Bonney’s Gynaecological Surgery
This book is dedicated to the memory of Victor Bonney. It is also dedicated to our wives Maggie, Jane and Rupal for their support, understanding, patience and love which they have shown us in our lives together.
Bonney’s Gynaecological Surgery

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Preface to the tenth edition

Unfortunately the tenth edition of this famous text has been a little slow in arriving. The pressures on a surgeon in modern clinical practice have reduced markedly the time available for ‘extra’ work. As the senior editor I am extremely grateful for the contributions made to this edition by my colleagues Tito Lopes and Raj Naik, without their assistance this edition would have been even longer in the gestation.

Surgery remains an art form with a tinge of science to leaven the advances. Even though we have seen enormous advances in the medical treatment of a number of conditions previously diagnosed or treated by surgical means, the role of surgery remains vitally important. In many circumstances, particularly in gynaecological oncology, gynaecological urology, the management of the disordered pelvic floor and of advanced endometriosis, surgery continues to be the mainstay of treatment.

The need to teach surgery remains a high priority but with a significant reduction in working hours, an increase in the numbers of junior doctors and pressures from patients not to be treated as ‘guinea pigs’; gaining a weight of surgical experience has become increasingly difficult. There are now very few countries where the teacher can utilise live animals for training. Cadaver experience is also becoming increasingly complex to access due to changes in consent rules and personal privacy laws.

However in spite of all these setbacks, some of which are almost medieval in their arbitrariness, surgeons around the world continue to innovate, inspire and develop this exciting field for the benefit of their patients. Much of the change reflected in the tenth edition is a combination of innovation from surgeons working closely with the surgical instrument industry. This combination has encouraged change and advancement and out of the difficulties identified above have developed new method of teaching with live demonstrations, animal work where possible and the use of simulators of increasing sophistication. The surgeon continues to demonstrate that eternal desire to improve. Like all art, surgery is going through another difficult phase which we hope can be alleviated by the production of this tenth edition which continues to extol the virtues of simple minimalistic surgery.

I am also grateful for the contribution from Stuart Stanton and John Newton. My thanks to Jane Fallows and Roger Hulley for their contribution to the artwork. Rebecca Huxley has kept my nose firmly to the grindstone once we started to move, she certainly has made the difficult phases of this book much easier to negotiate; many thanks.

John M. Monaghan
Whitton Grange
2004
The influence of Victor Bonney and his pupils upon gynaecological surgery has developed from the publication of the first edition of *A Textbook of Gynaecological Surgery* in 1911. The first to the fourth editions were the results of the collaboration of Bonney with Sir Comynus Berkeley. Following the death of the latter, Victor Bonney produced the fifth and sixth editions alone. Bonney’s pupils Howkins and Macleod then produced the seventh edition. The death of Macleod signalled virtually the end of those practising surgeons who had been trained by Victor Bonney. The very successful eighth edition was prepared by John Howkins and Sir John Stallworthy. These two great figures of Commonwealth Gynaecology had worked together as junior colleagues during the last years of Bonney’s clinical career.

When the eighth edition was published in 1974 many changes were incorporated into the text. However, in the next 10 years, an enormous number of new developments have occurred, possibly the greatest being a resurgence of interest in gynaecological surgery and the growth and establishment of gynaecological oncology as a recognized subspecialty. The present editor has only a tenuous link with Victor Bonney in that he has been greatly influenced in his career by the late Dr A.F. Anderson of Edinburgh and by Mr Stanley Way, both of whom spoke frequently with great affection and reverence of the master surgeon. Indeed it was Way who introduced me to the Bonney scissors, which instruments the reader will see referred to throughout this edition.

When asked by the medical editor of Baillière Tindall for my opinion of the eighth edition of *Bonney’s Gynaecological Surgery* some 2 years ago, I replied that I thought that it was undoubtedly the leading textbook of gynaecological surgery in the world, but would nevertheless benefit from a major revision. I also jokingly said ‘Give me five years and I will do it for you’. The prompt rejoinder was ‘We will give you two years if you will take it on’. Little did I know at the time that I had been ‘set up’, as the Americans say. I felt hesitant at the prospect of making major changes to such a well-established book but realized that large-scale changes were necessary and also that if modern materials and instruments were to be incorporated, most of the drawings would require reworking.

It was also clear that no single surgeon could encompass all the skills of modern gynaecological surgery and that I would need assistance with three major sections. I have been delighted with the response and the quality of the contributions from Sir Rustam Feroze, Stuart L. Stanton and Professor John R. Newton. I am indebted to them.

