Tumors of the large intestine

A number of factors may contribute to the formation of colon polyps and colon cancer. They include:

Age. The great majority of people with colon cancer are 50 or older.

Sex. More men than women develop colon polyps and colon cancer.

Inflammatory intestinal conditions. Long-standing inflammatory diseases of the colon such as ulcerative colitis and Crohn's disease can increase the risk.

Family history. The risk increased to develop colon polyps or cancer if the patients have a parent, sibling or child with them. If many family members have those, the risk is even greater. In some cases this connection isn't hereditary or genetic. For example, cancers within the same family may result from shared exposure to an environmental carcinogen or from similar diet or lifestyle factors.

Diet. Eating a high-fiber diet — one plentiful in fruits, vegetables and whole grains — can reduce the risk of colon polyps and colon cancer. Fiber seems protective against colon cancer because it provides bulk that moves the stool more quickly through the bowel. This means that cancer-causing substances (carcinogens) in the foods aren't in contact with the bowel wall as long as they might be if we are at a low-fiber diet. Fruits and vegetables are also rich in antioxidants — substances that protect cells from damage caused by unstable molecules (free radicals) that may lead to cancer.

Smoking and alcohol. Smoking significantly increases the risk of colon polyps and colon cancer. Smokers are 30 percent to 40 percent more likely to die of colon cancer than are nonsmokers. Drinking alcohol in excess also makes it more likely to develop colon polyps. If the patient smoke and drink, the risk increases even more.

A sedentary lifestyle. This may be because inactivity makes the waste stays in the colon longer.

Obesity. Being significantly overweight — 30 pounds or more — has been linked to an increased risk of several types of cancer, including colon cancer.

Race. black, at higher risk of developing colon cancer than white.

Inherited gene mutations

Another risk factor for colon polyps is genetic mutations. A small percentage of colon cancers result from gene mutations. These cancers are autosomal dominant, meaning that one need to inherit only one defective gene from either of his or her parents. If one parent has the mutated gene, offspring's have a 50 percent chance of inheriting the mutation. Although inheriting a defective gene greatly increases the risk, not everyone with a mutated gene develops cancer.

One genetic defect that plays a key role in colon cancer occurs in the adenomatous polyposis coli (APC) gene. When the APC gene is normal, it helps control cell growth. But if it's defective, cell growth accelerates, leading to the formation of multiple adenomatous polyps in the intestinal lining.

Conditions related to APC gene defects include:

- Familial adenomatous polyposis (FAP). This is a rare, hereditary disorder that results from an APC gene defect. FAP causes patients to develop hundreds, even thousands, of polyps in the lining of the colon beginning in the teenage years. If these go untreated, the risk of developing colon cancer is nearly 100 percent. The encouraging news about FAP is that in some cases, genetic testing can help determine whether patients are at risk of the disease.
- Gardner's syndrome. This syndrome is a variant of FAP. This condition causes polyps to develop throughout the colon and small intestine. The patients may also develop noncancerous tumors in other parts of the body, including the skin (sebaceous cysts and lipomas), bone (osteomas) and abdomen (desmoids).

- Hereditary nonpolyposis colorectal cancer (HNPCC). This is the most common form of inherited colon cancer. It, too, results from a defect in the APC gene, but unlike people with FAP or Gardner's syndrome, people with hereditary nonpolyposis colorectal cancer tend to develop relatively few colon polyps. They do, however, often have tumors in other organs. Hereditary nonpolyposis colorectal cancer includes Lynch I and Lynch II syndromes. People with Lynch I syndrome (site specific) usually develop a small number of polyps that quickly become malignant. Those with Lynch II syndrome (Cancer family Syndrom) tend to develop tumors in the breast, stomach, small intestine, urinary tract and ovaries as well as in the colon

Benign Tumors

The term ‘polyp’ is a clinical description of any elevated tumor.

