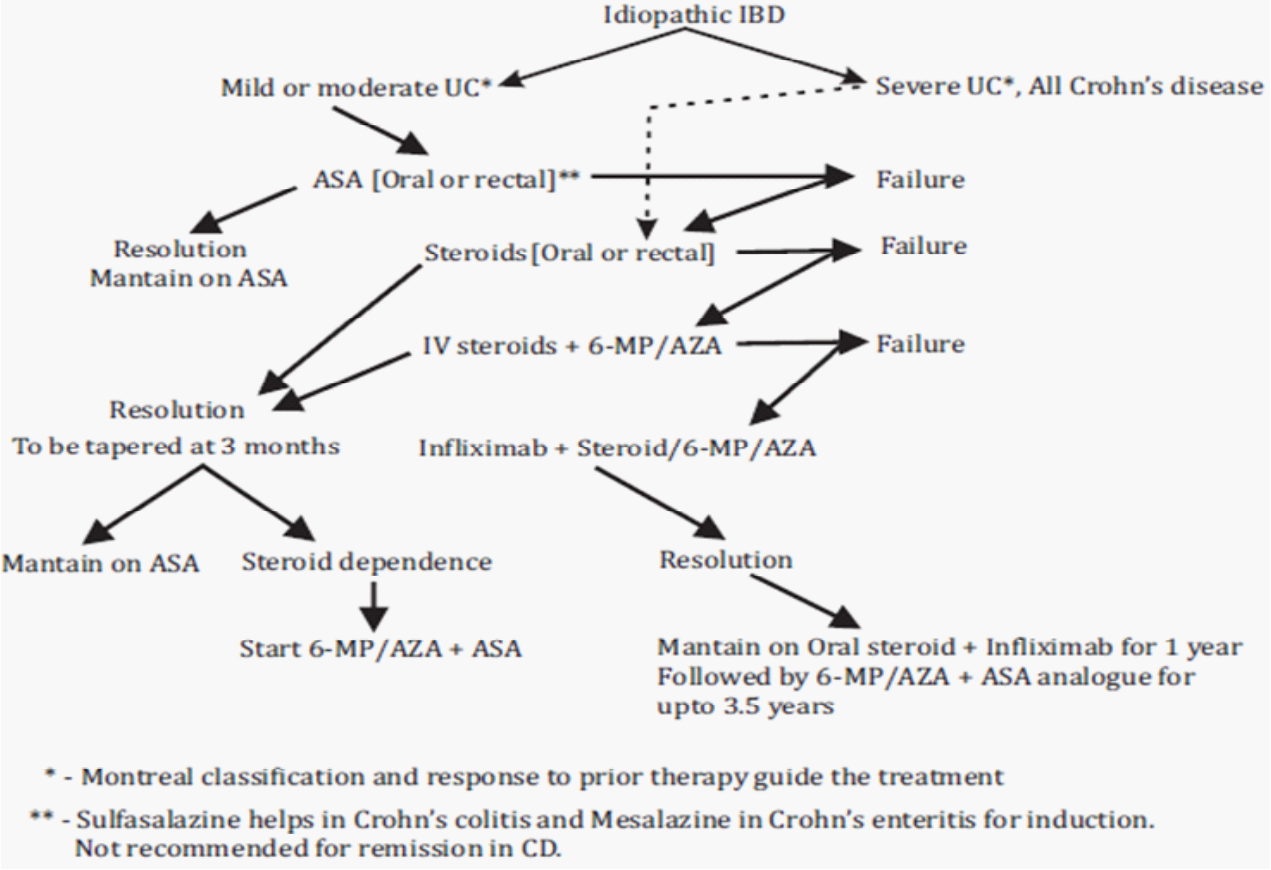

Figure 4: Our algorithmic approach to medical management of IBD

6. Surgical Management of IBD

In ulcerative colitis, 20% of the patients need surgery during the first 10 years after disease diagnosis and nearly 1/3rd of the patients need surgery during the first 25 years of disease diagnosis. Relapse rates are minimal in ulcerative colitis. In Crohn's disease on the other hand, nearly 80% of the patients need surgery at some point in their life which is significantly higher than ulcerative colitis. Also, after the first surgery, 1/3rd of the patients relapse within 3 years and 2/3rd of these require atleast one other surgery during their life. 1/3rd of the patients with Crohn's disease need more than two surgeries during their lifetime. 10% of patients have disease that does not respond to any therapy and is referred to as disabling disease. **Indications for surgery** are as shown in **Table 2** [24,25,26].

Table 2: Indications of surgery in IBD

Emergency Surgery	Elective Surgery
Gastrointestinal bleeding Intestinal obstruction Intestinal perforation Severe colitis/Toxic megacolon not responding to medical therapy in 72 hours of starting treatment	Steroid dependence Steroid refractory disease Non-compliance to medical therapy Suspected/confirmed malignancy Financial constraints to medical therapy Not tolerating adverse effects of medicines
Indications specific to Crohn's Disease Intractable fistula [Enterocutaneous, entero-enteric, enterovesical, enterovaginal] Complex/Simple perianal fistula Growth retardation Intra-abdominal/Pelvic abscess not responding to medical/percutaneous treatment	

7. Options for Surgical Management and Surgical Techniques

Basic principles of surgery for intestines remain the same for surgery even in IBD – To achieve disease free margin and establish continuity of the gut by a tension free, vascular anastomosis. In CD, the principle is of bowel preservation to avoid short bowel syndrome due to the need for repeated surgeries. Also, in CD, patients undergoing surgery early after diagnosis have an increased probability of being re-operated [24,26].

