

MODERN OPERATIVE SURGERY

EDITED BY THE LATE

G. GREY TURNER

LL.D., D.Ch., M.S., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S.

Professor of Surgery in the University of London and Director
of the Department of Surgery at the British Postgraduate
Medical School. Surgeon, Hammersmith Hospital.

Emeritus Professor of Surgery in the University of Durham.
Honorary Consulting Surgeon, Royal Victoria Infirmary,
Newcastle-upon-Tyne.

AND

LAMBERT CHARLES ROGERS

V.R.D., M.Sc., M.D., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S.

Professor of Surgery, University of Wales; Director of Surgical
Unit, Cardiff Royal Infirmary; Surgeon, United Cardiff
Hospitals; Adviser in Surgery, Welsh Regional Hospital Board;
Consultant in Neurosurgery to the Royal Navy; Member of
Council and formerly Member of Court of Examiners and Vice
President, Royal College of Surgeons of England.

WITH A FOREWORD BY

SIR GORDON GORDON-TAYLOR

K.B.E., C.B., M.A., LL.D., Sc.D., M.D., M.S., F.R.C.S., F.R.C.S.E.,
F.R.C.S.I., F.R.A.C.S., F.A.C.S.

FOURTH EDITION

In Two Volumes

VOLUME II

CASSELL AND COMPANY LTD

London

1956

CASSELL & CO. LTD

37/38 St. Andrew's Hill, Queen Victoria Street, London, E.C.4

and at

210 Queen Street, Melbourne
26/30 Clarence Street, Sydney
24 Wyndham Street, Auckland, N.Z.
1068 Broadview Avenue, Toronto 6
Avenida 9 de Julho 1138, São Paulo
Galeria Güemes, Escritorio 454/459 Florida 165, Buenos Aires
Haroon Chambers, South Napier Road, Karachi 2
15 Graham Road, Ballard Estate, Bombay 1
Munshi Niketan, Behind Kamla Market, 13/14 Ajmeri Gate Extension, New Delhi
17 Chittaranjan Avenue, Calcutta 13
P.O. Box 275, Cape Town
P.O. Box 11190, Johannesburg
P.O. Box 959, Accra, Gold Coast
Macdonald House, Orchard Road, Singapore 9
17 Kauwlaan, The Hague, Holland
25 rue Henri Barbusse, Paris 5e
Bederstrasse 51, Zurich 2
Marne 3B, Mexico 5, D.F.
25 Ny Strandvej, Espergaerde
P.O. Box 189, Bridgetown, Barbados

First Edition . . . *December, 1924*
Second Edition . . . *October, 1934*
Third Edition . . . *November, 1943*
Reprinted *January, 1945*
Reprinted *November, 1946*
Reprinted *February, 1948*
Fourth Edition . . . *September, 1956*

ALL RIGHTS RESERVED

MADE AND PRINTED IN GREAT BRITAIN
AT THE CHAPEL RIVER PRESS
ANDOVER, HANTS

MODERN OPERATIVE SURGERY

CONTENTS TO VOL. II

	Page
Chap. XXIII. OPERATIONS FOR HERNIA. By G. Grey Turner . . .	1231
Oblique Inguinal Hernia	1241
Direct Inguinal Hernia	1257
Femoral Hernia	1260
Umbilical Hernia	1266
Obturator Hernia	1282
Scar or Incisional Hernia	1283
Strangulated Hernia	1292
Diaphragmatic Hernia	1301
 Chap. XXIV. OPERATIONS ON THE RECTUM AND ANAL CANAL. By C. Naughton Morgan, M.S., F.R.C.S., Surgeon, St. Bartholomew's Hospital, St. Mark's Hospital for Diseases of the Rectum and Colon, Royal Masonic Hospital; Consultant Surgeon, Hospital for Tropical Diseases; Consultant Surgeon, R.A.F., Consultant Surgeon (Proctology), R.N. and Army; and O. V. Lloyd Davies, M.S., F.R.C.S., Consultant Surgeon, St. Mark's Hospital for Diseases of the Rectum and Colon, and Middlesex Hospital	1306
Surgical Anatomy	1306
Pre-operative Treatment for Hæmorrhoids, Anal Fissure and Fistula Cases	1315
Hæmorrhoids	1316
Fissure in Ano	1321
Submucous Perianal and Ischio-rectal Abscess	1324
Fistula in Ano	1325
Post-operative Care of Hæmorrhoids, Fissure and Fistula Cases	1333
Rectal Prolapse	1335
Perineal Operations	1337
Benign Tumours	1341
Cancer of Rectum and Rectosigmoid	1344
Operations for Carcinoma of the Rectum	1346
 Chap. XXV. RADIO THERAPY IN MALIGNANT DISEASE. By B. W. Windeyer, F.R.C.S.(Ed.), F.R.C.S., D.M.R.E., F.F.R., Hon. F.R.A.C.S., Hon. D.Sc., Hon. F.C.R.A., Professor of Radiology, University of London; Director, Meyerstein Institute of Radiotherapy, Middlesex Hospital, and Radiotherapy Department, Mount Vernon Hospital	1373
Radiosensitivity	1376
Clinical Reactions of the Patient During and After Treatment	1381
Care of the Patient Undergoing Radiotherapy	1389
Accuracy of Dosage and Distribution	1390

