

LEFT HEMICOLECTOMY

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FILE NAME SW-LHEMI

OPERATION NO 013

SURGEON.....M.H.EDWARDS

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STEPWISE

LEFT HEMICOLECTOMY

GRADE 6 (EXTREMELY SEVERE)

THESE STEPS COVER

LEFT HEMICOLECTOMY WITH/WITHOUT CLOSURE OF LEFT ILIAC
COLOSTOMY

LIMITED LEFT HEMICOLECTOMY

EXTENDED LEFT HEMICOLECTOMY WITH/WITHOUT CLOSURE OF
TRANSVERSE COLOSTOMY

ELECTIVE PROCEDURE
FOR AN EMERGENCY COLECTOMY
SEE EMERGENCY STEP-WISE

CLOSURE OF ILIAC COLOSTOMY WITH LEFT HEMICOLECTOMY

TRANSVERSE COLOSTOMY

THESE STEPS DO NOT COVER

ANTERIOR RESECTION OF RECTUM WITH HAND STITCHED
ANASTOMOSIS

STAPLED ANASTOMOSIS WITH THE AUTOSUTURE PREMIUM CURVED END
TO END (EEA) DISPOSABLE SURGICAL STAPLER

TOTAL COLECTOMY AND ILEO-RECTAL ANASTOMOSIS

STAGES

STEP NO.

PRELIMINARIES

ANAESTHESIA

STANCE

PREPARATION

INCISION

MOBILISATION

MOBILISATION IN ABDOMEN

RESECTION

ANASTOMOSIS

CLOSURE

POSSIBLE COLOSTOMY

FINAL TOUCHES

STEPS

- 1 PRELIMINARIES - READ ON
- 2 CHECK YOU HAVE THE CORRECT PATIENT
- 3 CHECK YOU HAVE THE CORRECT SIDE
- 4 CHECK THERE IS NO OTHER PROCEDURE TO DO
- 5 CHECK THERE IS A DIATHERMY PAD

PRELIMINARIES READ ON

CHECK YOU HAVE THE RIGHT PATIENT

CHECK THE HISTOLOGY for a carcinoma.

CHECK BLADDER CATHETER is present in a female.

CHECK THE PATIENT knows that there may be a colostomy.

CHECK THERE IS NO OTHER PROCEDURE TO DO.

CHECK THE STAPLE GUN is in the theatre if necessary.

CHECK THE ANAESTHETIC AND THEATRE STAFF know whether stapling is to be done.

CHECK A DIATHERMY PAD is present.

ANAESTHESIA GENERAL.

PASS A URETHRAL CATHETER in the male.

POSITION Supine. Lloyd Davis if stapling is planned.

CHECK THE URINE DRAINAGE BAG is below the level of the patient to allow free drainage of urine.

FIX THE URINE DRAINAGE CATHETER to the operating table or to the patients thigh using 4" elastoplast. Make sure the catheter is not pulling on the patients urethra. Have the catheter bag strapped to the patients right thigh. There will always be sufficient access to pass a stapling gun per rectum. If there is insufficient abduction you are in trouble.

PREPARE THE SKIN in two parts.

CLEAN THE SKIN from the nipples down to the mid-thigh and from one iliac crest to the other, using two swabs on sticks with 0.5% Chlorhexidine in 10% Propanol and one to dry off.

HAVE ANY STOMA BAGS REMOVED and the stoma cleaned with a gauze swab.

CLEAN THE PERINEUM and genitalia and the skin from the mid-thigh to the coccyx and from one greater trochanter to the other using 2 swabs on sticks with 0.5% Chlorhexidine in 70% Propanol and dry off.

TOWEL UP - in two stages.

START WITH THE ABDOMEN

PLACE AN UPPER TOWEL down to the xiphisternum.

PLACE A PARTLY UNFOLDED LOWER SKIN TOWEL up to the symphysis pubis.

PLACE A LEFT SIDE SKIN TOWEL to the anterior superior iliac spine.

PLACE A RIGHT SIDED TOWEL to the mid-line. If there is a right sided stoma place this towel more laterally than the stoma.

FIX THE ABDOMINAL SKIN TOWELS with an adhesive
Cover any stoma with this.

TOWEL UP UP THE PERINEUM.

PUSH A LOWER SKIN TOWEL between the buttocks and the operating table.

TAPE THE MALE GENITALIA TO THE RIGHT SIDE.

APPLY STERILE LEGGINGS.

FIX THE BOTTOM END TOWELS to the skin with towel clips.