Owing to this observation and also on seeing the excellent response to immunomodulators in CD for various indications, the newer approaches came in CD wherein early and aggressive initiation of immunomodulator/infliximab therapy led to reduction in rates of surgeries. However, for the patients who have already undergone early surgery, the early initiation of this drug therapy does not seem to protect against the re-surgery rates. Hence, it is recommended to avoid early surgery and begin immunomodulator/infliximab therapy as early as feasible in CD which is a big paradigm shift in the management of CD [25].

There are various **surgical options** to take care of the varied clinical presentations and varied disease location in IBD. **For CD**, segmental bowel resections, diverting loop ileostomy and subtotal colectomy with ileostomy are the emergency surgeries. For perianal fistulas/abscess, incision and drainage of abscess, fistulotomy/seton placement/fistulectomy, diverting stomas and advancement flaps are utilized. For strictures due to CD, Heineke Mickulicz stricturoplasty and Finney stricturoplasty or side to side isoperistaltic stricturoplasty are the options [1,27].

For UC, subtotal colectomy with ileostomy is the surgical option of choice in emergency whereas total proctocolectomy with Brooke's or Kock's ileostomy or subtotal colectomy with ileorectal anastomosis [IRA] or restorative proctocolectomy with ileal pouch anal anastomosis [RPA with IPAA] are the treatment options in elective cases. Of these, the surgeries apart from pouch are routinely performed for other indications also and are not discussed at length in this

chapter. A word is mentioned here on technical details of pouch surgeries for UC [28,29].

7.1. IPAA for IBD

The IPAA can be done by a double stapled technique wherein a rectal mucosal cuff of upto 2 cm remains above the anal transition zone or it can be done by hand sewn anastomosis after a mucosectomy which theoretically removes all the rectal mucosa and hence, protects against future risk of malignancy. Hence, the double stapled technique is contra-indicated in cases with dysplasia in lower 2/3rd of rectum. Studies however, have shown no difference in oncologic outcomes when the two techniques are compared [30].

The problem with mucosectomy is that it is not always complete and islands of tissues are often left behind which may lead to malignancy. This rectal cuff is buried behind the anastomosis and hence, is not amenable to endoscopic surveillance or biopsy acquisition. Also, due to extensive retraction during surgery, there is found to be higher risk of sphincter damage and also, because of loss of complete rectal mucosa, there is loss of discrimination between flatus and stool and results in incontinence. Studies have shown a higher rate of nocturnal seepage as compared to the double stapled technique. In addition to these problems, it is difficult intraoperatively because complete mucosectomy and hand sewn ileo-anal anastomosis need additional 2-4 cm of mobilization of pouch to make it reach the lower stump which may be difficult in some cases – May lead to tension on the anastomosis and problems with its blood supply which may predispose to postoperative pouch related complications [31,32].

The shape of the pouch constructed can be S, W or J shaped. S and W shaped pouches are complex to construct. Also, they often dilate excessively over time and lead to fecal stasis and anastomotic stenosis at the ileo-anal end. The S pouch has a long outflow limb and this can cause problems with the emptying of the pouch. Failure rated of S and W pouch are high at nearly 50-60%. J pouch is easier to construct, has less complications than the other two but, has more diarrhea episodes initially. The anatomy of the J pouch is as shown in the **Figure 5** below [33].

7.2. Minimally invasive surgery for IBD

Laparoscopy has evolved slowly for IBD when compared to the other indications. This is because of several factors. The disease is characterized by inflamed tissues, multiple operations and bad planes due to inflammation and previous surgery. Also, patients are often malnourished with low albumin, are anemic, may be on chronic steroids and may have a strong history of smoking, all of which are detrimental to surgical outcomes. In current times, laparoscopy is considered feasible and safe for first elective surgery as well as for emergency surgeries for idiopathic IBD in expert hands with equivalent surgical outcomes. However, no studies have been able to demonstrate conclusively that added benefits of laparoscopy on

postoperative scores and pain scores translate into practice and these benefits have not reached statistically significant levels across studies [34].

Laparoscopy is associated with higher operative times, but, lower blood loss. Penetrating type of IBD has been shown to be associated with higher conversion rates and higher rates of stoma compared to laparoscopy for other indications in IBD. Technological advances in laparoscopy and the advent of robotic surgery have encouraged surgeons to use these modalities in patients of IBD also [35].

Both hand assisted laparoscopy (HALS) and Single incision laparoscopy (SILS) as well as natural orifice specimen extraction (NOSE) and transanal minimally invasive surgery (TAMIS) have all been attempted for IBD surgery and all have cleared the safety and feasibility stage. HALS restorative proctocolectomy is associated with shorter operative times with no other significant difference compared to complete laparoscopic surgery. SILS has not gained fame so far and studies are scanty for this indication. Whether it is beneficial statistically is not yet established. TAMIS has been used for total mesorectal excision to achieve the right plane from perineal side in combination with abdominal surgery in rectal cancer. Feasibility in IBD for rectal disease and complex fistulas has been established whereas long term results on outcomes are awaited [34,35].

Robotic surgery has already demonstrated benefit for rectal surgeries owing to the dexterous hand of robot to work in the narrow pelvis. Nerve preservation rates are higher with robotic pelvic dissections for rectum. Hence, robotic completion proctectomy is a feasible and good option. On the other hand, for other surgeries of IBD, robotic instruments will be required in more than one abdominal quadrant and the cost and time required for these steps may not be as beneficial [36].

8. Life after first Surgery

This is the period where the patient has achieved control of the disease and is on maintenance protocols. The issues here include monitoring for progression of disease, relapse, dysplasia and cancer or extra-intestinal manifestations as well as the complications of the surgery. Focus also needs to be on assessment for lifestyle changes and quality of life issues. These points are now discussed in the remaining chapter and the management of associated problems are presented.

