D-tubocurarine in dosage sufficient to produce a normal tidal air. Whichever drug is used to produce relaxation it is essential to keep the patient on the respiratory pump until it is absolutely certain that the action of the relaxant has been completely reversed.

The use of a mechanical ventilator for long operations of this kind offers three main advantages: (1) it ensures even ventilation, which is necessary to maintain proper oxygenation and carbon dioxide elimination; (2) the regular rhythm of the pump is a great help when performing a difficult dissection in the hilum of the liver; and (3) the use of a negative-phase respirator reduces venous congestion and so bleeding.

The use of halothane with a respiratory pump is permissible only if the concentration of vapour in the inspiratory gases is accurately known and controllable. Probably the most economical technique is to pass 3-4 litres of 1% halothane per minute, using nitrous oxide and oxygen as a vehicle, into a non-return circuit and to make up the balance of the minute-volume with air. If the whole of the inspired gases are passed through a halothane vaporizer then concentrations of less than 0.5% must be used. Anaesthesia must be kept light enough for the patient to regain consciousness before he returns to the ward.

We make it a rule never to return a patient to the ward unless: (a) blood loss has been completely replaced; (b) blood-pressure is at its preoperative level; and (c) reflexes are present with a normal respiratory function—that is, respiratory exchange is sufficient to maintain full oxygenation without the aid of oxygen.

Post-operative Care

The immediate post-operative care of the patient is similar to that of any patient who has had a thoraco-abdominal incision. These patients tolerate all forms of sepsis badly, and it is important to get the lung expanded at the earliest possible moment and remove any retained secretions.

In patients with liver disease there are abnormalities of water and salt metabolism, and it is easy to produce water and sodium retention. It is our practice to give no sodium intravenously on the first post-operative day and to limit the intake of water to 1,000 ml. for this period. The gastric tube is removed on the second day, and shortly after this the intravenous infusion is discontinued. In a few patients 500 ml. of 0.9% NaCl has been given on the second day.

After surgery, protein feeding is resumed with caution during the fifth to seventh post-operative days. The diet is then built up in 10-g. increments every two days until 70 g. is reached. The protein intake is maintained at this level for three months before increasing it to 120 g. Increasing the dietary protein above 70 g. too soon after operation may precipitate portasystemic encephalopathy.

Summary and Conclusions

For the operation of portacaval and splenorenal anastomosis to be of value in the treatment of bleeding oesophageal varices the operative mortality must be low.

We report a series of 33 consecutive shunt operations without operative mortality.

The factors which are important in maintaining a low operative mortality are described.

REFERENCES

- Linton, R. R. (1951). *Ann. Surg.*, **134**, 433.
 McDermott, W. V., Adams, R. D., and Riddell, A. G. (1954). *Ibid.*, **140**, 539.
 Nachlas, M. M. (1958). *Ibid.*, **148**, 169.
 Riddell, A. G., and Cassie, A. B. (1959). *Recent Advances in Surgery*, edited by S. Taylor, p. 437. Churchill, London.
 — and Jones, W. K. (1959). *Ibid.*, p. 420.

ASPECTS OF CONVALESCENCE AFTER HERNIORRHAPHY

A REVIEW OF 762 PATIENTS

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The purpose of this investigation was to study the actual convalescence of patients treated at a general surgical hospital and to relate this to other factors affecting the results of operation. All operations for herniae performed at the Bolingbroke Hospital in the years 1948-57 have therefore been reviewed.

"Nobody seems to be able, or prepared, to answer the question: When shall a patient return to work? Perhaps this is because the convalescent is in a therapeutic no-man's-land." And, again, convalescence "is an aspect of hospital treatment which after 20 years remains almost unchanged" (*Lancet*, 1957).

The Oxford Dictionary defines convalescence as the period of regaining health, and one can therefore regard surgical convalescence as beginning as the operation ends. The concept of health is incapable of mensuration. So in discussing the problems of convalescence it is more profitable to consider two periods of time: firstly, the length of stay in hospital and/or convalescent home; and, secondly, the length of time between discharge and return to work or full activity.