COVER THE EXPOSED PERINEAL SKIN with a temporary skin towel.

STANCE Stand on the patients left side. Have one assistant on the patients right side. Have a second assistant between the patients legs.

CHECK THE DIATHERMY

INCISION Left paramedian - read on.

INCISE THE SKIN from 2 cms. above the pubic tubercle to 2 cms. below the costal margin 3 cms. to the left of the mid-line.

MODIFY THIS INCISION to keep 2 cms. of healthy skin between the incision and the edge of any stoma.

The incision needs to be this length to give adequate access to the pelvis and also to the splenic flexure of the colon.

RETRACT THE SKIN EDGES with gauze packs on the skin held by your assistant and yourself.

DEEPEN THE INCISION with a scaple through the fat and through the anterior rectus sheath along the whole length of the wound.

COAGULATE BLEEDING VESSELS in the fat and anterior rectus sheath.

PICK UP THE RECTUS SHEATH (medial leaf) with 4 artery clips equally spaced down the wound.

FREE THE RECTUS SHEATH (Medial leaf) from the rectus abdominus muscle.

THE ASSISTANT holds the upper two forceps up and apart.
Dissect the tissues with a scalpel in one hand to cut and a diathermy forceps in the left to retract and coagulate.

START AT THE TOP OF THE OPENING IN THE RECTUS SHEATH and move steadily down to the lower opening of the rectus sheath.

SLOW DOWN AT THE TENDERNESS INTERSECTION in the rectus muscle because of blood vessels there. Avoid making holes in the rectus sheath. If you do, repair them when you close the wound.

SWEEP THE RECTUS MUSCLE laterally off the posterior rectus sheath, and below this, off the extra peritoneal fat.

COAGULATE THE INFERIOR EPIGASTRIC ARTERY AND VEIN at two sites medial and lateral to the planned opening of the peritoneum.

PICK UP THE PERITONEUM with two artery forceps in the middle of the wound.

CHECK BY PINCHING THE PERITONEUM that you have not picked up abdominal contents.

FIT THIS OPERATION TO COVER RE-DO LAPARTOTOMY. Bear this in mind throughout the whole procedure.

OPEN THE PERITONEUM very carefully between the artery clips with the scalpel held flat against the peritoneum to avoid damaging the structures inside.

GO ESPECIALLY CAREFULLY if there has been a previous laparotomy.
Adherent bowel is slightly browner than peritoneum. If you meet adherent bowel, dissect this very carefully off the overlying peritoneum. Consider making an opening at another half of the peritoneum. If you open the bowel, close it with two layers of continuous catgut and try opening the peritoneum at another part of the wound. YOU ARE IN TROUBLE. Consider making an entirely new incision.

EXTEND THE PERITONEAL OPENING to the very end of the wound.

FREE ADHESIONS from the peritoneal surface of the wound for 5 cms. all round.

PLACE SKIN TOWELS over the edges of the wound and 5 cms. inside the peritoneal cavity.

FIX THE SKIN TOWELS with towel clips at the ends of the wound.

RETRACT THE WOUND EDGES with a large Finochetti retractor placed with an opening mechanism facing your assistant.

DIVIDE ADHESIONS getting a view of the abdominal cavity and pelvis.

INSPECT THE PERITONEAL CAVITY FOR A TUMOUR

CHECK THE PRESENCE OF A TUMOUR
CHECK THE SIZE
CHECK THE MOBILITY
CHECK THE ADHERENCE TO LOCAL STRUCTURES
CHECK THE DEGREE OF OBSTRUCTION
CHECK FOR FAECAL LOADING
CHECK FOR LYMPH NODES METASTASES
CHECK FOR LIVER METASTASES
CHECK FOR PERITONEAL AND OVARIAN METASTASES
CHECK FOR OTHER TUMOURS

CHECK FOR OTHER PATHOLOGY
CHECK FOR ADHESIONS AROUND ANY COLOSTOMY

DECIDE ON RESECTABILITY

CHECK EVIDENCE OF RENAL FUNCTION OF THE OPPOSITE SIDE. The resectability depends on the amount of fixity to local structures. In the abdomen this means the pressure of peritoneal structures (ureter) soft tissues, the lateral abdominal wall and the anterior abdominal wall, small bowel and omentum.

THE IDEAL CASE for resection is a mobile tumour above the sacro-iliac joint without a stoma.

THE IDEAL CASE for an anastomosis is where the lower resection line is above the pelvis peritoneum and there is no faecal loading, no obstruction, there is ample proximal bowel.