	Page
Chap. XXV. RADIOTHERAPY IN MALIGNANT DISEASE.— <i>continued</i> .	
Indications for Radiotherapy	1392
Highly Radiosensitive Tumours	1393
Moderately Radiosensitive Tumours	1394
Radioresistant Tumours	1403
Palliation	1404
Chap. XXVI. OPERATIONS ON SKULL AND BRAIN. By Sir Geoffrey Jefferson, C.B.E., F.R.S., M.S., M.B., F.R.C.S. Eng. and Ire., F.R.C.P., Hon. M.Ch., Hon. F.R.F.P.S., Hon. F.A.C.S., Hon. LL.D., Emeritus Professor of Neuro- surgery, University of Manchester	1407
Introduction	1407
Principles of Neuro-surgery	1408
Diagnostic Procedures	1408
General Technique	1418
Complications	1439
The Different Types of Tumour	1442
Decompression	1447
The Cerebellar Approach	1449
Acoustic Neuromas	1457
Torkildsen's Operation	1461
Intraventricular Tumours	1463
Operations on the Pituitary Gland	1464
The Surgery of Trigeminal Neuralgia	1476
Division of the Eighth and Ninth Nerves and of the Trigeminal through the Posterior Fossa	1486
Intracranial Aneurysms	1491
The Surgery of Cranio-cerebral Trauma	1494
Intracranial Hæmorrhage	1502
The Surgery of Intracranial Abscess	1505
Cranial Defects, Cerebral Scars and Epilepsy	1510
Chap. XXVII. OPERATIONS ON THE EAR. By Sydney R. Scott, M.B., M.S. Lond., F.R.C.S. Eng., Consultant Aural Surgeon, St. Bartholomew's Hospital; Consulting Surgeon for Diseases of Ear, Nose and Throat, National Hospital for Paralysis and Epilepsy, Queen Square and St. Andrew's Hospital, Dollis Hill, N.W. With a section on Fenestration by J. P. Monkhouse, M.B., B.S., F.R.C.S., Surgeon, Ear, Nose and Throat Department, Middlesex Hospital; Consultant Aural Surgeon, Queen Charlotte's Maternity Hospital and National Hospital for Diseases of the Heart, London	1513
The External Ear	1514
The Middle Ear	1517
Operation on the Intracranial Sinuses for Infections of Otitic Origin	1541
Internal Ear: Operations on the Labyrinth	1547
The Operation of Fenestration of the Labyrinth for Otosclerosis	1552
Brain Abscess (Otogenic)	1557

