STRANGULATED EXTERNAL HERNIA

An Analysis of 120 Personal Cases*

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In spite of much research and of improvements in pre- and post-operative treatment, strangulated external hernia still remains the commonest cause of death in the practice of acute surgery. This is largely due to the age and poor general condition of many patients when they reach hospital, but also in part to imperfections in surgical treatment. This account of 120 cases is presented together with a consideration of some of the important factors in the condition, a review of the late results and some suggestions which may prove helpful.

A study of the literature shows that the type of anaesthesia employed has a definite bearing on the mortality (Jarboe and Pratt, 1947; Jens, 1943; Frankau, 1931). The patients in the present series were all operated on by the author under local anaesthesia. No similar series has been found in the recent literature. Although local anaesthesia has been widely recommended for seriously ill patients with strangulated hernia by Garber (1949), Godfrey (1948), Douglas (1942), Colley (1924), Watson (1938) and others, no series where it has been used exclusively has been discovered by the writer.

These 120 cases of strangulated hernia were admitted as urgencies during the years 1946 to 1949. Their average age was as follows: Inguinal hernia 65.0 years, femoral hernia 60.0 years and ventral hernia 66.2 years.

Table 1 shows the results obtained.

TABLE 1

	Cases	Recovered	Died in hospital	Mortality
Femoral ..	75	65	10	13.3%
Inguinal ..	24	21	3	12.5%
Ventral ..	21	15	6	28.6%
Total cases	120	101	19	15.8%

The mortality rate for the various types of hernia was approximately the same for both sexes.

Factors Influencing the Mortality of Strangulated Hernia

1. Age

It has already been pointed out above that the average age of patients suffering from strangulated hernia is increasing and, as might be expected, the older the patient the worse is the prognosis. However age itself is no bar to operation; the four patients in this series over 80 years all recovered. Table 2 shows the relation of age to mortality in 75 cases of strangulated femoral hernia.

TABLE 2

STRANGULATED FEMORAL HERNIA

Age group	Recovered	Died	Mortality
20-30	1	0	0
30-40	5	0	0
40-50	10	1	10%
50-60	16	2	11.1%
60-70	22	4	15.3%
70-80	9	3	25.0%
80+	2	0	0

2. Duration of Strangulation

It has been known for many years that the prognosis is proportionally worse the longer the bowel has been strangulated. The relationship is not a simple arithmetical one as patients who are operated on after five days' strangulation have a slightly better outlook than those with a shorter history. In the late cases the strangulation is only partial, otherwise they would die before coming to operation. In the present series four cases were strangulated for more than five days; they were all Richter's hernia and all survived. Bellar and Colp (1926) and Jarboe (1947) suggest that in these cases the sac may contain omentum only, or that a partial reduction has occurred leaving only a Richter's hernia still in the sac. Table 3 shows the relationship of the length of time the bowel has been strangulated to the mortality. The time of

* Based on a lecture given to the Surgical Section of the Manchester Medical Society, November 14, 1950.

strangulation is estimated from the first attack of vomiting or acute central abdominal colic.

TABLE 3
DURATION OF STRANGULATION AND MORTALITY

Duration	FEMORAL			INGUINAL		
	Re-covered	Died	%	Re-covered	Died	%
6—6 hrs.	4	0	0	1	0	0
6—12 "	14	0	—	7	0	0
12—24 "	17	1	5.6	8	1	11.1
24—48 "	13	2	13.3	2	1	33.3
2—3 days	7	0	0	2	1	33.3
3—4 "	4	4	50	—	—	—
4—5 "	2	3	60	1	0	0
5+ "	4	0	0	—	—	—
Total	65	10	13.3	21	3	12.5

Duration	VENTRAL			TOTAL		
	Re-covered	Died	%	Re-covered	Died	%
0—6 hrs.	—	—	—	5	0	0
6—12 "	3	1	25	24	1	4.0
12—24 "	1	1	50	26	3	11.5
24—48 "	4	3	42.0	19	6	24.0
2—3 days	6	0	0	15	1	6.25
3—4 "	1	0	0	5	4	44.4
4—5 "	—	1	100	3	4	57.1
5+ "	—	—	—	4	0	0
Total	15	6	28.5	101	19	15.8

3. The Amount of Bowel Strangulated

The larger the strangulated segment of bowel the worse the prognosis; alternatively if less than the complete circumference of the bowel is strangulated, as in Richter's hernia, the prognosis is better. In this series there were 15 cases of Richter's hernia, of which 14 recovered, giving a mortality of 6.6 per cent. Vomiting occurred in all cases and there was nothing in the symptomatology of these cases to differentiate them from cases where the complete circumference of the bowel was strangulated.