Victor Bonney had skills far beyond those of mere mortals; to be able to operate to the highest level and then to be capable of transferring those ideas to paper as the most clear and concise drawings was an amazing talent. I have been especially fortunate in obtaining the services of Mr Douglas Hammersley, once head of graphics at the University of Newcastle upon Tyne, to illustrate all the chapters which have been rewritten. Doug has now moved to Norfolk to be a little closer to his chief interest, that of observing and drawing butterflies. I am sure that the reader will appreciate the outstanding quality of the drawings in this new edition, in particular the way in which they have captured the movement and dynamism of surgery. I am totally indebted to Doug for bringing to life my attempts at surgery.
This book is very much my own; the philosophy of the surgery is entirely mine and the responsibility for making such drastic alterations to this classic text are also mine. I do not make apologies as I feel that Bonney would have approved because I have attempted to keep his beloved gynaecological surgery moving forward. Indeed, even between the beginning and end of the 2-year writing period, new developments have occurred which have had to be incorporated into the text.

I have attempted to show that by adopting an economy of movement in surgery as well as in the text, operations can be performed cleanly and neatly, without ritual. Operations should flow with a style and a natural pace, rather like a well-choreographed dance. There should be no great crises and the procedure should not be performed to the point of total exhaustion for the surgeon and his staff. I have tried to show the enormous enthusiasm which I have for gynaecological surgery and the way in which I feel that it can become a source of great satisfaction and pride. I hope that a little of this enthusiasm is transmitted to the reader and that this book will bring forth new energies for the development of our fascinating subject.

The updating of this text has been for me an enormous honour and a great pleasure. I have had to clarify my thoughts on many aspects of surgery and take bold decisions to cut out large quantities of the previous edition, particularly the results and complications sections, which although historically interesting are not relevant to modern-day practice except as records of the past. Their repetition would simply occupy space.

This ninth edition hopefully reflects the most modern aspects of gynaecological surgery as well as retaining all that is still valuable and relevant from past editions. It also emphasizes the continuing role of gynaecological surgery in the management of a multitude of gynaecological conditions, particularly highlighting the place of surgery in cancer care and the newer surgical technique relating to the infertile woman. The place of new tools such as the laser and staples has been added to the more standard instrumentation.

I would like to thank Baillière Tindall and in particular Dr Geoffrey Smaldon for his constant support. To all those who have assisted, guided and encouraged me during my career, occasionally allowing this stubborn, single-minded Yorkshireman to have his way, I am grateful.

Very special thanks must go to Mr Alan Evans who, as my senior registrar, painstakingly read all my first drafts and attempted to bring a Welsh view of the English language to bear upon my efforts.

I stand in great awe at the end of a long line of illustrious names in gynaecological surgery. I hope that I have done them justice in this the ninth edition of Bonney's Gynaecological Surgery.

John M. Monaghan
Newcastle upon Tyne
April 1986
Surgeon should soon realize that speed and ease of operating are the product of accuracy and safety. Accuracy and skill arise from assiduous practice and analysis of technique. This analysis will often take the form of ‘playing back’ procedures in the mind so that all steps can be assessed and evaluated. Unfortunately the most common drive to reassess surgical procedures is when ‘things go wrong’; I would recommend to all surgeons that an ability to recall every tiny step in a procedure is vital. As this analytical process develops, the surgeon will realize that speed and ease of operating arise from a striving for perfection both in decision-making and technical skills. Surgery should be one continuous flowing movement, without undue stops and starts or alarms and excursions.

The most accomplished surgeon appears to be deliberate, making no unnecessary movement and directing both the instruments and assistants accurately. Communication of instrumental requirements to the scrub nurse should be in advance of the moment of need so that the surgery can flow without either significant pause or the stress generated by the urgency of immediate need. It is vitally important that the tyro should not regard the time spent as a junior as the sole period of learning of new techniques and observance of other surgeons working. Unfortunately, from the time appointed to independent practice, the majority of surgeons will rarely see other colleagues work. This is especially common in departments where the organization of clinic and operating lists are such that it is difficult or impossible for colleagues to come together in the operating theatre. In recent times the resurrection of the ‘live’ theatre demonstration has to some extent assisted the promulgation of new techniques and ideas.

Introduction

As with the last edition of this famous text I have felt the need to retain the basic Bonney philosophy as it contains all that I feel is important in the development of the surgeon. This first chapter is virtually as Bonney wrote it because it remains relevant and vital for today’s practising surgeon. It is also a tribute to the great skill and understanding shown by the father figure of British gynaecological surgery. I have spent over half my life working in gynaecological surgery and owe a great debt to my predecessors, many of whom can claim a direct link to Bonney and his colleagues. I now feel a solid part of that link and hope that I can pass on to my pupils the importance of a clear recognition of where we have come from but at the same time, encourage a searching desire to take the subject forward and constantly to question dogma by applying rigorous analysis to our entire practice.

This new text takes a lot from the old but is generated out of the need to recognize the enormous changes in technology and practice which have occurred in the last 10 years.

Surgical discipline is learned in three broad phases.
1 Learning to assist and appreciate the importance of teamwork.
2 Learning the detail of the steps in the operation and building up the skills to deal confidently with each step.
3 Learning to direct the assistants so that the operation flows in an efficient and timely manner.

