

Evolution of Colorectal Surgery in India

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Introduction

Colo-Rectal Surgery has evolved over last 30 years slowly but steadily. Way back in 1970's it was realized by Late Dr. R. K. Menda that proper evolution of Colo-Rectal Surgery cannot take place unless a dedicated and dynamic section is created within A. S. I. After 2 or 3 unsuccessful attempts, The Association of Colo-Rectal Surgeons of India (ACRSI) was formed in 1977. Started then with only seventeen members, now it can boast of almost 1000 members. Having taken great strides over the years, it is the most vibrant section of A. S. I. today. It was a big milestone in evolution of Colo-Rectal Surgery in India and hence it will be appropriate to see its contribution and impact.

Historical

Sushrut about 1000 to 2000 BC in his Sushrut Samhita described Incision and Drainage of Perianal Abscesses. He also described ligation of piles and devised some instruments for ano-rectal surgery. In 1835 Fredric Salmon in London started a hospital for the treatment of Piles, Fissure and Fistula which was the fore runner of St. Mark Hospital, London in 1836. After that, few specialty centres of Colo-Rectal Surgery were started in USA and some other countries. They also formed associations like American College of Gastro-Enterology, International Society of University of Colon and Rectal

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Surgeons, American Proctologic Society, International Academy of Proctology etc. Dr.R.K.Menda was already associated with these associations either as a member or a fellow. Hence he had an intense desire to establish this specialty in India and later on in Asia. Evolution of Colo-Rectal Surgery in India can easily be discussed under following headings.

Scientific contributions of ACRSI

The ACRSI organizes conferences, basic and advanced instructional courses and training programmes for specialization in this specialty. It conducts fellowship examination to give recognition to those who desire to practice this specialty. It offers scholarships in the form of travelling fellowships and visiting professorships at both national and international levels. The association honors the senior specialists by inviting them to deliver orations and guest lectures. It publishes the Journal of Colo-Rectal Diseases and invites research projects. The association has prepared teaching material in the form of books, videos and CDs of live operative procedures.

Dr. P.N. Joshi with the help of Dr. Parvez Sheikh made recordings of almost all Ano-Rectal procedures in the form of video and CD which became very popular and has contributed a lot to impart the training.

To provide teaching materials, proceedings of Basic and Advance Courses were brought out by Dr.Prasad and Dr. Kum Kum Singh, Dr. Sivalingam, Dr. Shekhar Suradkar and Dr. Chivate, Dr.Parvez Sheikh and Dr. M.M.Begani, and others. Dr. Sivalingam

published his book on Surgery of Colon, Rectum and Anus.

ACRSI actively participates for 2 full days at all ASICON conferences and draws maximum no. of delegates during the scientific sessions. It also organizes 1 day CMEP and updates in various cities along with hands-on training on bowel anastomosis and staplers. Eminent companies like Johnson & Johnson invites faculty from ACRSI to conduct professional Education activities at their faculties which are endorsed by ACRSI.

Contribution by Members

It was the contribution of office – bearers and members which helped to evolve Colo-Rectal Surgery in last 25 years. The credit goes to all Presidents, Secretaries, Treasurers and Executive Committee members of ACRSI who were totally committed and dedicated towards the progress and evolution of colo-rectal surgery. They all participated actively at all Annual and Midterm National conferences giving the benefit of their experiences to the members and surgeons at large. So many members have played major role in this evolution that it is not possible to mention all the names. Contribution of Presidents and Secretaries was so outstanding that some of them were subsequently elected as Presidents of ASI.

Establishment of Coloproctology Departments

Dr. R. K. Menda was responsible for starting first department of Coloproctology at Grant Medical College and G. T. Hospital in Mumbai in year 1967. Dr. H. L. Chulani, and Dr. P. N. Joshi were associated with him and developed full-fledge department over the years. They together contributed mainly towards the evolution of anorectal surgery. It was the first of its kind in the country and probably in Asia and helped to create

awareness of this specialty. It also organized National and International conferences.

Subsequently Colorectal department was established by Prof. Sivalingam at Madurai Medical College which then continued to operate under Prof. K. S. Maylivaganan. In some medical colleges & hospitals, colorectal department is part of Gastrointestinal Surgery. Last to be added is a Colorectal Department at Sir Gangaram Hospital at New Delhi under Dr. Vijay Arora and also at Bharatiya vidyapeeth at Pune.