Large Intestinal Polyps (Classifications)

Class	varieties
Inflammatory	Inflammatory polyps
Metaplastic	Metaplastic or Hyperplastic polyps
Hamartomatous	Peutz –Jeghers polyps Juvenil polyps
Neoplastic	Adenoma ✓ Tubular ✓ Villous ✓ Tubulovillous Adenocarcinoma Carcinoid

Adenomatous polyps

- tubular adenoma ,like a raspberry on a stalk,
- villous adenoma, a flat spreading lesion.
- Tubulovillous

Solitary adenomas are usually found during the investigation of colonic bleeding or sometimes accidentally.

Villous tumours more usually give symptoms of diarrhoea, mucus discharge and occasionally hypokalaemia.

The risk of malignancy developing in an adenoma increases with increasing size of tumour, for example, in 1-cm diameter tubular adenomas there is a 10 per cent risk of cancer, whereas in villous adenomas over 2 cm in diameter there may be a 15 per cent chance of carcinoma.

Adenomas larger than 5 mm in diameter are usually treated because of their malignant potential.

Colonoscopic snare polypectomy or diathermy obliteration with hot biopsy forceps can be used.

Huge villous adenomas of the rectum can be difficult to remove even with techniques per anus and occasionally proctectomy is required; the anal sphincter can usually be preserved.

Hamartomatous polyps

Peutz—Jeghers polyps may occur in the colon as either solitary or multiple lesions.

Juvenile polyps may occur as multiple lesions in the colon often associated with a congenital defect such as a malrotation or Meckels' diverticulum. They have minimal malignant potential and ate only removed if they are causing troublesome pain, bleeding or hypoproteinaemia.

Metaplastic polyp

Metaplasia is defined as when the cells of the epithelia change from one type to another like in Barrett's oesophagus, where the cells change from squamous to columnar.

metaplastic polyps are an overgrowth of tissue of normal mucosa. The name "metaplastic polyp" is actually a misnomer as there is no change in epithelia. Metaplastic polyps are the most common type of colonic polyp followed by adenoma polyps. But unlike adenomas they have no malignant potential and rarely grow larger than 5mm.

Inflammatory polyp

These are polyps which are associated with inflammatory conditions such as Ulcerative Colitis and Crohns disease

Haemangioma

A localised submucous telangiectasis is often the cause of bleeding which may be profuse. If bleeding is continuing, both angiography and colonoscopy can help to localise the source.

If found by colonoscopy the lesion can be removed endoscopically, whereas arteriographic detection can be followed by the use of vasopressin or microspheres to stop the haemorrhage. Often the only method of detecting it is to operate while the bleeding is in progress. The distribution of blood within the intestine is noted; scrutiny of the blood-containing portion of the colon may reveal the lesion but on-table colonoscopy could be necessary. The tumour is resected once located.

Lipoma

Lipoma is less frequently encountered in the large than in the small intestine. In the large intestine it is almost always confined to the caecum. The tumour is submucous and in more than half the cases it is the cause of an intussusception. On occasion a lipoma at the ileocaecal valve can be confused with a caecal cancer.

Familial adenomatous polyposis

Familial adenomatous polyposis (FAP) is a general neoplastic disorder of the intestine. Although the large bowel is mainly affected polyps can occur in the stomach, duodenum and small intestine. The main risk is large bowel cancer, but duodenal and ampullary tumours have been reported. It is inherited as a Mendelian dominant and the gene responsible (APC gene) has now been identified on the short arm of chromosome 5 .

Males and females are equally affected. It can also occur sporadically without any previous sign or history, presumably by new mutations. There is often, in these cases, a history of large bowel cancer occurring in young adulthood or middle age suggesting pre-existing adenomatosis.

FAP can be associated with benign mesodermal tumours such as desmoid tumours and osteomas. Epidermoid cysts can also occur (Gardner’s syndrome);

desmoid tumours in the abdomen invade locally to involve the intestinal mesentery and although non-metastasising they can become unresectable. Clinical features. Polyps are usually visible on sigmoidoscopy by the age of 15 years and will almost always be visible by the age of 30. Carcinoma of the large bowel occurs 10—20 years after the onset of the polyposis. One or more cancers will already be present in two-thirds of those patients presenting with symptoms.