As these three phases are being learned the surgeon will go on to develop the art and the science of surgery. Although it is understandable to try to emulate the facility and smoothness of one’s teacher, the junior surgeon should soon realize that speed and ease of operating are the product of accuracy and safety. Accuracy and skill arise from assiduous practice and analysis of technique. This analysis will often take the form of ‘playing back’ procedures in the mind so that all steps can be assessed and evaluated. Unfortunately the most common drive to reassess surgical procedures is when ‘things go wrong’; I would recommend to all surgeons that an ability to recall every tiny step in a procedure is vital. As this analytical process develops, the surgeon will realize that speed and ease of operating arise from a striving for perfection both in decision-making and technical skills. Surgery should be one continuous flowing movement, without undue stops and starts or alarms and excursions.

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The need for adequate continuing medical education (CME) has been recognized by clinicians and governing bodies alike with the result that there are now a plethora of live teaching and hands-on training courses available. The availability of cadavers and animals for surgical practice is severely limited and dependent upon the particular regulations of the countries involved. Where such facilities are available or the opportunities arise to visit such centres, both the established and the trainee surgeon should jump at the chance.

There are increasing pressures on all clinicians to be ‘cost effective’ and to practise ‘evidence-based’ medicine within the overarching ambience of ‘clinical governance’. Although the words may be novel within the bounds of traditional medical practice, if the surgeon can step back from the fashionable and novel jargon for a moment they will see that the high-quality surgeon need modify little in their practice. The stimulation of a never-ending desire to improve one’s practice linked to rigorous audit and research will provide a constant framework which will stand the test of time.

**Prologue—after Victor Bonney**

The surgeon

A surgeon should always remember that the work of his subordinates is influenced by his own behaviour. It is impossible to lay down rules for all temperaments but there are certain considerations which may prove useful to those embarking on a surgical career. Anyone who cares to observe the work of other operators cannot fail to see how variously the stress and strain of operating are borne by different individuals and will deduce from a consideration of the strong and weak points of each operator some conception of the ideal.

The thoughtful surgeon, influenced by this study, will endeavour so to discipline himself so that he will strive constantly to achieve the ideal. By so doing, he will encourage all who work in the wards and theatres with him—young colleagues in training, anaesthetists, nurses, theatre assistants and orderlies—to appreciate the privileges and responsibilities of their common task. Expert coordinated teamwork is essential to the success of modern surgery. This teamwork has resulted in a significant lowering of operative morbidity and mortality.

However, it is important to recognize the enormous contribution to the safety of modern surgery made by other disciplines, especially anaesthesiology. The preoperative assessment and the postoperative care carried out by the anaesthetist has rendered surgery safer and has also allowed patients who would not in the past have been considered eligible for surgery to have their procedures performed successfully. The role of specialties such as haematology, biochemistry, microbiology, radiology, pathology and physiotherapy are also well recognized.

Bonney maintained that the keystone of a surgeon’s bearing should be his self-control; and whilst it is his duty to keep a general eye on all that takes place in the operating theatre and without hesitation correct mistakes, he should guard against becoming irritable or losing temper. The surgeon who when faced with difficulties loses control has mistaken his vocation, however dextrous he may be, or however learned in the technical details of the art. The habit of abusing the assistants, the instruments or the anaesthetist, so easy to acquire and so hard to lose, is not one to be commended; the lack of personal confidence from which such behaviour stems will inevitably spread to other members of staff, so that at the very time the surgeon needs effective help it is likely to be found wanting. However, the converse of accepting poor standards of care and behaviour is not to be condoned. The continual presentation of inadequately prepared instrumentation should not be accepted. There is little excuse for staff or equipment to arrive in theatre in a state ill prepared for the task ahead.

The whole team should look forward to a theatre session as a period of pleasure, stimulation and achievement, not as a chore and a period of misery to be suffered. The surgeon should also remember that he is on ‘display’ and his ability to cope with adversity as well as his manner when the surgery is going well will be keenly observed. The surgeon should teach continuously, point out to assistants and observers the small points of technique as well as related facts to the case in hand.

Bonney enjoined that the surgeon should not gossip; the present editor feels that day-to-day chit chat is not out of place in the operating theatre and is to be preferred to the media view of an operating theatre as a place of knife-like tension fraught with grave interpersonal relationships. However, the mark of the good surgeon and his team is that at the time of stress, the noise level in theatre should fall rather than rise, as each
member of the team goes about his or her task with speed and efficiency.

It is inevitable that at some point the surgeon will come face to face with imminent disaster; even the most stalwart individual will feel his heart sink at such a moment. The operator should always remember that at such moments if basic surgical principles are applied quickly and accurately the situation will be rapidly rescued. Hesitation and uncertainty will all too often terminate in disaster. A sturdy belief in his own powers and a refusal to accept defeat are the best assets of a calling which pre-eminently demands moral courage.

Before operating the surgeon should prepare by going over in his own mind the various possibilities in the projected procedure, so that there may be no surprises and he may all the better meet any eventuality. Likewise, following the procedure, it is valuable to go over in one’s mind every step in the operation in order to analyse any deficiencies and difficulties experienced; it is only by this continuous self-assessment and analysis that the surgeon can from his own efforts improve his practice.