Organisation of National and International Conferences

In the year 1968, Dr.R.K.Menda , Dr. S.J. Aptekar and Dr. I.D. Sood organized the International Seminar on the Diseases of Colon-Rectum and Anus at Taj International Hotel. Many international dignitaries participated in the programme. In 1974 under the banner of Asian Federation Society of Colo-Rectal Surgery, the First Triennial Conference of the Asian Society of Colo-Rectal Surgery was held at Hotel Taj International Bombay. In the year 1975 on behalf of International Academy of Proctology the conference was organized at Bombay, Jaipur and Delhi.

In the year 1978 the first sectional programme of ACRSI was organized along with annual conference of ASI at Gauhati. Dr. R.K. Menda, Dr. Arthur Desa, Dr. T.E.Udwadia, Dr. J.N. Ravalia, Dr. P.N. Joshi, Dr. H.L. Chulani, Dr. Rangabashyam, Dr. R.S. Sinha, Dr. I.T. Khubchandani, Dr. D.P. Sanan and many other members contributed a lot at this conference and later on to the association at its annual programmes. From 1982 onwards additional Midterm National conferences were organized which were independent of ASI conferences.

Deliberations at this conferences on various

topics helped to bring out evidence based and experienced based surgery and changed the concepts in management of piles, fissure-in-ano, fistula and also change from open to laparoscopic surgery.

Basic and Advance Courses

In 1996 under the able secretaryship of Dr. P. K. Jhawer, Basic and Advance courses in Colorectal Surgery were started. They are continued even today. It has played an outstanding and major role in spreading the knowledge of this vast specialty. Basic course is conducted in March – April and Advance Course in September and are booked and announced two years in advance. Appropriate subjects and faculty are selected by Academic Convenor. Dr. Ashok Ladha has played a major role in initiating these courses.

Fellowship Examination (FACRSI)

Efforts were made to obtain MCh degree from the University of Bombay and DNB from National Board by Dr. P. N.Joshi and Dr.P.Sivalingam but they did not succeed.

ACRSI has now successfully initiated a dialogue with National Board to recognize some surgical units as centres of teaching for DNB in coloproctology. Hence in 1996 under the able secretaryship of Dr.P.K.Jhawer the decision was taken to conduct the Fellowship Examination on FRCS (Ed) basis. Dr.R.B.Singh who was already associated with the training programme and fellowship examination of FRCS (Ed) designed the pattern of examination. The candidates who were 3 to 5 years in surgical practice post M.S. were required to attend two courses: the Basic Course and the Advanced Course. Only those who attended these courses were eligible to appear for the fellowship examination.

The fellowship examination is in three parts.

Part I – Written examination – MCQ + short notes

Part II – Written examination – Essay Type Questions and three Tables.

Table 1- Viva – Basic Sciences

Table-2- Pathology and X-rays – imaging systems

Table-3- Instruments and operative procedures

The candidates had to submit the log book of the Colorectal procedures conducted by them or assisted by them over a period of 3 years.

Part III – Consisted of Clinical Examination: Short Cases and a Long Case. The candidates were supposed to appear for the part one first and if they cleared it then only they were eligible to appear for part two and similarly after clearing part two they will be eligible to appear for part three.

The first Fellowship examination was held in the year 2000 in Mumbai. Fellowship examination has been conducted all these years without interruption. Even many senior surgeons appear for this examination and that indicates its acceptance and its value. Till date 56 fellows have appeared for this Fellowship (FACRSI) and Honorary Fellowship has been awarded to 28 Fellows.

Institution of Orations, Fellowships, Guest Lectures and Medals

In the year 1991 two orations were instituted; Dr. R.K. Menda oration by the donation from his family members and Dr. Harry Bacon Oration with the assistance of Dr. Indru Khubchandani financed by Harry Bacon Foundation. Dr. R.K. Menda Visiting Professorship and Travelling Fellowship were also introduced. Ethicon Visiting Professorship of ACRSI was instituted in the year 1995 by the good offices of Dr. H.G. Doctor. Dr. V.B. Naikwadi brought the

donation from J.G. Co-operative Hospital for awarding the Gold Medal for the Best Free Paper. Unfortunately Harry Bacon Oration has lapsed due to paucity of funds. ETHICON Endosurgery also sponsored 4 Travelling Fellowships, 3 Visiting Professorships, as well as one overseas Travelling Fellowship. In the year 2005 Dr. Indru Khubchandani oration was instituted funded by Khubchandani trust. From the year 2007, Dr. P.N. Joshi's Oration at the time of National Conference and Guest lecture at the time of Annual Conference has been instituted. Recently one Overseas Travelling Fellowship has been offered by Hargobind Foundation and Two International Travelling Fellowships offered by Zydu Alidac. All these activities and achievements indicate the prestigious position of ACRSI today in surgical arena and has helped its members to learn and practice latest advancements in colorectal surgery. All these scientific activities have boosted up the interest of General Surgeons in colorectal surgery.

