Hernia surgery: from guidelines to clinical practice

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ABSTRACT

INTRODUCTION Over the last 30 years, hernia surgery has developed into an evidence-based practice assisted by the development of guidelines.

MATERIALS AND METHODS Prior to 1993, best practice in the UK was a nylon darn repair under general anaesthesia as an in-patient with prolonged recovery. The publication of The Royal College of Surgeons of England (RCSE) *Guidelines on Groin Hernia Repair* stimulated debate and coincided with the introduction of mesh hernioplasty and laparoscopic techniques. Further evolution of hernia management has occurred to enable the production of the European Hernia Society (EHS) guidelines in 2008.

RESULTS The EHS guidelines cover all aspects of abdominal wall surgery including: indications for operation; investigations; organising surgical care; techniques; local anaesthesia; after-care, complications and outcome; and information for patients.

CONCLUSIONS Surgeons have many choices when selecting an appropriate hernia operation for an individual patient. The EHS guidelines provide a basis for this decision-making.

KEYWORDS

Hernia surgery – European Hernia Society guidelines

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Hernia surgery is a core activity for general surgeons. The annual rate for inguinal hernia repair is approximately 200 operations per 100,000 population. Therefore, most district general hospitals will perform many hundreds of inguinal hernia repairs each year. The operation is a valuable tool for teaching the basic principles of dissection, tissue handling and anatomical reconstruction. More complex procedures such as recurrent inguinal hernias and abdominal wall incisional hernias can be learnt progressively and some surgeons now specialise in abdominal wall reconstruction.

Guidelines for the management of adult groin hernia were the first clinical guidelines to be published by The Royal College of Surgeons of England (RCSE). These preceded the formalisation of evidence-based medicine but, nevertheless, provided a valuable guide for best practice and, most importantly, a tool for eliminating bad practice. The present review outlines the process for the production of the guidelines in 1993 and compares them with the comprehensive evidence-based guidelines produced by the European Hernia Society in 2008. The RCSE guidelines were used as a basis for setting up the Plymouth Hernia Service in 1996.

The fore-runners of mesh hernioplasty

Thirty years ago, the techniques used for inguinal hernia repair were empirical and usually involved sutured, tensioned reconstruction of the posterior inguinal wall with silk or braided suture material. The Maloney darn repair was a popular technique and was used by many surgeons usually operating under general anaesthesia. The merits of local anaesthesia have been promoted previously in a Hunterian Lecture delivered by Frank Glassow.¹ Glassow worked in the Shouldice Clinic; while this technique was highly effective in the environment of his hospital, it had not been effectively popularised, although the techniques of local anaesthesia were being learnt and utilised.^{2–4} To achieve good results, the Shouldice operation requires extensive training: a new member of staff at the hospital is required to observe 500 operations, undertake 500 operations under supervision and then perform 1000 audited operations before being approved to join the staff. It is unlikely that a surgeon working in general surgical practice could achieve this standard of excellence. To test this hypothesis, a randomised trial comparing the Shouldice technique with the plication darn was carried out and

reported in 1992.⁵ For protagonists of the Shouldice operation, the results were disappointing: in 322 patients operated on by 15 surgeons, the recurrence rate was 4.6% at a mean follow-up of 30 months after the Shouldice operation. Initial scepticism of this result was followed by three similar studies from Texas, Cologne and the French Association for Surgical Research indicating even higher recurrence rates for the Shouldice operation in the hands of general surgeons, varying between 6.6% and 12.8%.⁶⁻⁸ Although the layered, sutured repair of Shouldice has been superseded by mesh hernioplasty, it may still be used in instances where there is a grossly contaminated wound occurring during emergency surgery, when bowel necrosis has occurred from strangulation or in younger males with indirect hernias, or for patient preference.

RCSE guidelines on the management of groin hernia

There were two major reasons for writing these guidelines. The first was the results of a National Confidential Enquiry into PeriOperative Deaths which investigated the surgical management of strangulated hernia in 1991/2.⁹ During that year, 210 deaths followed inguinal hernia repair and 120 followed femoral hernia repair. Patients that died were elderly (45 were aged 80–89 years), and unfit (24 had an ASA of 3 and 21 and ASA of 4). However, only 19% of these patients were operated on by consultants and 8% by senior trainees. Detailed analysis revealed that ITU facilities were often not available for resuscitation or postoperative care of these patients. The second stimulus came from the UK Department of Health who had indicated that contracts and hospital funding might be dependent on the adoption of guidelines by clinicians. The Royal College of Surgeons of England was invited to produce guidelines with a view to minimising inconsistencies and expediting care because inguinal hernias accounted for the majority of long-wait cases at that time. A working party was convened by the late H Brendan Devlin (Fig. 1) in August 1991. Six surgeons ranked and reviewed literature and prepared papers on specific aspects of hernia management. Papers were then presented to a conference of 25 invitees from the Association of Surgeons of Great Britain and Ireland in June 1992. The guidelines were revised as a result of this meeting and published in July 1993.¹⁰ The recommendations fell into six categories:

1. Indications for operation and urgency of treatment.
2. Organising surgical care.
3. Techniques of hernia repair.
4. Local anaesthesia.
5. Aftercare complications and outcome.
6. Information for patients.