It is of increasing importance that the surgeon understands the need for meticulous record keeping in order to build a comprehensive database for future analysis. The modern surgeon has to examine continually his and other’s work in order to practise to the highest possible standards. More and more guidelines are being generated; the surgeon has to be sure that his work meets the quality requirements of modern practice. Patients, purchasers and professional bodies wish to be able to access the best possible practices. Transparency of standards is essential to modern medical practice. The high-quality surgeon has little to fear from the implementation of guidelines and should look upon these times as opportunities for developing the highest quality of care.

Surgery is physically and mentally tiring. The surgeon should be sure to be adequately equipped in both these areas to meet the demands of theatre. It is important to remember that driving the staff on for long, tiring sessions is counterproductive; there is little merit in performing long procedures with an already exhausted staff. The surgeon’s hands and mind become less steady, his assistants less attentive and the nurses tired and disillusioned. It is under these circumstances that mistakes occur. It is important, however, not to be dogmatic about the ideal length of either individual operations or of operating lists. A full day in the operating theatre may suit one surgical team but be anathema to another.

Speed in operating

Speed, as the outcome of perfect operating technique, is as characteristic of a fine surgeon as striving for effect is the stock-in-trade of the showman. An operation rapidly yet correctly performed has many advantages over one technically as correct yet laboriously and tediously accomplished. The period over which haemorrhage may occur is shortened, the tissues are handled less and are therefore less bruised, the time the peritoneum is open and exposed is shortened, the amount and length of anaesthesia is shortened and the impact of the operative shock, which is an accumulation of all these factors, is reduced. Moreover, less strain is put upon the legs and temper of the operator and the assistants with the result that the interest of the latter and the onlookers is maintained at the highest level.

However, this speed must be tempered with attention to detail, particularly of haemostasis and by a conscious effort not to handle tissue unnecessarily.

Operative manipulation

Minimizing trauma is of fundamental importance for uncomplicated wound healing. The art of gentle surgery must be developed (Moynihan). Sadly, many surgeons achieve speed by being rough with tissue, particularly by direct handling. This must be avoided at all costs and the temptation to tear tissue with the hands rather than to incise and dissect delicately with instruments is to be eschewed. All operative manipulations should be gentle; force is occasionally essential but should be applied with accuracy, only to the tissue to be removed, and for limited periods of time. The surgeon who tears and traumatizes tissue will see the error of his ways in the long recovery periods that his patients require and in the high complication rate.

Minimalistic surgery

Moynihan spoke in 1920 at the inaugural meeting of the British Association of Surgeons on ‘the Ritual of a Surgical Operation’, stating, ‘he [the surgeon] must set endeavour in continual motion, and seek always and earnestly for simpler methods and a better way. In the craft of surgery the master word is simplicity’.
First, he would recommend the reader to look back to his training days and make regular reference to a first class text of general gynaecological pathology. The one he would recommend is *Pathology of the Female Genital Tract* by Ancel Blaustein. It is published by Springer-Verlag, New York, and although weighty and a little expensive it is very readable with an extensive list of references for each chapter.

The second book the editor would recommend reading and, ideally, obtaining is *Lymphatic System of the Female Genitalia* by Plentl and Friedman, published by W.B. Saunders, Philadelphia. Sadly, it is now out of print but well worth seeking out. Although the book is subtitled *The morphologic basis of oncologic diagnosis and therapy* its contents apply to the whole of gynaecological surgery and brings a wider understanding of the pelvic anatomy and its function.

In a more relaxed vein, the editor would recommend a small volume which is a gem; it is entitled *Classical Contributions to Obstetrics and Gynecology* by Herbert Thoms, Associate Professor of Obstetrics and Gynaecology at Yale University, with a foreword by Howard A. Kelly of the ‘bladder buttressing stitch’ fame. This small volume consists of brief monographs, each dedicated to one of the great names in obstetrics and gynaecology. Sadly, Bonney is not among the illustrious list mainly because the list stops in the early part of the twentieth century but also because it is a little light on gynaecologists. It will, however, demonstrate to the reader that there is very little truly new and also impress him with the enormous strides made by some of our predecessors in the face of the most amazing adversity.

In virtually all modern operating theatres, instruments and drapes are prepacked and sterilized in ‘sets’ for individual or generic procedures in a central sterile supply department (CSSD). This clearly has major advantages in terms of high standards of sterility over selecting instruments for a specific procedure and sterilizing them immediately prior to an operation in or close to the operating theatre. However, as with all things the need for much specialized instrumentation has resulted in two developments.

The first is the introduction of a wide range of prepacked and sterile disposable instruments of amazing complexity, including much of the equipment used in minimal access surgery.

The second is a recognition that from time to time an ‘immediate’ sterilizing facility is required so that in many operating theatres on-the-spot sterilization is available for a small number of specialized pieces of equipment.

The generic tray system, however, remains the central plank of instrument provision for the majority of gynaecological procedures.