Live Workshops

Apart from conducting Basic and Advanced Courses and CMEP, live workshops were always conducted all over India whenever there was a meeting of ACRSI. Many of the office bearers and Ex. Com. Members used to travel at far of places to demonstrate surgical procedures.

Every year Advance Course is associated with 2-3 days of Live Workshop. In addition, ETHICON visiting professors every year spend a week to ten days at a stretch to demonstrate live procedures.

Outstanding contribution to live workshops has been by Dr. P. N. Joshi ably supported by Dr. Khubchandani, Dr. P. Sivalingam, Late Dr. Jhaver, Dr. V.B. Naikwadi, Dr. Ashok Ladha, Dr. R. B. Singh, Dr. K. S. Mayilvaganan and Dr. Parvez

Sheikh.

These workshops were conducted from Srinagar to Kanyakumari and from Mumbai to Kolkata right across the country.

Simple yet common Anorectal procedures as well as complex procedures were demonstrated. This has helped to install confidence in the members to carry them out on their own.

International Faculty

In every Mid-Term and Annual Conferences International Faculties Participated actively and contributed by delivering prestigious orations, Guest Lectures and Moderating Scientific sessions. They were from U.K., Australia, Singapore and USA Prominent among they were Russel stitz, Hedi, Nelson, David Bartolo, Saumitra Banerjee, I.T. Khubchandani, Wilson Hendry, Denis Nyam, Mata, Kiran Lodha and Michael Parker and Karandikar. They enthused all our members and provided latest advances in colorectal surgery.

Journal of ColoRectal Diseases

The official journal of the Association of Colon and Rectal Surgeons of India was started in 1986. It was called the 'Journal of Colo-proctology'. Dr. Momen was the editor, and Dr. PK Mukherjee was the Emeritus Editor, while Dr PK Biswas was the Editorial Secretary. In 1997, Dr. P Jagannath took over as Editor of the journal and continued until 2006. Dr. PJ Shukla was appointed the editor-in-Chief of the Journal in 2006. The journal's name was changed to 'Journal of ColoRectal Diseases'. The journal is published from Mumbai as a Quarterly. The Editorial team comprises of experts in the field, and has both national and international representation.

Practice Parameters

The availability of multiple modalities of

treatment for many colorectal diseases at times confuses an average general surgeon as to the best modality to offer his patients. The lack of standardization in the management aspects prevents us from adopting the best scientific approach to treat our patients. The ACRSI has proactively taken a step towards standardizing the treatment for few of the common colorectal disorders by formulating practice guidelines for them. This is probably the first attempt by any speciality association to lay down guidelines for the surgical fraternity at large. The committee comprising of senior colorectal national faculty, set up by the ACRSI has met on several occasions at various venues across the country to formulate the practice guidelines and few of them are already ready to be published. The lack of Indian data compelled it to refer to the American guidelines while framing our own. We however strongly hope that more and more Indian literature is published over these years due to the encouragement given by the ACRSI to many young FELLOWS, that the revised guidelines whenever formed would be based on our own data. The role played by ZYDUS ALIDAC in supporting this activity is commendable.

Evolution of ColoRectal Surgery in India

Having seen the impact of various organizational activities of ACRSI, we will now briefly see the evolution in some of the specific diseases.

Amoeboma, amoebic granuloma

Early in 70's and 80's, amoeboma and/or amoebic granuloma and/or amoebic granuloma was not uncommon. It used to occur either in low rectum and caecum. It was necessary to rule out malignancy. It used to be a soft diffuse mass with or without

history of amoebic dysentery. Inj Emetine or Inj Dehydroemetine were drugs of choice and they acted dramatically. They were the drugs of choice even for Amoebic Hepatitis followed by 2-3 weeks of chloroquine. Subsequently of course, it is totally replaced by metronidazole group of drugs.