4. Resection of Bowel

It has been shown in numerous papers that where resection of the intestine was necessary in cases of strangulated hernia, the mortality was increased at least threefold (Thorburn, 1903; Alexander, 1913; Burgess, 1928; Vaughan Smith and Selbie, 1941).

Although resection of strangulated bowel is to be avoided if possible, in cases where doubt remained after observation of the bowel for 15 minutes at operation, resection of the gut was performed; provided that the patient's general con-

dition was satisfactory. A systolic blood pressure above 100 and a pulse rate below 120 were considered to be a rough criterion of fitness for resection. In the present series 13 cases required resection (Table 4). There were two further patients who, at operation, were thought to require resection but were unfit because of their general condition; both died following exteriorization of the gut.

TABLE 4
RESULTS OF RESECTION OF BOWEL

	Cases	Recovered	Died	Mortality
Not resected	107	93	14	13.1%
Resected ..	13	8	5	38%
Total ..	120	101	19	15.8%

The mortality rate of 38.4 per cent. in this series compares favourably with most published figures, but a wide variation is seen in the literature from 80 per cent. (Godfrey, 1948; Vaughan, Smith and Selbie, 1941), 66 per cent. (Jens, 1943) to 13.3 per cent. (Dennis, 1943).

The recognition of the state of the strangulated bowel is a matter of paramount importance. In many cases there is little doubt, as soon as the bowel is released, that it will recover; the bowel wall is seen to become pinker, the serosal coat is intact and shiny, peristalsis occurs across the affected segment and the mesenteric arteries are seen to pulsate.

In borderline cases, however, it may be very difficult. The bowel remains plum coloured and the mesentery pulseless; there is no frank gangrene and no mesenteric thrombosis. In such cases, unless the bowel shows some sign of improvement, it should be resected. Improvement in colour, tone or peristalsis rather than actual appearance is the most satisfactory guide. It is in these cases that mistakes are made, as was pointed out by the Clinical Research Committee of the Department of Public Health of the London County Council (1948). This committee found that mistakes were more likely to occur in strangulation of long loops of bowel, 50 cm. or more, or in cases where there was a suspicion of mesenteric thrombosis. In the present series one case of strangulated femoral hernia died after operation in which a loop of bowel considered viable was returned to the abdomen, but was found at post-mortem examination to be gangrenous and had perforated and caused peritonitis. Oversewing of gangrenous patches of bowel wall was done in Richter's hernia, using 60 or 80 thread. Constriction rings were treated similarly. No ill effects were noted after this procedure, which appeared to be

TABLE 5
VIABILITY OF BOWEL

	FEMORAL			INGUINAL			VENTRAL		
	Cases	Deaths	Mortality	Cases	Deaths	Mortality	Cases	Deaths	Mortality
Gut viable	69	7	11.4%	22	2	9.1%	17	3 *	17.6%
Gut non-viable	7*	3*	42.8%	2	1	50%	4*	3*	75%
Totals	75	10	13.3%	24	3	12.5%	21	6	28.6%

* This figure includes one case in which the gut was non-viable but the patient was considered unfit for resection of the gut at the time of operation.

satisfactory (Hamilton Bailey, 1943; Maingot, 1949).

5. Concurrent Illness

Table 6 shows a list of the causes of death in this series in cases in which the bowel was not resected. It will be seen that five cases died from pneumonia. Douglas (1942) points out that in old people pulmonary disease is one of the chief causes of death and is particularly liable to occur if elderly patients are confined to bed for more than a few days, especially after prolonged intravenous therapy. He advocates a minimum period of bed rest and this policy was followed in this series. Patients were encouraged to get out of bed on the second or third day following operation.