The content of the trays must represent the actual requirements of the surgeons involved, this means that the instrument choice must be the surgeon’s and not that of a manager of a CSSD who may never handle the equipment and has no concept of the surgeon’s requirements. Good communication of the surgeon’s need to those in control of the budget is essential. It is important that a surgeon does not develop a reputation for desiring every minor new development seen at surgical meetings, but should instead insist on a broad range of high-quality functioning equipment that does not continually irritate by failing to work, whether this be a simple pair of scissors or the most sophisticated minimal access equipment.

**Instruments for major gynaecological procedures**

The instruments currently used in the editor’s gynaecological general operating set are listed in Table 2.1.

The instruments used in the gynaecological minor procedures set are shown in Table 2.2. Some of the instruments mentioned warrant special comment.

**Scissors**

*Bonney’s dissecting scissors* (Fig. 2.1) are often marketed as Mayo scissors. They are heavy, but have a sureness about them, which allows for accurate gentle dissection, particularly of the ‘separate and cut’ type. The ends of the scissors are relatively blunt and will do little damage when separating tissue, whereas the blades are powerful enough when coupled with the long levers of the 10" handles to cope with the toughest of scar tissue. This latter characteristic is especially important in cancer work when operating on tissues previously treated with radiotherapy.

*Monaghan’s dissecting scissors* (Fig. 2.2) developed out of a need for a lighter pair of dissecting scissors which retained the wonderful ‘feel’ of the Bonney scissors without the weight. This instrument has allowed the scissor dissection technique taught by the editor to reach the level of anatomical dissection required to meet the most stringent standards of cancer surgery. The tips of the instrument remain relatively blunt but
do allow for accurate point dissection without the risk of trauma to tissues that need to be preserved. For example, the dissection of all nodal material from blood vessels can be achieved without any trauma to the vessels themselves.

**Artery forceps**

The forceps included in the set are almost all straight, merely reflecting the editor’s personal preferences. The only exceptions to this general rule are the Meigs’ (Navratil) forceps (Fig. 2.3) which is of great value in dealing with vessels deep in the pelvis; the right angle of the small head of the instrument allows ties to be accurately placed. The throw of the suture material or tie can be placed around either the points or the heel of the forcep, and if the assistant then rotates the forceps, the opposite end automatically loops around the tie, allowing the surgeon to deal with vessels surely and confidently. As with many instruments in the set, the Meigs/Navratil is long and reaches easily into the depths of the pelvis.

**Tissue forceps**

The two forceps favoured by the editor for gentle manipulation of tissues are the Lane’s (Fig. 2.4) for grasping large blocks of tissue which will be removed as a
Fig. 2.1 Bonney’s gynaecological scissors.

Fig. 2.2 (a) Monaghan’s gynaecological dissecting scissors. (b) Comparison of Bonney’s scissors (top) and Monaghan’s scissors (bottom).
out from between the jaws. Many different varieties have been designed and produced probably because these requirements are difficult to achieve.

As a general principle, it appears that those designs with longitudinal ridging of the jaws have an advantage over those with transverse. In addition, a single tooth interdigitating with a double tooth at the tips of the jaws assists correct apposition. Currently the editor uses Zeppelin slightly curved tissue clamps (Fig. 2.6). These clamps have been used for many years and meet the requirements mentioned above. The markedly angled Zeppelin clamps are particularly useful when incision of a pedicle is required at right angles to the line of specimen, and the Littlewood’s (Fig. 2.5) which is gentler and used on tissue which is to be preserved. These two forceps are occasionally augmented with Allis’, both short and long, and Babcock’s tissue forcep which is used exclusively for holding bowel.

Tissue clamps

On many occasions in gynaecological surgery, it is necessary to clamp discrete blocks of tissue firmly and then suture the block to occlude the vessels contained with it. It is important that these clamps are strong, that the jaws appose accurately and that tissue does not slide out from between the jaws. Many different varieties have been designed and produced probably because these requirements are difficult to achieve.

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It is important to understand that there is no ideal, universal, suture material. The purpose of a suture material is to hold a tissue in apposition until such time that the tissues have achieved enough tensile strength to maintain the apposition. Although this statement is clearly true, it is interesting that sutures are commonly removed from the skin at intervals of between 5 and 7 days when the skin has only recovered approximately 10% of its tensile strength. Clearly, other factors than tensile strength maintain the integrity of the tissue at this time.
The use of permanent suture material such as nylon has to be carefully considered and applied in selected cases. Skin closure has now almost entirely been taken over by stapling devices that simply grip the skin edges rather than provide a route for the ingress of infection.

The maxim of never using a braided material for skin must always be adhered to, as the risk of ingress of bacteria along the braiding is significant compared to the risk with monofilament sutures.