A lot of parameters have been evaluated for use as markers of disease relapse or progression as well as to evaluate the response to therapy such as c-reactive protein, erythrocyte sedimentation rate, fecal lactoferrin, fecal neopterin etc. Only fecal calprotectin levels have been shown to be helpful in this regard. This calcium and zinc binding protein is produced by neutrophils, remains stable in unprepared samples for upto 7 days, helps in differentia-

tion between IBD and irritable bowel syndrome and is more accurate than CRP and ESR for monitoring for disease relapse. Elevation above normal value for 2 consecutive values predict a relapse within the next 3 months with a sensitivity of 95% and specificity of 91%. Regimes for testing have been monthly to 3 monthly across different studies [2].

Response is usually monitored by clinical parameters. Endoscopic documentation of mucosal healing is not mandatory. However, in case of doubt, colonoscopic evaluation in CD or limited sigmoidoscopic evaluation after pouch for UC to evaluate mucosal healing is appropriate [1,28].

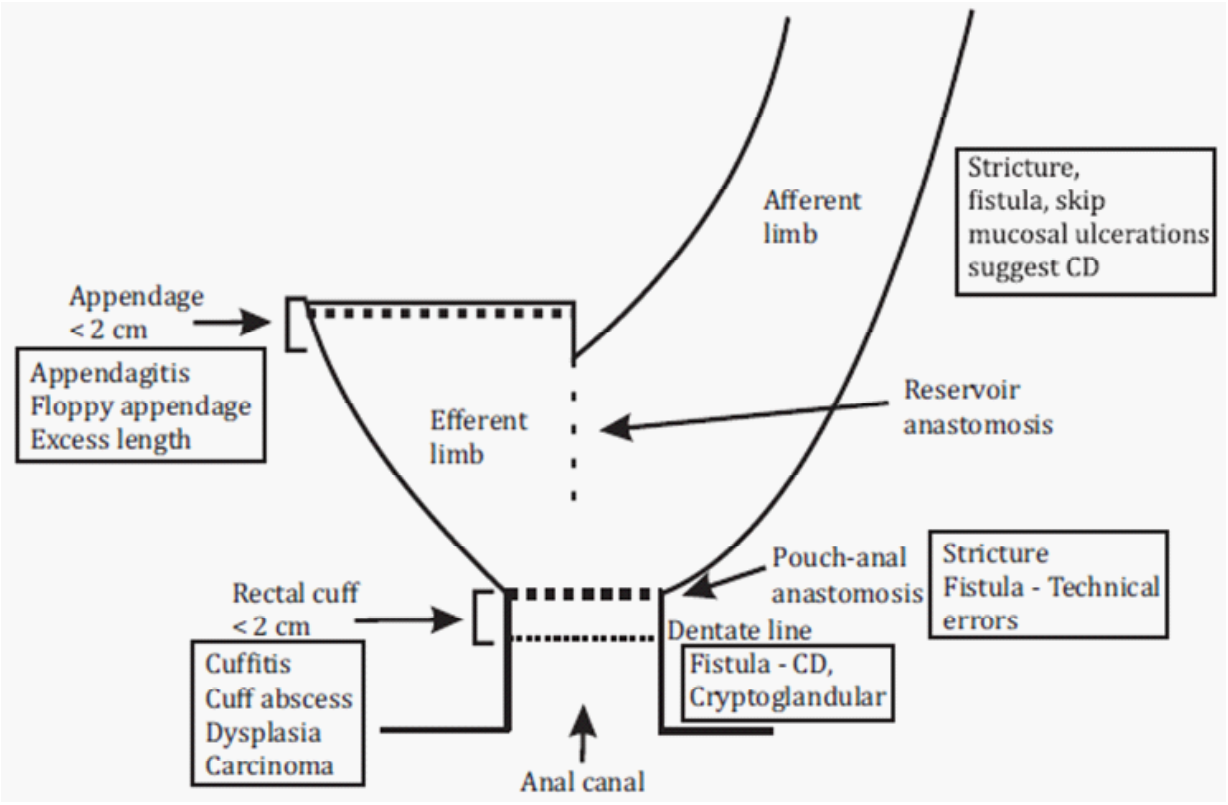

Figure 5: Parts of J pouch and related postoperative events at specific points

Studies have shown that if a patient achieves a clinical remission, the type of surgery i.e. stoma versus pouch does not make a major difference in the quality of life and more than 95% of these patients do recommend surgery to other patients when asked after 5 years of their first surgery. On evaluation of daily activities though, the J pouch performed better in terms of social interaction, recreational activities, sexual life, participation in sports and allied activities etc. However, the difference was not significant overall [37].

Physiologically, these patients have a limited physiological reserve to fight situations with fluid losses. This is because colon can increase its absorptive capacity from 1-1.5 lit/day to upto 5 lit/day in case of need for water. Similarly, colon can cause salt reabsorption to excrete less than 2 meq/day in case of need. With ileostomy or pouch diarrhea in absence of colon, these patients have an obligatory fluid loss of 500-800 ml/day and sodium loss of 30-40 meq/day which is not modifiable. Also, the patients develop vitamin B_{12}, folate and second-

ary bile acid deficiency due to loss of terminal ileum and colon and these need to be replaced. [37,38].

Number of daytime and nighttime defecation episodes range from 6/day and 1-2/night. Incontinence usually increases with time and may double over the next 15-20 years after surgery. However, the overall success rate of pouch is still upto 90%. Sexual dysfunction after IPAA occurs in the form of dyspareunia in 5-7% women and retrograde ejaculation and impotence in 4% and 2% males respectively. Overall life expectancy however, is not changed after the surgery in the long term provided there are no other complications [39].

