

RECENT ADVANCES IN SURGERY

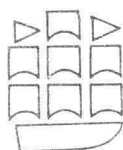
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SELWYN TAYLOR

NUMBER NINE

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PREFACE

It is not possible to define what is 'recent' nor what is an 'advance', especially in a field like surgery and therefore in gathering together the contents of the present volume of Recent Advances I have used the same formula as before. I have chosen subjects in which there has been a complete change of approach, those in which the pattern of treatment has now emerged clearly, and finally I have included descriptions of new techniques which seem to me to have reasonably wide applications in surgery.

Take the subject of carcinoma of the rectum as an example. In the early days attempts were made to excise it through the perineum. Later a variety of operations were devised; first approaching it through an incision beside the sacrum, later via the perineum and finally through the abdomen. There used to be great arguments as to whether an abdominoperineal operation was better than a perineoabdominal one and for a period there was a vogue for anterior resection, no matter how low the lesion lay. Today it is possible to look back and hopefully forward, and review the best method available for tackling the disease at whatever level it lies and at whatever stage it is discovered. Who better could present such a review than John Goligher, whose opinion in these matters is respected all over the world. There are however, quite different advances in this field, and colonoscopy and the technique of removing polyps endoscopically is one of these as Christopher Williams explains.

In the field of malignant disease it is timely to review the treatment of tumours of the testis and John Blandy tackles this with his usual clarity. The gastrointestinal tract is well represented in this volume as John Dawson looks at portal hypertension, de Jode at pancreatitis and, in order to be thoroughly controversial, Michael Baddeley reviews his own experience in using an intestinal bypass for obesity. Finally in this section Ivan Johnston gives an excellent up-to-the-minute account of parenteral alimentation; I imagine in the United States this chapter would have been headed hyperalimentation but then they have a tradition of overstatement.

In each issue of Recent Advances I have tried to introduce a central theme and on this occasion it is the place of immunology in surgery. There is practically no part of the body now into which the immunologist has not introduced his expertise and for those of us who were not brought up in this field it is necessary to go back to school. It would be difficult to find a better guide

than the Professor of Pathology at the Royal College of Surgeons, John Turk, and he has been ably abetted in his task by John Castro who has been as active in the tumour immunology field as he has in renal transplantation. The language being difficult, I persuaded the authors to include a jargon-box to which the reader can rapidly refer when he temporarily forgets the meaning of one of the basic new words in this subject.

For good measure I have included on this occasion another subject of universal importance to surgeons, mainly because it has been giving me concern in the management of patients. This is the investigation and management of disorders of bleeding and clotting. One of my erstwhile Hammersmith colleagues, R. Mibashan, in collaboration with Milica Brozovic of the Central Middlesex Hospital, has produced a guide which I believe will be a standard reference for a long time.

Professor Welbourn and Stephen Joffe have reviewed the apudomas, those fascinating endocrine tumours that have so much influence on the bowel and also on the rest of the endocrine system. In the field of locomotion there is a splendid account of low backache, which is such a problem in the outpatient clinic and consulting room, and it is very appropriately written by the collaboration of a physical medicine expert with an orthopaedic surgeon.

The cardiovascular system is represented by a masterly account of the treatment of stroke by Professor Taylor and John Lumley, a field in which surgery plays a special part. Coronary bypass, which takes up so much operating time today and offers such rewards in the right patients, is discussed by cardiac surgeon and cardiologist, William Cleland and Celia Oakley. The anterior tibial syndrome, so often misdiagnosed, is neatly portrayed by Georges Jantet.

Turning to the newer techniques, Professor Walder writes about the use of hyperbaric oxygen in surgery where it is now an essential part of the treatment for certain afflictions. It has been brought to the fore recently as a result of the diving hazards associated with drilling for oil in the North Sea. Another technique that has certainly come to stay and will certainly impinge on more and more surgical fields is microsurgery. In this country it was Terence Cawthorne who pioneered the use of magnification and later the microscope in middle ear surgery; however it is an ophthalmic surgeon, Walter Rich of Exeter, whom I have invited to contribute what is a particularly exciting chapter.

The contribution on SI units, the *Système Internationale*, was essential as we all have to make the transition to these new units of measurement, confusing though it will undoubtedly be. Finally, I make no apology for the clash with tradition in writing about surgical education. For all of my professional life I have been involved in teaching and latterly closely concerned with the evolution of the Higher Surgical Training Scheme and Accreditation. I hope that every reader will turn to this chapter as it is so important that the working of the scheme is understood throughout the surgical world.

