DETAILS OF PATIENTS

Patient	Diagnosis	Initial P.P.D.	Highest temperature (°F)	Pneumothorax	Alkaline phosphatase (Bodansky units)*	Culture obtained	Mycobacteria on tumour culture	Tumour necrosis	Tumour granulomata/ intense inflammatory reaction	Operation
1	Squamous carcinoma of lung	+	101·5	No	60	No	—	Yes	No/yes	(L) Pneumonectomy
2	Adenocarcinoma of lung	−	101	No	40	No	—	Yes	No/yes	(L) Upper lobectomy
3	Squamous carcinoma of lung	+	98·6	Yes	170	No	—	Yes	Yes/yes	(R) Lower lobectomy
4	Squamous carcinoma of lung	+	101	No	76	No	—	Yes	Yes/yes	(R) Lower lobectomy
5	Adenocarcinoma of lung	−	102	Yes	84	Yes	Yes	Yes	Yes/yes	(L) Lower lobectomy
6	Squamous carcinoma of lung	−	99	No	90	Yes	Yes	Yes	No/no	(L) Upper lobectomy
7	Metastatic colon carcinoma	+	98	Yes	40	Yes	Yes	Yes	Yes/yes	Segmental resection
8	Metastatic colon carcinoma	+	98	Yes	115	Yes	Yes	Yes	Yes/yes	(L) Lower lobectomy
9	Squamous carcinoma of lung	+	98	No	50	Yes	Yes	Yes	Yes/yes	(R) Upper lobectomy

*Normal 30–110 Bodansky units

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directly into the tumour preoperatively would be even more effective than intrapleural B.C.G. This study evaluates the feasibility of direct intratumour injection of B.C.G. into lung tumours before pulmonary resection.

Nine patients received direct intratumour injections of 0·5–1·0 ml. of Glaxo B.C.G. by percutaneous needle injections and fluoroscopic imaging. All patients were skin-tested for sensitivity to P.P.D., and the positive responders received the smaller amount of B.C.G. All patients underwent pulmonary resection 2–3 weeks after injection, and all were placed on isoniazid 10 days before surgery.

The clinical and histopathological features are presented in the accompanying table. All injected tumours showed necrosis. Granulomatous inflammation with typical Langhans' giant cells were often seen, and all the tumours which were cultured grew *Mycobacterium bovis*. Complications were slight. Four patients developed a small pneumothorax, but none required a chest-tube. Four developed mild fever (none above 102°F). At the time of surgery, 2–3 weeks after B.C.G. injection, the pleural space was free of significant adhesions, and the granulomatous reaction was limited to the injected tumour nodule and the regional lymph-nodes. There were no postoperative complications, and all patients are free of disease at the present time (mean follow-up 5 months).

CONCLUSION

This study has established that intralesional immunotherapy of pulmonary tumours is safe and technically simple. It must be emphasised that the role of intralesional B.C.G. in these patients is not to eradicate the primary tumour but to induce systemic antitumour immunity. Since the histological features are essentially identical to those observed in animal models where systemic antitumour immunity is achieved, it seems reasonable to assume that this form of immunotherapy will also give rise to systemic antitumour immunity in patients with lung cancer. The therapeutic benefits of this therapy have yet to be demonstrated, but our preliminary results indicate that clinical trials with this new immunotherapy are feasible.

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SPERM GRANULOMA AND REVERSIBILITY OF VASECTOMY

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Summary Ninety-two consecutive patients who had undergone bilateral vasectomy 1 month to 28 years earlier were studied at the time of vasectomy reversal for sperm output, dilatation of the vas-deferens lumen, and sperm granuloma. Thirty-nine men had unilateral or bilateral sperm granuloma. The presence of a sperm granuloma virtually assured normal sperm in the vas fluid no matter how long ago the vasectomy was performed. In the absence of a sperm granuloma, the interval since vasectomy had an important influence on the quality of vas fluid. The presence of a sperm granuloma was associated with significantly less dilatation of vas-deferens lumen at the testicular end. The site of the vasectomy and the amount of vas deferens removed did not influence sperm quality. A sperm granuloma on only one side resulted in normal spermatozoa in the vas fluid on that side, whereas the side without the sperm granuloma had abnormal spermatozoa or no spermatozoa in the vas fluid. It is concluded that when sperm granuloma follows vasectomy it vents the high pressure otherwise created by vasectomy and prevents disruption of sperm output in the vas fluid.

