SURGICAL MANAGEMENT OF THE AGED

A SURVEY OF RESULTS OF MAJOR SURGERY
IN 99 PATIENTS OVER 70

BY

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"The days of our years are threescore years and ten ;
and if by reason of strength they be fourscore years,
yet is their strength labour and sorrow ; for it is soon
cut off, and we fly away."

The average age of the population is increasing, and is likely to do so. It therefore seems reasonable to survey the results of surgery in those patients who are over the age of 70 years, the one-time allotted span of life.

During the thirty months January, 1947, to June, 1949, 1,609 patients were admitted to the 32 surgical beds of one surgical unit at a London teaching hospital. Of these 1,609 patients 131 were over the age of 70—seven were not submitted to surgery, 24 were submitted to minor surgery, and 99 were submitted to major surgery. It is instructive to compare this situation with those existing 10 and 20 years ago. Table I shows in a comparable number of admis-

TABLE I

Period	Total Admitted	No. Over 70	No. of Patients Over 70 Submitted to Major Surgery
Jan., 1927, to Nov., 1929	1,609	82 (5.1%)	40 (49%)
Jan., 1937, to Sept., 1939	1,609	108 (6.7%)	61 (56%)
Jan., 1947, to June, 1949	1,609	131 (8.1%)	99 (75%)

sions the numbers of patients over 70 seen and the number of these patients submitted to major surgery. Applying the rules of significance to these figures, it will be apparent that more patients over the age of 70 were admitted in 1947-9 than was the case 20 years ago, and that more patients over the age of 70 were submitted to major surgery than was the case 10 years ago.

It is the 99 patients in our series submitted to major surgery that we wish to discuss. Distribution between the sexes was almost equal—49 males and 50 females. Fifteen patients were admitted as emergencies ; 17 patients (6 females and 11 males) died before discharge from hospital.

Operations Performed

Operations on the Head and Neck

Section of sensory root, fifth cranial nerve	..	..	1
Hemiglossectomy	..	..	2
Block dissection glands of neck	..	..	1
Section thyroglossal cyst	..	..	1
Subtotal thyroidectomy	..	..	1
Excision of large rodent ulcer of nose and skin graft	..	..	1

Operations on the Trunk and Upper Limbs

Radical mastectomy	..	..	..	5
Lymphangioplasty	..	..	..	1

Hernias and the Scrotum

Incisional hernia	..	..	..	1
Inguinal hernia without strangulation	..	..	..	4
Strangulated inguinal hernia repair	..	..	..	2
Strangulated inguinal hernia with resection	..	..	..	1

Femoral hernia repair	..	..	..	8
Strangulated femoral hernia, resection, and anastomosis	..	..	..	1
Operations on scrotum and contents	..	..	..	2
Incarcerated umbilical hernia	..	..	..	2

Intra-abdominal Operations

Colostomy	..	..	..	7
Closure of colostomy	..	..	..	4
Laparotomy	..	..	..	10
Laparotomy and colostomy	..	..	..	5
Laparotomy, colostomy, repair of inguinal hernia, and dorsal slit	..	..	..	1
Laparotomy and cholecystenterostomy	..	..	..	1
Laparotomy and suprapubic cystostomy	..	..	..	1
Cholecystostomy	..	..	..	1
Cholecystectomy	..	..	..	1
Cholecystectomy and choledochotomy	..	..	..	1
Suture of perforated peptic ulcer	..	..	..	1
Gastrotomy	..	..	..	1
Gastrostomy	..	..	..	1
Subtotal gastrectomy	..	..	..	3
Subtotal gastrectomy and colectomy	..	..	..	1
Gastro-enterostomy	..	..	..	2
Transabdominal repair of diaphragmatic hernia	..	..	..	1
Trans thoracic oesophago-gastrostomy	..	..	..	1
Appendectomy	..	..	..	1
Caecostomy	..	..	..	1
Right hemicolectomy	..	..	..	2
Ileo-transverse-colostomy	..	..	..	2
Resection sigmoid colon	..	..	..	1
Resection sigmoid colon and colostomy	..	..	..	1
Perineal excision of rectum	..	..	..	1
Perineal excision of rectum and colostomy	..	..	..	1
Abdomino-perineal excision of rectum	..	..	..	7
Perineo-abdomino excision of rectum	..	..	..	3
Excision of ovarian cyst	..	..	..	1