In practice these periods are often a compromise between what the patient considers economically possible and what the physician considers ideally necessary. Although the former is beyond the scope of the present study, its importance is reflected in the results obtained in this series.

The length of convalescence considered desirable after individual operation is a subject which has received little study. Medical students are taught much about the criteria for operation, the methods of operation, and to a less extent about post-operative management. But authoritative guidance on the further stages is lacking. Each surgeon has his own views on how long he likes to keep his patients in bed post-operatively and whether or not they should spend a period of convalescence at a recognized home or hostel. But the time of return to work may be decided upon by the registrar or house-surgeon who sees the patient in the follow-up clinic, by the patient's own general practitioner, or even by the patient himself.

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Moss *et al.* (1957) drew attention to the diversity of views on the subject. They obtained 229 opinions (including those of professors of surgery, board certified general surgeons, industrial physicians, and general practitioners) on the convalescence desirable after four different common operations—namely, appendicectomy, haemorrhoidectomy, herniorrhaphy, and cholecystectomy.

In the case of herniorrhaphy, examples chosen were a man aged 25 and one aged 50, with an indirect inguinal hernia, otherwise healthy, of normal weight, and with no complications. The patient was assumed to return to the job which he had held for at least one year prior to operation. The lengths of convalescence suggested for the 50-year-old lay between 1 and 10 weeks for return to light work, and from two weeks to six months for heavy work. For the 25-year-old the figures were from 1 to 12 weeks and from 2 to 24 weeks respectively. The average time, taking both groups together, was 22 days for light work and 48 days for heavy work.

Saffair (1958) investigated patients covered by insurance schemes paying for convalescence after operation. In men the average duration of convalescence after haemorrhoidectomy was three weeks, after appendicectomy three to four weeks, and after herniorrhaphy six weeks. There were large variations in both sexes, but all convalescences were longer in women. Men employed in heavy labour took twice as long to return to normal work as those in light work. The time taken over convalescence increased with age.

Herniorrhaphy is one of the commonest operations performed in our general hospitals. Over the past 10 years at the Bolingbroke Hospital, about 10% of all the operations performed were herniorrhaphies. The condition thus has some economic importance to the community, as well as to the individual. However, even in this common condition there is no unanimity concerning the period of convalescence.

Edwards (1943), in an authoritative survey, mentioned 22 possible operations, which is sufficient indication of the technical controversy. With regard to after-treatment he says: "The fact seems to be that if one excises the sac only, without interfering with the musculature, early ambulation does not have any malign influence, except that it goes counter to the sound and age-long practice of resting a wound till it has healed. If this operation is combined with careful repair of the transversalis fascia, then weight-bearing upon the scar should be avoided until the fascia has healed, and this is adjudged to take three weeks." For the inguinal region he recommended muscle exercises in bed from the eleventh day onward, three weeks in bed, and three to four weeks in a convalescent depot, where eventually the full range of physical training is practised. This was, in fact, the procedure adopted by the British Army during the late war.

In recent years the tendency has been towards earlier ambulation and, to a less extent, shorter convalescence, partly in an effort to reduce the incidence of deep vein thrombosis and pulmonary embolism and partly because of the demands on bed space.

Wenger (1956) reported on 639 herniorrhaphies on U.S.A.A.F. personnel, in which the average time lost from duty was only 19.9 days, with a recurrence rate of 4.25%. He concluded that this comparatively short period saved money and man-hours, while it did not affect the recurrence rate. This is admittedly a selected group of healthy young males.

Method of Investigation

A complete abstract on punch cards of the notes of all abdominal herniae operated upon from January 1, 1948, to December 31, 1957, was made.