This, the ninth in the series, like its predecessors is not a new edition but an entirely new book. It is for this reason that I have included a list of contents of Number Eight since in many ways it complements the present volume. So do earlier volumes in the series, but sadly they are all long out of print.

I could not have produced this, the ninth *Recent Advances in Surgery*, without the help, advice and wisdom of many colleagues and friends. In particular my assistant John Cooke has given yeoman assistance as well as contributing the chapter about SI units.

London, 1976

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CURRENT TRENDS IN THE RADICAL MANAGEMENT OF CARCINOMA OF THE RECTUM

J. C. Goligher

THE OVERALL CONTEMPORARY ACHIEVEMENTS OF RADICAL SURGERY

There are few other forms of malignant disease about which we possess such detailed information regarding the outcome of surgical treatment as we do in relation to carcinoma of the rectum. Thanks mainly to the comprehensive and meticulous analyses of Gabriel (1932, 1957, 1963), Dukes (1940, 1957), Morgan (1965), Bussey (1963) and Bussey, Dukes and Lockhart-Mummery (1960) at St Mark's Hospital, London, of Grinnell (1953) at the Presbyterian Hospital, New York City, and of Waugh, Block and Gage (1955), Mayo, Lee and Davis (1951), Mayo, Laberge and Hardy (1958) and Vandertoll and Beahrs (1965) and their colleagues at the Mayo Clinic, a vast fund of accurate data has been amassed regarding the prospects of cure after rectal excision for cancer. The general impression derived from a study of this information is of steady improvement in the results over the past three or four decades culminating in a standard of accomplishment at the present time that is vastly superior to that of surgical treatment for several other common cancers, such as those of the bronchus, oesophagus or stomach.

Nowhere is this continued improvement better demonstrated than in Dukes' (1957) chronicle of the rising resectability, falling operative mortality and increasing five year survival rate at St Mark's Hospital between the years 1928 and 1952 (Table 1.1). Morgan (1965) has shown that there has been a further rise in resectability rate to 96.5 per cent and fall in operative mortality

Table 1.1 Resectability, operative mortality and five-year survival in patients with rectal carcinoma at St Mark's Hospital 1928 to 1952 (based on data from Dukes, 1957)

Period	Resectability rate (per cent)	Operative mortality (per cent)	Crude five-year survival rate of immediate survivors of operation (per cent)	Corrected five-year survival rate of immediate survivors of operation (per cent)
1928-32	46.5	12.8	49.3	56.5
1933-37	57.6	11.0	46.2	54.5
1938-42	69.4	11.1	46.8	54.9
1943-47	79.0	7.9	53.7	63.9
1948-52	92.7	6.8	46.2	56.1

rate to 2.6 per cent at St Mark's Hospital during the period 1958 to 1963. That these excellent results are not confined to a specialist centre like St Mark's is attested by many published reports from general hospitals, such as Butler's (1971) from the London Hospital and my own (Whitaker and Goligher, 1975) from the General Infirmary at Leeds. Though we have a resectability rate of 90 per cent it should be pointed out that, as at St Mark's Hospital in more recent years (Morgan, 1965), roughly 18 per cent of the 90 or so in every 100 patients who proceed to removal of their growths have purely palliative excisions in the presence of hepatic deposits or other unremovable extensions, for it has long been established that excision of the main primary growth under these circumstances has an important contribution to make towards relief of symptoms (Goligher, 1941).

Published results of surgical treatment tend to be better than the much more common unpublished results and it may be questioned how accurately the statistics referred to from leading centres reflect the average experience of the majority of surgeons throughout the country. A more accurate impression of mean achievements of surgery in the country at large is conveyed by the reports of various Cancer Registries which relate to all the cases of cancer in a particular region of the country. One of the largest of these in Britain is the Birmingham Regional Cancer Registry, which has followed up 5800 cases of rectal carcinoma treated in that area between 1950 and 1961 inclusive (Slaney, 1971): 3005 or 52 per cent underwent radical resection. The crude and corrected five-year survival rates for resected cases were 37.8 and 48.6 per cent respectively and for all cases registered 21.9 and 29.2 per cent. During the years 1962 to 1964 inclusive the South-Western Regional Cancer Bureau (Walker, 1971) registered 1346 patients with cancer of the rectum; 923 or 68.6 per cent had excision. The crude five-year survival rate in resected cases was 34.1 per cent and for all cases registered 23.5 per cent.