Symptomatic patients.

- loose stools,
- lower abdominal pain,
- weight loss,
- diarrhoea and
- the passage of blood and mucus.

Diagnosis;

- sigmoidoscopy,
- double-contrast barium enema.
- If in doubt colonoscopy is performed with biopsies to establish the number and histological type of polyps.
- If over 100 adenomas are present the diagnosis can be made confidently but it is important not to confuse this with non-neoplastic forms of polyposis.

Asymptomatic patients.

Usually members of affected families attend for screening. As yet there is no reliable means of knowing whether an individual is affected unless adenomas develop. If there are no adenomas by the age of 30, FAP is unlikely. Pigmented spots in the retina (CHIRPES) and deoxyribonucleic acid (DNA) tests for the FAP gene should make screening mote reliable in the future.

If the diagnosis is made during adolescence, operation is deferred usually to the age of 17 or 18.

Screening policy.

1. All members of the family should be examined at the age of 10—12 years, repeated every 1—2 years.
2. Most of those who are going to get polyps will have them at 20 and these requite operation.
3. If there are no polyps at 20, continue with 5-yearly examination until age 50; if there are still no polyps there is probably no inherited gene.

Carcinomatous change may exceptionally occur before the age of 20. Examination of blood relatives, including cousins, nephews and nieces, is essential and a family tree should be constructed and a register of affected families maintained.

Treatment.

1. Colectomy with ileorectal anastomosis has in the past been the usual operation because it avoids an ileostomy in a young patient. The rectum is subsequently cleared of polyps by snaring or fulguration. The patients ate examined by flexible sigmoidoscopy at 6-monthly intervals thereafter. In spite of this, a proportion of patients develops carcinoma in the rectal stump. The risk of carcinoma in the St Mark's series was 10 per cent over a period of 30 years.
2. The alternative and now more common operation is a restorative proctocolectomy with an ileoanal anastomosis. This has a higher complication rate than ileorectal anastomosis. It is indicated in patients with serious rectal involvement with polyps, those who are likely to be poor at attending for follow-up and those with an established cancer of the rectum or sigmoid. However, it is now used mote frequently for less severe cases.

Malignant Tumors

Adenocarcinoma of the colon

Pathogenesis

Colorectal cancer is a disease originating from the epithelial cells lining the gastrointestinal tract. Hereditary or somatic mutations in specific DNA sequences, among which are included DNA replication or DNA repair genes, and also the APC, K-Ras, NOD2 and p53 genes, lead to unrestricted cell division. The exact reason why (and whether) a diet high in fiber might prevent colorectal cancer remains uncertain. Chronic inflammation, as in inflammatory bowel disease, may predispose patients to malignancy.

Pathology.

Macro-scopically the tumor may take one of four forms

1. Annular,
2. Tubular,
3. Ulcerative &
4. Cauliflower

Type 4 is the least malignant form. It is likely that all carcinomas start as a benign adenoma, the so-called ‘adenoma—carcinoma sequence’. The annular variety tends to give rise to obstructive symptoms whereas the others more commonly will present with bleeding.

Microscopically

Microscopically, the neoplasm is a columnar cell carcinoma originating in the colonic epithelium.

The most common colon cancer cell type is adenocarcinoma which accounts for 95% of cases. Other, rarer types include lymphoma and squamous cell carcinoma.

The spread of carcinoma of the colon. Generally this is a comparatively slow growing neoplasm.

Local spread

The tumour is limited to the bowel for a considerable time; it spreads round the intestinal wall and usually causes intestinal obstruction before it invades adjacent structures. The ulcerative type mote commonly invades locally and an internal fistula may result, for example, into the bladder. There may also be a local perforation with an abscess or even an external fecal fistula. The progression of invasion occurs across the sub mucosa into the muscularis propia and thence out into the serosa and fat, lymphatics and veins in the mesentery alongside the bowel wall.