Operations on Prostate and Anal Canal

Haemorrhoidectomy	..	..	..	2
Prostatectomy	..	..	..	2
Transurethral resection of prostate	..	..	..	5

Operations on the Lower Limbs

Above-knee amputations	..	..	..	8
Below-knee amputations	..	..	..	1
Manipulations of ankle	..	..	..	2
Excision of popliteal aneurysm	..	..	..	1

A number of these patients underwent minor surgical procedures requiring further anaesthetics.

Preparation of the Patient for Operation

A full clinical examination was made, with special reference to the heart and lungs. After the age of 70 it is only natural to find signs of wear and tear in the cardiovascular and respiratory systems. Of these 99 cases 60 showed clinical evidence of abnormalities in one or both of these systems:

Gross hypertension (i.e., B.P. 180/100 or more)	..	14
Hypertension or signs of myocardial insufficiency	..	13
Signs of myocardial insufficiency	..	6
Hypertension and/or myocardial insufficiency and signs and symptoms of respiratory disease	..	15
Respiratory disease alone	..	12

In addition, arteriosclerosis, anaemia, and wasting were very common findings.

Operation was delayed in 13 cases ; the reasons for delay were:

Patient in bed too long	..	..	..	1
Poor nutrition	..	..	..	2
Dehydration	..	..	..	1
Dehydration associated with low percentage of haemoglobin	..	..	..	1
Low percentage of haemoglobin	..	..	..	2
Abdominal distension	..	..	..	2
Respiratory disease	..	..	..	4

Pre-operative Measures Taken.—The usual treatment for shock was practised according to the severity. Throughout this series of cases it has been customary to encourage

early rising after operation. Therefore, when a patient had been confined to bed for a period, operation was delayed while he was made ambulant so that he could be sat out of bed immediately after recovery from the anaesthetic. If possible, general nutrition was improved. In some cases it was necessary, as in a case of achalasia of the cardia, to give a high-calorie diet through an oesophageal tube. Vitamin intake was maintained when necessary by intramuscular injection of vitamin C and "heparglandol B," and "synkavite" was given as a routine in all cases undergoing surgery of the biliary system. Dehydration was corrected by intravenous saline or glucose-saline; blood transfusion was given pre-operatively in all cases which showed a low haemoglobin percentage. Distension increases the risk of operation and also the difficulty. Where the operation was not in itself likely to be a decompressing procedure, operation was delayed if distension was present while a Miller-Abbott tube was passed. A Ry'e's tube was passed on all patients who were vomiting pre-operatively. All cases with respiratory disease and all cases about to undergo intra-abdominal operations were given pre-operative breathing exercises unless the case was an emergency. Coughing and postural drainage were encouraged in those who had productive coughs; penicillin inhalations were given and systemic penicillin and sulphonamides started. In some cases this treatment was carried out for one week before operation. Digitalis therapy was given to those with auricular fibrillation.

Premedication.—All cases received a hypodermic injection of 1/100 gr. (0.65 mg.) of atropine half an hour before operation. In addition, those with marked pain received 1/6 gr. (11 mg.) of morphine. Hyoscine (scopolamine) was purposely avoided because of its tendency to produce disorientation and restlessness in the aged, and morphine was avoided or kept to a minimum in order not to depress the vital capacity.

Anaesthesia

The choice of anaesthetic was determined to a large extent by the type of operation to be performed and the general condition of the patient. Of the 134 anaesthetics, 81 were for intra-abdominal and 53 for extra-abdominal procedures. The agents used for the various types of operation are shown in Table II.