There is little to be gained from heroic surgery in patients with liver metastases, peritoneal seedlings, (massive lymph node enlargement) or other major disease. Consider a by-pass or a proximal stoma.

If there is fixation to tissues in the abdomen, a resection is nearly always possible. Check you have the expertise to resect small bowel, omentum. Check whether the patient will gain from these procedures. Always ask for advice if the condition is not absolutely straight forward at this stage.

Anastomosis is hazardous in the presence of sepsis.

FIXITY OF THE TUMOUR to the pelvic organs and tissues is likely to be more hazardous. Again you may not be able to decide if such a lesion is unresectable until you have had a go at a dissection.

Remember that you are unlikely to go cure a patient with malignant invasion of the bladder. A hysterectomy is quite feasible if there are malignant adhesions here. However this operation is beyond the scope of this manual. The main danger is catastrophic bleeding from pelvic veins which may only be controlled with packing. The ureter is probably more at risk in the lower pelvis than in the pelvic brim or stomas.

MOBILISATION

START THE MOBILISATION - FOR A TUMOUR ABOVE THE PELVIC RIM GO TO STEP..

FOR A TUMOUR OF THE PELVIC RIM OR BELOW - Read on..

TILT THE PATIENT head down 15 degrees to keep the abdominal contents in the pelvis. Empty the pelvis of small bowel omentum and as much large bowel as is possible.

PACK AWAY the bowel from the pelvis using two large packs to control the small and large bowel.

TAKE YOUR TIME OVER THIS to make sure that there are no loops of bowel slipping past the packs.

If they do slip, control them with a third pack.

PERSIST WITH ADJUSTING the packs to get stability, otherwise the rest of the operation will be obscured by loops of bowel and you will be out of control.

RETRACT THE PACKS on the right side of the abdomen to display the right side of the pelvis meso-colon.

RETRACT THE BLADDER AND UTERUS FORWARDS with a retractor held by a second assistant.

INCISE THE PERITONEUM on the right side of the pelvic meso-colon, above the pelvic rim. Run down over the sacro iliac joint and down in the gully between the base of the pelvic meso-colon and the side wall of the pelvis. Continue the peritoneal incision using scissors across the peritoneum in front of the recto vaginal or recto cervical pouch.

DEEPEN THE INCISION with a swab on a stick from back to front.

Display the ureter crossing the sacro-iliac joint and the vessels running parallel laterally. If they bleed, coagulate these vessels or ligate them if that fails. Find the ureter by division, a slightly pink colour.

Laterally, deepen the dissection between the iliac arteries and veins and the side wall of the rectum.

Posteriorly, dissect between the upper rectum and the uterus and vagina or bladder.

Sort out different priorities for resecting diverticular disease, crohn's, colitis.

AIMS OF MOBILISATION, to remove diseased large bowel, to rejoin healthy ends of bowel.

RESECT THE LEFT SIDE OF THE PELVIC COLON from the left sacro-iliac joint down to the front of the rectum to meet up with the dissection from the right side.

RETRACT THE SIGMOID AND UPPER RECTUM TO THE RIGHT with a retractor to expose the left side of the bowel.

Display the vessels from the ureter crossing the left common iliac artery. Dissect this space forwards, free the pelvic mesocolon from the side wall of the pelvis. Take care to preserve the ureter as it runs forwards.

DISSECT BEHIND THE SIGMOID COLON AND UPPER RECTUM under direct vision. Find a bloodless vein in front of the sacrum and in front of the plexus of veins on the sacrum.

Continue the resection posteriorly down the front of the sacrum and onto the coccyx.

Preserve the parasympathetic nerves if you can. These are flattish, whitish 5 mm glands running over the sacro-iliac joints towards the base of the bladder. Keep them next to the lateral pelvic wall.

If you find it difficult identifying the pre-sacral space, dissect with scissors just in front of the middle of the upper sacrum. The plane is very close to the sacrum. Lower down in the sacrum you will need to do the dissection with the tips of your fingers.

DIVIDE THE RIGHT LATERAL TISSUES running between the upper rectum and the lateral pelvic wall. These are often called the lateral ligaments and are close to the middle vessels.

They are usually bloodless. Make sure you can see the ureter clearly before dividing them.

DIVIDE THE LEFT MUSCLE running between the upper rectum and the left abdominal wall. Again make sure that you can see the ureter clearly before dividing these tissues.

PACK THE PRE_SACRAL SPACE with a large gauze pack if there is any oozing.