	Page
Chap. XXVIII. EYE SURGERY. By H. B. Stallard, M.B.E., M.A., M.D., F.R.C.S., Hon. LL.D., Surgeon, Moorfields, Westminster and Central Eye Hospital, Ophthalmic Surgeon and Lecturer in Ophthalmic Medicine and Surgery, St. Bartholomew's Hospital, Ophthalmic Surgeon, Alex- andra Hospital, Luton	1572
Operation on the Lid	1574
Operations on the Extrinsic Muscles of the Eye	1585
Operations on the Lacrimal Apparatus	1592
Operations on the Conjunctiva and Cornea	1596
Operations on the Iris	1601
Retinal Detachment	1620
Radiotherapy for Malignant Intra-ocular Neoplasms	1622
Excision of the Eye	1623
Foreign Bodies in the Eye	1625
Operations on the Orbit	1628
Chap. XXIX. OPERATIONS ON THE NOSE AND PHARYNX. By W. Douglas Harmer, M.A., M.Ch.Cantab., F.R.C.S.Eng., Consulting Surgeon to the Throat Department, and Lecturer in Diseases of the Throat, St. Bartholomew's Hospital; Consulting Surgeon, Mount Vernon Hospital, assisted by J. Cecil Hogg, M.A., B.Ch.Cantab., F.R.C.S.Eng., Surgeon, Ear, Nose and Throat Department, St. Bartholomew's Hospital; Surgeon to The Royal National Throat, Nose and Ear Hospital, London	1633
Introduction	1633
Operations on the Nasal Fossæ and Accessory Sinuses	1636
Operations on the Turbinate Bones	1642
Operations on the Lacrimal Sac	1644
Operations on the Accessory Nasal Sinuses	1646
Operations on the Pharynx	1661
Removal of Adenoids	1667
Neoplasms	1668
Results	1685
Pharyngeal Pouches	1686
Chap. XXX. OPERATIONS ON THE LARYNX AND TRACHEA. By S. E. Birdsall, M.A., M.B., B.Ch.Cantab., F.R.C.S., Surgeon, Royal National Throat, Nose and Ear Hospital; Laryngologist, Woolwich and District War Memorial Hospital; Surgeon, Ear, Nose and Throat Department, Prince of Wales General Hospital and Paddington Green (St. Mary's) Children's Hospital, London	1692
Laryngeal Operations by Indirect Laryngoscopy	1692
Direct Laryngoscopy	1693
Tracheal Operations	1696
External Operations on the Larynx	1712
Diathermy	1730
Irradiation	1730
Management of Extrinsic Growths	1732

	Page
Chap. XXXI. INVESTIGATION OF THE UPPER AIR AND FOOD PASSAGES. By Sir Victor Negus, D.Sc., M.S., F.R.C.S.Eng., F.R.C.S.Edin. (Hon.); Consulting Surgeon for Diseases of the Ear, Nose and Throat, King's College Hospital, London, and G. Grey Turner	1733
Direct Laryngoscopy, Pharyngoscopy, Broncho- scopy and Œsophagoscopy	1733
Bronchoscopy	1734
Examination of the Œsophagus	1737
Chap. XXXII. OPERATIONS ON THE ŒSOPHAGUS. By G. Grey Turner and Sir Victor Negus	1747
Methods of Treatment with the Œsophagoscope: removal of foreign bodies	1747
Perforation of Œsophageal Walls	1749
Spontaneous Rupture of Œsophagus	1750
Œsophagotomy	1751
Abnormalities	1755
Inflammatory Diseases	1761
Operations for Simple Tumours	1772
Measures for the Relief of Carcinoma	1772
The Technique of Œsophagectomy	1775
The Thoracic Region	1781
Œsophagectasia	1796
Œsophageal Varix	1805
Œsophago-tracheal or Bronchial Fistula	1805
Œsophagostomy	1806
Chap. XXXIII. OPERATIONS ON THE LIPS, JAWS, MOUTH, TONGUE AND SALIVARY GLANDS, TOGETHER WITH METHODS OF TREAT- MENT BY IRRADIATION. By A. J. Gardham, M.S., F.R.C.S.Eng., Honorary Surgeon, University College Hospital and Hampstead General Hospital; Examiner in Surgery, University of Cambridge	1807
Anatomical Considerations	1807
Operations for Non-Malignant Conditions of the Mouth and Tongue	1812
Malignant Disease of the Mouth and Tongue.	1820
The Treatment of Local Recurrences	1893
Diseases of the Salivary Glands	1899
Chap. XXXIV. HARE LIP AND CLEFT PALATE. By W. E. M. Wardill, M.B., B.S., F.R.C.S., Honorary Consulting Surgeon, Royal Victoria Infirmary, Newcastle-on-Tyne; Pro- fessor of Surgery, Royal Medical College, Baghdad; formerly Surgeon, Babies Hospital, Newcastle-on-Tyne	1919
Anatomical and Physiological Considerations	1919
Operation for Complete Unilateral or Alveolar Cleft	1924
Operation for Bilateral Alveolar Clefts	1929
Operation for Post-alveolar and Partially-repaired Alveolar Clefts	1931