Lymphatic spread

Lymph nodes draining the colon are grouped as follows:

• N1 — nodes in the immediate vicinity of the bowel wall;

• N2 — nodes arranged along the ileo-colic, right colic, midcolic, left colic and sigmoid arteries;

• N3 — the apical nodes around the superior and inferior mesenteric vessels where they arise from the abdominal aorta. Involvement of the lymph nodes by the tumour progresses in a gradual manner from those closest to the growth along the course of the lymphatic vessels to those placed centrally.

Bloodstream spread

This accounts for a large proportion (30—40 per cent) of late deaths. Metastases are carried to the liver via the portal system sometimes at an early stage before clinical or operative evidence is detected (occult hepatic metastases).

Transperitoneal spread: (especially with mucoid carcinoma)

Malignant cells may spell over the serous surface to implant elsewhere in the peritoneal cavity (Omentum, intestine, ovaries (Krukenberg's tumour) or rectovesical pouch (Blumer's shelf).

Complications:-

1. Bleeding : is rare except in cancer of the right side.
2. Perforation: is also rare and usually slow giving rise to abscess or fistula.
3. Acute intestinal obstruction: usually due to faecal impaction or stenotic lesions.
4. Anaemia, loss of weight, and general debility.
5. Distant metastases.

Staging colon cancer.

Dukes' classification was originally described for rectal tumours but has been adopted for histopathological reporting of colon cancer as well. There have been numerous modifications of the original system leading to some confusion but in its most basic form Dukes'

classification for colon cancer is as follows.

Dukes'

A — confined to bowel wall;

B — through the bowel wall but not involving the free peritoneal serosal surface;

C — lymph nodes involved.

Dukes himself never described a D stage, but this is often used to describe either advanced local disease or metastases to the liver.

TNM classification.

The TNM classification is more detailed and accurate but more demanding.

T — tumour stage:

T1 — into submucosa;

T2 — into muscularis propria;

T3 — into pericolic fat but-not breaching serosa;

T4 — breaches serosa or directly involving another organ.

N — nodal stage:

N0 — no nodes involved;

N1 — 1—2 nodes involved;

N2 — 3 or more nodes.

M — metastases:

M0 — no metastases;

M1 — metastases.

Ly — lymphatic invasion:

L0 — no lymphatic vessels involved;

L1 — lymphatics involved.

V — venous invasion:

V0 — no vessel invasion;

Vi — vessels invaded.

R — residual tumour:

R0 — no residual tumour;

R1 — margins involved, residual tumour present.

AJCC stage groupings

The stage of a cancer is usually quoted as a number I, II, III, IV derived from the TNM value grouped by prognosis; a higher number indicates a more advanced cancer and likely a worse outcome.

Stage 0 = Tis, N0, M0

Stage I = T1, N0, M0 or T2, N0, M0

Stage IIA = T3, N0, M0

Stage IIB = T4, N0, M0

Stage IIIA = T1, N1, M0 or =T2, N1, M0

Stage IIIB = T3, N1, M0 or = T4, N1, M0

Stage IIIC = Any T, N2, M0

Stage IV = Any T, Any N, M1

Clinical features.

Carcinoma of the colon usually occurs in patients over 50 years of age but it is not rare earlier in adult life. Twenty per cent of cases present as an emergency with intestinal obstruction or peritonitis. In any case of colonic bleeding in patients over the age of 40 a complete investigation of the colon is required. A careful family history should be taken. Those with first-degree relatives who have developed colorectal cancer at the age of 45 or below are at high risk and may be part of one of the colorectal cancer family syndromes.

Carcinoma of the left side of the colon

Most tumours occur in this location. They ate usually of the stenosing variety. The main symptoms are those of increasing intestinal obstruction.

Pain is referred to the suprapubic area. Patients will have episodes of colic; a constant ache may suggest an advanced tumour.