These reports show what a discrepancy there is between the results that are possible under specially favourable circumstances and those regularly obtained in various regions of the country, including all grades of hospital. Perhaps the main cause of the poorer results in regional surveys is the lower average operability rate, which is not compensated for by any improvement in the survival rate amongst those undergoing resection. In turn this may reflect partly differences in the type of patients presenting for treatment and partly a less determined approach towards eradication of adherent lesions by many of the surgeons concerned. Clearly at a national level there are no grounds for complacency in the management of rectal cancer.

THE VALUE OF PREOPERATIVE RADIOTHERAPY IN IMPROVING THE RESULTS OF RADICAL SURGERY

In 1959 Stearns, Deddish and Quan reported that a retrospective survey of the patients treated for carcinoma of the rectum and sigmoid at the Memorial

Hospital, New York City, during the years 1939 to 1951 showed that those who had had preoperative irradiation prior to radical surgery obtained a significantly better five-year survival rate than did those who were treated solely by operation. As a consequence of these observations it was decided at that hospital to set up a prospective, properly controlled trial of preoperative irradiation at a dose of approximately 2000 rad. Only patients who underwent an ostensibly curative operation, who had no obvious evidence of residual or metastatic cancer in distant sites, were included. Stearns et al (1974) have now reported that during the years 1957 to 1967 790 patients were entered in the trial. The crude five-year survival rate in the 376 control patients was 65 per cent and in 414 treated patients 67 per cent. The incidence of nodal metastasis in the control cases was 37 per cent and in the treated cases 35 per cent. The five-year survival rate for cases without nodal involvement in the treated group was 78 per cent and for similar cases in the untreated group 79 per cent. When nodes were involved the survival rate was 40 per cent in both groups. This trial would thus seem to demolish the hopes of improvement of the achievements of surgical treatment of rectal cancer by means of supplementary radiotherapy.

However, more encouraging results from preoperative irradiation have been reported by Dwight et al (1972) in a controlled trial in 700 cases treated in Veterans Administration Hospitals in USA. Approximately half the patients were randomly allocated to radiotherapy at a dose of between 2000 and 3000 rad (usually delivered by conventional 180–400 kV equipment) and half were exempted from this treatment. Roughly the same number of patients underwent removal of their growths in the two groups, most of them by abdominoperineal resection, some by anterior resection. At first the operative mortality was slightly higher in the irradiated cases but later this difference diminished. A striking feature was that the proportion of patients showing lymph node metastases was higher in the non-irradiated than the irradiated group, suggesting that radiotherapy had, as it were, sterilised some nodes of their metastases in the latter patients. Survival curves constructed by life table methods for the two groups showed a five-year survival rate of 44 per cent for cases having excision after irradiation and 35 per cent for those having excision without radiotherapy—a difference that is statistically significant. The better survival rate of preoperative irradiation applied only to patients whose lesions were removed by abdominoperineal excisions and not to those who were submitted to anterior resection.

In view of the contradictory results as to the value of preoperative radiotherapy recorded by these two trials, the Medical Research Council has recently instituted a study in several centres in Britain in which patients with growths up to 15 cm from the anal verge on sigmoidoscopy are being randomised to three groups—one of which is given no radiotherapy, one receives 2000 rad of preoperative irradiation, and one has only 500 rad. This trial has only been running for 12 months so that no reliable data are yet available.

At the present time therefore, the usefulness of preoperative radiotherapy remains sub judice and, in my opinion, till the controversy is resolved by further controlled studies, it would not be justifiable to employ this treatment as a routine measure in the radical surgical management of rectal cancer.