Haemorrhoids

The treatment for first and second degree internal Haemorrhoids has not undergone much change, but surgery for third and fourth degree piles has undergone drastic changes to make surgery safe and comfortable for the patient. Better understanding of the aetiopathogenesis of Haemorrhoids has revolutionized the surgery for piles. Traditionally haemorrhoidectomy was performed for third and fourth degree piles. This was usually followed by a painful post operative period and the wound often took weeks or months to heal. This often deterred the patient from undergoing surgery for the same. With the advent of the PPH stapler, the painful post operative period was drastically reduced and the wounds healed primarily thus enabling the patients not only to return home early but also to return to their normal life soon. Doppler guided haemorrhoidal artery ligation with mucopexy, another new surgery, for the treatment for 3rd and 4th degree piles results in an even less post operative pain, with no external wounds; thus enabling the patients to return to their normal lives almost immediately. The newer procedures are not without their complications and require a period of training before they can be perfected.

Fissure in ano

The non operative treatment of fissure in ano has undergone vast changes with the advent of local calcium channel blockers and nitric oxide ointments. Botulinum toxoid

injection also proved effective in avoiding surgery for fissure. The operative treatment for fissure in ano has traditionally been anal dilatation and extension of fissure. Lateral internal sphincterotomy has minimized the complication seen with anal dilatation and any incontinence caused by this is easily reversible by local sphincter repair. This procedure has now emerged as the treatment of choice for the surgical treatment for fissure in ano

Fistula in ano

Better understanding of the anatomy of the anal sphincter along with the newer investigative methods has markedly decreased sphincter injuries which were associated with fistula surgery. Endoanal ultrasound and MRI have enabled the surgeon to visualize the fistula tract in relation to the sphincters, and have enabled him to plan the surgery in a more scientific manner, so as to cause minimal injury to the sphincter, as well as to excise the entire pathology. Fibrin glue has been tried with not much success. Seton is still widely used. Anal fistula plug which was introduced in 2006 allows the surgeon in some cases to treat the fistula without the patient undergoing a major surgery.

Anal incontinence

Better modalities in visualization of the anorectal anatomy and physiology have enabled the surgeon to approach a case of incontinence in a more scientific and rational manner. Nerve conduction studies also allow the clinician to identify a neurological aetiology, if present. MRI and now 3-D endoanal ultra sound allows the surgeon to identify the exact site and length of the sphincter defect, thus allowing the surgeon to choose either a local sphincteroplasty or an adjacent muscle repair like gracilis or gluteus maximum repair. It is now recognized

that an early sphincter repair gives better results. Artificial anal sphincter repair has undergone vast improvements in the last decade, but has not proved to be very successful.

Pilonidal sinus

Surgery for pilonidal sinus has now shifted from the traditional excision with the wound being left open, to excision with primary wound closure. At times principles of plastic surgery are used to give a tension free closure on one side of the midline, and to obliterate the anal cleft. This prevents breakdown of the wound and also prevents recurrence.

Evolution and Strategies for the treatment of Colorectal Cancer

Colorectal cancer (CRC) is the third most common cancer in the western world. Although CRC is not as common in Asia in general or India in specific, awareness is critical since with early detection and current treatment, cure maybe possible. This article looks at the evolution of the treatment strategies available for colon and rectal cancer. Surgeons in India have ensured that treatment options offered in the country have consistently kept up with options and outcomes available globally.

Colon Cancer

Surgical Treatment

Approximately 90% of patients with colon cancer are treated surgically and surgical resection remains the only avenue for a cure. Curative intent by radical colectomy is based on the assumption that optimal treatment can only be achieved by removal of the primary tumour as well as the involved nodes. The nodal drainage of the colon is divided into the epicolic along the colonic wall, paracolic along the marginal artery, intermediate found along the main arterial trunks and apical located

at the aortic base. A standard radical colectomy therefore involves resection of the primary tumour with high ligation of the respective mesenteric vessel in order to incorporate the apical nodes. A margin of 10 cm on either sides of the colon is generally recommended since positive nodes are rarely found beyond this margin.

Hand-sewn to Stapled Anastomosis

A primary anastomosis is performed which can be either hand sewn or, as in recent times, a stapled anastomosis. Although there has been no data indicating an advantage of stapled anastomosis of the colon over a hand sewn anastomosis, there is obviously less inter-surgeon variability in the stapled technique.