Alteration of bowel habit.An adult previously having a predictably regular bowel habit suddenly develops irregularity. There may be increasing difficulty in getting the bowels to move, requiring laxatives. The episodes of constipation may be followed by attacks of diarrhoea.

Palpable lump. The lump that is felt on abdominal, rectal or bimanual palpation is sometimes not the tumour itself, but impacted faeces above it. When the tumour is situated in a pendulous pelvic colon, a hard movable swelling may be felt in the rectovesical pouch on rectal examination.

Distension. Lower abdominal distension is not uncommon and, as with the pain, is relieved by passing flatus.

Carcinoma of the sigmoid

This follows the general pattern of the above, with these differences.

Pain is usually colicky from the outset.

Tenesmus. Low tumours may give rise to a feeling of the need for evacuation which may result in tenesmus accompanied by the passage of mucus and blood, especially in the early morning.

Bladder symptoms are not unusual and in some instances may herald a colovesical fistula.

Carcinoma of the transverse colon

This may be mistaken for a carcinoma of the stomach because of the position of the tumour together with anaemia and lassitude.

Carcinoma of the caecum and ascending colon

This may present with the following.

• Anaemia, severe and unyielding to treatment; there may be a palpable tumour present.

• The presence of a mass in the right iliac fossa. Colono-scopy may be needed to confirm the diagnosis.

• Caecal carcinoma is sometimes discovered unexpectedly at operation for acute appendicitis or for an appendix abscess failing to resolve. On rare occasions the appendix is inflamed, or even gangrenous, from the obstruction to its lumen by the tumour.

• A carcinoma of the caecum can be the apex of an intussusception presenting with the symptoms of intermittent obstruction.

Metastatic disease

Patients may present for the first time with liver metastases and an enlarged liver, ascitis from carcinomatosis peritonei and, more rarely, rnetastases to the lung, skin, bone and brain.

Methods of investigation

Laboratory:

- Blood picture may reveal microcytic hypochromic anemia.
- Liver function lests to detect hepatic metastases.
- Carcinoembryonic antigen (CEA)

A tumor marker whose serum level is high in colorectal cancer but is not specific.

* It is of prognostic rather than diagnostic value. CEA-positive serum

(concentration greater than 2.5 ng /ml) is found in patients with colorectal and other conditions e.g: other malignancies, benign colonic tumors, cirrhosis and pancreatitis.

* The level drops after a successful radical surgery (4 months later).
* If it show a rise in the follow up period, this signifies recurrence.

Sigmoidoscopy. This is part of the routine investigation of patients passing blood and mucus that is really limited to the rectum.

Flexible sigmoidoscopy. The 60-cm, fibre-optic, flexible sigmoidoscope is being used increasingly in the out-patient clinic or in special rectal bleeding clinics. The patient is pre-pared with a disposable enema and sedation is not usually necessary.

Colonoscopy. This has the advantage of not only picking up a primary cancer but also having the ability to detect synchronous polyps or even multiple carcinomas which occur in 5 per cent of cases. It tends to be used in patients with bleeding as their main presenting symptom, those with known polyps and those in whom there is doubtful radiology. Ideally every case should be proven histologically before surgery. Full bowel preparation and sedation are necessary.

Radiology. Double-contrast barium enema is used routinely now. It shows a cancer of the colon as a constant irregular filling defect (Fig. 57.43). It is the investigation of choice in patients with predominant change in bowel habit as their presenting symptom.

Ultrasonography is often used as a screening investigation for liver metastases, and CT is used in patients with large palpable abdominal masses to determine local invasion and is particularly used in the pelvis in the assessment of rectal cancer.