INTRODUCTION

THE popularity of vasectomy has led to increasing interest in methods of reversal. I have already described a microscopic technique for accurate reconnection of the vas deferens.[1-3] When many normal motile or normal non-motile sperm were present in the vas-deferens fluid at the time of vasovasotomy, the sperm-count usually became normal after reversal.

In an effort to determine what effect intratubular pressure might have on subsequent reversibility of vasectomy and to what degree the formation of sperm granuloma after a vasectomy might affect that pressure, ninety-two consecutive patients in whom vasectomy reversal was attempted 1 month to 28 years after the original vasectomy were studied prospectively.

METHOD

Patients were 21 to 55 years old. The interval since the patient's original vasectomy varied between 1 month and 28 years. All patients were azoospermic. The operative technique and results of microscopic vasectomy reversal have been described in detail elsewhere.[1-5] Thirty-nine men had unilateral or bilateral sperm granuloma noted at the time of vasovasotomy.

The vas-deferens lumen was measured under the operating-microscope with a micromillimetre rule. Vas fluid was sampled with a micropipette. In all patients both vasa deferentia were accurately reconstructed under the microscope.

RESULTS

Table I summarises the content of vas fluid noted at various intervals after vasectomy in relation to the presence or absence of sperm granuloma in 184 vasa deferentia in these ninety-two patients. Some normal spermatozoa were present in the vas fluid of all thirty-nine cases with sperm granuloma, even when vasectomy had been performed over 10 years earlier. 8% of patients with sperm granuloma had abnormal spermatozoa together with normal spermatozoa.

When no sperm granuloma was present at the site of the vasectomy, only 7% had completely normal spermatozoa in the vas fluid. None of the patients with sperm granuloma had grade 4 or grade 5 vas fluid. However, vas fluid from men without sperm granuloma were often grade 4 or grade 5.

TABLE II—INNER DIAMETER OF VAS-DEFERENS LUMEN ON TESTICULAR SIDE OF OBSTRUCTION IN RELATION TO PRESENCE OR ABSENCE OF SPERM GRANULOMA

Internal diameter (mm)	Sperm granuloma*	No sperm granuloma†
0·33	8 (20%)	0
0·50	25 (63%)	3 (4%)
0·75	6 (15%)	14 (18%)
1·00	1 (3%)	28 (36%)
1·25	0	25 (32%)
1·50	0	7 (9%)
Totals	40	77

Mean inner diameter of the vas lumen on abdominal side of obstruction=0·32±0·07 (±S.D.) (A).
*Mean inner diameter with granuloma (±S.D.)=0·52±0·15 mm. (B).
†Mean inner diameter without granuloma (±S.D.)=1·05±0·24 mm. (C).
B *vs.* C; $P<0.00001$.
B *vs.* A; $P<0.001$.

TABLE I—CONTENTS OF VAS FLUID AT VARIOUS INTERVALS AFTER VASECTOMY IN RELATION TO PRESENCE OR ABSENCE OF SPERM GRANULOMA*

	Sperm granuloma				No sperm granuloma			
	0–5 yr	6–10 yr	>10 yr	All patients regardless of time since vasectomy	0–5 yr	6–10 yr	>10 yr	All patients regardless of time since vasectomy
Grade 1:								
Many motile normal sperm	12 (63%)	15 (68%)	11 (61%)	38 (64%)	8 (12%)	0 (0%)	0 (0%)	8 (6%)
Grade 2:								
Many non-motile normal sperm	7 (37%)	5 (23%)	4 (22%)	16 (28%)	2 (3%)	0 (0%)	0 (0%)	2 (1%)
Grade 3:								
Sperm heads with some normal sperm	0 (0%)	2 (9%)	3 (17%)	5 (8%)	18 (26%)	5 (17%)	4 (14%)	27 (22%)
Grade 4:								
Sperm heads only	0	0	0	0	26 (38%)	18 (62%)	12 (43%)	56 (45%)
Grade 5:								
No sperm	0	0	0	0	14 (21%)	6 (21%)	12 (43%)	32 (26%)
Totals	19	22	18	59	68	29	28	125

*59 out of 184 vasa had sperm granuloma.