DISPLAY THE ANTERIOR RECTUM by elevating the anterior abdominal flap in the incision in front of the upper rectum using Moynihan's cholecystectomy forceps.

Dissect carefully with a pledget on a stick between the which has prominent veins on its surface and the anterior structures, ie. uterus, vagina, bladder, seminal vesicals (with the vasas laterally).

Use the St. Marks retractor to get better access. Coagulate vessels as you go. Take your time.

The upper and mid-rectum should now be fully mobilised.

CHECK THERE IS NO BLEEDING coagulate bleeding vessels. Rarely there is ferocious bleeding from the vessels from the front of the sacrum, diathermy may be sufficient. Packing with a six metre gauze pack led out through a separate stab incision in the abdominal wall may be necessary - two or three packs may be needed. Plugging the bleeding with a sterile stainless drawing pin may be life-saving.

MOBILISE THE ABDOMINAL COLON

STAND ON THE PATIENTS RIGHT

RETRACT THE LEFT ABDOMINAL WALL with a Kelly retractor.

RETRACT THE LEFT COLON MEDIALY with one or two large gauze packs.

DISPLAY THE LEFT PARA COLIC GUTTER abdominally incision in the pelvic peritoneum up to the splenic flexure

Display the genital fold of peritoneum running up the para colic gutter which will be your guideline to the next part of the dissection.

INCISE THE RIGHT PARA COLIC GUTTER using dissecting scissors. Run from the incision in the pelvic peritoneum towards the splenic flexure.

This will require considerable skill in placing gauze packs to retract the bowel. The manipulator of the operating theatre should follow your movements closely.

CLEAN THE ASCENDING COLON MEDIALY with a swab on a stick. Make sure the domadal vessels and ureter are kept laterally. Make sure that the ureter does not get dissected medially if it is closely applied to the peritoneum medial to the incision.

Run this dissection up towards the splenic flexure. This can be very difficult in a large fat patient with a deep chest.

CHECK THE WOUND EXTENDS RIGHT UP TO THE COSTAL MARGIN.

CHECK THE PACKS ARE PROPERLY PLACED.

CHECK THE FINOCHETTI RETRACTOR IS WIDELY OPEN.

TILT THE PATIENTS FOOT DOWN, ROLL THE TABLE TOWARDS YOU.

MOBILISE THE SPLENIC FLEXURE under direct vision. Extend the cut in the peritoneum round the top of the splenic flexure onto the transverse colon. This

can be very difficult because it is the most distant part of the dissection. Coagulate vessels before you cut them. Make sure you have complete control of bleeding at all times. Dissect the strands of tissue very carefully off the lower pole of the spleen. Avoid tearing the capsule of the spleen. If it does tear and bleed, you may need to perform a splenectomy.

DISSECT THE LEFT COLON AND THE LEFT COLIC VESSELS medially using a swab on a stick until you reach the aorta.

End this step with a left colon and splenic flexure together with their blood vessels completely mobilised and lying in the left side of the abdominal cavity. The colon will be much more mobile than the blood vessels. Infact, the blood vessels will be the main restraint to the mobilisation. Concentrate on freeing the vessels medially. Keep away from the lower pole of the kidney and the fourth part of the duodenum.

If there is a left iliac colostomy, try to perform this mobilisation without disturbing the colostomy. If this is not possible due to the colostomies position and previous surgery, dissect the colostomy from the inside of the abdominal wall and temporarily close the colostomy with two layers of continuous 2 0 catgut (Ethicon W441).

PRESCRIBE ANTI BIOTICS Metronidazole 1 gram and Cephuroxine 1.5 grams intravenously.

MOBILISE THE TRANSVERSE COLON to provide more mobility for the eventual anastomosis. Clip cut and tie with No. 1 silk (Ethicon W) the greater omentum. The transverse colon and the mesocolon from the omental tissues running down from the stomach and spleen.

IDENTIFY THE MARGINAL ARTERY in the mesocolon. This is usually within 2 cms. of the bowel itself. Preserve this artery where it supplies bowel which is to be retained.

DIVIDE THE INFERIOR MESENTERIC VESSELS to continue the mobilisation of the left colon. These vessels will be seen in the mesocolon overlying the sacro-iliac joint. Hold the mesocolon up to the light if there is any difficulty. Clamp the vessels with two Moynihan cholecystectomy forceps. Divide the tissues between clamps and tie both ends with a 1 0 silk (Ethicon). Take care to clamp the vessels at least 2 cms. away from the marginal artery if the bowel is to be retained.