Chap. XXXV. PLASTIC SURGERY. By Sir Harold D. Gillies, C.B.E., F.R.C.S., Hon. F.A.C.S., Hon. F.R.A.C.S., Cdr. Order Dannebrog; Cdr. Order St. Olav, Norway; Hon. Emeritus Plastic Consultant, Ministry of Health, attached Rooksdown House, Basingstoke; Hon. Consultant (Plastic Surgery), Ministry of Pensions, R.A.F. and Army at Home; Civil Consultant (Plastic Surgery), Admiralty; Consulting Plastic Surgeon, St. Bartholomew's Hospital, and North Staffs. Royal Infirmary; and John N. Barron, M.B., Ch.B., F.R.C.S., Director of Plastic Surgery, Plastic and Oral Surgery Centre, Odstock Hospital, Salisbury; Lecturer and Consulting Plastic Surgeon, Postgraduate Medical School, London	1945
Skin Flaps	1960
Lymphædema	1967
Deformities in Upper Limb.	1968
Rhinoplasty	1973
Plastic Operations on Eyelids and Eyebrows	1984
Plastic Operations on the Ears	1992
Plastic Operations on the Lips	1995
Buccal Inlay in the Restoration of Under-Development of the Chin	2006
Cleft Palate	2007
Fractures of the Face	2009
Cosmetic Reduction Operations	2011
Chronic Radio-dermatitis and Radio-necrosis	2017
Chap. XXXVI. OPERATIONS ON THE NECK. By the late W. E. Tanner, M.B., M.S. Lond., F.R.C.S.Eng., Surgeon, Prince of Wales's General Hospital, Tottenham, and Evelina Hospital for Children; Lecturer on Surgery, North-East London Post-Graduate College	2022
Treatment of Tuberculous Cervical Nodes	2028
Treatment of Tuberculous Abscesses in the Neck	2052
Treatment of Retropharyngeal Abscesses	2054
Removal of Lymph Nodes for Diagnostic Purposes	2055
Removal of Secondary Malignant Lymph Nodes from the Neck	2056
Radiotherapy or Radiation in the Treatment of the Lymph Nodes	2061
The Surgery of the Thoracic Duct	2062
Treatment of Other Cervical Growths	2063
Chap. XXXVII. THE SURGERY OF THE THYROID, PARATHYROID AND THYMUS GLANDS. By Sir Geoffrey Keynes, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G., Consulting Surgeon, St. Bartholomew's Hospital, New End Thyroid and Endocrine Unit, London	2067
The Thyroid Gland	2067
Congenital Abnormalities	2071
Thyroiditis	2073

	Page
Chap. XXXVII. THE SURGERY OF THE THYROID, PARATHYROID AND THYMUS GLANDS.— <i>continued.</i>	
Thyroidectomy	2074
Adenoma of the Thyroid	2084
Colloid Goitre	2084
Nodular Goitre	2085
Toxic Goitre	2086
Lymphadenoid Goitre and Riedel's Disease	2088
Carcinoma of the Thyroid	2089
Thyroid Grafts	2091
The Parathyroid Glands	2091
The Thymus Gland	2093
Chap. XXXVIII. SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM. By Sir Geoffrey Jefferson; and A. Michael Boyd, M.B., B.S., F.R.C.S., Hon. M.Sc., Hon. F.A.C.A., Professor of Surgery, University of Manchester; Surgeon, Royal Infirmary, Manchester	2103
Sympathectomy for the Upper Limb	2103
Sympathectomy for the Lower Limb	2111
Sympathectomy for Hypertension	2117
Sympathectomy for the Relief of Pain	2123
Paravertebral Block	2124
The Applications and Results of Sympathectomy	2126
Chap. XXXIX. GYNÆCOLOGICAL OPERATIONS. By John Howkins, M.S., M.D., F.R.C.S., F.R.C.O.G., Obstetric and Gynæcological Surgeon, St. Bartholomew's Hospital; Gynæcological Surgeon, Royal Masonic Hospital, London; Gynæcological Surgeon, Hampstead General Hospital, London	2133
Operations on the Vulva	2137
Operations on the Vagina	2144
Operations on the Perineum	2160
Operations on the Cervix	2167
Operations on the Uterus	2174
Operations on the Ovaries	2203
Operations for Sterilization	2213
Presacral Sympathectomy	2214
Accidents during Operations	2215
Mortality	2217
Chap. XL. OPERATIONS ON THE KIDNEY AND URETER. By the late John Everidge, O.B.E., F.R.C.S.Eng. Revised by Henry K. Vernon, M.S., F.R.C.S., Surgeon, St. Peter's Hospital for Stone and Other Genito-Urinary Diseases, London; Surgeon i/c Genito-Urinary Department, St. James's Hospital, Balham; Lecturer, Institute of Urology, University of London	2218
Operations on the Kidney	2218
Exploration of the Kidney	2226

