

antrum was filled with 10 grammes of sulphonamide powder. The wound was packed with sulphonamide powder and closed without drainage. The patient made an uneventful recovery. The wound healed by first intention. No parotid fistula developed. When seen a month after the operation the patient had no complaints. The maxilla was healthy, the scar being barely perceptible.

The second case was the result of a direct injury. A wooden pile weighing about a ton struck the patient's face on the left side. There was a compound fracture of the facial surface of the maxilla. The nose was completely disfigured.

The wound was excised, and all loose bone fragments were removed. The antrum was packed with 10 grammes of sulphonamide powder. The wound was dusted with sulphonamide powder and sutured.

The nose was refashioned by manipulation and intranasal leverage.

The wound healed by first intention. The patient when seen six weeks later had no complaints; the nose was a good-looking one.

Gunshot wounds.—Five gunshot wounds of the extremities were operated upon. All were wounds without bone, nerve, or major vascular lesions. The bullet track was excised—excision in its true meaning. The wound was packed with 15 grammes of sulphonamide powder and closed with a continuous suture without drainage. All wounds healed by first intention.

Mastoidectomy.—The patient had acute suppurative otitis media on the right side. Mastoiditis was associated. Œdema was demonstrated from occiput to forehead up to the vertex.

The mastoid process was excised as far as possible clear of pus. The antrum and aditus were cleared. The middle ear was full of pus with the ossicles 'floating' in pus. The bone was smoothed out till clear healthy bone was reached. The lateral sinus was exposed for about an inch. It was healthy. The wound was packed with 15 grammes of sulphonamide powder.

The wound was drained. The drain was removed on the second day. The wound healed by first intention. The patient left hospital on the eighth day, completely cured. There was no facial paralysis, giddiness or discharge from the ear.

A carpenter's 3-inch broad chisel was the chief instrument used. A small everyday hammer was used.

A case of *filariasis of the penis and scrotum* was brought up for surgical aid. The patient showed suicidal tendencies.

The penile skin and the scrotum were excised; the tunica vaginalis of right and left sides was excised. The testicles were embedded under the fascia lata at the upper end of the thigh medially. The skin off the thigh was Thiersch grafted on the penis with the Bard Parker knife. The result was most gratifying. The graft took, and there

(Concluded at foot of next column)

INGUINAL HERNIA

(A RECORD OF 104 CASES)

By N. DAS, M.B.

Assistant Surgeon, Emergency Hospital, Feni

BASSINI published his operation for inguinal hernia in 1884. It soon became the standard operation. Operations at present in use are all based in principle on Bassini's operation.

(Continued from previous column)

were no complications. The patient was a new man with a happy future. A grateful patient has been left behind in Persia. This patient has never left Persia. He has had filariasis of the scrotum for eight years. He has been in service as a cook with a Bengali for two years and a Madrassi for three years during the last eleven years.

Culex fatigans is found in South Persia. This possibly explains the occurrence of filariasis. Will filariasis spread with the Indian Army?

Discussion.—The operations detailed cover a varied field. It is to be noted that sepsis is conspicuous by its absence considering the conditions, locality and the personal hygiene of the patients. Undoubtedly sulphonamide locally has played the star rôle. One could without hesitation recommend its use as detailed where sterility is doubted.

The equipment is interestingly limited. The carpenter's saw was an excellent instrument. Manipulation is easy and the speed with which a femur can be sawn through is amazing.

The carpenter's chisel was 3 inches broad, and sharp. My chief, Major Drummond, I.M.S., always recommended its use in orthopaedic surgery. The instrument proved its value in an emergency.

The limited use of catgut definitely minimizes sepsis. It is used where essential. In the scrotal tumour case, only one tube of the catgut was used.

Drainage was not used except in the mastoidectomy. The dictum 'when in doubt don't drain' is borne out in this short series.

The instruments were used only for 'clean cases'. They were boiled once a week and looked after with affectionate care. They were sterilized before the operations by 'flaming'.

No morphia was used in the series. Patients could not afford it; it was not essential. A plaster was always used to protect the wounds till the sutures were to be removed. Chloroform and ether were used, 'the bottle and rag method'; it proved its value in the emergency. Dates provided an abundant supply of glucose and vitamins A and D.