Staples

The use of staples in general surgery began in Hungary in the early part of the 20th century. The initial development was carried out by a surgeon named Huntl who designed staples, which closed into a ‘B’ shape, setting the standard pattern for the remainder of the century. In general gynaecology stapling has not enjoyed a significant role except for skin closure. However, in recent times the increased interest in minimal access surgery (MAS) and the growth of the subspecialty of gynaecological oncology has resulted in a massive expansion of the use of stapling devices. The range of staplers used is identified in the chapters dealing with MAS and oncological procedures.

The skin staples are very popular with many variations of the original Michel Clips now available (Fig. 2.7 shows a typical example).

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Fig. 2.7 Elite skin stapler (by kind permission of Autosuture UK Ltd; the artwork was originally prepared for the United States Surgical Corporation’s General Atlas and for publication by Professors Mark Ravitch MD and Felicien Steichen MD, ©USC 1981).

Ideal suture characteristics

These will include good knot security, inertness, adequate tensile strength, flexibility, ease of handling, non-allergenic nature, resistance to infection, smooth passage through the tissues and absorbability.

Although traditional materials such as silk and catgut have continued to be used on a surprisingly large scale, the recent decision by one of the major suture manufacturers to cease producing catgut will bring a lot of surgical practice into the modern age.

The great advantages of using strong, slowly absorbable synthetic sutures, such as Vicryl (introduced in the early 1970s) and Dexon (introduced in 1970), have been known for three decades. These materials have similar characteristics with tensile strength lasting for up to 14 days and all material being absorbed between 70 and 90 days, leaving virtually no tissue reaction. Newer materials such as Monocryl (dyed) has only 30% of its strength at 14 days, whereas Panacryl still has 80% at 90 days and 60% at 180 days. It is still surprising that so many surgeons remain wedded to catgut and silk, which are clearly poorer surgical suture materials in terms of reaction but may have reassuring handling properties which maintain the surgeon’s desire to use them.

The increased strength, on a weight-for-weight basis, of the synthetic materials means that smaller diameter materials can be used with less tissue trauma and weight of material to be absorbed.

As the diameter and therefore strength of the synthetic materials is constant when compared to the variability of catgut, the surgeon finds that a standard ‘pull’ does not generate those embarrassing moments of breakage which have to be accepted when using catgut. Probably the most important element, which has influenced transfer to the synthetic materials, is that the tissue reaction involved in absorption is considerably less. In more recent times newer suture materials such as PDS, Maxon, Panacril and Monocril have further enhanced the range of synthetic materials available.

Modern suture materials tend be very hard and can traumatize the surgeon’s hands. However, this slight disadvantage is markedly outweighed by the sureness of suture holding. Criticism of the knot-holding properties of these modern materials is unfounded once it is understood that the first knot must be tied firmly and accurately to the final required tension, i.e. it is not possible to run down the second knot so as to increase tension on the first.
Suture techniques

In previous editions of this textbook a large variety of suture techniques was shown. The current editor has selected those that are of most value to the gynaecologist and, where possible, has retained some of Bonney’s original drawings.

As modern suture materials have completely replaced the need for eyed needles, the major choice left to the clinician is the choice of needle tip. Round-bodied needles are of value in suturing relatively thin or soft materials, whereas cutting needles are essential for use on strong or thicker materials such as cervix or skin. The combination trochar cutting needle is of value for a broad range of use and has the advantage of minimal tissue trauma.

Interrupted sutures

Interrupted suture are used where it is necessary to remove individual sutures or where there is a risk of infection such as in skin closure. The interrupted suture is of particular value where there is a risk of serous or bloody ooze, which should not be allowed to develop further in deep tissues; drainage will easily occur between the individual sutures.

The interrupted suture may be simple (Fig. 2.8) or mattress (Fig. 2.9); the editor does not favour sutures which ‘roll in’ the edge of the material to be sutured since this may hide bleeding points inside the wound and compromise the healing of the area. The mattress suture has the added advantage that haemostasis will be further improved by an increased area of local pressure on fine bleeding points. However, it is important to note that the suture should be used to appose the tissues not to necrose them; excessive force must not be used. Following all surgery the tissue thickness will increase markedly, so the suture can be placed relatively lightly to achieve apposition and haemostasis.

In areas where a significant amount of small vessel oozing commonly occurs, such as the vulva, around the clitoral base, the use of a horizontal mattress or crossed mattress suture is frequently of value (Fig. 2.10).

Continuous sutures

Continuous sutures can produce a near perfect closure and apposition of two surfaces with excellent haemostasis. They are more rapidly performed than interrupted sutures and obviously require fewer knots. Their major disadvantage is that the whole stitch has to be removed if there is infection, and serous and bloody ooze cannot escape from below the suture line. Simple continuous suturing is used for peritoneum and sheaths of muscles, but it is not generally used for skin.

Lembert sutures (Fig. 2.11) are used for water-
oversew the vaginal edge at the completion of the hysterectomy procedure (Fig. 2.12).

Puckering sutures are used for shortening tissues and where there are series of small vessels in a tissue edge which cannot be easily dealt with individually (Fig. 2.13).