Treatment

Preoperative preparation. Full mechanical bowel preparation before colonic surgery is essential. The most commonly used method is dietary restriction to fluids only for 48 hours before surgery; on the day before operation two sachets of Picolax (sodium picosulphate) are taken to purge the colon. In addition a rectal washout may be necessary. Alternatives include prograde lavage via a nasogastric tube using water or balanced electrolyte solutions. A stoma site is carefully discussed with the stoma care nursing specialist and antiembolus stockings are fitted; the patient is started on prophylactic sub-cutaneous heparin and intravenous prophylactic antibiotics are given at the start of surgery. When intestinal obstruction is present, preparation in this way may precipitate abdominal pain and it may be safer to save preparation to the time of the operation using an on table lavage technique.

Operations

The test of operability. The abdomen is opened and the tumour assessed for resectability.

1. The liver is palpated for secondary deposits, the presence of which is not necessarily a contraindication to resection because the best palliative treatment for carcinoma of the colon is removal of the tumour.
2. The peritoneum, particularly the pelvic peritoneum, is inspected for signs of small, white, seed-like, neoplastic implantations. Similar changes can occur in the omentum.
3. The various groups of lymph nodes that drain the involved segment are palpated. Their enlargement does not necessarily mean that they are invaded by metastases because the enlargement may be inflammatory.
4. The neoplasm is examined with a view to mobility and operability. Local fixation, however, does not always imply local invasion because some tumours excite a brisk inflammatory response.

The operations to be described are designed to remove the primary tumour and its draining locoregional lymph nodes which may be involved by metastases.

Lesser resections are indicated, however, should hepatic rnetastases render the condition curable nonsurgically. There is some evidence that early division of major blood vessels supplying the involved colon (no-touch technique — Turnbull) can slightly improve the number of curative operations.

Carcinoma of the caecum or ascending colon is treated when resectable by right hemicolectomy .

The abdomen is opened, the peritoneum lateral to the ascending colon is incised and the incision carried around the hepatic flexure. The right colon is elevated, with the leaf of peritoneum containing its vessels and lymph nodes, from the posterior abdominal wall, taking care not to injure the ureter, spermatic vessels in the male or the duodenum. The peritoneum is separated medially neat the origin of the ileo-colic artery, which is divided together with the right colic artery when this has a separate origin from the superior mesenteric. The mesentery of the last 30 cm of ileum, and the leaf of raised peritoneum attached to the caecum, ascending colon and hepatic flexure, after ligation of the mesenteric blood vessels, is divided as far as the proximal third of the transverse colon. When it is cleat that there is an adequate blood supply at the resection margins, the right colon is resected and an end-to-end anastomosis fashioned between the ileum and transverse colon.

Carcinoma of the hepatic flexure. When the hepatic flexure is involved the resection must be extended correspondingly .

Carcinoma of the transverse colon. When there is no obstruction, excision of the transverse colon and the two flexures together with the transverse mesocolon and the greater omentum, followed by end-to-end anastomosis, can be used. An alternative is an extended right hemicolectomy .

Carcinoma of the splenic flexure or descending colon. The extent of the resection is from right colon to descending colon. Sometimes removal of the colon up to the ileum, with an ileorectal anastomosis, is preferable.

Carcinoma of the pelvic colon. The left half of the colon is mobilized completely . So that the operation is radical, the inferior mesenteric artery below its left colic branch, together with the related paracolic lymph nodes, must be included in the resection. This entails carrying the dissection as far as the upper third of the rectum. Many surgeons advocate flush ligation of the inferior mesenteric artery on the aorta (high litigation). Provided that there is no obstruction primary anastomosis is the rule. Occasionally a protecting upstream stoma may be necessary.

When a growth is found to be inoperable. In the upper part of the left colon, a transverse colostomy is performed. In the pelvic colon, a left iliac fossa colostomy is preferable. With an inoperable growth in the ascending colon a bypass using an ileo-colic anastomosis is the best procedure. Over 95 per cent of colonic carcinomas can, however, be resected.