ADJUVANT CYTOTOXIC DRUG THERAPY

In the belief that malignant cells are particularly liable to be exfoliated into the portal circulation by handling of growths during operation, Warren Cole's group (Cruz, McDonald and Cole, 1956; Mrazek et al, 1959), introduced the practice of injecting a cytotoxic agent into a tributary of the portal vein during operation and into a peripheral vein in the early postoperative period in the hope of minimising the risks of distant metastases. They employed nitrogen mustard for this purpose but had to report no significant improvement of the results in the cases so treated. Dwight, Higgins and Keehn (1969) and Holden and Dixon (1962), preferred to use triethylenethiophosphosamide in their controlled trials of this form of adjuvant chemotherapy for rectal (and colonic) cancer, but were equally unsuccessful. More recently Nadler and Moore (1964) commenced similar trials with 5-fluorouracil—which is currently believed to be the most effective cytotoxic agent against alimentary neoplasms—and in one report (Higgins et al, 1971) there was evident a slight trend in favour of the treated group, but no significant difference had yet emerged.

The information so far available thus provides no inducement to engage in routine adjuvant chemotherapy in operable, ostensibly curable cases of rectal cancer.

SPECIAL ANTIBACTERIAL MEASURES

Because of the infective nature of the colonic contents patients undergoing operations for carcinoma of the colon and rectum, particularly those involving opening of the bowel and establishment of an anastomosis, are predisposed to develop septic complications (Goligher, 1975). In an effort to lessen the incidence and severity of such complications special antibacterial measures have been much used in recent years with encouraging results.

Bowel Preparation and Intestinal Antiseptics

Surgeons are fairly generally agreed—not so much on the basis of good objective data as on common-sense grounds—that thorough mechanical preparation of the bowel by aperients, enemas and wash-outs is desirable before major operations on the colon and rectum. But despite many careful studies there is no consensus of opinion on the value in such cases of pre-operative medication with oral antibiotics and other drugs in securing a

reduction in the bacterial population of the stools and a lowering of the incidence of septic complications. Each report in the literature favourable to these agents seems to be followed by yet another casting doubt on their efficacy (Yale and Peet, 1971; Nichols and Condon, 1971; Goligher, 1975).

In the last few years the importance of faecal anaerobic bacteria in pathogenesis has been emphasised, and unquestionably the most fashionable organism in this connection at the moment is *Bacteroides fragilis* (Drasar, 1968; Gorbach et al, 1967; Moore, Cato and Holdeman, 1969). More recently, therefore, in the evaluation of preoperative oral antibiotic regimes of bowel preparations the special attention directed to the use of drugs effective against a wide range of organisms has been particularly interesting (Nichols et al, 1973; Washington et al, 1974).

In Nichols et al's (1973) study the antibiotics used were neomycin and erythromycin which were given in three doses of 1 g of each at 1 p.m., 2 p.m. and 11 p.m. of the day before operation. A comparison of cultures from stools obtained before commencement of the preoperative antibiotic regime and from faeces aspirated from the resected specimen at laparotomy in the treated group showed a considerable reduction in the numbers of aerobes and anaerobes, amounting to virtually complete suppression in many instances. A similar comparison in the control patients given mechanical preparations alone disclosed no significant change in the numbers of aerobic and anaerobic organisms. In terms of septic complications the difference between treated and untreated groups was of the same order, but its significance was lessened by the small size of the two series.

In Washington et al's (1974) trial the patients were randomly allocated to three groups, all of which were given mechanical preparation (saline purgatives and enemas) for 48 h before operation, one had in addition neomycin medication during the same period, and another neomycin and tetracycline. As is shown in Table 1.2 the incidence of wound infection was significantly less in the neomycin-tetracycline group than in the other two groups. There were no instances of staphylococcal or pseudomembranous enterocolitis in the entire study. Among the bacteria isolated from the infected wounds (mainly in Groups 1 and 2) *Bacteroides fragilis* was a frequent offender. This trial seems to show beyond question the advantage of neomycin-tetracycline preparation for elective colorectal surgery. It is, however, arguable that a neomycin-clindamycin combination might be even more valuable, because of clindamycin's particular effectiveness against *Bacteroides*.

Total Gut Irrigation for Mechanical Preparation

An interesting development in the last year or two in the mechanical preparation of the bowel for rectal or colonic resection has been the attempt by Hewitt et al (1973) to replace the conventional methods of aperients, enemas and wash-outs spread out over several days by an orthograde irrigation

of the entire gastrointestinal tract from above downwards in a period of $2\frac{1}{2}$ to 3 h. The irrigation is delivered into the stomach via a nasogastric tube whilst the patient sits on a commode. The solution used consists of sodium chloride (6.14 g), potassium chloride (0.75 g) and sodium bicarbonate (2.94 g) in distilled water (1000 ml) warmed to 37°C in a water bath. It is delivered to the stomach tube by a peristaltic pump at the rate of 75 ml/min. The first bowel action usually occurs about 40 to 60 min after the start of the irrigation. Almost clear fluid is passed from about 90 min onwards and the irrigation is continued for a further hour after this stage has been reached. The total irrigation time is therefore 2 to 3 h and the amount of irrigant in the region of 11 litres.