Purse string sutures (Fig. 2.14) are of value in closing gaps such as in peritoneum and for burying pedicles. Purse string inverting sutures are used for burying the stump of the appendix (Fig. 2.15), or closing very small holes in the bladder.

Some suture techniques can be combined to provide multiple functions: the editor uses a combined figure-of-eight sutures and simple continuous technique (Fig. 2.16) for closing the posterior vaginal skin and at the same time closing the subcutaneous tissue, thus eliminating dead space and removing the risk of haematoma formation during perineorrhaphy.

Surgical knots and methods of tying

Facility in tying knots is an important part of the surgical technique in which all young surgeons should attempt to excel. They must also remember that it is not adequate to be competent to tie one knot—they should
practise a wide variety, learning the indication for their uses as skills improve. As an assistant, the young surgeon learns to cut the tails of sutures accurately and quickly, taking care to leave a short but adequate length. The cut should be made with the scissors stationary and with due regard to the position of the tips of the blades at the end of the cutting stroke. Equally, the surgeon should present the suture in such a way that the assistant could easily see and safely cut without hazarding adjacent tissues or organs.

It is often tempting to try to use very short lengths of suture material in difficult places: this practice must be eschewed. The suture material for knot tying must be presented to the surgeon in at least ‘half lengths’, and, ideally, on the reel so that the surgeon can efficiently continue to tie without asking for more suture. This mode of presentation is also more economical in the long term.

The granny knot

This is the simplest and quickest knot to make, consisting of two identical hitches. It has the advantage that the first hitch is easily held tight while the second is being made and that should the first tie slip the second will tighten it up again. This only applies to suture materials which slide, such as Nylon, PDS, Monocril and catgut. If the surgeon uses Dexon, Vicryl or equivalents he must learn to tie all knots as he wishes them to end
up—the tension on the first knot must be exactly as it is wished to be, as there is no possibility of ‘snugging’ down the second throw. This facility of catgut to ‘snug down’ has generated some very sloppy surgical practices, which must be eliminated before being able to competently use materials that are more modern. When the granny knot is used, a third throw is an important safety feature. Figure 2.17 (1–3) shows the technique of tying as described by Bonney.

Fig. 2.17 Two-handed technique for tying knots (after Bonney).
The reef knot

This knot consists of two hitches, one tied with one end of the ligature and one tied with the other end (Fig. 2.17 4–6). This two-handed technique produces a firm knot but it is possible by crossing the hands to perform a reef knot using the one-handed technique. The safest technique of all, which the editor uses constantly, is to throw two granny knots followed by a reef knot, which completely locks the whole knot firmly.

It is important to remember that any cord with a knot in it is significantly less strong than one without. Do not therefore be surprised to find suture material breaking at the knot when excess tension is applied.

The single-handed knot

This fast, elegant and simple technique allows the surgeon to operate dexterously and rapidly without putting down the instruments or requiring special tools for tying knots. The technique is shown in Fig. 2.18 (1–4).

The forceps knot

This elegant method of tying is shown in Fig. 2.18 (5 & 6). It is particularly useful when there is only a short piece of suture material available.

Knot tying in deep holes

It has been recommended that the lasso technique be used when a bleeding point occurs in a deep or inaccessible spot. The editor would instead recommend the use of a long angled clamp such as the Meigs/Navratil (see Fig. 2.3). This type of clamp, which has attributes of gallbladder forceps, will allow the tie to be hooked either around the heel or the tip of the clamp so that it is firmly held while the knot is being made (Fig. 2.19). If the bleeding point is extremely difficult to reach the use of small metal artery clips such as liga clips or the preloaded variety (Ethicon) is of enormous value (Fig. 2.20).

Ligatures

Ligatures should always be tied where possible so that complete haemostasis is achieved. The material to be ligated is held in a clamp, which is placed so that a small part of the tip projects beyond the tissue to be tied. This allows the suture material to be firmly held by hooking it around the projecting tip while the knot is tied (Fig. 2.21).

Simple pedicle ties

The ligature may be simple, carrying the entire throw around the mass of tissue to be ligated. The major drawback of this method is the potential for slipping: this risk is reduced if the tension is adequate and if the tissue beyond the tie is of a reasonable amount.

It is important to remember not to be too ambitious and try to include so large a mass that the edges slip out and produce haemorrhage which may be difficult to control.

Remember the simple loop pedicle ligature should never be used if there is tension on the pedicle. Double tying of pedicles is now rarely used. The editor feels that with modern suture materials there is virtually no place for this technique. The amount of material included in a double-tied pedicle is considerable, generating a large amount of necrotic material which has to be removed.

Transfixion stitch

The mass of material to be ligated can be transfixed at one or both ends so that the ligature will not slip and material escape. The transfixion stitch should be used with great care in pedicles which are known to contain significant blood vessels. The risk of damage to vessels is greatest when suturing the ovarian or uterine pedicles during a total hysterectomy. The ovarian vessels in the infundibulopelvic ligament are thin and wide. It is the editor’s practice to use a simple tie on this pedicle and not to put any tension upon it. The uterine artery or a large vein is easily pierced when stitch ligaturing the lower pedicles alongside the uterus during a hysterectomy. When this occurs a rapidly developing haematoma grows into the soft tissues of the broad ligament behind the pedicle, discolouring the tissues and making identification of bleeding points extremely difficult. It is not usually safe simply to reclamp the bleeding area as the vein or artery often retracts once it is cut.