CLAMP, CUT AND LIGATE THE LEFT COLIC AND MID COLIC VESSELS WITH 1 0 SILK (ETHICON W).

EXAMINE THE MOBILISED BOWEL. You should now have the large bowel mobilised from the middle of the transverse colon to the mid-rectum together with marginal blood supply in the attached 3 cm. rim of mesocolon. All the mobilised bowel should look viable, ie. free from any dark or blue areas. If these areas are present they need to be resected and should not be retained.

CONFIRM YOU ARE DOING AN ANASTOMOSIS, if not, your options are, Hartmann's operation, Paul Mikulicz's operation, proximal colostomy, abdomino-perineal resection. It is usually quite clear by this stage which of these is the correct procedure to do.

Insert - Mobilisation of Splenic Flexure.

CONTINUE THE INCISION IN THE LEFT PARA COLIC GUTTER PERITONEUM TO THE SPLEEN. Divide the peritoneum and rather vascular adventitia adherent to the lower pole of the spleen. Dissect medially and you will come across the greater omentum. Clamp, divide and tie the greater omentum above the transverse colon. Dissect the lower leaf from the greater omentum from the transverse colon in the bloodless plane on its anti-mesenteric border. Extend the dissection of the anti-mesenteric border to the middle of the transverse colon. Now excise the peritoneum on the upper surface of the transverse mesocolon to free tissues here. Continue the freeing of the greater omentum at the border of the colon and the transverse mesocolon and any other unnamed adhesions until the only restraints on the downward freeing of the splenic flexure are the middle colic and left colic vessels running to connect with the marginal artery.

DECIDE ON A RESECTION you will need at least 2 cms. of healthy bowel below the diseased portion and at least 5 cms. above the diseased part to obtain disease free resection lines. To get this below the tumour, consider an abdomino-perineal resection. For diverticular disease the distal appearance need only be 3 mm and the same applies for Crohn's disease.

PREPARE THE BOWEL FOR A RESECTION by clearing a 12 cm. length of bowel distal to the diseased segment and a similar segment above it.

START AT THE LOWER END because this is the more difficult. Obtain 1 cm. bites using 2 Moynihan cholecystectomy forceps. Divide the intervening tissue and tie up with old ties (Ethicon W). Tie off the bite of mesenteric tissue first so that the upper cholecystectomy forceps is out of the way. Avoid big bites. Take your time with minor vessels and fat. Extend the division of the mesentery to the gap already made in the mesentery of the mobilised proximal bowel. Clear the resection line with a 4 cm. segment of bare colon. Clip, cut and divide the mesenteric tissues from the plane between the far wall and the mesentery and the main gap in the . Stop check 2-3 times before you clear the upper section of bowel. The planned section will extend 2 cms. beyond the lower cleared segment without any pull. This will allow for inevitable bunching of the bowel plus a loss of length at the site of the anastomosis and still keep the bowel

Beginners tend to perform the anastomosis under tension which can be fatal. Over-compensate for this from the start.

DECIDE ABOUT STITCHING OR STAPLING THE ANASTOMOSIS Use a circular end to end anastomosis staples for all anastomoses below the mid sacrum (ie. within reach of the stapler inserted through the rectum).

Use hand stitching for anastomosis above the middle of the sacrum.

FOR STAPLED ANASTOMOSIS go to Step... (Insert Staples File).

FOR HAND STITCHED ANASTOMOSIS read on..

TURN TO THE LOWER RESECTION LINE

NON CRUSH CLAMP THE DISTAL VALVE using a Hayes right angled clamp. Place across the bowel at right angles, the jaws in the transverse plain of the body. Use two clicks. Put the jaws 2 cms. distal to the clamp resection line. Avoid clamping the mesentery. Make sure the distal valve is not twisted.

NON CRUSH CLAMP THE UPPER BOWEL 2 cms. above the clamp dissection line. Use a Hayes right angled clamp placed at right angles to the long axis of the bowel. Use two clips at the top. Avoid the mesentery. Apply the clamp so that it will

rest against the lower clamp for the anastomosis without any twisting of the upper bowel.

TEST THE BOWEL MOBILITY by approximating the two clamps. The proximal and distal bowel should lie together without any pull whatsoever. If there is any tightness at all, free off any strands of peritoneum, adventitia or omentum. You may need to divide more of the feeder vessels to the marginal artery and mobilise more of the transverse colon. Very rarely a total colectomy with ileo-rectal anastomosis is needed. Finally consider a Hartmann's operation. Do not be tempted to accept an anastomosis which is under tension. It will fail.