Gratitude must be expressed to my very able assistant, Sgt. C. R. Pritchard, R.A.M.C., for his never failing co-operation and untiring enthusiasm. He had never seen an operation till he joined the unit. He has developed into an excellent assistant. The writer thanks Capt. T. W. Percival, R.A.M.C., for the anaesthesia given well.

Almost every year new modifications are described. Why? It is because hernia not infrequently recurs after operation. Why does hernia recur? Suppuration was alleged as the cause, but it has been proved that suppuration occurs in less than one-fifth of the recurrent cases (Battle). Incomplete removal of the sac is an important cause of recurrence. The neck should be properly identified and the sac transfixed just proximal to it. Unless this is done thoroughly, a dimple at least will be left at the neck of the sac and it will form the precursor of the future sac. Loss of tone of the muscles or their actual degeneration constitutes another important cause of recurrence. The muscles at fault are the internal oblique, the transversalis and the aponeurosis of the external oblique. Other causes of recurrence which need a reference are trauma, faulty technique, lack of co-operation of the patient, and persistent and violent expulsive efforts caused by conditions such as chronic cough, enlarged prostate, obstinate constipation, etc. It goes without saying that these latter troubles need rectification before the cases are actually put up for operation. The loose areolar tissue under the aponeurosis of the external oblique at the site of operation and around the cord should be broken or removed by gauze dissection, because this areolar tissue helps recurrence by keeping an open space under the external oblique. Sixty-five per cent of recurrent hernias occur within 6 months, and 85 per cent within 12 months after operation (Coley).

This paper gives a record of 104 cases, all seen in the district of Bakarganj (Bengal) and operated on in the Barisal Sadar Hospital. Cases were operated on at all ages and at all stages; in other words, all cases in which there was a reasonable prospect of success were done. The only cases which were left out as inoperable were obese and elderly patients in the advanced stage of secondary weakness of musculature. The results have so far been satisfactory.

Of these cases, 68 were indirect, 25 direct and 11 congenital. Fifty-five cases of indirect hernia occurred in persons between 20 and 45 years of age. Eight cases of direct hernia occurred between 30 and 45 years and 12 between 50 and 62 years of age.

TABLE I

Age in years	Number of cases	Indirect	Direct	Con-genital	Duration of disease in years
5	1	1	4
12-16	10	2	..	8	3-4
20-30	44	38	4	2	5-8
30-45	27	19	8	..	5-8
50-62	20	8	12	..	12-15
80-88	2	1	1	..	10-20
TOTAL	104	68	25	11	

About 75 per cent of the patients were Hindus and 25 per cent Muslims. It might be mentioned that Bakarganj is a Muslim majority district. The comparative muscular weakness of the Hindus was the only noticeable cause for the preponderance of hernia in this community.

TABLE II

Age in years	Number of cases	Hindu	Muslim	Christian
5	1	1
12-16	10	8	2	..
20-30	44	32	12	..
30-45	27	20	7	..
50-62	20	15	5	..
80-88	2	1	..	1
TOTAL	104	77	26	1

Operation

In this small paper it has not been my aim to describe the operative details extensively, nor do I think it would serve any useful purpose. Stress has been laid on those points which were found to be particularly important in preventing recurrence. I have described the operation under three heads—indirect, direct and strangulated hernia—and have incorporated notes of a small number of cases which I thought were worthy of separate mention.

Anæsthesia.—Fifty-six cases were done with spinal neocaine (0.5 to 1.0 gramme). It was found to be a very useful and safe anæsthetic. Unfortunately, it is not available now. Thirty-three cases had A.C.E. In 15 cases in old persons, subjects of chronic bronchitis or 'bad risk' cases, operation was done under local novocaine 1 per cent.

Technique of local anæsthesia.—One 10 c.cm. syringe and a 3½-inch needle are necessary.

(a) Through a point 1 inch medial to the anterior superior iliac spine, the muscular planes are infiltrated, the ilio-inguinal, the ilio-hypogastric and the twelfth dorsal nerves being thus blocked.

(b) Through a point at the saphenous opening, tissues below the inguinal ligament and at the base of the scrotum are infiltrated, the pubic and the genito-femoral nerves being thus blocked.