9. Complications and their Management

The overall morbidity rates have come down due to advances in surgical technology, equipments as well as improved perioperative care of the patient. However, the morbidity rate is still reported around 30-60% and the mortality rate is reported anywhere in the range of 2-17% across the various studies on IPAA. The complications/adverse events/morbidities that can occur after the first surgery for idiopathic IBD are as shown in the **Figure 6** [28,31,32,40].

9.1.1. Pouch related septic complications

Nearly 20% of the patients have septic complications of which upto half have abscess which can be pelvic abscess, intra-abdominal abscess or anastomotic cuff abscess. The process usually starts as an anastomotic leak in 1/3rd of these patients which can be from pouch anal anastomosis > reservoir staple line > end of the appendage.

Anastomotic leak is more common in obese patients, patients operated at an age > 50 years and those on long term steroid use. Surgeon inexperience is also associated with this complication. Clinical presentation is similar to cases of GI leak usually with patient developing features of sepsis towards the end of the first postoperative week or may present with altered drain output or wound discharge. Some anastomotic leaks present later as a persistent small enterocutaneous fistula. Diagnosis can be achieved by using computed tomography [CT] scan with rectal contrast {may demonstrate a leak/mesenteric stranding/extravasation of contrast/extraluminal air}. Gentle pouchoscopy can visualize the leak in case of doubt. Antibiotics, bowel rest and percutaneous drainage in case of need are the intial management options. However, more than half the cases may need surgery wherein, if the defect is easily visible and small with good bleeding edges, a primary repair with diversion loop ileostomy can be done. In all other cases, options include lavage and diversion or pouch excision with permanent ileostomy as a last resort [28,41].

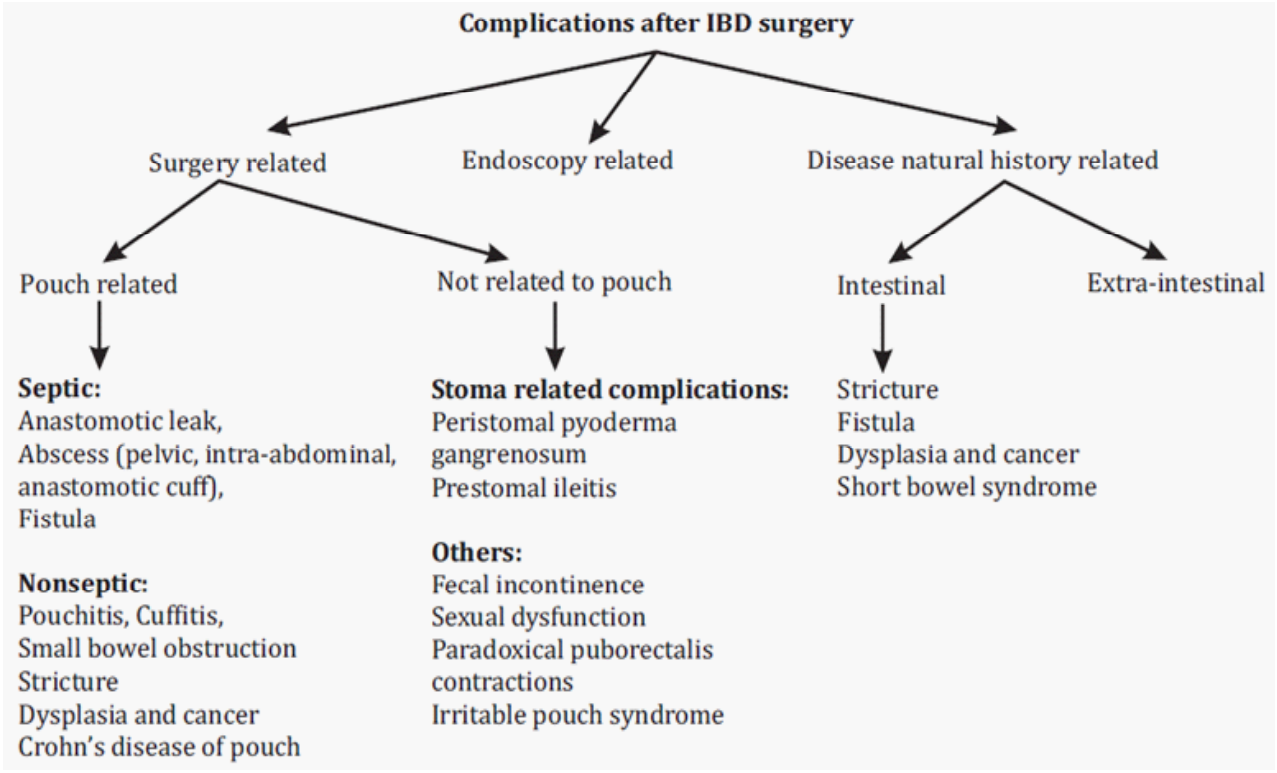

Figure 6: Complications in the postoperative life after first surgery for idiopathic IBD

Abscesses can be intra-abdominal, pelvic or anastomotic cuff abscess. Anastomotic cuff abscess is unique to hand sewn pouch anal anastomosis with mucosectomy wherein bleeding after mucosectomy and resultant hematoma and anastomotic dehisence with secondary infection from above via the pelvic space or ascending infection from the anastomotic leak site may lead to this abscess. Anastomotic leaks and vascular compromise of the pouch result in an abscess soon after surgery. Delayed presentation should raise a flag to evaluate for CD. CT scan with rectal contrast, magnetic resonance imaging [MRI] of pelvis for perianal sepsis and/or fistula, examination under anesthesia and/or pouchogram are useful investigations here to achieve a diagnosis. These are preferably drained transanally if feasible to avoid fistula creation which is a possibility after trans-perineal or trans-vaginal drainage. If it does not resolve or in cases of abdominal abscess, laparotomy may be required to drain the abscess with/out diverting stoma or delay of the stoma reversal in case of a pre-existing stoma, in case of a leak. It is a major cause of pouch failure in upto 30-40% cases [42].