A questionnaire was sent to each of the patients operated upon in the years under review. The patients were requested to complete these and bring them along when they attended hospital for examination for possible

TABLE I.—*Analysis of Patients Seen by Year in Which Operation was Performed*

Year	Total No.	No. Dead	No. Seen	No. of Recurrences in Patients Seen
1948	119	8	77 (64.7%)	5
1949	98	9	55 (56.1%)	4
1950	73	7	49 (67.1%)	1
1951	89	4	56 (62.9%)	5
1952	109	5	80 (75.2%)	5
1953	82	4	62 (75.6%)	4
1954	121	5	98 (81%)	5
1955	108	7	88 (81.5%)	11
1956	112	3	100 (89.3%)	11
1957	107	3	97 (90.6%)	3
	1,018	55	762	54

recurrence of the hernia. Those patients who for various reasons were unable to attend were asked to give their permission for a home visit. The questionnaire answers were checked at the hospital visit.

Information Collected.—Out of 1,018 patients operated upon during the 10 years, 762 were personally seen and examined by one or both of us, 55 had died, and the remainder were untraceable despite exhaustive efforts (Table I). The 762 patients seen form the basis of this investigation.

Results

The information collected can be placed into four main categories for ease of comparison and correlation (Table II). Most of the information is factual. In this series the preoperative and operative factors varied greatly from year to year in a haphazard way. But many important factors concerning a patient and his hernia are imponderable. The assessment of these will vary with the criteria of the investigators. In a retrospective study, their importance must not be forgotten as a variable factor affecting the result obtained.

Table III analyses the type of hernia seen in each year under review. It is seen that the indirect hernia was the commonest, direct inguinal and femoral hernia were present in equal number, and umbilical and incisional herniae formed the smallest group seen.

Tables IV and V show respectively the time the patients were kept in bed and the time they spent in hospital. The trend is demonstrably towards a shorter time in bed and consequently a shorter period in hospital. Table VI shows that the percentage of complications was no higher in the earlier years of the study and therefore could not account for longer hospitalization.

Table VII shows the total time spent on convalescence—that is, from the date of operation to the date of return to work. Here the figures are roughly comparable for each year; so, presumably, in the earlier years the patients, although staying longer in hospital, spent a shorter period convalescing after discharge. That this is not due to variation in social status or physical activity of the patient is shown by Table VIII.

Table IX demonstrates that the nature of the patient's work does affect the length of convalescence. Thus only

42.4% of those engaged in heavy work had returned to work by six weeks against 72% in light work and 66% in sedentary occupations.

When length of convalescence is correlated with social status (Table X) it is found that less than half of those in class V have returned to work by six weeks, whereas over 60% of all other classes have returned by this time. This would be expected, as most of those engaged in heavy work are also in social class V.

TABLE II.—Synopsis of Factual Information Which May be Collected from Patients with Abdominal Herniae

1. *Preoperative factors*: Age and sex. Type of hernia. Method of admission (list or emergency). Length of history. Previous treatment.
2. *Operative factors*: Status and experience of surgeon. Type of operation. Suture material used for repair. Anaesthetic employed.
3. *Post-operative factors*: Time in bed post-operatively. Complications and intercurrent diseases. Post-operative treatment. Time in hospital. Time convalescent. Type of work and social status.
4. *Miscellaneous factors*: General condition and health of patient. Condition of musculature. Size of hernia. Decision and reason for return to work. Period of time between repair and review. Examination standard of recurrence.

TABLE III.—Analysis of Type of Hernia Operated Upon (as Percentage of Total Seen at Follow-up)

Year	Indirect Inguinal	Direct Inguinal	Femoral	Um-bilical	In-cisional	Other
1948	60	16.7	14.3	7.7	1.3	—
1949	61.8	16.4	10.8	5.5	5.5	—
1950	71.4	10.2	12.3	6.1	—	—
1951	64.3	10.7	16	7	1.7	—
1952	60	10	15	6.3	8.7	—
1953	51.6	21	22.6	4.8	—	—
1954	64	15.3	12.2	3.2	3.2	2.1
1955	58	18.2	12.4	6.8	4.6	—
1956	67	16	9	4	4	—
1957	64	13.4	14.4	4.2	3	1