The site of proximal pedicle ligation is based on the location of the primary tumour and the vascular supply to that segment of the colon. If the tumour lies equidistant between two vessels then both vessels are ligated. It follows that for caecal and descending colon cancers, the ileocolic and left colic vessels respectively, are ligated together with their lymphatic drainage. On the other hand, ascending colon tumours require ligation of the ileocolic to middle colic vessels, splenic flexure tumours require ligation of both the middle colic and left colic while the left colic to the superior rectal artery are ligated for sigmoid tumours. The National Comprehensive Cancer Network (NCCN) recommends that at least twelve nodes are required for accurate staging.

Adjuvant Therapy

Adjuvant therapy for colon cancer involves chemotherapy. The need for chemotherapy is based on the stage of the disease and the performance status of the patient. According to guidelines by the National Comprehensive Cancer Network (NCCN), chemotherapy

should be offered to patients with stage 3 and 4 disease of the American Joint Committee on Cancer (AJCC) TNM Staging System. However patients with poorly differentiated tumours, lymphovascular invasion, T4 tumours (that is, stage 2B), colon cancers presenting with obstruction or perforation or inadequate lymph node retrieval (less than 12) should also be considered for chemotherapy.

Evolution of Adjuvant Chemotherapy

Adjuvant chemotherapy began with mustine based regimens however the regime of 5-fluouracil and leucovorin soon became the standard of care until recent time. The European MOSAIC trial as well as the National Surgical Adjuvant Breast and Bowel Project (NSABP) C-07 compared 5-fluouracil (5-FU) and leucovorin to 5-fluouracil, leucovorin and oxaliplatin (FOLFOX) and both found an improved disease free survival in the FOLFOX arm. The current NCCN guidelines therefore recommends, with category 1 evidence, FOLFOX for all patients with stage 3 disease or patients with stage 2 disease in the presence of adverse factors as stated above. There is however category 2A evidence for the adjuvant use of capecitabine or 5-fluouracil and leucovorin.

Rectal Cancer

The rectosigmoid junction can be defined surgically by the sacral promontory or anatomically by the third sacral vertebra; however from a treatment perspective, rectal cancer can be defined as one arising within 12 cm of the anal verge. Evidence has shown that rectosigmoid cancer behaves similar to colon cancer.

Surgical Treatment

The main aim of surgical treatment for rectal cancer is the maintenance of sound oncological principles while preserving

genitourinary and sometimes sphincter function.

Total Mesorectal Excision (TME)

One of the main oncological principles in rectal cancer was described by Heald in 1982 in which the rectal dissection was kept just outside the envelope of the fascia propria, a plane sometimes termed the holy plane of Heald. In so doing, the mesorectum is excised with its containing lymphatics while preserving the hypogastric plexus. The result has been a decrease in the local recurrence from 30% to 5%, mainly due to clear circumferential resection margins yet with preservation of urinary and sexual function. Mesorectal excision is therefore the standard of care for rectal cancer.

Abdomino-Perineal Resection/Anterior Resection

Surgical treatment can be either sphincter-preserving resection or abdominoperineal resection. Historically, abdominoperineal resection originally described by Ernest Miles and, to a lesser extent, the Kraske transsacral approach, was commonly performed for low rectal cancers. At present, sphincter preservation can be achieved for lesions greater than 2 cm from the anorectal ring in specialized centres. This has been made possible because of the development of the circular stapler as well as the technique of intersphincteric resection. An abdominoperineal resection will be indicated in patients with sphincteric infiltration of the tumour and impaired anal tone.

Extending the scope of Sphincter Preservation

In sphincter-preserving resection, one of the concerns is adequacy of the distal margin. Based on a study by Grinell *et al*, a distal margin of 2 cm in the upper rectum and 1 cm in the lower rectum is acceptable for well or

moderately differentiated cancers but a margin of 5 cm is required for poorly differentiated cancers. Another issue in sphincter-preserving resection is the type of anastomosis performed. The options are coloanal anastomosis, J pouch anastomosis or coloplasty. Straight coloanal anastomosis can result in the anterior resection syndrome of frequency, urgency and incontinence while the J pouch anastomosis can result in incomplete defaecation. The long term results of both are identical however. Coloplasty, on the other hand has a high incidence of anastomotic leak. Another debate is the use of a protective stoma. Some indications are an anastomosis less than 5 cm from the anal verge, neoadjuvant radiotherapy, intraoperative haemodynamic instability, use of corticosteroids or if the surgeon was not happy with the integrity of the anastomosis, although these are not absolute.