		Page
Chap.	XL. OPERATIONS ON THE KIDNEY AND URETER.—<i>continued</i>.	
	Decapsulation of the Kidney	2227
	Nephropexy	2228
	Nephrectomy	2230
	Nephrolithotomy	2246
	Operations for Temporary Deviation of the Urine in the Upper Urinary Tract	2258
	Plastic Operations on the Upper End of the Ureter and Renal Pelvis	2261
	The Operative Treatment of Injuries of the Kidney	2273
	Operations on Anomalous Kidneys	2275
	Operations upon the Ureter	2280
	Ureteral Injuries and their Treatment	2309
Chap.	XLI. OPERATIONS ON THE BLADDER. By R. Ogier Ward, D.S.O., O.B.E., M.C., T.D., M.A., Hon. D.Sc., M.Ch., F.R.C.S., Honorary Consulting Surgeon, St. Peter's, St. Paul's and St. Philip's Hospitals, London; A. W. Badenoch, M.A., M.D., Ch.M.Aberd., F.R.C.S., Surgeon to St. Peter's Hospital for Stone and Other Genito-Urinary Diseases; Surgeon to the Royal Hospital of St. Bartholomew; Visiting Urologist to the Royal Masonic Hospital and to the Samaritan Hospital for Women; Consulting Urologist to the King Edward VII's Hospital for Officers (Sister Agnes Founder) and to the Association of Retired Naval Officers; and David Mitchell Wallace, O.B.E., M.S., F.R.C.S., Surgeon, St. Peter's Hospital for Stone; Associate Urologist, Royal Marsden Hospital, London	2315
	Exposure of the Bladder	2320
	The Treatment of Injury to the Bladder	2322
	Operative Treatment in Ectopia Vesicæ	2323
	Operations for Vesical Calculus	2324
	Operations for Foreign Bodies in the Bladder	2333
	Operations for Tumours of the Bladder	2334
	Operation for Diverticulum of the Bladder	2349
	Operations for Fistula of the Bladder	2354
	Operations for Incontinence of Urine	2357
Chap.	XLII. OPERATIONS ON THE PROSTATE. By R. Ogier Ward, A. W. Badenoch and D. M. Wallace	2361
	Chronic Prostatitis	2394
Chap.	XLIII. OPERATIONS ON THE URETHRA. By John Everidge and Henry K. Vernon	2399
	Removal of Calculi from the Urethra	2401
	Operations for Stricture	2402
	Rupture of the Urethra	2416
	Operations for the Repair of Fistula of the Urethra	2422
	Operations for Acquired Urethral Defects	2426
	Operations for Congenital Defects of the Urethra	2429

		Page
Chap.	XLIV. OPERATIONS ON THE PENIS AND TESTICLE. By John	
	Everidge and Henry K. Vernon	2439
	Circumcision	2439
	Amputation of the Penis	2443
	The Operation for Varicocele	2453
	Operations for Hydrocele	2454
	Operations on the Epididymis and Vas	2456
	Operations on the Testis	2461