There is also considerable danger in blindly clamping alongside the uterus and cervix, as the ureter is not far away. It is better to open up the pelvic side wall, identify the uterine artery at its origin, tie it and then follow it through to the uterus over the top of the ureter. This
burying the stumps of ligatures and reperitonealization of the pelvis was included (Fig. 2.22). It is now generally accepted that attempts to reperitonealize the pelvis by closure of the peritoneum is at best superfluous and at worst may be causative in the development of lymphocysts and possibly incriminated in small bowel ob-

simple demonstration of the ureter in its lower course is immensely reassuring.

Burying the stumps of ligatures
In recent editions of this text, a paragraph dealing with burying the stumps of ligatures and reperitonealization of the pelvis was included (Fig. 2.22). It is now generally accepted that attempts to reperitonealize the pelvis by closure of the peritoneum is at best superfluous and at worst may be causative in the development of lymphocysts and possibly incriminated in small bowel ob-
Any procedure where it has been impossible to achieve perfect haemostasis or where a significant post-operative serous ooze is anticipated. This latter indication used to be linked to radical cancer surgery, but drains are now rarely used in even the most radical procedures.

2 Where there is a danger of urine leakage such as following repair to a damaged bladder or ureter or following elective surgery on these structures.

3 Where there has been widespread contamination of the peritoneal cavity with infected material.

NB: drains should not be put in place following ovarian cancer surgery or the treatment of *Pseudomyxoma peritonei*.

**Drainage route**

After many years of utilizing drainage by the vaginal route, the last two decades have demonstrated the superiority of transabdominal suction drainage. The disposable prevacuumed systems now available are efficient and leave little scarring at the drainage exit site. Where there has been gross soiling of the peritoneal cavity, such as following bowel opening, a larger

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**Fig. 2.19** Tying a pedicle around a Meig’s forcep.

**Fig. 2.20** A commonly used automatic clip dispenser.

**Fig. 2.21** Ligating a pedicle.

**Fig. 2.20** A commonly used automatic clip dispenser.
bore drain coupled with meticulous peritoneal lavage may be necessary (Jackson-Pratt, pencil, etc.).

Wound drainage may be necessary where wounds are extensive, the operation is a repeat procedure or the patient is on heparin. Wound drains can be very small, should be placed down to the rectus sheath and are usually removed within 48 hours of surgery as drainage resolves.

Management of drains

Drains should be removed when they have ceased to function or drainage has stabilized at a low level. It is important that they be anchored carefully by adequate fixation in theatre. Suction drains can be fixed by a simple multiple loop tie with nylon around the plastic drain and attached to the abdominal wall. Larger bore drains may be marked with a large safety pin so that they may be shortened at regular intervals.

The presence and type of drain must be accurately recorded in the operation note and clear instructions for drain care included in the postoperative instructions. Decisions for removal are usually made and recorded during the postoperative ward rounds.

Further reading

The editor’s recommendations for further reading following a chapter covering general instrumentation and basic techniques may seem a little strange but he would heartily recommend the habit of reading instrument catalogues from cover to cover. It is amazing how frequently an instrument used in a different surgical discipline will be seen to have valuable applications in another, the classic example in the editor’s own practice being the use of the McGill’s endotracheal forceps in inserting a vaginal drain deep in the pelvis at the end of a Wertheim’s hysterectomy. This technique was introduced to the department by the editor’s predecessor Mr Stanley Way. As vaginal drains are not used any more, the instrument is rarely used but still resides on the tray for the time being. For more on modern approaches to drainage, see Lopes A de B, Hall JR, Monaghan JM. Drainage following radical hysterectomy and pelvic lymphadenectomy: dogma or need? Obstet Gynecol 1995;86(6):1–4.

Textbooks

For the more enterprising trainee or surgeon, the textbook Stapling in Surgery by Felicien Steichen and Mark Ravitch, published in 1983 by Year Book Medical Publishers, Chicago, will give a marvellous view of the history and the role of staples in all forms of surgery. A number of the techniques demonstrated in the book have been incorporated into this the tenth edition of Bonney’s Gyneacological Surgery, particularly in the oncology sections. For the surgeon who is able to read German, the recently published text Nahtmaterialien und Nahttechniken in der operativen Gynakologie by Professors Hepp and Scheidel and published by Urban and Schwarzenberg, Munich, is recommended. The text comprehensively covers the use of all modern suture and stapling materials in gynaecological surgery, including an appendix with recommendations for the various weights of suture required for different procedures.

There are a multitude of articles and textbooks on different suture materials and their various applications in surgery; the surgeon should always be prepared to read them but should not expect too many totally new comments.