Laparoscopic-assisted colectomy is a minimally-invasive technique that can reduce the size of the incision and may reduce post-operative pain

Adjuvant therapy

Hepatic metastases

It is important to biopsy hepatic metastases for histological diagnosis. Unless they are on the very surface and edge of the liver, they are not usually resected at the time of colonic surgery. Patients with up to two or three liver metastases confined to one lobe of the liver may be offered hepatic resection. Multiple painful hepatic metastases can be palliated by cytotoxic drugs, cryosurgery or laser therapy .

Chemotherapy

Chemotherapy is used to reduce the likelihood of metastasis developing, shrink tumor size, or slow tumor growth. Chemotherapy is often applied after surgery (adjuvant), before surgery (neo-adjuvant), or as the primary therapy (palliative).

Chemotherapy after surgery is usually only given if the cancer has spread to the lymph nodes (Stage III).

At the 2008 annual meeting of the American Society of Clinical Oncology, researchers announced that colorectal cancer patients that have a mutation in the K-RAS gene do not respond to certain therapies, those that inhibit the epidermal growth factor receptor (EGFR)--namely Erbitux (cetuximab) and Vectibix (panitumumab). Following recommendations by ASCO, patients should now be tested for the KRAS gene mutation before being offered these EGFR-inhibiting drugs.

However, having the normal K-RAS mutation does not guarantee that these drugs will benefit the patient.

Adjuvant (after surgery) chemotherapy.

One regimen involves the combination of infusional 5-fluorouracil, leucovorin, and oxaliplatin (FOLFOX)

Chemotherapy for metastatic disease.

Commonly used first line chemotherapy regimens involve the combination of infusional 5-fluorouracil, leucovorin, and oxaliplatin (FOLFOX) with bevacizumab or infusional 5-fluorouracil, leucovorin, and irinotecan (FOLFIRI) with bevacizumab

Radiation therapy

Radiotherapy is not used routinely in colon cancer, as it could lead to radiation enteritis, and it is difficult to target specific portions of the colon. It is more common for radiation to be used in rectal cancer, since the rectum does not move as much as the colon and is thus easier to target.

In Colon cancer it is indicated only for pain relief - targeted at metastatic tumor deposits if they compress vital structures and/or cause pain

Immunotherapy

Bacillus Calmette-Guérin (BCG) is being investigated as an adjuvant mixed with autologous tumor cells in immunotherapy for colorectal cancer.

Vaccine

In November 2006, it was announced that a vaccine had been developed and tested with very promising results. The new vaccine, called TroVax, works in a totally different way to existing treatments by harnessing the patient's own immune system to fight the disease. Experts say this suggests that gene therapy vaccines could prove an effective treatment for a whole range of cancers. Oxford BioMedica is a British spin-out from Oxford University specialising in the development of gene-based treatments. Phase III trials are underway for renal cancers and planned for colon cancers.

Treatment of liver metastases

According to the American Cancer Society statistics in 2006, over 20% of patients present with metastatic (stage IV) colorectal cancer at the time of diagnosis, and up to 25% of this group will have isolated liver metastasis that is potentially resectable. Lesions which undergo curative resection have demonstrated 5-year survival outcomes now exceeding 50%.

Resectability of a liver metastasis is determined using preoperative imaging studies (CT or MRI), intraoperative ultrasound, and by direct palpation and visualization during resection. Lesions confined to the right lobe are amenable to en bloc removal with a right hepatectomy (liver resection) surgery. Smaller lesions of the central or left liver lobe may sometimes be resected in anatomic "segments", while large lesions of left hepatic lobe are resected by a procedure called hepatic trisegmentectomy. Treatment of lesions by smaller, non-anatomic "wedge" resections is associated with higher recurrence rates. Some lesions

which are not initially amenable to surgical resection may become candidates if they have significant responses to preoperative chemotherapy or immunotherapy regimens. Lesions which are not amenable to surgical resection for cure can be treated with modalities including radio-frequency ablation (RFA), cryoablation, and chemoembolization.

Patients with colon cancer and metastatic disease to the liver may be treated in either a single surgery or in staged surgeries (with the colon tumor traditionally removed first) depending upon the fitness of the patient for prolonged surgery, the difficulty expected with the procedure with either the colon or liver resection, and the comfort of the surgery performing potentially complex hepatic surgery.