Usually the inner diameter of the vas-deferens lumen on the testicular side of the vasectomy was dilated, reflecting an increase in pressure. However, there was significantly less dilatation when a sperm granuloma was present (table II). The vas lumen was less dilated when the vas fluid contained normal spermatozoa. Abnormal spermatozoa or absence of spermatozoa in the vas fluid was generally associated with much greater vas dilatation. The site of vasectomy and the amount of vas deferens removed appeared to have no effect on sperm quality.

Nineteen patients had a sperm granuloma on one side only. If the sperm granuloma had a systemic effect one would expect vas fluid from both testes to be affected. Many normal motile or non-motile spermatozoa were always seen in the vas deferens on the side with the granuloma. No abnormal sperm were seen in any of the vasa with sperm granulomas in this group. However, in seventeen of the nineteen patients with unilateral granuloma either no sperm or just sperm heads were seen on the side without sperm granuloma. Only two of these patients had normal spermatozoa on the side without granuloma. Thus, the sperm granuloma seemed to have a local rather than a systemic protective effect.

Sperm granulomas did not cause much discomfort. Histological sections revealed multiple canaliculi and crevices in which many sperm were sequestered and were being absorbed by macrophages.

The patient in whom vasectomy had been performed only 1 month before had morphologically normal but completely non-motile dead spermatozoa in his vas fluid. This indicates that the spermatozoa within the vas deferens after a vasectomy have a life span of a month or less.

The patient in whom vasectomy had been performed 28 years before had two large sperm granuloma and had completely normal, motile sperm in his vas fluid on each side. This indicates that the proposed protective effect of sperm granuloma on fertility is long term.

DISCUSSION

These azoospermic patients had been vasectomised in centres all over the world. There was leakage and sperm granuloma in 32%. This sperm granuloma seemed to be harmless, and I believe may have protected against the build-up of high pressure on the testicular side of the disconnected vas deferens by providing a safety valve. Persistent leakage and reabsorption of spermatozoa at the vasectomy site seems to assure the patient of continuing adequate production of spermatozoa for the potential recovery of fertility after vasovasotomy no matter how long ago his vasectomy was performed. In the absence of a sperm granuloma very high intratubular pressures and sperm stasis can develop.

The results of this investigation suggest that in the presence of sperm granuloma, vasectomy may be a more reversible procedure than has previously been believed.

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Reviews of Books

A Clinician's Guide to Antibiotic Therapy

PAUL NOONE, M.R.C.PATH., Royal Free Hospital, London. Oxford: Blackwell. 1977. Pp. 106. £3.25.

ANTIBIOTICS are among the most used and abused of drugs, and the perplexing number of new antimicrobial agents appearing every year calls for a text giving clear, authoritative guidelines on usage. This small book gives the views of one microbiologist on the best antibiotic therapy for different infections. A brief introduction deals with general topics such as antibiotic resistance, toxicity, and use of the laboratory, the remainder of the book being divided into two sections. In the first section is listed, under disease headings, probable pathogens, appropriate antibiotics in order of preference, and prescribing information with useful comments. In the second section the author gives a thumb-nail sketch of most of the antimicrobial agents. Only the most single-minded would attempt to read what has been written as a bedside reference book from cover to cover; the book contains the terse facts necessary for prescribing, rather than memorable information on infectious diseases or principles of antibiotic usage. Few would argue with the basic prescribing information, but some of the detail is open to question—for example, the use of chloramphenicol by the intramuscular route, the omission of tuberculosis as a cause of bacterial meningitis, and the selection of clomocycline as "first choice" in brucellosis. More information on dosage in renal or hepatic failure would also be appreciated. The main criticism, however, is of the involved format, which makes the required information difficult to obtain on rapid scanning of the text. There is no doubt that there is much useful information in this short volume, but both the price and the size are a little large for the overburdened pocket of many medical students and young doctors.