CRUSH CLAMP THE LOWER BOWEL with a Peyr's crushing clamp. At the clamp resection line make sure that the jaws are long enough to crush the whole width of the bowel. Check the jaws are loose enough to allow easy clamping with one hand. Crush clamp the upper bowel, with Peyr's clamp at the planned resection line. Check the jaws are long enough to crush the whole of the bowel. Check the jaws are loose to allow easy curving of the clamp with one hand.

PROTECT THE OPERATING FIELD against contamination from faecal matter by tucking large gauze packs all around and placing swabs on sticks under each Peyr's clamp.

CUT THE LOWER BOWEL flush with the lower Peyr's clamp using a scalpel. THE LOWER PEYR'S CLAMP AND BOWEL out of the way.

CUT THE UPPER RESECTION LINE flush with the Peyr's clamp using a scalpel. Make sure that you do not cut anything else.

TRANSFER THE RESECTION BOWEL AND TWO PEYR'S CLAMPS into a receiver by a non-scrubbed person.

APPROXIMATE THE CUT ENDS OF BOWEL in the position that they will be anastomosed.

CLEAN THE BOWEL LUMEN with swabs on sticks to remove faecal matter and mucus. Keep the whole procedure clean.

EMPTY THE PROXIMAL BOWEL CONTENTS into the portion of bowel to be removed. Do this by milking the contents along with your fingers through the bowel wall. If there is more faecal matter in the proximal bowel than the capacity of the resected bowel, remove what you can. If there is severe proximal loading, decide easily to do a transverse colostomy.

EXAMINE THE CUT ENDS OF BOWEL. Check that the lumen down to the non crushing clamp is clean. Check there is a 1 cm. rim of bowel free from fat and external blood vessels ready for the anastomosis.

CHECK THE BOWEL ENDS HAVE NOT SLIPPED in either non crushing clamp.

If the bowel diameters differ, the ends of the bowel as best you can. In the anastomosis you need to take larger stitch bites of the larger diameter bowel to compensate for this inequality.

START THE PLANNED ANASTOMOSIS - read on

START THE SERO-MUSCULAR LAYER where the walls of the upper and lower bowel are touching.

INSERT THE FIRST STITCH of 2 0 silk (Ethicon W333) at one limit of the touching bowel walls. Place the stitch 5 mm from each edge of the two pieces of bowel. Make sure that the stitch does not go into the lumen of either piece of bowel. This will give an idea of the depth of other sero-muscular stitches. Tie the

suture with three half hitches pulled so that the bowel walls lie together. Clip the ends 10 cms. long. Trim both ends flush with the forceps and use the thread as a retractor.

INSERT A SECOND END STITCH of 2 0 silk (Ethicon W333) at the opposite end of the clamped upper and lower bowel. Tie with three half hitches. Clip the ends 10 cms. long. Trim. Use the threads as a retractor.

INSERT THE REMAINING SERO MUSCULAR STITCHES clear of the other suture line. Use interrupted stitches 5 mm apart and 5 mm from the cut ends of the bowel. Make sure you insert these stitches under direct vision. Make sure you compensate for inequality of the of the upper and lower bowel. Tie the ends with three half hitches. Cut the ends 3 mm long. You should end up with the opposing walls of the upper and lower bowel snugly held together without any gaps. Insert extra stitches if there are any gaps. Avoid tearing the muscle with stitches that are over tight.

START THE INNER ALL LAYER SUTURE LINE with a 2 0 double needled catgut.(Ethicon W6441). Start in the middle of the line of toughing bowel wall. Stitch through all layers 3 mm from the cut ends. Tie the stitch with 3 half hitches. Cut one needle out of the way.

Stitch the other end of the catgut continuously over and over the two bowel walls to the ends of the clamp.

Pass the needle from inside one lumen, out through the back bowel wall, then pass the needle under direct vision from outside the other bowel wall into the other lumen. Repeat this in an over and over fashion.

At the end, continue taking bites passing from inside the lumen through one bowel wall to the outside. Then from the outside of the opposite wall into the opposite lumen again in an over and over fashion. This should produce a virtually water tight inner suture line.

Continue until you have closed 1 cm. of the front layer of the inner suture line. Make a lock stitch and tuck the needle away.

PICK UP THE OTHER NEEDLE

RUN A SIMILAR CONTINUOUS all layers over and over catgut suture (Ethicon 441). from the knot along the posterior layer of the joined bowel wall, round the corner and onto the front wall.