Pouch fistulas can arise from appendage, afferent or efferent limb, reservoir suture line or from the pouch-anal anastomosis. The other end of the fistulous opening can be skin, vagina, urinary bladder or other intestinal loop. Most common of these is pouch-vaginal fistula. Overall incidence is around 3.5% across studies. Fistula resulting from anastomotic leak followed by abscess is the most common event. Other factors resulting into a fistula include improper application of stapler during pouch creation or CD of the pouch. On the basis of cause, presentation can be **anastomotic site fistula** in cases of surgical error or anastomotic leak, **perianal fistula** in case of CD and fistula at and around the **dentate line** in cases of cryptoglandular origin [43,44].

Clinical presentation is soon after surgery in case of technical errors. However, delayed presentation nearly after one year of surgery is more common. Examination under anesthesia with per vaginal and per rectal examination, pouchoscopy and contrast enema or CT with rectal contrast are the useful investigations. MRI is very useful in cases of complex fistulas or in cases of diagnostic confusion. Biopsy is required in cases of suspected CD [40].

Management of a fistula follows the same protocols as for any other cause of fistula viz. fluid and electrolyte balance, sepsis control, wound management, nutrition, evaluation and planning for definitive surgery and finally post-surgery care. Specifically in IBD, local(transvaginal or perineal) approach is preferred for low lying fistulas at the pouch-anal anastomosis with/out local advancement flaps. Abdominal approach to repair is utilized in high fistulas(above the pouch-anal anastomosis site) wherein the patients may also require diverting loop ileostomy for sepsis control. Collagen plugs with/out buttons to plug the fistulas, excision of fistula and primary repair with mesh partition of the two organs are other options [40,43,44].

Nearly 20-25% patients end up with pouch failure leading to permanent ileostomy because of recurrent or refractory fistulas. Medical management with infliximab has been shown to benefit these patients. Surgical timing with infliximab dosing is essential. Initial dosing is at 0,2 and 6 weeks followed by 8 weekly doses wherein surgery is planned 4 weeks after the dose and the next dose is given 4 weeks after the surgery [44,45].

9.1.2. Non-septic pouch related complications

Pouchitis is an idiopathic, nonspecific inflammation of the ileal pouch. It is the most common of the pouch related complications seen in upto 40% of the cases for ulcerative colitis and only around 8-10% cases after pouch construction for familial adenomatous polyposis(FAP). Its incidence increases with the duration after surgery and upto 75% of the patients suffer from pouchitis atleast once within 20 years of the surgery for its creation. The most common time period is the postoperative 6 month period after diverting stoma closure if it was created. Etiology is not known. Risk factors include duration of ulcerative colitis prior to surgery, duration of stoma prior to closure and number of surgeries required before pouch creation or for pouch creation. It is of two types – Acute and Chronic as shown in **Table 3**. It must be remembered that acute and chronic are based on symptom duration [46,47].

Table 3: Differences between acute and chronic pouchitis

Acute pouchitis	Chronic pouchitis
Symptom duration < 4 weeks	Symptom duration > 4 weeks
Presentation is delayed after stoma closure	Presentation is early after stoma closure
Incidence – 7-8%	Incidence – 10-12%
Patients have low level of pANCA activity	Patients have high level of pANCA activity
Extra-intestinal manifestations – Primary sclerosing cholangitis, history of long term steroid use and smoking predispose	Postoperative complications after pouch surgery predispose. Smoking is protective
Antibiotic responsive	Antibiotic dependent or refractory

Clinically, these patients have **intermittent or persistent** symptoms related to pouch as well as systemic symptoms related to the inflammatory process and its systemic effects. **Local symptoms** include abdominal cramps, fecal urgency, bleeding per rectum and tenesmus. **Systemic symptoms** include fever, anemia, electrolyte disturbances and generalized discomfort and malaise [47,48].

Diagnosis is aided by the scoring systems such as Pouchitis disease activity index(PDAI) whereby clinical, endoscopic and histologic features are clubbed together and a score ≥ 7 is diagnostic for pouchitis. Endoscopically, the mucosa is edematous, friable with loss of vascular pattern due to edema. Also, there may be mucosal granularity, mucoid exudates covering the mucosa or mucosal ulcers. Biopsy features show villous atrophy or distortion of crypt architechture or mucosal polymorphonuclear infiltration and ulceration. Management algorithm is as shown in **Figure 7** [28,48,49].

Cuffitis is chronic, nonspecific inflammation of the retained cuff of rectal mucosa just above the anal transition zone in double stapled technique of pouch reconstruction. Incidence is lower than pouchitis and is around 15%. Clinical presentation is similar to pouchitis and its medical management is on the same lines as for pouchitis except that the antibiotics are not useful for cuffitis and hence the management protocol starts with topical steroids and mesacol enemas. Refractory cuffitis is managed surgically by combined abdominal and perineal approach to perform complete mucosectomy and pouch advancement with re-anastomosis and almost always a diverting loop ileostomy to be closed at a later date [28,46].

Small bowel obstruction is seen in upto 20% cases. Intestinal obstruction in these cases can be because of structural reasons or non-adhesive obstruction and adhesive obstruction which can present within 90 days (early) or after 90 days (late). Usually, structural causes lead to early intestinal obstruction whereas adhesive obstruction presents late. The management of adhesive obstruction follows the same principles as for any adhesive intestinal obstruction [50]. Structural causes need specific management and this is as follows:

Anastomotic stenosis at pouch-anal anastomosis – Repeated anal dilatations with Hegar's dilators

Redundant and long dilated appendage (> 2 cm) – Revision pouch surgery with excision of the excess appendage

Floppy pouch reservoir – Laparotomy with pouchpexy to sacrum and in severe cases, revision pouch surgery with creation of a jejuna pouch or pouch excision with permanent ileostomy

Pouch volvulus – Untwisting of pouch and pouchpexy or pouch excision

Pouch prolapse – Mucosal prolapsed can be managed with stool bulking agents and biofeedback therapy and if it does not resolve on that, trans-anal mucosal excision can be performed. Full thickness prolapsed requires laparotomy with pouchpexy or pouch excision and permanent ileostomy [28].