TABLE II.—*Anaesthetic Used*

	Intra-abdominal (Including Intrathoracic)	Extra-abdominal (Including Intracranial)	Total
Curare and light anaesthesia	52	3	55
Spinal and local	10 (7 spinal, 3 local)	1 (spinal)	11
Thiopentone, gas, oxygen, ether,	16	16	32
Gas, oxygen, ether			
Thiopentone and cyclopro- pane	3	7	10
Thiopentone, gas, oxygen, and trile	—	20	20
Bromethol, gas, oxygen, and trile	—	2	2
Thiopentone	—	4	4
Total	81	53	134

Thiopentone.—When thiopentone was used for induction it was injected very slowly, because the circulation time in the aged is prolonged. Also, owing to the low basal metabolic rate in the elderly, the elimination of thiopentone in the body is slower, and liver and kidney damage may be present. Hence only very small doses were used—rarely more than 0.5 g.

Curare.—Curare in the form of *d*-tubocurarine chloride was mostly used when relaxation was required. The initial dose was usually 10 mg., and the final total dosage depended

on the agent used to maintain light anaesthesia; with ether, approximately half the usual dosage of curare is required. The closed-circuit carbon-dioxide-absorption technique was used as a routine for cases receiving curare; the basal oxygen requirement in the aged is low, but at the same time suboxygenation must be avoided. This often entailed assisted respiration for the whole of the operation, as some degree of stagnant hypoxia was already present owing to a poor myocardium and a sluggish peripheral circulation.

Spinal Analgesia.—This method was used only if the site of operation was subumbilical, if the patient's blood pressure was within normal limits, and if the condition of the chest did not warrant an inhalational method.

Local Analgesia.—This method was used in three cases: in an emergency laparotomy with faecal vomiting, in an emergency caecostomy in a patient who was in cardiac failure, and in a patient with incarcerated incisional hernia who was in early cardiac failure.

Intubation.—Intubation of the trachea was carried out in all abdominal cases. If vomiting was a pronounced symptom, as in cases with bowel obstruction, intubation was performed with a cuffed intratracheal tube, and a sucker was at hand to keep vomitus clear of the larynx. The Ryle's tube was kept in place throughout the operation and aspirated from time to time.

Position on the Operating Table.—Old people are prone to osteoarthritis, and their skins withstand pressure badly. For these reasons their position on the operating table must be carefully supervised, a support provided for the back, shoulder-pieces well padded, and hands not placed under the buttocks.

Resuscitative Measures.—Patients suffering from pre-operative shock or dehydration continued with blood or saline throughout the operation. If a long operation was anticipated a slow blood drip was started at the beginning of the procedure. If signs of shock developed during an operation blood or plasma was administered. All such cases returned from the theatre to the ward with their intravenous drips still running.

Post-operative Measures

As soon as the patient was sufficiently recovered from the anaesthetic, he or she was sat up and encouraged to cough, to take deep breaths, and to move the legs. The services of a trained physiotherapist were found to be invaluable in this respect. Five-minute inhalations of carbogen every hour were a useful adjunct to physiotherapy. The patient was sat up in a chair within 12 hours of operation in all cases in which it was practicable. Where the likelihood of respiratory complication was great, even patients undergoing gastric suction and intravenous drip therapy were so treated. They sat in a chair for increasing periods each day from then on. Continuous gastric suction and intravenous therapy were practised for 48 hours after operation in all cases undergoing an intra-abdominal operation which might result in paralytic ileus. Intravenous therapy and suction were stopped only when intestinal movements were well established. Watch was kept over the bladder to ensure that retention with overflow did not occur. The usual measures to combat retention were practised up to 24 hours, after which catheterization was performed if necessary. Where retention was persistent and due to prostatic hypertrophy, an indwelling catheter was used until the patient was considered fit for a transurethral resection, and penicillin or a sulphonamide was administered. Routine testing of urine for chlorides was practised from the first post-operative day.

Post-operative Therapy.—All drugs administered pre-operatively were continued in the post-operative period—i.e., penicillin, sulphonamides, or digitalis. In all major abdominal procedures, and where sepsis was a danger, prophylactic penicillin and sulphonamides were administered. Where cardiovascular complications occurred digitalization was instituted. In all cases of respiratory complications and in those cases in which coughing was

(e) **Retention of Urine.**—Four cases of retention of urine required transurethral resection of the prostate.