TABLE 6

CAUSES OF DEATH IN CASES OF STRANGULATED HERNIA IN WHICH THE BOWEL WAS NOT RESECTED	No. of cases
Pneumonia	5
Myocarditis, calcified myocardium ..	3
Gangrene of strangulated loop after release	1
Volvulus of small intestine due to an adherent loop	1
Peritonitis	1
Haematemesis	1
Shock and toxæmia, unfit for resection	2
	14

Since 1936 chemotherapy and antibiotic therapy have become increasingly efficient in combating infection. Pneumonia and other post-operative infections such as peritonitis and phlebitis have, therefore, become more amenable to treatment. On the other hand, with the advancing age of the recent series of cases, the state of the patient's cardiovascular system has become increasingly important so that in any series of cases a proportion die from general physical disability rather than from the strangulated intestine itself. In the present series, nine cases may be said to have died

from a concurrent lesion and not from the strangulated bowel, although the strangulation must be regarded as the precipitating factor.

Problems in the Treatment of Strangulated Hernia

In strangulated external hernia, two pathological segments of intestine may be recognized, firstly the closed loop of strangulated gut in the hernial sac and secondly the long segment of obstructed intestine above it. The relative importance of these two segments varies. If the hernia is large and contains a long loop of strangulated gut, the pathology is chiefly due to the strangulated segment. This loop becomes infarcted and gangrenous; it produces the tender, dramatic hernial swelling and may cause death by rupturing and discharging its septic contents into the general peritoneal cavity.

When the hernia is small, as it frequently is, the changes in the obstructed proximal loop are more important. The obstructed loop becomes increasingly oedematous with loss of plasma into the gut wall; this causes a gradual circulatory collapse. Mechanical obstruction results in vomiting with the loss of fluid and electrolytes.

It is these pathological features that the surgeon has to correct; he has to prepare an ill, toxic patient for the minimal operation which will restore the bowel to its normal function, and to correct any hernial deficiency as a secondary consideration.

In this series of cases the following points appeared to help in treatment.

1. Pre-operative Preparation

(a) *Intravenous therapy.* In cases in which persistent vomiting had occurred for more than 12 hours, intravenous 5 per cent. glucose saline, alternating with glucose water, was given; 24 hours persistent vomiting was considered to be equivalent to a loss of 4 to 6 pints (Marriott, 1947). In obese, old patients who appeared in fair

general condition, with a blood pressure above 110 systolic, intravenous therapy was often deferred until the bowel was exposed at operation. If the bowel appeared obviously viable after release, limited oral and rectal fluids were preferred in order to reduce the risk of thrombosis and hypostatic pneumonia. If, on the other hand, bowel survival appeared to be questionable, intravenous saline drip therapy was begun during operation, and if the blood pressure fell, blood was given.

There seems no doubt that intravenous therapy, however carefully given, causes a definite morbidity in old patients.

(b) *Gastric suction.* A Ryle's tube was passed in every case and left *in situ* and the stomach washed out. A Miller Abbott tube was only employed on a few occasions; it was found to have no advantage over a Ryle's tube and always caused the patient much more distress when it was passed. Moreover, its passage was time-consuming and necessitated the turning of the patient. It is noteworthy that some American writers are now condemning its pre-operative use in intestinal strangulation (Dennis and Vasco, 1947; Gatch and Montgomery, 1945; Aird, 1950).

There is only a limited time available for pre-operative preparation of the patient with a strangulated hernia. During this pre-operative period, where toxæmia and shock were marked, a blood count and blood grouping were performed and the patient's bladder emptied. The chloride content of the urine was estimated in the later cases in this series by Fantus's method as a guide to chloride depletion.

2. Chemotherapy

In established cases of strangulated hernia, chemotherapy should be started pre-operatively. Pneumonia or urinary infection often make this imperative and, in any case, it is a wise prophylactic measure. In cases where the bowel is resected, streptomycin should be exhibited post-operatively for three to four days as a routine.

In the present series, sulphamezathine (sulphadimidine B.P.), and penicillin were widely used, administration being started pre-operatively. Streptomycin was used in the later cases (1949) after resection or where intraperitoneal sepsis was present.