TABLE IV.—Time in Bed Post-operatively in Days (Expressed as Percentages of Those Patients Seen)

Year	Days in Bed							
	1	2	3	4	5	6	7+	Not Known
1948	6.5%	6.5%	1.2%	3.8%	2.6%	1.2%	74.8%	3.4%
1949	9	—	9	3.6	7.2	1.8	56.7	12.7
1950	6.2	4.1	4.1	4.1	6.2	—	75.3	—
1951	23.2	8.9	10.1	3.5	8.9	7	34.3	3.5
1952	15	23.8	7.5	18.7	7.5	1.2	23.8	2.5
1953	1.6	4.8	6.3	12.9	9.6	—	60	4.8
1954	7	10.2	21.5	13.3	11.4	3.1	26.5	7
1955	13.6	18.2	7.9	5.6	18.2	4.7	28.4	3.4
1956	22	19	22	3	10	3	20	1
1957	44.5	15.5	17.6	2	3	3	11.4	3

TABLE V.—Time in Hospital in Days (Expressed as Percentages of Those Patients Seen)

Year	Days in Hospital				
	0-7	8-10	11-14	15-21	22+
1948	—	—	10.8%	75%	14.2%
1949	—	5.4	16.3	65.6	12.7
1950	2	8.1	18.3	59.4	12.2
1951	—	43.0	32.1	21.4	3.5
1952	—	27.5	38.7	25	8.8
1953	8	4.8	42.1	30.6	14.5
1954	8.3	5.1	52	29.3	5.1
1955	15	1.1	51	29.5	3.4
1956	5	4	55	26	10
1957	6.1	7.1	61	15.5	10.3

TABLE VI.—Complications Seen in Patients Followed Up

Year	Incidence of Complications	Chest Infection	Wound Haematoma	Wound Infection	Venous Thrombosis	Other
1948	12 (15.5%)	5	1	2	—	4
1949	4 (7.2%)	—	1	1	—	2
1950	7 (14.2%)	—	—	—	7	—
1951	6 (10.7%)	3	1	—	—	2
1952	18 (22.5%)	9	5	3	—	1
1953	14 (22.5%)	4	3	5	1	1
1954	26 (26.5%)	5	10	7	2	2
1955	11 (12.5%)	4	3	4	—	—
1956	13 (13%)	6	1	3	2	1
1957	23 (23.7%)	6	4	7	2	4

TABLE VII.—Time Convalescent in Weeks in Patients Seen but Excluding Those Retired or Children at the Time of Operation (Expressed as a Percentage of Number Seen)

Year	Weeks							Weeks	
	0-2	3-4	5-6	7-9	10-12	13-18	18+	0-6	7-18+
1948	4.8	28.5	33.3	17.4	8.0	3.2	4.8	66.6	33.4
1949	8.9	48.9	22.2	8.9	8.9	2.2	—	80	20
1950	6.6	34.7	21.7	15.2	6.6	8.6	6.6	63	37
1951	5.8	36.5	19.3	9.6	11.6	3.8	13.4	61.6	38.4
1952	12	34.8	27.2	6.5	9.0	7.5	3	74	26
1953	12	38	14	22	6	6	2	64	36
1954	6	31.4	26.5	19.3	4.8	3.6	8.4	63.9	36.1
1955	5.7	30.5	33.4	17.4	7.3	4.3	1.4	69.6	30.4
1956	6	22	22	18.3	18.3	7.4	6	50	50
1957	2.8	33.9	24	22.5	12.6	1.4	2.8	60.7	39.3

TABLE VIII.—Social Status and Physical Activity of Those Patients Followed Up, Expressed as a Percentage of Those Seen