(f) **Pressure Sores.**—These occurred in three cases.

(g) **Cardiovascular System.**—Auricular fibrillation (electrocardiogram showed poor myocardium in one case), 3; auricular flutter, 1; incipient cardiac failure necessitating digitalis therapy, 1.

The 17 fatal cases are analysed in Table III.

TABLE III.—*The Patients Who Died*

Case No.	Age	Sex	Operations Performed	Anaesthetic	Previous Condition	Cause of Death	
Respiratory	1	82	F	Removal of carcinoma of ovary	Thiopentone, 0.2 g., N ₂ O, oxygen, ether	History of previous pneumonia and chronic cough	Bronchopneumonia
	2	70	M	Strangulated inguinal hernia with resection of gut (E.)	Thiopentone, 0.3 g., N ₂ O, oxygen, ether	B.P. 200/120; severe arteriosclerosis	Intercurrent lobar pneumonia
Cardiac	3	74	M	(1) Laparotomy and colostomy (2) Perineo-abdominal resection of rectum	(1) Thiopentone, 0.5 g., curare, N ₂ O, oxygen (2) N ₂ O, oxygen, ether		Cardiac failure. Post mortem: brown atrophy of heart muscle
	4	74	M	(1) Laparotomy and colostomy (2) Perineo-abdominal resection of rectum	(1) Thiopentone, 0.25 g., curare, N ₂ O, oxygen, ether (2) Thiopentone, 0.2 g., curare, cyclopropane	B.P. 230/120; severe arteriosclerosis	Hypertensive heart failure
	5	73	M	Repair of right inguinal hernia and orchidectomy	Thiopentone, 0.7 g., N ₂ O, oxygen, ether	B.P. 180/100; some cough; senile Parkinsonism	Hypertensive heart failure
	6	70	F	Lotheissen's operation for Richter's hernia (E.)	Thiopentone, 0.4 g., cyclopropane, curare	B.P. 210/110; asthmatic heart enlarged	" "
	7	85	M	Prostatectomy	Cyclopropane	Fibrillating under digitalis; moist sounds both bases	Cardiac failure
	8	72	M	Caecostomy (E.)	Local	Pulsus alternans; moist sounds both bases	" "
	9	71	F	Above-knee amputation (E.)	Thiopentone, 0.15 g., cyclopropane	B.P. 190/115; mild diabetic	Fibrillated: congestive heart failure
	10	70	M	Gastrostomy	Thiopentone, 0.25 g., curare, cyclopropane		Cardiac failure; toxæmia from subphrenic abscess; carcinoma of oesophagus
Secondary Emergency Operations	11	71	M	(1) Gastro-enterostomy	(1) Thiopentone, 0.65 g., curare, cyclopropane	Previous history of pneumonia; scattered rhonchi	No cause for death; terminal bronchopneumonia
	12	70	M	(2) Laparotomy (E.) (1) Perforated peptic ulcer (E.) (2) Subtotal gastrectomy (E.)	(2) Local (1) N ₂ O, oxygen, ether (2) Thiopentone, curare, N ₂ O, oxygen, trilene	B.P. 130/70; severe blood loss before second operation	General peritonitis from leaking duodenal stump and terminal bronchopneumonia
	13	80	F	(3) Resuture abdominal wound (E.) (1) Subtotal gastrectomy (2) Ileo-transverse colostomy (E.)	(3) Curare, thiopentone, cyclopropane (1) Curare, thiopentone, 0.7 g., cyclopropane (2) Thiopentone, 0.5 g., cyclopropane	B.P. 190/95. B.P. 60/? before second operation	General peritonitis from leaking duodenal stump
Carcinomatosis	14	70	F	Cholecystostomy (E.)	N ₂ O, oxygen, ether	Obstructive jaundice, diabetic	Carcinomatosis secondary to carcinoma of pancreas. Died day after operation
	15	70	M	Laparotomy only	Thiopentone, 0.5 g., curare, N ₂ O, oxygen, ether	B.P. 140/94	Died six weeks after operation; carcinomatosis
	16	72	M	" "	Curare, N ₂ O, oxygen, ether	B.P. 160/115; severe arteriosclerosis	Died 7 days after operation; carcinomatosis with paralytic ileus
	17	74	F	" "	Thiopentone, 0.4 g., N ₂ O, oxygen, ether	B.P. 260/100	Died 3 months after operation; asthenia due to carcinomatosis

(E.) = Emergency operation.

difficult owing to tenacious sputum, mistura sodii chloridi composita (N.W.F.) was found to be invaluable.