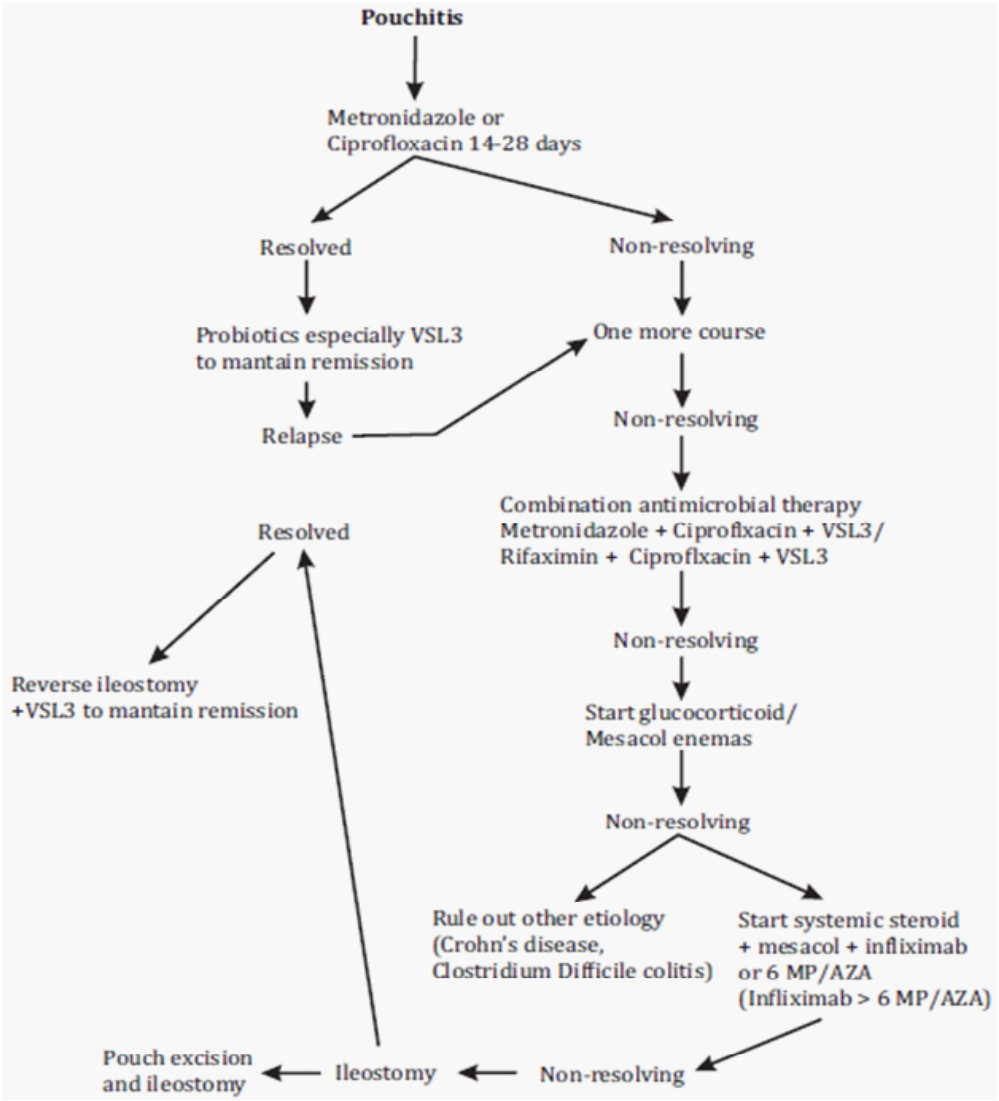

Figure 7: Treatment algorithm for pouchitis

Postoperative strictures occur at an incidence of 10-15% after these surgeries. Patient factors(obesity, smoking), surgeon factors (hand sewn anastomosis, anastomosis under tension, poor blood supply of pouch) and presence of diverting ileostomy are the risk factors for postoperative strictures. Stapled anastomosis usually result in short, non-fibrotic strictures which are manageable with endoscopic dilatation whereas hand sewn anastomosis with mucosectomy results in long and fibrotic strictures which are difficult to manage endoscopically and are managed with transanal advancement flap anoplasty. If the stricture is proximal to afferent limb, strong suspicion should be made for CD and if identified, it is managed as for CD strictures by strictureplasty/bypass and medical management. The last resort is pouch excision. [51].

Dysplasia and carcinoma are also reported after IPAA. Squamous cell cancer at the perianal region, adenocarcinoma of the pouch or the afferent limb are all possibilities. Hence, surveillance is recommended for patients at high risks for these events viz. patients with history of primary sclerosing cholangitis, or cancer in the resected colonic specimen or history of ulcerative colitis more than 10 years duration. Surveillance scopy in these patients is recommended every year. All other patients can be followed up with endoscopy 5 yearly [52,53].

Crohn's disease of the pouch is one of the most common reasons for pouch failure and its incidence is around 10%. As discussed in natural history of CD, in pouch also, the disease is suspected when inflammatory, fibrotic or penetrating disease occurs in pouch or its vicinity. Thus, CD of pouch is suspected when patient has inflammatory disease characterized by recurrent (> 4) episodes of pouchitis for 2 consecutive years which may be antibiotic resistant or has penetrating disease in form of perianal or small bowel fistulas or has fibrotic disease with afferent limb strictures or any small bowel long segment stricture [54].