(c) Through a point in the external ring, the middle line, the neck of the scrotum and the neighbourhood of the inguinal canal are infiltrated.

(d) The line of skin incision is infiltrated.

Indirect inguinal hernia.—An incision is made over the inguinal canal extending from an inch outside the abdominal inguinal ring to just short of the pubic spine. The skin, the fascia of Camper and the fascia of Scarpa are successively cut, and the aponeurosis of the external oblique is exposed and split in the line of its fibres from the external ring outwards. The two

flaps of the external oblique are reflected to expose the conjoint tendon and the deep surface of the Poupart's ligament clearly. The ilio-hypogastric nerve which runs over the conjoint tendon is carefully preserved. The ilio-inguinal nerve which runs with the cord is also safeguarded.

By a few light touches of the scalpel over and along the cord, the sac can be found as a shining membrane; it is caught with a pair of artery forceps and is separated from the cord to just beyond its neck. Recognition of the neck is very important because incomplete removal of the sac is a very important cause of recurrence. The neck should be properly identified and transfixed just proximal to it. How can one identify the neck? At the neck (a) the sac expands into the peritoneum, (b) there is a collar of fat (extra-peritoneal), (c) the sac is narrowest and thickest and (d) the inferior epigastric artery courses round the sac. But the sac should not be pulled beyond the neck as in that case one is likely to encounter the bladder. The sac is then opened to make sure that no adhesions between the sac and its contents exist. The neck is transfixed with catgut no. 2 and the sac is cut away. In nearly 50 per cent of cases of the present series, the cremaster muscle was seen rather overgrown and was removed between ligatures with a view to giving less bulk to the cord and less width to the ring to be constructed to give passage to it.

The conjoint tendon is then sutured to the deep aspect of Poupart's ligament by 4 or 5 interrupted stitches of chromicized catgut no. 3. One of the stitches is placed above the abdominal inguinal ring (Coley's stitch) and others below it. The uppermost of the stitches below the cord is applied so as to leave just enough room for the cord, i.e. the cord should neither be compressed nor left loose. The lower stitches are applied behind the cord. Great care is taken in picking up Poupart's ligament, so that this delicate structure is not lacerated. These stitches, if tied too tight, are likely to strangle and damage the muscular fibres of the conjoint tendon and lead to stitch abscess, one of the causes of failure. In order to produce as little damage as possible these sutures are placed at right angles to these structures.

In the vast majority of cases, recurrence occurs through the lower end of the canal, and this part of the canal, therefore, needs special attention. The reflected inguinal ligament is a fan-shaped expansion from the lacunar ligament and proceeds medialwards behind the spermatic cord and superior crus of the subcutaneous inguinal ring and in front of the inguinal aponeurotic falx to its fellow of the other side. The reflected inguinal ligament and the inguinal aponeurotic falx are sewn behind the cord to Poupart's ligament close to its insertion into the pubic spine.

Repair by hernial sac.—Heterogenous tissues, viz. the muscular fibres of the internal oblique and the transversalis and the ligamentous Poupart's ligament, do not unite or the union is insecure, a fact familiar to all who have had occasion to operate on recurrent hernias. Moreover, these structures can only be apposed by stitches under some tension, and tension stitches do not take. These factors baffle Bassini's primary object of strengthening the posterior wall of the inguinal canal. Moreover, the normal sphincter action of the conjoint tendon and the arched fibres of the internal oblique which function by contracting down on the cord and Poupart's ligament is interfered with. Living fascia is thus introduced to repair the canal (Gallie).

Fascial strips are cut from the fascia lata and are laced or darned as a suture across the gap of the posterior wall of the canal. A strip of aponeurosis detached from the upper of the external oblique flaps at the site of the operation is also used as living suture. It is freed at its lateral end and left attached at its medial end and used as a continuous suture approximating the conjoint tendon and Poupart's ligament.