Neuromuscular Function and Disorders

A. J. MCCOMAS, F.R.C.P.C., McMaster University, Hamilton, Ontario. London and Boston: Butterworth. 1977. Pp. 364. £19.50.

THIS is a most interesting and lucid account of the neurophysiology of muscle fibres and motorneurones. The first half of the book deals with neuroanatomy and physiology, and this is well done. This section includes reviews of development and of neurological ageing processes. The second half of the book is devoted to disorders of nerve and muscle, with clinical descriptions, investigations, and therapy dealt with briefly but adequately. The main emphasis here is on interpretation in terms of disordered physiology. The author has included many hypotheses which not all authorities would find exact or even tenable, but nevertheless, he is right to do so—for two reasons: these hypotheses provide a working framework which can serve only to stimulate and not to mask new ideas; and new hypotheses add a certain excitement and interest which is too often lacking in standard texts. A good example is Dr McComas' "sick motorneurone hypothesis", which has attracted considerable controversy but has undoubtedly stimulated and generated new work. This particular hypothesis is dealt with in detail, and most if not all criticisms are answered. There have been many attempts to produce a textbook which combines clinical features with up-to-date neurophysiological and neuroanatomical material. These have usually fallen short on both the clinical and basic-science fronts. Dr McComas has the advantage of a relatively restricted field, but he has covered it well and in depth. It is undoubtedly the best account available. The book is well presented. It is thoroughly recommended to clinical neurologists and all workers in the neurosciences.

Respiratory Disease

Tutorials in Postgraduate Medicine: vol. V.—Edited by D. J. LANE, F.R.C.P., Radcliffe Infirmary, Oxford. London: Heinemann. 1977. Pp. 565. £12.50.

THIS book is aimed at doctors with a special interest in respiratory disease. Whole chapters are devoted to aspects of respiratory disease and function commonly encountered in clinical practice but rarely considered separately. An example of these is the chapter on dyspnœa which offers a working hypothesis for the genesis of dyspnœa but arrives no nearer a conclusion as to how to judge when dyspnœa is appropriate in individuals. Another such chapter is concerned with the problem of widespread radiological pulmonary shadowing; yet another reminds us that the lung is a metabolically active organ with both endocrine and exocrine secretory functions. Mycobacterial disease features as a single brief chapter (out of twenty-four) and is deliberately concerned with problems associated with human tuberculosis that some might consider controversial, such as the future value of B.C.G. vaccination and the long-term follow-up of patients with old tuberculous scarring who form too large a part of many chest clinics. The vulnerability of the lungs to the quality of the air is the subject of three chapters concerned with the barrage of particles—apparently inert, fibrogenic, infective, or antigenic—which we inhale. The chapters on chronic obstructive lung disease very successfully relate clinical features to measurable factors—preaching to the converted in view of the anticipated readership but nevertheless a valuable approach. It would be a mistake to think that the first section entitled "Fundamentals" is a simple review of pulmonary physiology which is part of every textbook of respiratory disease. This section is a very detailed account indeed of lung function from the brain to alveolar capillary and definitely not for beginners. There are a number of irritating spelling mistakes in an otherwise pleasing format. References are well arranged, grouped in subjects though still numbered in the text. This is a superb book with its deliberately selective approach, the following of current streams of interest, and the relating of clinical findings to measured abnormalities. It should certainly be in every medical library and will undoubtedly be bought by many chest physicians for personal use.

Principles of Medicine in Africa

Edited by E. H. O. PARRY, Ahmadu Bello University, Zaria, Nigeria. Oxford: Oxford University Press. 1977. Pp. 604. £12.