Tie the ends of catgut together with three half hitches. Cut the ends 1 cm. long.

Oversew any parts of the inner suture line which do not appear to be water tight. If the anterior bowel walls are reluctant to come together, adjust the clamps to give more freedom for this to happen. If the bowel wall tears, there is too much tension. This must be released or the anastomosis will fail. You may be pulling too hard. Go more gently.. You may need to excise the damaged bowel and start again with healthy bowel ends.

Remove the non-crushing clamp.

COMPLETE THE OUTER LAYER OF SUTURES Use interrupted sero muscular sutures of 2 0 silk (Ethicon W333). Place the stitches 5 mm apart. Take the bites of the upper and lower bowel about 5 mm from the inner suture line, where the bowel will naturally allow inversion of the inner suture line. This is where you will appreciate the generous allowance of bowel to prevent any tension. If the bowel

is not floppy you must take steps to release any straining tissues. Go back to Step...

You should end up with the muscle coats of the upper and lower bowel neatly approximated without any gaps and without the inner suture line or mucosa visible. Oversee any gaps. If the sutures have worn out there is probably too much tension and the anastomosis will fail. You need to re-mobilise re-resect and re-anastomose and also ask for help.

CHECK THE ANASTOMOSIS LUMEN Pinch through the anastomosis by vaginating your finger and thumb. Make sure there is a lumen of at least 2 cms. in diameter. If not, the anastomosis should be taken down and re-done.

CHECK THE BOWEL LIES LOOSELY in the left side of the abdomen. If it does not you need to re-mobilise the proximal bowel.

DECIDE ABOUT A PROXIMAL COLOSTOMY

DO A COLOSTOMY IF:-

YOU HAVE DOUBT ABOUT THE VIABILITY OF THE ANASTOMOSIS
IF THERE HAS BEEN FAECAL LOADING
IF THE PROXIMAL BOWEL IS NOT EMPTY
IF THERE HAS BEEN MORE THAN A MINOR SMEAR OF FAECAL CONTAMINATION
IF THERE HAS BEEN ANY PUS
IF THIS IS ONE OF YOUR FIRST TEN COLECTOMIES

IF NO COLOSTOMY IS DONE - GO TO STEP

TO MAKE A TRANSVERSE COLOSTOMY - READ ON..

REMOVE THE ABDOMINAL PACKS

ELEVATE THE UPPER WOUND with a Kelly retractor to inspect the right upper quadrant of the abdomen.

CHECK THE MOBILITY OF THE RIGHT TRANSVERSE COLON You are aiming for a loop of right transverse colon that will pull out easily through an opening in the right rectus abdominis muscle. Check the meso colon is long enough to allow the loop to project easily. If the meso colon is short, perform a loop ileostomy. Go to Step No.. If the meso colon is long enough READ ON...

CHOOSE A LENGTH OF RIGHT TRANSVERSE COLON for the colostomy. This should be under the planned site of the stoma. You will need 8 cms. of bowel.

CLEAR THE BOWEL OMENTUM ADVENTITIA AND SMALL BLOOD VESSELS

TRANSVERSE COLOSTOMY

PUT SLING AROUND TRANSVERSE COLOSTOMY Pick the colon planned for the colostomy, open the mesentery at its junction with this part of the colon.

PASS A SLING OF 1 CM. diameter plastic tube (sucker tubing) through the opening. Clamp the tubing. The tubing should be 15 cms. long.

CHOOSE THE STOMA SITE ON THE SKIN 6 cms. from the mid-line and 5 cms. above the umbilicus.

PICK UP THE SKIN at this point with an artery clip.

CUT OUT A SKIN CIRCLE 2.5 cms. diameter where the skin is tented up by the artery clip. Use a scalpel.

CLIP THE SUBCUTANEOUS FAT in the middle of the stoma incision with artery clips.

POUR OUR THE SUBCUTANEOUS FAT down to the rectus sheath 2.5 cms. in diameter using the artery clip retraction. Cut the fat with strong scissors.

OPEN THE ANTERIOR RECTUS SHEATH WITH A 2.5 cm. cross shaped incision using scissors.

INCISE THE RECTUS MUSCLE transversely using scissors right down to the posterior rectus sheath. Coagulate bleeding vessels particularly the superior epigastric artery.

OPEN THE POSTERIOR RECTUS SHEATH and peritoneum with a shaped incision 2.5 cms. in diameter.