PLATES IN VOL. II

		<i>Facing Page</i>
PLATE	III. Pyograms: antero-posterior and lateral views of temporal lobe abscess	1506
PLATE	IV. Pyograms: same case as in Plate III, 3 weeks later; abscess shrunk and healing	1507
PLATE	V. Congenital shortening of œsophagus	1758
PLATE	VI. Diverticulum of thoracic œsophagus	1759
PLATE	VII. Irradiation of the tongue	1828
PLATE	VIII. Irradiation of the cheek with a sandwich applicator	1829
PLATE	IX. Excretion urogram fifteen minutes after the injection of uroselectan-B. Investigation made 29 years after bilateral ureter transplantation into the colon by Sir Harold Stiles	2301

(By courtesy of Sir Harold Stiles, Mr. Henry Wade and the Edinburgh Medical Journal.)

CHAPTER XXIII

OPERATIONS FOR HERNIA

By G. GREY TURNER

History.—Operation for the radical cure of hernia is one of the oldest of surgical procedures, and many methods have been employed. Those known by the names of their authors, Wood, Czerny, Annandale, Mitchell Banks, Ball, Macewen, and Kocher, to mention only a few, described during the period 1876–90, have now mainly an historical interest. Incidentally, it is important to remember that a great deal of the detail of modern wound treatment has been evolved in connection with the radical cure of hernia. The greatest advance in the operation resulted from Bassini's work, first described in 1888.* The fundamental steps consisted in dividing the fibres of the aponeurosis of the external oblique sufficiently to expose the whole of the inguinal canal, separating the sac from the cord to the highest possible point, transfixing and tying it at the neck, removing the sac, transplanting the cord, and suturing the conjoined tendon behind the cord to the inner surface of Poupart's ligament. This soon became the standard operation, and forms the basis of most methods at present in use. Modifications have arisen from time to time, the most important being the Wölfler operation, similar in all respects to Bassini's, except that the cord is not transplanted, and resembling the Bevan operation, which has a particular value in the cure of congenital hernia in children with incomplete descent of the testis.

Halsted, in 1890, modified the Bassini operation by dividing, not only the external oblique, but also the internal oblique and transversus muscles and the transversalis fascia to a point 1 in. external to the internal ring, forming a new internal ring external to the original one, transplanting the cord, which had been stripped of most of its vessels, and uniting all the divided muscular and aponeurotic structures behind the cord, which thus came to lie directly under the skin. Lockwood displaced the neck of the sac, after transfixion and ligation, high up under the transversalis muscle by passing the long ends of the ligature through the transversalis and internal oblique muscle from within outwards, and tying the ends together on the surface of the internal oblique under cover of the aponeurosis of the external oblique. Polya, in 1905,† realizing that recurrence takes place, if at all, at one of two points—(a) at the lower angle of the canal or (b) at the entrance of the cord to the canal—adopted the Halsted method of resecting the redundant vessels of the cord, and displacing the latter.

* On December 23rd, 1884, Bassini carried out the first of the operations for hernia now known by his name. Four and a half years later the patient was found to be free from recurrence which was considered a remarkable result at that time.

† *Centralbl. f. Chir.*, 1905, No. 9, xxxii, 210.

To strengthen the weak spot at the lower angle of the canal he opened the sheath of the rectus for a distance of some two inches from its pubic attachment, mobilized this muscle, and sutured it to Poupart's ligament.

Thus, for over sixty years the root idea of Bassini's operation has been accepted, and such variations as have been suggested have had for their object the strengthening of degenerated structures or details of technique. Bassini's operation is admittedly adequate where muscular development is satisfactory, e.g. in the ordinary oblique inguinal hernia of congenital type occurring in children or healthy young adults. When the hernia is associated with or has resulted from weakness or degeneration of the abdominal muscles, particularly of the conjoint tendon, additional steps, such as the overlapping of the external oblique aponeurosis, the use of the rectus muscle or sheath or the employment of fascial or other special sutures are indicated. Especially is this the case in direct inguinal hernia.