THIS is primarily a textbook for medical students in Africa, and in it there is an emphasis on what they daily see and handle. Prominence has been given to the ecology of disease and to the underlying physiology which has been disturbed by the disease process. An attempt has been made to break away from lists of diseases and to emphasise principles. All the authors are working in or have worked in Africa. The book has been well written and produced and its aims have been accomplished. Into its 600 pages is packed information which all medical students in Africa should know, and the material is clearly and attractively presented. It is, as we learn from the foreword, "a foundation stone on which scientific medicine in Africa can be built". From this it follows that it is not meant to be exhaustive, nor is it; students will no doubt wish to amplify its contents by reference to other, fuller works. The stated object of breaking away from lists of diseases renders it difficult to obtain an adequate picture of some diseases, and others are described very briefly. Even though ulcerative colitis is less common in Africa than in some other regions it seems, for example, inadequate to give only nine lines of text to it. There is no indexed mention in the book of acute bronchitis and only a page on chronic obstructive bronchitis, though there are six given to respiratory physiology and eleven to homœostasis. Breaking away from lists of diseases has also led to confusion in the classification of the infective diseases—here labelled "communicable" even though many are not communicable in the ordinary sense of that word (i.e., by person-to-person contact). These have been grouped according to the mode of transmission, a sometimes misleading approach when many are transmitted by more than one means. Thus Lassa fever is grouped under diseases spread by droplet infection when this is probably the least important of the ways by which it may be acquired. Not all the accepted ways of grouping and describing diseases can be foregone without some loss of clarity. No doubt such points can receive attention when, as it deserves, the book goes to a second edition. There are welcome chapters on the approach to treatment, outpatient care, the pregnant patient, and infection and immunity, all very important in the African context. The book deserves to become the foundation it sets out to be and its editor is to be congratulated on his accomplishment.

Non-invasive Clinical Measurement

Edited by D. E. M. TAYLOR and J. WHAMOND, Royal College of Surgeons of England. London: Pitman Medical. 1977. Pp. 205. £13.

MANY people seem preoccupied with "non-invasive" methods of measuring physiological functions and indices, often when satisfactory, relatively harmless, and only slightly invasive methods are available. However, the editors of this book state that the increasing use of monitoring for both ambulatory and intensive-care patients increases the need for truly non-invasive methods. This small book covers cardiology, vascular dynamics, ultrasound, orthopædics, obstetrics, and respiration, and it is therefore unlikely that any one reader will be interested in more than a small portion of the whole. The choice of subjects also seems odd: why is the clinically dubious monitoring of fetal breathing movements by ultrasound included whilst the many and varied proven uses of ultrasound are ignored? However, those who are interested in a review of these many unrelated topics will find this book well written, concise, and readable. There is a surprising uniformity in the frank and unbiased approach which most contributors have brought to their chapters, though almost all of them have been rather parochial in their views. Broader reviews of other workers' experiences, and comparisons with alternative techniques would often have been valuable. Those readers already familiar with any one contributor's work will not find any new data, and the content is so diverse that it is really very difficult to imagine who will buy the book. If there is to be a new breed of "non-invasive diagnostician" they will find this book a very readable introduction to the subject.

Urinary Cytology

DUANE N. TWEEDDALE, M.D., University of Missouri. Boston: Little, Brown. 1977. Pp. 150. $16.50.

A BRIEF historical review of the subject is followed by a description of methods used in urinary cytology (the cytocentrifuge is not mentioned). The rest of the book is taken up with a description of the normal and abnormal cytological and histological findings in diseases of the urinary tract. The text and bibliography are thorough, but there is little emphasis on Dr Tweeddale's apparently wide experience of the subject. A book on cytology demands, above all, a very high standard for its illustrations. The great majority of those in this book are poor, and in many it is quite impossible to identify the cytological details. The author has found it necessary to accompany some of his photomicrographs with diagrams to clarify their features. In addition, this subject is covered in several other good general textbooks of cytology. This book is unlikely to attract support unless the illustrations are improved.