In the present series in almost all the cases the duration of illness was 5 years or more and the sacs were fairly thick. Strips were cut from the sac and made use of as living suture in the repair of the

inguinal canal. The sac after excision is kept in sterile normal saline at body temperature. It is laid open longitudinally and made into a long strip half inch wide by cutting the sac in a circular fashion from near the margin towards its centre. It is then threaded on a large-eyed needle (of Gallie) and used as a continuous suture, picking up in turn the lower edge of the conjoint tendon and the deep aspect of the Poupart's ligament, to lace across the posterior wall of the canal. It is next carried round the cord to constrict the abdominal inguinal ring. The end of the strip is stitched to the penultimate loop of the suture by catgut. Great care is taken in picking up Poupart's ligament so that the delicate structure is not damaged. It is essential to apply the living sutures after the tension is relieved by interrupted catgut stitches. A few catgut stitches are applied fixing the angles of the continuous suture to the conjoint tendon. The vas and the cord are then placed on the sewn conjoint tendon and the flaps of the external oblique aponeurosis are sutured over it by interrupted chromicized catgut no. 1. The skin is then sutured without drainage by interrupted silk or silkworm gut.

Direct inguinal hernia

The operation for direct hernia differs from that for oblique hernia in that the repair of the canal must be more thorough because the musculature is defective.

The internal oblique and transversalis are degenerative, the conjoint tendon atrophied and stretched and the external oblique aponeurosis toneless and frayed. The sac is almost always a peritoneal bulge and on account of the relaxed condition of the surrounding structures the bladder is frequently associated with the sac. In the present series in almost all of the 25 cases, the sac had a wide neck and could not be tied in the ordinary way. It was opened, the edges excised and then united by a running suture of chromicized catgut no. 2, like a laparotomy wound. The strip of the sac like that described in oblique hernia is laced across the posterior wall of the canal. It is then carried beyond the cord through the external oblique aponeurosis to secure closure of its gap in front of the cord.

Post-operative care.—Nothing special. Stitches are removed on the eighth day. Period of stay in bed should be 3 weeks. Sedentary workers may resume work after a further 3 weeks' convalescence but must be warned to avoid any work of strain for several months. Labourers should avoid heavy work for 6 months. All the cases of this series had an uneventful convalescence.

Of the 25 cases 6 were recurrent hernia. Hernia recurred in 3 cases within 7 months of operation and one of these 3 cases was a recurrent hernia.

Strangulated inguinal hernia

The operative procedure is similar to that of internal herniorrhaphy with modifications that may be necessary according to the condition of the strangulated loop.

The sac is exposed, its tense fundus nicked to let out the pent-up collection of fluid which is mopped up carefully and the opening is enlarged up to the neck. Contrary to the teaching of the textbooks, it is always seen that the constricting ring is the fibrous thickened neck of the sac at the internal ring which by itself has nothing to do with strangulation. The constricting ring is divided with great care to avoid injury to the strangulated gut which is then drawn out to determine its viability.

There were 33 cases of strangulated hernia in this series and 32 were of indirect variety and one of direct. From the standpoint of treatment the cases could be divided into 3 groups

according to the condition of the strangulated intestine, *viz*, viable, doubtful and non-viable.

TABLE III

Difference between viable and non-viable gut

	Viable	Non-viable
1. Colour	Pink and sheeny.	Grey and lustreless.
2. Feel	Elastic	Toneless and flaccid like sodden blotting paper.
3. Peristalsis	Present	Absent.
4. Wrapped in hot packs for 5 mins.	Return of colour and tone.	Unchanged.
5. Pulsation of mesenteric vessels.	Present	Absent in late cases.
6. Fluid of the sac.	Clear and odourless.	May be sanious and offensive.
7. Inhalation of pure oxygen.	Colour rapidly turns healthy pink.	Color unchanged.

A. *Viable*.—Twenty-six cases. In each the gut was viable beyond all suspicion and the hernia was dealt after relief of strangulation in the ordinary way.

Two cases are worthy of mention.

A Brahmin, aged 88 years. Right inguinal hernia—20 years. Operated on 6 hours after strangulation under local novocaine 1 per cent. The canal was repaired with sac as usual. Fourteen months after operation he died of malignant ulcer of the tonsil but there were till then no signs of recurrence of hernia.

An English priest, aged 80 years. Had strangulation of a recurrent inguinal hernia and was operated on 4 hours after strangulation under local novocaine 1 per cent. It was a direct hernia. Ten months have elapsed after operation but there is as yet no sign of recurrence.