3. Anaesthesia

In all cases, local anaesthesia was used. A regional block of the operative field was induced by a buffered solution of 1% procaine in groin herniae and $\frac{1}{2}$ % procaine in ventral herniae. Infiltration of the mesentery of the strangulated loop of gut enables resection to be done if required.

Adequate pre-medication, which is essential when using local anaesthesia, was obtained by using morphia, omnopon or barbiturates one hour pre-operatively, repeated if necessary. The pre-medication should be prescribed by someone who is accustomed to operate under local anaesthesia. Scopolamine and excessive sedation should be avoided.

Local anaesthesia gives adequate time to operate precisely, gently and with minimum blood loss (Watson, 1938; Dennis and Vasco, 1947; Monroe, 1950).

Provided that the operative field is anaesthetized and the patient comfortable, why should he have to combat additional toxæmia and probably some anoxæmia and increased metabolism from general anaesthesia?

4. Operative Technique

(a) *Approach.* In umbilical hernia, the classical Mayo operation was performed. In inguinal hernia, the routine inguinal approach was employed. In femoral hernia, a new high approach was used. The neck of the femoral hernial sac was exposed through an oblique incision, parallel to and 1 in. above Poupart's ligament, passing through the external oblique aponeurosis, the rectus sheath and the transversalis fascia. The fundus of the sac was exposed below Poupart's ligament in the usual manner. This method has been described by McEvedy (1948 and 1950), and has been found to give a wider exposure of the neck of the femoral sac than Lotheissen's operation, thus facilitating resection when necessary.

(b) *Management of strangulated gut.* It is imperative that the gut should be liberated and reduced gently. In femoral hernia, using the approach outlined above, the femoral sac may be released at its neck using a bistoury and director, under direct vision. The sac may then be opened from above and the strangulated gut inspected as it is drawn into the abdomen. If the bowel is obviously viable it is returned to the peritoneal cavity, the sac is resected and the hernia repaired.

In cases where the viability of the gut was doubtful, 10 to 20 ml. of 1% procaine solution were injected into the mesentery adjacent to the bowel, as it has been noticed that this often helped the return of peristalsis and increased the vascularity of the gut. Herrlin, Glasser and Lange (1942) and Forget (1947) have also noted this. As mentioned above, resection could be carried out under mesenteric infiltration.

(c) *Repair of the hernia.* This was always carried out if the patient's general condition warranted it. A follow-up clinic for these cases showed that if no repair was done the hernia

inevitably re-appeared, although it rarely caused a second strangulation of the bowel.

In ventral hernia, a simple Mayo overlap repair was performed using nylon sutures. In inguinal hernia, the transversalis fascia was repaired by interrupted sutures or by a Tanner 'slide' operation with a release incision in the rectus sheath. In large scrotal hernia in patients over 65 years, the cord was divided at the internal abdominal ring, or an orchidectomy was performed. These patients were amongst the most grateful in this series, being relieved of a long-standing and incapacitating encumbrance. If the cord is divided, there is a 5% risk of testicular gangrene unless there has been a previous inguinal operation (McEvedy, 1948). However, no testicular necrosis occurred in any of these cases.

Thirty femoral hernia were repaired by suturing the conjoint tendon to Astley Cooper's ligament, using the new approach described above. In some of the early cases, the hernial orifice was repaired by suturing the transversalis fascia to Cooper's ligament in the manner since described by Hughes and Fathi (1950), but the transversalis fascia is often of poor quality in these cases. The new method was therefore preferred.

Late Results of Strangulated Hernia

The surviving patients were re-examined at the follow-up clinic six to eighteen months after operation. The following results were obtained:

TABLE 7

1. FEMORAL HERNIA

Number surviving	65
" traced	62
" examined	55
" died outside hospital .. .	3
" left district	2
" refusing to be seen .. .	2
" recurred	4*
Inguinal hernia following repair of femoral hernia	2

2. INGUINAL HERNIA

Number surviving	21
" traced	20
" died outside hospital .. .	1
" examined	19
" recurring	2†

3. VENTRAL HERNIA

Number surviving	15
" died outside hospital .. .	1
" examined	14
" recurring	3†

*All unrepaired at operation.