Support therapies

Cancer diagnosis very often results in an enormous change in the patient's psychological wellbeing. Various support resources are available from hospitals and other agencies which provide counseling, social service support, cancer support groups, and other services. These services help to mitigate some of the difficulties of integrating a patient's medical complications into other parts of their life.

Prognosis

Survival is directly related to detection and the type of cancer involved. Survival rates for early stage detection is about 5 times that of late stage cancers. CEA level is also directly related to the prognosis of disease, since its level correlates with the bulk of tumor tissue.

Follow-up

The aims of follow-up are to diagnose in the earliest possible stage any metastasis or tumors that develop later but did not originate from the original cancer (metachronous lesions).

The U.S. National Comprehensive Cancer Network and American Society of Clinical Oncology provide guidelines for the follow-up of colon cancer. A medical history and physical examination are recommended every 3 to 6 months for 2 years, then every 6 months for 5 years. Carcinoembryonic antigen blood level measurements follow the same timing, but are only advised for patients with T2 or greater lesions who are candidates for intervention. A CT-scan of the chest, abdomen and pelvis can be considered annually for the first 3 years for patients who are at high risk of recurrence (for example, patients who had poorly differentiated tumors or venous or lymphatic invasion) and are candidates for curative surgery (with the aim to cure). A colonoscopy can be done after 1 year, except if it could not be done during the initial staging because of an obstructing mass, in which case it should be performed after 3 to 6 months. If a villous polyp, polyp >1 centimeter or high grade dysplasia is found, it can be repeated after 3 years, then every 5 years. For other abnormalities, the colonoscopy can be repeated after 1 year.

Routine PET or ultrasound scanning, chest X-rays, complete blood count or liver function tests are not recommended. These guidelines are based on recent meta-analyses showing that intensive surveillance and close follow-up can reduce the 5-year mortality rate from 37% to 30%

Prevention

This section contains weasel words, vague phrasing that often accompanies biased or unverifiable information. Such statements should be clarified or removed.

Most colorectal cancers should be preventable, through increased surveillance, improved lifestyle, and, probably, the use of dietary chemopreventative agents.

Surveillance

Most colorectal cancer arise from adenomatous polyps. These lesions can be detected and removed during colonoscopy. Studies show this procedure would decrease by > 80% the risk of cancer death, provided it is started by the age of 50, and repeated every 5 or 10 years.

As per current guidelines under National Comprehensive Cancer Network, in average risk individuals with negative family history of colon cancer and personal history negative for adenomas or Inflammatory Bowel diseases, flexible sigmoidoscopy every 5 years with fecal occult blood testing annually or double contrast barium enema are other options acceptable for screening rather than colonoscopy every 10 years (which is currently the Gold-Standard of care).

Lifestyle and nutrition

The comparison of colorectal cancer incidence in various countries strongly suggests that sedentarity, overeating (i.e., high caloric intake), and perhaps a diet high in meat (red or processed) could increase the risk of colorectal cancer. In contrast, a healthy body weight, physical fitness, and good nutrition decreases cancer risk in general. Accordingly, lifestyle changes could decrease the risk of colorectal cancer as much as 60-80%.

A high intake of dietary fiber (from eating fruits, vegetables, cereals, and other high fiber food products) has, until recently, been thought to reduce the risk of colorectal cancer and adenoma. In the largest study ever to examine this theory (88,757 subjects tracked over 16 years), it has been found that a fiber rich diet does not reduce the risk of colon cancer. A 2005 meta-analysis study further supports these findings.

The Harvard School of Public Health states: "Health Effects of Eating Fiber: Long heralded as part of a healthy diet, fiber appears to reduce the risk of developing various conditions, including heart disease, diabetes, diverticular disease, and constipation. Despite what many people may think, however, fiber probably has little, if any effect on colon cancer risk."