The originators of this method advise against its use in elderly patients, in those with impaired heart or kidney function, or in those with stenosing carcinomas. The irrigation is surprisingly well tolerated by patients and can produce a most effective cleansing of the large bowel, affording excellent conditions for large bowel surgery. Our experience confirms these claims and shows also that the method is an excellent way of preparing patients for barium enema studies or for colonoscopy. But further experience with it is necessary to define its safety and convenience under a variety of circumstances.

Local Antiseptic Applications to the Parietal Wound or Abdominal Cavity

Parietal wound. As is well shown in Table 1.2, one of the commonest manifestations of sepsis after colorectal surgery is infection in the parietal abdominal wound. Realisation of this fact has induced many surgeons to adopt the practice of placing a deposit of an antiseptic agent in the parietal wound immediately before suturing it at the conclusion of the operation. There is good evidence from controlled trials with several different antiseptic drugs that the incidence of wound sepsis can thereby be reduced. This holds for ampicillin 1 g in powdered form (Nash and Hugh, 1967; Mountain and Seal, 1970; Anderson, Korner and Østergaard, 1972; Stoker and Ellis, 1972), ampicillin 0.5 g and cloxacillin 0.5 g in powdered form (Jensen et al, 1975) cephaloridine 1 g in solution (Evans, Pollock and Rosenberg, 1974) and povidone iodine as a spray (Gilmore and Sanderson, 1975).

Peritoneal cavity. When a major degree of contamination with faecal matter has occurred at operation—as may occasionally happen during the conduct of an anastomosis when the bowel is more heavily loaded than usual or if the colon or rectum is accidentally torn at the site of the growth or elsewhere, it is natural to consider the use of some form of antiseptic irrigation. In Britain at the present time the popular solution for this purpose is noxythiolin. Not an antibiotic, but a chemotherapeutic agent, it is said to be effective against practically all Gram-positive and Gram-negative bacteria. It is introduced

Table 1.2 Postoperative complications after three different regimes of bowel preparation (from Washington et al, 1974)

	Group 1 (mechanical preparation alone)	Group 2 (mechanical preparation and neomycin)	Group 3 (mechanical preparation and neomycin/ tetracycline)
Wound infection ^a	27	28	3
Peritonitis	5	1	0
Wound separation	0	4	0
Septicaemia	4	4	2
Faecal fistula	7	1	0
Staphylococcal enterocolitis	0	0	0
Pseudomembranous enterocolitis	0	0	0
Ileus	1	0	0
Urinary tract infections	12	8	6
Cardiac	3	2	2
Pneumonia	3	1	0
Pulmonary embolus	0	0	0
Renal failure	0	0	0
Hepatic failure	0	0	0

^a Difference between incidence of wound infection between group 3 and groups 1 and 2 is significant ($P < 0.01$).

into the peritoneal cavity (5 g in 200 ml of fluid) immediately before the abdomen is closed and removed subsequently by a suction drain which is set in action as soon as the wound closure has been completed. The best documented report on the use of noxythiolin for faecal contamination of the peritoneal cavity is that of Browne and Stoller (1970). Apparently it is relatively ineffective in combating parietal wound sepsis (Bird et al, 1971; Stoker and Ellis, 1972).

Systemic Antibiotic Therapy

Surgical opinion has been sharply divided on the wisdom of administering prophylactically to patients undergoing surgical operations a full course of systemic antibiotics in order to lessen the risk of septic complications, particularly when there has been some degree of contamination of the operative field as is not infrequent at any rate in anastomotic procedures for carcinoma of the rectum and colon. Probably the majority of surgeons have hitherto been opposed to the practice of systemic antibiotic therapy in 'clean-contaminated' cases partly because of doubts as to its efficacy and partly because of the fear that antibiotics given in this way over a period of several days might lead to the development of strains of bacteria that would be resistant to the particular antibiotics used. More recently, however, several convincing experiences have been recorded with shorter prophylactic courses of anti-