Role of Local Excision

Local excision for rectal cancer does have a role especially for early disease or for the medically unfit in the hope of avoiding a radical procedure. According to the NCCN guidelines, transanal excision can be performed providing the tumour is within 8 cm from the anal verge, it involves less than 30% of the circumference of the lumen, ERUS reveals a T1 lesion and histology confirms a well differentiated tumour. The option of transanal endoscopic microsurgery (TEM) can be offered if the lesion is between 8 cm and 15 cm from the anal verge. If the histology of the resected lesion reveals involved margins, poor differentiation or lymphovascular invasion then a formal radical resection is recommended. If however histology reveals a T2 tumour without any of these adverse factors then adjuvant chemoradiation is adequate.

Neoadjuvant Therapy

Neoadjuvant therapy comprises radiation and 5-FU based chemotherapy. Neoadjuvant chemoradiation has the advantages of downsizing the tumour to allow for an adequate mesorectal excision therefore decreasing the local recurrence rate, decrease radiation to the small intestines and a better response to radiation in the well oxygenated cancer cells. A study by both MD Anderson and Memorial Sloan Kettering Cancer Centres also revealed an increase in the sphincter preservation rate. The main disadvantages are the possible need for a stoma and the overstaging seen in preoperative investigations. Preoperative staging is therefore critical to the use of neoadjuvant therapy. Most commonly, endorectal ultrasound (ERUS) or magnetic resonance imaging with endorectal coil (ERC-MRI) is employed. Patients with preoperative stage T3-4 or nodal involvement should be offered neoadjuvant chemoradiation. The NCCN guidelines recommend a 5 to 10 week interval following the 6 week chemoradiation regime before proceeding to surgery.

Adjuvant Therapy

Adjuvant chemotherapy is recommended to all patients with stage 2 and 3 disease and radiotherapy is also recommended to these patients provided neoadjuvant radiation was not given. Studies by Gastrointestinal Tumour Study Group (GITSG) and the National Surgical Adjuvant Breast and Bowel Project (NSABP) 1 and 2 confirmed a decrease in local recurrence rate with radiotherapy and improved survival with chemotherapy. At present, the only randomized trial comparing preoperative chemoradiation to postoperative chemoradiation is from the German Rectal Cancer Study Group which stated a decrease in the local recurrence but no improvement in overall survival in patients receiving

preoperative chemoradiation. The NCCN recommends radiotherapy with 5-fluouracil and leucovorin (category 1 evidence) or FOLFOX or capecitabine (category 2 evidence).

Colorectal Liver Metastasis (CRLM)

Evolution of Management of Liver Metastases

The diagnosis of hepatic metastasis in patients with colorectal carcinoma has, until recently, been associated with an extremely grave outlook with 5 year survival rates in the region of 5%. The options available were either palliative chemotherapy or palliative care. Hepatic metastasectomy has added a new dimension in the treatment of colorectal hepatic metastasis with studies revealing an increase in the 5 year survival in the region of 45%. Even for unresectable disease, the availability of ablative therapy as well as targeted immunotherapy has revolutionized our approach to CRLM.

Surgery for Hepatic Metastases

The selection criteria for hepatic metastasectomy have broadened over time. The rigid guidelines dictated by tumour size and number of metastasis were no longer an issue since resectability was determined by the ability to achieve an R0 resection. Even the definition of adequate margins has changed since current data has shown that the local recurrence rate, disease free survival and overall survival were identical when comparing a margin of 1 cm to 1 mm. In addition, synchronous hepatic and pulmonary metastasis is no longer considered inoperable disease once the metastases are resectable.

With the field of interventional radiology expanding by leaps and bounds and with the evolution of portal vein embolisation (PVE) even bilobar disease can be treated by staged resection.

As stated, resectability is determined by the ability to achieve an R0 resection while maintaining an adequate hepatic reserve. Adequate hepatic reserve can be quantified as having a standardized Future Liver Remnant (FLR) of greater than 20% in a normal functioning liver or 40% in patients with underlying liver disease. The standardized FLR is defined as the ratio of the measured FLR (based on CT volumetry) to the calculated total liver volume (TLV).