From time to time surgeons have supplemented their efforts at radical cure by the use of metallic suture material. In 1909 Lawrie McGavin published* an account of silver wire filigrees buried in the hernial sites, where they are intended to remain, and after incorporation with the tissues to act as barriers against recurrence. The lapse of time is showing that this plan has attained more success than has previously been acknowledged. In their search for some yet better method Gallie and Le Mesurier† experimented with strips of fascia lata used as sutures. This was soon recognized as a new principle, for it was proved that the strips become incorporated with the tissues and survive as a permanent addition to the architecture of the areas in which they are employed. Their first paper was published in 1924 and since that time the method has been subjected to an extensive world-wide trial and is recognized as a great addition to the solution of the hernia problem.

A revival of interest in the old method of injection for the cure of hernia took place some years ago and was conscientiously subjected to further trial, notably by Delisle Gray and A. E. Porritt‡ in this country.

In every decade there are surgeons who become dissatisfied with the results of operations designed for the radical cure and this attitude is always intensified in war time. The winter of their discontent does nothing but good, for it is well that the attention of the profession should be focused on those procedures which, lacking the elements of novelty, are too often treated with dangerous complacency. But all who have looked into this question with unbiased minds have often to admit that the degree of non-success which they deplore is due to causes which are preventable. Too often the operation for the radical cure is regarded as trivial or unimportant, and left to enthusiastic but inexperienced juniors, who have often but a superficial knowledge of the anatomy of the parts concerned and a poor

* *Brit. Med. Journ.*, Aug. 14, 1909.

† *Brit. Journ. Surg.*, 1924, xii, 289.

‡ *Pro. Roy. Soc. of Med.*, 1938, xxxii, 893.

understanding of the essentials necessary for repair. Even with ampler knowledge they often lack the technical skill which should be brought to every detail of this operation which is often of such importance for the comfort and welfare of the patient and for his economic position.

The history of the operative management of hernia throughout the last half-century has emphasized the fact that all hernias of any group are not necessarily the same and that individual consideration is required in planning their management. Unfortunately the basis for the management of hernia remains hypothetical, for with the exception of the presence of a congenital sac or the assumption of inherent weakness the cause is not known. The anatomical aspect of the problem has been minutely studied in still life throughout the ages but there is much more to be done on the study of the living functional anatomy. Such studies should be made in the conscious patient and when in the vertical as well as the horizontal position. Lytle* of Sheffield has already made contributions along these lines.

Methods available.—There are only two methods which hold out a prospect of permanent cure in hernia—open operation and closed injection. The latter only requires mention in a work on operative surgery. It has the one outstanding advantage that it is ambulatory and, in fact, many patients continue to follow their occupation while undergoing treatment. The method is usually limited to inguinal hernias that are completely reducible and can be efficiently controlled by truss which *must* be worn continuously throughout the treatment. Whilst the size of the hernia seems to be of little importance, provided it is completely reducible, an excess of subcutaneous tissue is a contra-indication. From 8 to 12 injections are required at twice-weekly intervals. Complications are few, but local inflammations and even peritonitis have occurred. The recurrence rate is stated to be about 8 per cent., but it is said that some of these can be successfully treated by a further series of injections. No large series of cases appears to have been followed up over a period of several years.

In spite of anything that can be said in its favour the method has never been generally adopted in this country. In America the method has been fairly extensively used (*a*) in vigorous healthy young men who wish to escape hospitalization, and (*b*) in old feeble subjects in order to avoid the possible risks of open operation and the necessary confinement to bed.

Principles of operation.—The principles underlying the radical cure of all hernias are the same, namely, the complete isolation and removal of the whole sac, and the restoration and strengthening of that part of the abdominal wall through which the hernia has protruded. To attain these objects very numerous plans have been adopted and modifications are constantly being introduced, but the prospect of their success depends on the observance of these principles.

* *Brit. Journ. Surg.*, 1945, xxxii, 441.

Indications for the radical cure of hernia.—In these days there are very few cases of hernia that need be refused operation. Apart from the inconvenience which hernia causes, the real danger is strangulation, which still claims a mortality of about 20 per cent., whereas the mortality of operations for radical cure is considerably less than 1 per cent. This alone is a very cogent argument for operation. An attack of strangulation, even if the patient recovers without surgical interference, is always an indication for subsequent operation, for this complication is very apt to recur. With the methods of treatment now available, diabetes, or renal and cardiac disease are no longer absolute contra-indications, though they each require special measures to render operation justifiable. The greatest barriers to success are ruptures of so great a size that the contents cannot be comfortably returned to the abdomen; persistent and incurable cough; or advancing obesity which cannot be controlled by diet.