Risk factors include a pouch surgery for indeterminate colitis preoperatively and a patient with family history of CD or having history of perianal fistulas or intestinal strictures or in active smokers. The disease usually manifests itself after the diverting stoma is reversed and can be early onset (within months) or late onset (within years) after the stoma closure.

Treatment is same as for CD. Patients with refractory disease to conventional treatment, young age, history of steroid use, fistulizing disease especially the pouch-vaginal fistula have a poor prognosis for pouch preservation. Nearly 30-80% will eventually require pouch excision. 6 MP/AZA has achieved good response rates for fibrotic CD whereas infliximab has achieved a good response rate for all the types of CD not responding to conventional treatment. The widespread trend towards early aggressive medical therapy in CD may translate into lower rates of pouch failure in future [54,55].

9.2. Stoma related complications

General complications related to small bowel stoma such as stoma diarrhea, peristomal excoriations, stoma proplapse, mucocutaneous separation, parastomal hernia and stomal obstruction are all possible after this surgery and the management is the same as for other cases. Specific issues related to IBD patients with stoma are discussed below.

Prestomal ileitis can occur secondary to IBD recurrence or due to bowel obstruction and can present with systemic signs of sepsis, anemia and endoscopy will show multiple ulcers in the pre-stomal ileum. It is more common in CD than in UC and the management will depend on the cause.

Pyoderma gangrenosum is a severe, debilitating dermatologic manifestation more common with UC than with CD that presents with sterile pustular eruptions with/out ulcerations which may get secondarily infected. Medical management is preferred with steroids initially and immunomodulators and infliximab are reserved for refractory cases. Relocation of stoma does not help in most cases because the disease can recur at the new site [28,50].

9.3. Events related to the natural history of the disease

The presentation and management of extra-intestinal manifestations is similar in pre-surgery and post-surgery period and is not discussed at length here. Instead, the focus is on intestinal disease progression and associated manifestations and their management.

9.3.1. Recurrent strictures

Recurrent strictures is the most common disease related event in patients after surgery for CD. The rates go upto 35-80% in these patients. Risk factors include history of smoking, multiple previous intestinal resections and anastomosis, presence of ileal disease and presence of >50 cm diseased bowel (extensive disease). CT scan with contrast helps in differentiating inflammatory from fibrotic strictures. Endoscopy, with its advanced techniques such as double balloon or single balloon endoscopy and push enteroscopy, help in achieving diagnosis as well as treatment. Also, endoscopy can be performed intraoperatively in cases of need [56].

Medical management works well for inflammatory strictures. Gentle endoscopic dilatation with/out self expanding metal or bioprosthetic stents for 4 weeks followed by stent removal is also a feasible option for endoscopic management of these cases. For anastomotic strictures, endoscopic dilatation and intralesional steroid injection followed by endoscopic needle knife electro-incision under ultrasound guidance are the treatment options. Surgery is indicated in cases with fibrotic strictures or in strictures associated with fistulas/abscess/malignancy as well as strictures longer than 5 cm or strictures close to ileocecal junction where endoscopic management will not be possible [57].

Surgical options include strictureplasty or resection and anastomosis. Heineke Mickulicz strictureplasty is used for strictures < 10 cm length, Finney's strictureplasty is used for strictures between 10-20 cm length and side to side isoperistaltic strictureplasty is preferred for longer strictures. As mentioned before, stricture rates are high and these patients are prone to short bowel syndrome. Hence, principles of bowel conservation are of utmost importance in these patients [56,57,58].

9.3.2. Fistulas

Fistulas in these patients can be perianal or abdominal – entero-enteric, entero-cutaneous, entero-vesical or enterovaginal. For all the fistulas apart from the perianal fistulas, the management is the same as for other cases. Perianal fistulas are discussed next. These are debilitating, recurrent events in CD. They can be simple or complex same as in other fistulas. The disease can be associated with abscess, stricture, fissure or ulcer in the perianal region. Perianal disease is associated most commonly with colorectal CD (40-45%), small bowel involvement (25%) and isolated perianal disease in the remaining patients [59].

Examination under anesthesia is the best to diagnose the presence and extent of fistula. MRI pelvis is the best modality for diagnosis and nature of the fistula. Endoscopic ultrasound (EUS) is the best investigation for the assessment of involvement of lower pelvic musculature. Management begins with sepsis control and antibiotics. 1/3rd to ½ of the patients need surgery for sepsis control inspite of antibiotics. The algorithmic approach that we use to manage perianal fistulas in these patients is shown in **Figure 8** [60].

9.3.3. Short bowel syndrome

Short bowel syndrome has the same manifestations, diagnostic criteria and management options as for any other case and hence, is not discussed in detail here. These patients are also at risk for ***gall stones and renal stones*** and the management outline is similar to other cases due to different etiologies.

9.3.4. Dysplasia and cancer

Dysplasia and cancer are known events in the natural history of IBD. Long standing colitis (> 10 years), extensive colitis (> 50% colon involvement), pancolitis (disease upto or proximal to hepatic flexure), young males (< 45 years age), colitis associated with dysplasia on biopsy and history of primary sclerosing cholangitis are known risk factors for malignant transformation. UC and CD have the same risk of carcinogenesis [61,62,63].

The disease is important to recognize because the mean age of cancer diagnosis in these patients is less (10-20 years earlier), disease is more commonly multicentric (nearly double incidence of synchronous disease), associated dysplasia can be present away from cancer sites

in IBD, p53 mutations are more common and Ras mutations are less common and late and the tumors are often poorly differentiated, anaplastic and mucinous when compared to sporadic cancers.