Year	Social Status					Activity			
	I	II	III	IV	V	Heavy	Light	Sedentary	Retired
1948	5.2	11.7	35	28.6	19.5	20.8	61	15.6	2.6
1949	1.8	32.7	29	30.9	5.5	14.6	69.1	12.7	3.6
1950	6	14.2	34.8	24.6	20.4	18.6	67	10.3	4.1
1951	7	14.1	30.6	34.5	14.1	21.3	61.4	14.2	3.1
1952	6.2	13.7	20	45	15	13.7	62.5	18.8	5
1953	3.2	6.5	27.4	50	12.9	22.6	51.6	12.9	12.9
1954	10.2	10.2	27.5	36.7	15.4	20.4	46.9	22.5	10.2
1955	9.1	12.5	26.1	33	19.3	19.3	55.7	13.6	11.4
1956	6	10	31	36	17	17	58	9	16
1957	11.5	11.5	26.7	35	15.3	14.4	48.5	17.5	19.6

TABLE IX.—Time Convalescent in Weeks in Patients Considered by Type of Work

Work	No. of Cases	Weeks							
		0-2		3-4		5-6		7-12	
		No.	%	No.	%	No.	%	No.	%
Heavy	141	3	2.1	32	22.7	25	17.8	51	36.2
Light	395	40	10.1	136	34.4	110	27.8	86	21.8
Sedentary	99	6	6.1	36	36.3	23	23.2	26	26.2
								3	3.0
								5	5.0

TABLE X.—Time Convalescent in Weeks in Patients Considered by Social Status

Social Status	Weeks												Returned at 6 Weeks
	0-2		3-4		5-6		7-12		13-18		18 +		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
I (49)	3	6.1	13	26.1	14	28.9	13	26.1	2	4.1	4	8.2	61%
II (79)	7	8.8	36	45.4	23	30.4	9	11.3	4	5.0	0		84%
III (184)	13	7.1	58	31.5	43	23.3	53	28.8	9	4.9	8	4.3	62%
IV (225)	23	10.2	78	34.7	53	23.6	55	24.4	8	3.5	8	3.5	68%
V (98)	3	3.1	19	19.4	25	25.4	33	34.1	7	7.2	11	11.4	48%

However, in relating the length of convalescence to age (Table XI) there are no striking differences in the percentages returning to work before and after six weeks' convalescence.

Similarly, there are no striking differences in the time taken to convalesce with respect to the type of hernia. Half to three-quarters of all patients return to work within six weeks of their operation (Table XII).

The recurrence rate, expressed as the percentage of recurrences per number of patients seen for each convalescent period, is shown in the Chart. It is seen to vary haphazardly, and therefore no conclusion can be drawn other than that a short convalescence does not appear to influence recurrence.

Perhaps the most striking finding in this investigation is the reason given by the patients for their return to work (Table XIII). The columns refer to the person who first suggested return to work, and it is remarkable that in two-thirds of the cases it is the patient.

TABLE XI.—Time Convalescent in Weeks in Patients Considered by Age, Expressed in Actual Number Seen in Each Group (Excluding Patients Retired and Children)

Age	Weeks												Returned at 6 weeks
	0-2		3-4		5-6		7-12		13-18		18 +		
	N	%	N	%	N	%	N	%	N	%	N	%	
10-19 (12)	—	—	7	58.3	—	—	1	8.3	1	8.3	3	24.9	58.3%
20-29 (52)	6	11.5	17	32.7	13	25.0	12	23.0	2	3.8	2	3.8	69%
30-39 (108)	11	10.2	38	35.2	30	27.7	19	17.6	3	2.8	7	6.5	73%
40-49 (198)	14	7.2	60	31.1	50	25.8	47	24.3	13	6.7	9	4.6	64%
50-59 (168)	7	4.2	47	28	42	25.1	58	34.5	7	4.2	7	4.2	57%
60-69 (79)	6	7.6	26	32.9	20	25.3	21	26.6	4	5.1	2	2.5	65.8%
70-79 (23)	5	21.5	9	39.1	3	13.0	5	21.5	—	—	1	4.3	73%

TABLE XII.—Time Convalescent in Weeks in Patients Seen—Excluding Patients Retired and Children at Time of Operation—According to Type of Hernia