†One unrepaired at operation.

Each of the four patients in whom a femoral hernia recurred had been unfit for any reparative procedure at the time of operation. Their herniae now had wide necks and appeared unlikely to

strangulate. All four were satisfied to wear a truss. One inguinal hernia followed an operation for a strangulated femoral hernia after a Lotheissen type of operation. No recurrences of femoral hernia were found in the last 30 cases of strangulated femoral hernia when the new high approach had been used, but an inguinal hernia has occurred in one of them.

Commentary

Improvements in the treatment of strangulated hernia may be made by more attention to detail, more accurate pre-operative estimation of shock and replenishment of fluids and electrolytes, as Kreman (1949) suggests, and by better chemotherapy.

The simplest operative technique must be used. It may be that Dennis and Vasco's 'Minnesota' method of treating strangulated femoral hernia by primary resection of the strangulated segment without releasing it, may have some advantages over the more usual type of herniotomy in reducing the toxins entering the circulation (Dennis and Vasco, 1947). Further reports of this method, which requires section of the inguinal ligament, are not yet available.

Reduction of vascular spasm in the strangulated mesentery by means of local anaesthesia appears to help questionable bowel to survive (Laufmann and Method, 1947). The author's experience agrees with this observation.

The correction of concurrent lesions would also improve the mortality rate as the figures in this paper show.

However, the greatest improvement would be made if all cases were quickly recognized and reached hospital within 24 hours of onset. This has been stressed by many previous writers (Burgess, 1923; Holt, 1934; Frankau, 1931) and is amply supported statistically in previous papers (Douglas, 1942).

Summary

1. A review of 120 cases of strangulated external hernia operated on under local anaesthesia is given (75 femoral, 24 inguinal, 21 ventral herniae).

2. The results are analysed according to the age, duration of symptoms and whether or not resection was done.

3. The causes of mortality in strangulated hernia are considered.

4. An outline of treatment is described and the results of a new high operation for strangulated femoral hernia are reported.

5. The late results of strangulated hernia are tabulated.

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RECENT ADVANCES IN THE DRUG TREATMENT OF PARKINSONISM

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Introduction

From time to time the progress of pharmacological research results in a spate of new drugs coming under trial in the treatment of a disease or group of diseases which have hitherto responded unsatisfactorily or incompletely to the therapy available. Occasionally the outstanding success of the new preparations ensures them pride of place in the treatment of that disorder, but only too often difficulties of administration, uncertainty of effect or the appearance of unexpected toxic manifestations results in a swing of opinion away from the new drug and the reinstatement of the well-tried, if imperfect, remedies.

Whether such will be the fate of the newer methods of treatment of Parkinsonism remains to be seen, but already the early enthusiasm which greeted the new preparations briefly reviewed below has been dimmed in the light of further experience, and great caution is necessary in assessing their value.

The main disadvantages of the belladonna group of drugs are well known. In particular, the dosage giving maximum therapeutic effect is dangerously close to that which causes severe toxic symptoms, which may take the form of visual accommodation paralysis, extreme dryness of the

mouth in patients not suffering from excessive salivation, giddiness, light-headedness or even marked hallucinations. A preparation capable of producing a comparable improvement in the patient's condition, without these side effects, would have obvious advantages. *Myanesin*, shown to be capable of relieving spasticity of all types (Henneman and Scherrer, 1949), without general depression of the central nervous system and with little toxicity (Henneman *et al.*, 1949), has produced transitory relief in Parkinsonism, without atropine-like side-effects, when given intravenously (Stephen and Chandy, 1947). This method of administration makes its routine use impracticable, whilst there is also danger of intravascular haemolysis, and overdosage may produce irreversible respiratory paralysis.

Of the many other synthetic antispasmodics which have been tried, those found to be most efficacious are *Parpanit*, *Diparcol*, *Artane*, *Lysivane* and the well-known antihistamines.

Parpanit

This is a compound related to *Trasentin* and *Dolantin* and was first brought to prominence by Swiss workers (Domenjoz, 1946; Grünthal, 1946; Hartmann, 1946). Further careful at-