Diagnosis and management is based on the recent SCENIC recommendations. Surveillance is began after 8 years of diagnosis of pancolitis and after 15 years of diagnosis of left sided colitis as the risk of malignancy is low in left sided colitis. For all the above mentioned risk factors, the surveillance endoscopy is done yearly. In all others, the test is performed 5 yearly. Also, the patients with first degree relative with colorectal cancer at age < 50 are at high risk and the surveillance in these is also carried out yearly. Chromoendoscopy and targeted biopsy is now the preferred endoscopic method of surveillance if available as it has shown to increase the dysplasia detection rate by 7%. The previously used 4 quadrant biopsy every 10 cm recommendation is no longer an absolute requirement for surveillance now [64].

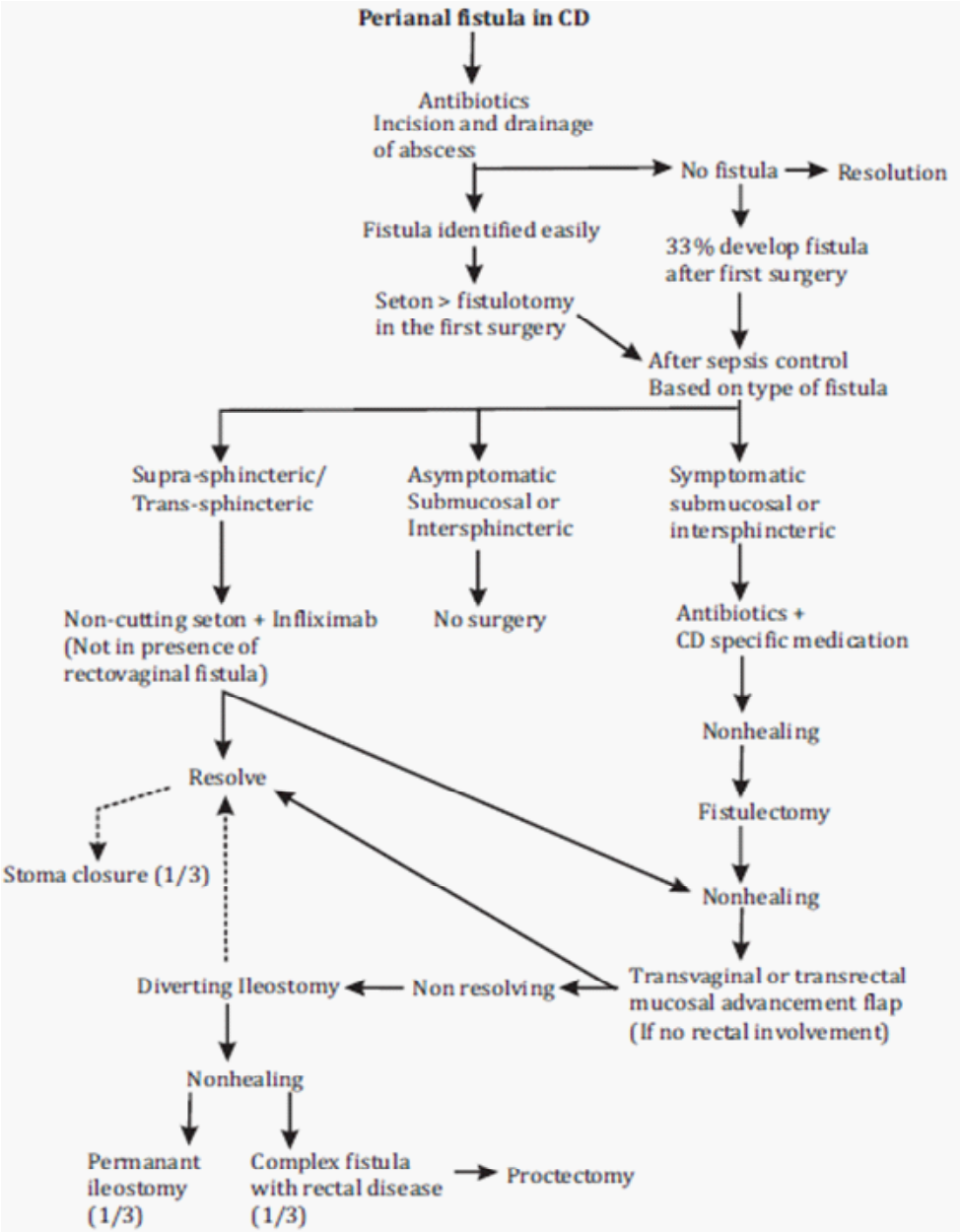

Figure 8: Algorithmic approach to management of perianal fistulas associated with CD

If a lesion is identified on endoscopy, the Paris classification is followed for the lesions identification and their management which is as follows:

- Ip or Is (Polypoid lesion pedunculated or sessile) – Endoscopic mucosal resection
- Non-polypoid lesion – flat but elevated with/out mild central depression (IIa,IIb) – Endoscopic mucosal resection
- Non-polypoid lesion but IIc (flat and nonelevated, mucosal depression and raised edge) – Endoscopic submucosal dissection
- Margins not distinct, high grade dysplasia, carcinoma – Total proctocolectomy and depending on the lower two-thirds of rectum, pouch if no cancer or high grade dysplasia there, ileostomy if cancer is present there and handsewn pouch with mucosectomy if high grade dysplasia is present there [64,65,66].

10. Conclusion

There are a lot of issues to take care of in patients with IBD even after their first attempt at medical and surgical management is over and remission is achieved. These events need to be understood and standardized management guidelines need to be understood to treat these complex situations and provide these patients with a disease free good quality of life.

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