Post-operative Complications

(a) **Wounds.**—Mild sepsis, 10; severe sepsis, 2; haematoma, 9; disruption, 1.

(b) **Thrombophlebitis.**—Due to intravenous drip therapy, 4; not due to intravenous drip therapy, requiring anticoagulant therapy, 3.

(c) **Chest.**—Major respiratory complications: severe bronchitis, 5; atelectasis (one case of bilateral basal collapse following a spinal analgesic), 5; bronchopneumonia, 3; pulmonary embolism, 1. It is to be noted that all these patients underwent an abdominal operation, and 12 of the 14 had pre-existing respiratory disease.

Minor Respiratory Complications

Under this heading are included all patients who had a raised respiratory rate for not more than three days after operation and cases of mild bronchitis. There was no relation to the type of operation, and of the 17 who suffered this complication 15 had pre-existing respiratory disease.

(d) **Intra-abdominal Complications.**—General peritonitis due to leaking duodenal stump, 2; persistent vomiting producing a salt-lack syndrome, 1.

Disposal of the Aged Patient

With the present shortage of hospital and convalescent beds, disposal of the aged patient requires some consideration. Such patients are not so fit as younger ones to return rapidly to normal domestic routine. Often they live alone and have no relatives to go to. Discharge from hospital therefore has frequently to be delayed. The almoner's department can often help with such cases by providing home helps or making suitable alternative arrangements. However, this problem is a very real one, and will require serious consideration in the future. Convalescent homes already have waiting-lists. At the present time the patient with an inoperable carcinoma who has been in hospital for a laparotomy often occupies a hospital bed until he dies. This is an undesirable situation in view of the great demand on hospital beds.

Conclusions

More patients over the age of 70 are submitted to major surgery than was the case 10 years ago.

Age alone is not a contraindication to surgery of any magnitude.

Care must be directed especially to the cardiovascular and respiratory systems.

Sepsis is a greater risk, and for this reason penicillin and sulphonamide therapy should often be used as a prophylactic measure.

The aged should never be allowed to lie in bed.

Disturbance of the electrolyte balance is not well tolerated. This is well illustrated in three patients who required second operations as emergencies: in all of them vomiting or blood loss had grossly disturbed the fluid balance. All three patients died.

The commonest cause of a major chest complication is pre-existing respiratory disease in association with an abdominal operation. These complications are rarely fatal.

The commonest cause of death is cardiac failure arising in a hypertensive patient irrespective of the type of operation.

Some steps must be taken in the future to facilitate the care of the aged post-operative patient who does not require further active surgical treatment in a hospital bed. A comprehensive medical service must make better provision for this.

Summary

The results of major surgery in 99 patients over the age of 70 are surveyed.

The types of operation performed are enumerated.

The pre-operative management is considered.

The choice and administration of anaesthetic are discussed.

The post-operative management is outlined.

The 17 fatal cases are considered in detail.

Conclusions are drawn concerning the practice of surgery in the aged.

A plea is made for more adequate provision for the care of the convalescing aged patient.

All these cases were admitted under Sir Cecil Wakeley and Mr. E. G. Muir, to whom we wish to express our thanks for permission to survey these cases and for their guidance at all times. We are grateful to Dr. Vernon Hall and other members of the anaesthetic staff who administered some of these anaesthetics. We also thank Miss Fern and her staff for the kind co-operation of the Record Office.