B. *Doubtful*.—Only one case.

Hindu male, aged 30 years. Operated on 9 hours after strangulation. The gut was retained outside the abdomen, after release of the strangulation, by fixing the gut to the neck of the sac by a few catgut sutures. The gut was kept covered with gauze soaked in hot water, frequently changed. The gut showed definite signs of recovery after 24 hours when the sutures were removed and the prolapsed intestine was reduced. The sac was transfixed and cut away as usual. It was washed in saline, cut into a long strip and utilized to effect a radical cure in the repair of the canal. Stitches were removed after 7 days. Primary union.

C. *Non-viable*.—There were 6 such cases. One case had gangrene of the proximal loop at the ring of constriction, which was buried by interrupted catgut sutures and the loop returned into the abdomen. The canal was repaired with sac as usual.

In 3 cases there were patches of gangrene chiefly in the anti-mesenteric border of the herniated gut. These patches were infolded by purse-string sutures and the gut returned into the abdomen. The canal was repaired with sac as usual.

Two cases showed definite gangrene of the ileum and one came 4 days and the other 10 days after strangulation.

The former, a Hindu male, aged 28 years, was in fairly good general condition. The gangrenous gut was

resected and an end-to-end anastomosis done. It was then returned into the abdomen and the canal repaired with the sac as usual. He had an uneventful recovery. The other patient, Hindu male, aged 36 years, was highly toxic and exhausted by pain, vomiting and sleeplessness. The operation was conducted under local novocaine 1 per cent. The ring of constriction was divided and the loop drawn down and sutured to the sac near its neck by interrupted catgut stitches. The two limbs of the loop were then sewn together by a few stitches above the gangrenous portion (6 inches) which was next cut away. A large rubber tube was passed into each limb of the loop and sutured in. An artificial anus was thus made. The operation was done very quickly and his general condition received all attention. Gradually he improved and on the 7th day was given rice diet. On the 14th day a secondary operation was done to close the faecal fistula. Ten days later he was operated on for the third time. The sac was slowly and carefully dissected out, transfixed at the neck and cut away. The canal was repaired as in Bassini's operation, no attempt being made to utilize the sac in suturing. The reinforcement of the posterior wall was done by a quadrilateral flap cut from the anterior wall of the rectus sheath with its base at the outer border. This flap was turned down and sewn to the Poupart's ligament, the attached edge acting as hinge (Walfer). At each step of the operation sulphamide powder was liberally dusted and the skin sutured without drainage. The patient, who could not be more ill than he was, survived this gravest emergency only because the absolute minimum was done at the first operation and the whole procedure was split up into 3 stages.

TABLE IV

Type	Number	Recurrence in 7 months.	CURE FOR			
			4 years	3 years	2 years	1 year
Congenital ..	11	..	4	3	2	2
Indirect ..	35	..	7	12	10	5
Direct ..	19	2	5	4	7	2
Recurrent (direct) ..	6	1	1	3	1	..
Strangulated ..	33	..	9	13	8	3
TOTAL ..	104	3	26	35	28	12

Discussion

Half a century ago Bassini observed: 'It will appear excess of daring to write at the present day of the radical treatment of hernia.' It must be admitted that even today, certain cases recur after operation.

In the present series, every one who had any prospect of cure was given a chance and the results were unexpectedly good. Except one case of congenital hernia in a child and another case of a very bad strangulated hernia, the inguinal canal of every other case was repaired by living suture derived from the sac which, being old-standing, was thick-walled.

In not a single case of the whole series did the sac-suture fail to take, probably because it was placed more or less in the original and natural position of the sac from which the suture was derived. When strips of fascia lata are

(Concluded on opposite page)

RESECTION OF THE RIGHT HALF OF THE COLON (HEMICOLECTOMY)*†

By S. D. ARAWATTIGI

Surgeon, Miraj Medical Centre, Miraj (S.M.C.)