In old-standing cases it is necessary to be sure that the hernia is not just a cloak for some other disease which is the cause of symptoms the patient unwittingly attributes to his obvious encumbrance. For instance, fat women with umbilical hernia often suffer from gall-stones but invariably attribute their biliary attacks to the rupture. Similarly, elderly men who have endured the inconvenience of a hernia for years will often begin to think of a radical cure when symptoms due to enlarged prostate become troublesome. Many other combinations occur such as obstructive symptoms due to carcinoma of the rectum or the general weakness associated with diabetes which have both been attributed to long-standing hernia.

There is a recurring urge to simplify the operation and many conscientious surgeons revolt at disturbing the anatomy of the canal in healthy young adults. They claim that it should be enough to completely and thoroughly remove the sac and to do nothing more. But this is a fallacy: it is the old operation in common use before the Bassini method was generally adopted, and those of us who are sufficiently senior recall the large proportion of recurrences which invariably followed. The writer has often been witness to the revival of the practice and always with the same result.

The object of intervention.—In children and healthy young adults operation can be undertaken in the confident expectation that the hernia will be permanently cured. In elderly and less robust members of the community and in those suffering from very large hernias operation may still be the best treatment, not only to remove the dangerous risk of strangulation, but to add to comfort and to promote well-being, but it cannot be undertaken with the same prospect of lasting cure. These patients should be warned that if signs of recurrence become manifest they should report for advice. Recurrence in the young adult usually justifies further operation. In the more elderly it may be wiser to fall back on a properly fitting and well applied truss. If the apparatus is used when the relapse first appears

it will prevent deterioration of the condition and may enable the patients to fulfil those activities for which they are otherwise fitted. In this way operation may be the means of exchanging a heavy burden for a manageable inconvenience.

Though the surgeon should not be easily deterred he should hesitate to make rash promises about the prospects of radical cure. Apart from other factors age is not necessarily a bar to successful intervention but the prospects of radical cure become less likely as the years advance. The advantages of the operation have proved so great that its reputation can sustain the opprobrium which naturally attaches to the occasional recurrence.

Suture material for the operation.—Many surgeons use chromicized catgut throughout, No. 3 being suitable for the deep sutures and No. 1 for the other parts of the operation. The Halsted school still use very fine black silk, and there are an increasing number who follow the Kocher technique and use thin Chinese twist silk. Floss-silk for lattice repair, various kinds of metal-wire and wire gauzes are also though less frequently employed. Kangaroo tendon seems to have quite gone out. But surgical memories are short and it is apt to be forgotten that every now and again troublesome sinuses follow the use of unabsorbable material. Whatever is used, it must be realized that the final success of the operation does not depend on the suture material but on the power of the tissues to unite. To give them the best chance, accurate and close apposition without tension and healing without infection are essential.

The use of living sutures introduced almost a new principle in the treatment of hernia.* The method was very carefully worked out by Gallie and his co-workers in Toronto. Their experiments showed that the lateral approximation of muscles to fibrous structures results in only a feeble union by scar-tissue. They found that living auto-genous sutures of fascia or tendon survived and became permanently incorporated with the tissues. They used this method in certain types of hernia, especially the direct inguinal variety, umbilical and ventral hernias, incisional hernias and recurrent cases. The sutures are cut from the fascia lata or from the external oblique bordering the inguinal canal. When the fascia of the thigh is employed it is either exposed by a long incision on the outer side, the strips being cut with a sharp scalpel or strips are cut by a special instrument called a fasciatome which can be introduced through a small skin incision at either end of the proposed suture. Generally speaking the open incision and the use of scalpel or scissors has been the most satisfactory. The strips are about 10 in. long and one-quarter of an inch wide and in an ordinary case two, or at most three, suffice. The gap left in the fascia is closed whenever possible, but little inconvenience has followed when this has not been done, provided, of course, that the skin incision is carefully sutured. Occasionally a large bulging

* Gallie and Le Mesurier, *Brit. Journ. Surg.*, 1924, xii, 289.