CHECK THE WHOLE STOMAL OPENING IS FREE FROM IRREGULARITIES by stretching it upwards four fingers. Insert an artery forceps, through the stoma into the peritoneal cavity.

GRASP THE COLON SLING by inserting the artery forceps into the two lumens of the sling tube. (Having removed the original artery forceps from the tubes).

DELIVER THE COLON through the stoma wound by pulling on the forceps and sling tube.

DO THIS GENTLY TO AVOID DAMAGE TO THE BOWEL AND MESO-COLON. You should end up with the line comfortably on the skin with the overlying loop of colon lying loosely.

IF THERE IS ANY TIGHTNESS CHECK THE COLON LOOP HAS BEEN EASED THROUGH PROPERLY. Check the stomal opening is not tight. Check the colon has been sufficiently freed from the omentum and meso-colon. All these problems can be tackled with further dissection.

If all else fails close the opening in the abdominal wall and make an ileostomy in the right iliac fossa. If the colostomy loop is satisfactory go to Step..

IF AN ILEOSTOMY IS NEEDED read on....

Find the terminal ileum. THE MOST DISTAL THAT IS MOBILE ENOUGH for the apex of the ileal loop to lie on the surface of the abdomen without any tension.

CHOOSE THE ILEOSTOMY SITE in the right iliac fossa 5 cms. from the anterior superior iliac spine. This will allow the ileostomy flange to stick effectively on a regular skin surface.

INSERT COLOSTOMY STEPS HERE:::
CHECK BOWEL IS VISABLY FLOPPY

CHECK HAEMOSTASIS particularly in the para colic gutter and around the spleen area.

INSERT TUBE DRAIN in the left iliac fossa.
Make a 2 cm. skin incision with a scalple.

PUSH AN ARTERY FORCEPS THROUGH THE FAT AND ABDOMINAL WALL INTO THE PERITONEAL CAVITY. Make sure that you do not damage intra-abdominal organs. Pull a red rubber drain 1.2 cms. diameter with 2 holes at its proximal end and through the stab wound. Position the inside end of the drain 2 cms. away from the

anastomosis. Suture the drain to the skin with 2 0 silk (Ethicon) tied with four half hitches to the skin, wrapped around the tube at the skin level four times. Secured with further half hitches. The suture ends being cut 4 cms. long.

CLOSURE read on..

PICK UP PERITONEUM AND POSTERIOR RECTUS SHEATH with a Moynihans cholecystectomy forcep on each side.

CLOSE THE PERITONEUM AND POSTERIOR RECTUS SHEATH with a continuous layer of No.1. Nylon Ethicon 749. Tie the first knot with five half hitches. Cut the end 1 cm. long. Take 1 cm. bites 1 cm. from the tissue edge. Tie the second end stitch with 5 throws and cut the ends 1 cm. long.

CLOSE THE ANTERIOR RECTUS SHEATH with a continuous layer of 1 0 nylon (Ethicon 749). Tie the first end stitch with 5 throws. Hold the ends of the stitch with an artery forcep ready for burying the nylon end with subsequent stitches. Place the stitches 1 cm. apart and 1 cm. from the wound edges. Tie the end knot with 5 hitches. Bury the suture ends by running all the loose ends under the rectus sheath stitches. Check the swab needle and instrument counts.

INSERT REGIME FOR DEEP TENSION SUTURES

CHECK HAEMASTASIS IN THE FAT.

SPRINKLE 1 GRAM AMPICILLIN POWDER IN THE FAT>

CLOSE THE FAT with continuous No.1. catgut (Ethicon 762) Tie the ends with three half hitches. Cut the ends 3 mm long.

CLOSE THE SKIN with continuous subcuticular 3 0 Vicryl (Ethicon 9890). Use 5 throws on the knot at the end of the Vicryl). Take 8 bites before pulling on the Vicryl to close the skin edges. Bury the ends with a loop stitch.

SPRAY THE WOUND with an Acrylic Spray (Nabecutane).

APPLY A SKIN DRESSING (Mepore)

CONNECT THE DRAIN TUBE TO A CLOSED SYSTEM OF DRAINAGE WITH A DRAINAGE BAG.

PERFORM A SPHINCTER STRETCH four fingers.

FINAL TOUCHES

WRITE LEGIBLE OPERATION DETAILS

FILL IN THE AUDIT FORM

PRESCRIBE CALCIUM HEPARIN 5000 units b.d. subcutaneously until the patient leaves hospital.

WRITE TO THE GENERAL PRACTITIONER

EQUIPMENT LIST

MATERIAL LIST

END.