Introduction

SURGERY of the colon proper necessarily awaited full development until the Listerian era,

(Continued from previous page)

used, an additional operation is necessary and extra time is lost in suturing the wound on the thigh. In repair by aponeurotic suture, there is a chance of weakening this essential structure, and the strip that is derived from it is obviously not long enough. Moreover, when the musculature is defective, the external oblique aponeurosis is too thin to provide a suture. The sac, to be useful as suture material, must be thick, and I have used it with extremely satisfactory results in old-standing cases of inguinal hernia.

Three cases recurred, 2 direct and 1 recurrent. Advanced muscular degeneration and loss of tone were the evident causes of recurrence which appeared within 7 months of operation. A case of bilateral recurrent hernia has apparently been cured, there being no signs of recurrence for 2 years on one side and 1 year on the other. Even strangulated hernia cases did very well with this procedure. The idea of utilizing the sac of the hernia as living suture owes its origin to my professor, Dr. S. Dutta, F.R.C.S. (Edin.), whom I assisted in 1933-35 in operations of inguinal hernia done in this way. I do not know nor have I read of any other surgeon making use of the sac in the repair of the inguinal canal in operations for hernia. Though the number of cases in the present series is too small to assess the efficacy of this method, yet I feel that suturing the posterior gap of the canal with the sac has a definite place in the treatment of inguinal hernia. It goes without saying that the sac should be transfixed at the proper site, without which failure is very likely to occur.

Summary

1. One hundred and four cases have been recorded.
2. Causes of recurrence of inguinal hernia have been discussed.
3. The sac has been utilized as living suture in repairing the canal, with promising results.
4. Thirty-three cases of strangulated hernia are included and their treatment discussed.

I am indebted to Rai B. B. Hajra Bahadur, Civil Surgeon, Bakarganj, for permitting me to operate on these cases and publish this paper.

* Read before the 9th General Conference of the Christian Medical Association of India, Burma, and Ceylon, on 26th March, 1943, held at Vellore (South India).

† This article was accompanied by a very large table giving a full detail of all the 40 cases. This table we are unable to reproduce.—EDITOR, *I. M. G.*

which followed the discovery of anaesthesia, and permitted fearless invasion of the peritoneal cavity. In the beginning, colostomy as a decompressive measure was the only operation performed for cancer, but gradually enterprising and persistent surgeons doggedly extended the horizon and began to attempt the removal of malignant lesions and the establishment of the gastro-intestinal continuity.

As far back as 1823, Reybard successfully resected the sigmoid flexure for cancer, and made a primary anastomosis in a young man of 23 years. The patient recovered, but professional criticism served to discourage the popularity of so drastic a measure. The progress was slow thereafter. Again in 1843, Thiersh resected the colon for acute obstruction. Thirty-seven years later, only 10 resections of large bowel had been recorded and only 3 of these were successful. Later, however, more resections were performed with great success because of the development of the 'principle of exteriorization' (Mikulicz's). Due to the efforts of many bold and enterprising surgeons such as Billroth, Marshall, Kraussold, Block, Mikulicz, Weir and many others, colonic surgery opened up a new field for extensive and successful resections.

The exteriorization principle was first advocated by J. M. Borton of Philadelphia in 1888 in '13th resection at the ileo-caecal valve for epithelioma'. Subsequently Block in 1891 published a report of this type of resection; and many others described similar procedures during the following years.

In 1902 Mikulicz spoke of a procedure which he claimed to have performed first in 1886 and for some reason his name has been commonly attached to all exteriorization operations by the surgeons of America. To-day the scope of application of operative procedures to many lesions of the large bowel hitherto considered ill-fitted for surgery has been enormously broadened. It is true that any mutilating operation is a most unpleasant duty to perform, yet in dealing with the diseased part of the bowel where irreparable damage has taken place, such as in cancer threatening life, destructive and mutilating methods which may prove to save lives in a large percentage of patients must be accepted and adopted.

Although, theoretically, total extirpation of the colon is probably the operation of choice, this procedure is associated with too high a mortality to be of practical value. Subtotal colonic resection of the greatest possible portion of the colon, including a part of the ileum and the involved lymph nodes with mesentery, gives the best results. It is true that in advanced cases in which the malignancy has invaded the other surrounding structures, with metastases in the liver and other parts of the abdomen, the above resection is obviously a palliative procedure. It removes the ulcerating, bleeding, obstructive or painful tumour, and lengthens life, but does not