CRLM can present either synchronously or metachronously. If the colorectal primary and the hepatic metastasis present synchronously and both are resectable then the recommendation is either a staged or concurrent resection followed by adjuvant therapy. If resectability is borderline however, then neoadjuvant chemotherapy can allow for biological selection and thereby avoiding major surgery in patients with aggressive and potentially advanced disease. The need for neoadjuvant chemotherapy in patients who present with metachronous hepatic metastasis, on the other hand would be determined by whether the patient underwent adjuvant chemotherapy following resection of the colorectal primary as well as whether this adjuvant therapy was completed within twelve months of the presentation of the synchronous lesion.

Ablative Therapy

A patient whose disease is not amendable to surgical resection or whose general condition does not allow for a major surgical undertaking has the option of ablative therapy in the form of radiofrequency ablation (RFA). Studies have shown that RFA does provide a survival benefit over chemotherapy alone however it must be noted that RFA is inferior to surgical resection in terms of local recurrence, disease free survival and overall

survival therefore surgery is the treatment of choice for resectable lesions. RFA uses heat in the form of high frequency alternating current to destroy the tumour. RFA is most effective for lesions less than 3 cm, can be used as an adjunct to surgical resection for small, residual tumours in the FLR and has a low morbidity and mortality rate.

Chemotherapy

Systemic Chemotherapy

Recent advances in chemotherapy for metastatic colorectal cancer have dramatically improved the outlook for these patients with stage 4 disease. The former standard of care in 5-FU and leucovorin with a median survival of 12 months have increased to over 20 months with the addition of new agents in the form of irinotecan (FOLFIRI:5-fluouracil, leucovorin and irinotecan) and the already mentioned oxaliplatin (FOLFOX).

Another major evolution is the use of immunotherapy in the form of bevacizumab, a monoclonal antibody to vascular endothelial growth factor receptor (VEGFR), which can be used in addition to the FOLFOX or FOLFIRI regimes. A lag time of six weeks is given prior to surgery, if bevacizumab is used as part of neoadjuvant therapy, to reduce the complications of wound infection and excessive bleeding.

Regional Chemotherapy

Regional chemotherapy in the form of hepatic artery infusion (HAI) is a promising new form of treatment for CRLM. It uses fluorodeoxyuridine (FUDR) which has a higher first pass extraction in the liver as compared to 5-FU and can be used in combination with systemic chemotherapy. The use of adjuvant HAI in conjunction with capecitabine and oxaliplatin now forms the basis of the ongoing NSABP C-09 Trial.

Minimal Access Surgery for Colorectal Diseases

Laparoscopic colectomy, in experienced hands, is now considered a feasible approach to the surgical management of colon cancer. This advancement has been facilitated by the development of laparoscopic staplers as well as the harmonic scapel.

This acceptance is not universal however. There are many reasons for this, namely the advance laparoscopic techniques required, the presence of an anastomosis preventing early discharge and the concern of adherence to adequate oncological principles.

There were many initial concerns about the adequacy of the cut margins and the number of nodes harvested. Numerous studies including Melotti et al and a meta-analysis by Korolija et al has confirmed that the number of lymph nodes harvested and tumour distance from the cut margins did not vary from open surgery.

Both the CLASICC and COST studies have concluded that the overall survival and disease free survival were comparable for laparoscopic and open surgery. A subanalysis from the COLOR Trial did indicate that these favourable results occurred when laparoscopic surgery was performed in high volume centres. There are, however impaired short term outcomes after laparoscopic anterior resection, including positive circumferential resection margins in the CLASICC Trial.

The National Comprehensive Cancer Network therefore recommends that laparoscopic surgery for colon cancer can be

considered once the surgeon is experienced, there are no prohibitive adhesions, no advanced local or metastatic disease or bowel perforation or obstruction.

Laparoscopic surgery for rectal cancer, on the other hand, should only be performed in a clinical trial.

Summary

The treatment of colorectal cancer has evolved tremendously over the last century. In India also, we have seen tremendous strides in all the aspects of these multi-modality treatment strategies. Issues such as the high local recurrence rate following rectal cancer surgery and the lack of effective treatment of CRLM are quickly residing in our distant memory. With surgical techniques, interventional radiology as well as medical and radiation oncology stretching the limits of the boundary we can only look ahead with anticipation for new and innovative means of treating this disease.

Conclusion

Evolution of colorectal surgery in India has taken tremendous strides in past 20-30 years and formation of separate colorectal section (ACRSI) has played a very major and significant role because of its various scientific activities, basic and advanced courses, fellowship examination, live surgery workshops and most important, commitment and dedication of some of its office bearers and members.

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