Type of Hernia	Weeks							0-6
	0-2	3-4	5-6	7-12	13-18	18+		
Indirect inguinal	6	31.4	25	27.8	4	5.8	62.4	
Direct "	2.8	30	30	25.7	7.7	3.8	62.8	
Femoral "	18.1	35.1	22.4	18.1	4.2	2.1	75.6	
Incisional	13.0	34.8	17.4	30.4	—	4.4	65.2	
Umbilical	11.5	19.3	23.1	23.1	11.5	11.5	53.9	

TABLE XIII.—Reason Stated by Patients Interviewed for Return to Work, Excluding Patients Retired or Children

Year	Own Wish	Own Doctor's Instructions	Hospital Doctor's Instructions	Works Doctor's Instructions
1948	65	23.8	8	3.2
1949	76.5	23.5	—	—
1950	60	35.6	2.2	2.2
1951	71.2	17.3	7.7	3.8
1952	70.2	19.4	10.4	—
1953	64	18	6	12
1954	58	27.6	9.6	4.8
1955	66	23.8	10.4	5.8
1956	65.5	14.8	12.3	7.4
1957	60	26.3	9.5	4.2

Discussion

In any discussion on convalescence it is realized that there are innumerable factors which will play a part in deciding the time actually taken to convalesce by any one patient. Table II is an attempt to list and clarify some of these points, which also have an equal bearing on recurrence of a hernia.

Most of the preoperative, operative, and post-operative factors can be factually reported. It was noted in this series that in every year there was a great diversity in all these factors, which did not follow any set pattern. But among the miscellaneous factors listed, certainly the decision to return to work cannot be evaluated, especially when it is realized that the majority of patients make up their own minds, apparently uninfluenced by their medical advisers. This is a salutary lesson. It is presumed that the decision is made when the patient feels able and fit to resume his occupation. Economic factors are doubtless of importance.

The observed result is that the majority of patients will return to work within six weeks. In 8 out of the ten years and in all but umbilical herniae, the highest number had only six weeks' convalescence from the date of operation. This means that most patients take only four weeks' rest at home. This appeared to have no malign effect upon the recurrence rate.

The length of convalescence did not vary with age or type of hernia. However, there was a tendency, as one would expect, for those patients in the lowest social class and performing the heaviest work to take longer over their convalescence. The incidence of recurrence of herniae in those cases seen did not vary significantly from year to year.

Summary

A review of 762 herniae is presented.

The diversity of factors involved in the treatment of herniae is discussed. The convalescent period is shown to be directly determined by the patient in the majority of cases. Most patients favour a period of two to four weeks (four to six from date of operation) after various types of hernia repair. This period is unrelated to age, type of hernia, work, or social status, except in class V and the heaviest work, but does vary as expected with the occurrence of complications.

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REFERENCES

- Edwards, H. C. (1943). *Brit. J. Surg.*, **31**, 172.
Lancet, 1957, **2**, 1269.
Moss, N. H., Schwegman, C. W., and Dohan, F. C. (1957). *J. Amer. med. Ass.*, **165**, 322.
Saffair, H. J. (1958). *Ann. N.Y. Acad. Sci.*, **73**, 444.
Wenger, D. S. (1956). *Industr. Med.*, **25**, 307.

A CLINICAL STUDY OF SERUM ANTINUCLEAR FACTOR

BY

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Since the description of the L.E.-cell phenomenon by Hargraves *et al.* (1948) and the rheumatoid factor by Rose *et al.* (1948) and Waaler (1940), immunological abnormalities in the connective-tissue diseases have been extensively sought for and studied.

In sera from patients with systemic lupus erythematosus (S.L.E.) a number of abnormal globulin factors have now been described, including autoimmune haemolytic antibodies (Zoutendyk and Gear, 1950), antiplatelet and anticoagulation factors (Dameshek, 1958; Loeliger, 1959), antileucocyte agglutinations (Seligman, 1958), and anticytoplasmic complement-fixing antibodies (Mackay and Gajdusek, 1958; Asherson, 1959; Deicher *et al.*, 1960).

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