Of nearly 7 million dollars spent on tuberculosis research in the United States in a 12-months period during 1947-8, about two-thirds were expended for the study of drugs in tuberculosis treatment. A survey undertaken by the National Tuberculosis Association showed that the greatest expenditure on tuberculosis research was by official agencies, with a total of nearly 4 million dollars, of which 3 million were allocated to chemotherapy investigations. Following closely behind the official agencies were manufacturing firms, with appropriations of over 2 million dollars. Research by firms manufacturing x-ray equipment was also carried out. Universities expended nearly 200,000 dollars on tuberculosis research, with only 4,500 dollars allocated to chemotherapy. It is pointed out, however, that a large part of the studies financed by other agencies are actually carried out in institutions with university affiliation. Dr. E. R. Long, director of the medical research and therapy department of the National Tuberculosis Association, has stated that if streptomycin had not appeared so promising a drug "it is safe to say that much less money would have been expended for chemotherapeutic research, and much less, accordingly, for all research," but he emphasizes that streptomycin research has disclosed the need for more fundamental research in tuberculosis. "Had streptomycin proved as successful as the most optimistic enthusiasts anticipated," he stated, "had it proved, for example, as effective as penicillin in certain types of pneumonia, it is probable that interest in basic investigation on tuberculosis would have declined. Actually, however, streptomycin research has raised more problems than it has answered, and the new problems, such as the nature of the antibiotic mechanism and the reason for bacillary resistance to the drug, can be solved only by fundamental laboratory research."

Medical Memoranda

Chronic Progressive External Ophthalmoplegia

The idiopathic form of chronic progressive external ophthalmoplegia is rare enough to warrant a brief description of the following case.

CASE REPORT

The patient was a man aged 39 who was born in Rumania and had wandered about Eastern Europe and the Middle East. The family history revealed nothing significant. He had been in England since 1947. In 1933 he developed suppurating cervical glands; in 1935 he had pneumonia, and in 1942 typhoid fever. While he was in Egypt, at the age of 36, he noticed drooping of his left eyelid. In April, 1949, he came to hospital complaining of dizziness, double vision, and cough. There was marked ptosis of the left eye. Asymmetrical external ocular palsies were present, and the movements of the eyes were as follows:

	Right Eye			Left Eye		
Outwards	..	..	8°	..	14°	} 16°
Inwards	..	..	12°	..	2°	
Upwards	..	..	30°	..	2°	} 27°
Downwards	..	..	25°	..	25°	

The pupils were equal and circular, and reacted normally to light. On ophthalmoscopic examination the fundi were normal; an error of refraction (vision: R. 6/12, L. 6/36) was easily correctable, and perimetry showed very slight symmetrical diminution of the peripheral parts of the visual fields in each eye. No abnormality of other cranial nerves was observed, and all reflexes and sensations were unimpaired. Examination revealed no other physical signs.

The cerebrospinal fluid was normal, and the blood pressure was 130/80. Radiographs of chest and skull were normal, and the blood Wassermann reaction and Kahn test were negative. To exclude myasthenia gravis a therapeutic test was done (2.5 mg. neostigmine + 1/100 gr. (0.65 mg.) atropine), but, as expected, no improvement in the eye movements was observed.

COMMENT

In 1900 Wilbrand and Saenger studied 32 cases of chronic progressive external ophthalmoplegia and considered the condition to be a distinct clinical entity. The characteristic features, as they described them, are as follows: The onset is gradual, usually beginning in childhood, but may be delayed. Ptosis may be the first sign of the disease for a considerable time; years may elapse before there are signs of paralysis of the external ocular muscles, and diplopia may or may not occur. The internal ocular muscles remain normal and the health of the patient is not affected. According to these authors, "It is a striking feature of the affection that no other signs or symptoms develop indicating implication of other organs or other structures of the nervous system." Since the beginning of this century very few cases have been reported which belong to this group.

Altland (1909) described a case in which ptosis of the right eye occurred at the age of 22, and which developed bilateral ptosis (left incomplete) and immobility of both globes at 51. McMullen and Hine (1921) reported three cases, but one was excluded from this group because a subsequent examination revealed disease of other parts of the central nervous system. There are also reports by Langdon and Cadwalader (1928) and Farias (1941).