Figure 1 The late H Brendan Devlin (1932–1999), Council Member, The Royal College of Surgeons of England.

In the 15 years since the publication of that report, the Plymouth Hernia Service has modelled itself on these six principles and in addition has become a specialist centre for incisional hernia and abdominal wall surgery. The team spirit that this has generated has resulted in the initiation of a humanitarian mission ('Operation Hernia') whose aim is to provide hernia surgery for the poor in Africa.

Guidelines provide a standard against which practice can be audited, they provide patients with some certainty about what should happen, they are helpful for training junior surgeons and eliminate the possibility of 'outside agency' imposing standards. Other organisations have contributed significantly to setting the standards in hernia surgery including the consensus conferences in Switzerland organised by Professor Volker Schumpelick in 1994, 1998, 2003, 2006 and 2008. The Netherlands Surgical Society produced hernia guidelines in 2005. There have been several Cochrane Systematic Reviews and meta-analyses produced by the EU Hernia Trialists Collaboration. The UK National Institute for Health and Clinical Excellence produced evidence to support the use of laparoscopic surgery for inguinal hernia repair in 2004 and 2007. In 2008, at its

annual congress, the European Hernia Society produced guidelines for the 26 countries of the European Union. The development of inguinal hernia surgery between 1993 and 2008 can be judged by comparison of the recommendations of the RCSE guidelines against those produced by the European Hernia Society (EHS).

Indications and urgency of treatment

The RCSE guidelines concluded that all femoral hernias should be repaired urgently and the repair of small, easily reducible direct inguinal hernias was not mandatory, especially in the elderly. The evidence for this was based on the fact that 40% of femoral hernias present urgently as obstructed or strangulated and the risk of strangulation for small direct hernias is negligible. In producing evidence-based guidelines, 'A' is the strongest recommendation based on at least two randomised control trials, and 'D' is a recommendation produced as a result of expert opinion. The EHS concluded that strangulated hernias should be operated on urgently (recommendation D), symptomatic inguinal hernias (Fig. 2) should be treated surgically (D), and minimally symptomatic inguinal hernias in men could be considered for a watchful waiting strategy (A). Indications for operation are particularly important in the era of mesh repair because the incidence of chronic post-herniorrhaphy pain now exceeds that of recurrence.^{11,12} O'Dwyer and Fitzgibbons have both carried out high-quality, randomised, controlled trials of watchful waiting for asymptomatic hernias and demonstrated a very low incidence of complications (1.8 episodes of incarceration per 1000 patient years of follow-up). However, after 2 years, 25% of patients in the unoperated arm opt for operation because of the development of symptoms.

An area not covered by the RCSE guidelines but included by the EHS document was diagnostics. The following recommendations were made: diagnostic investigations are required only in patients with obscure pain in the groin (B). The flow-chart recommended in cases of obscure pain is to begin with ultrasound examination and proceed to MRI (B). The EHS classification for inguinal hernia should be used when reporting clinical trials (D).¹⁵

Organising surgical care

The RCSE recommended that all operations should be performed or supervised by an appropriately trained surgeon. In addition, the provision of specialised facilities which were self-contained within existing hospitals or free-standing should be evaluated. On this basis, the Plymouth Hernia Service was commenced in 1996 to achieve high performance in day-case surgery. A specialist hernia nurse was appointed in February 1997 and a wide-ranging consultation was undertaken to produce protocols, patient information sheets, general practitioner (GP) information

Figure 2 Massive bilateral inguinal hernias; which operation?

sheets and postoperative instructions for patients. This was the first dedicated hernia service in a public hospital in the NHS. Subsequently, a prospective study of 1015 cases was published which indicated low recurrence rate (0.78%), ambulatory surgery in 81%, local anaesthesia in 90.5% and low morbidity with less than 1% of cases of persistent neuralgia and only one case of testicular atrophy. Five days after operation, 91% of patients had returned to normal activity.^{14,15}

The Modernisation Agency in the Department of Health commissioned the Plymouth Hernia Service to undertake a study of the feasibility of training nurses as surgical care practitioners (SCPs) to undertake independent inguinal hernia surgery.¹⁶ A qualified nurse first assistant was exposed to 800 h of operating theatre time undertaken for hernia surgery. She assisted at 150 inguinal hernia operations and then undertook 60 inguinal hernia operations under direct supervision. This was followed by six operations performed with indirect (supervising surgeon not in the operating theatre but close at hand) supervision, but only one of these operations was completed without intervention. It was concluded that training non-medically qualified practitioners to perform hernia surgery had a long learning curve. Even small inguinal hernias could be technically

Figure 3 The preperitoneal space utilised in open and laparoscopic hernia surgery.

challenging and could not be classified as minor procedures; therefore, training SCPs was not cost effective and was unlikely to contribute significantly to the hernia surgery workforce. As a spin off to this study, a competency assessment tool and a clinical classification were devised for inguinal hernias.¹⁷

In 2008, the EHS concluded that both laparoscopic surgery and Lichtenstein repair are accepted options for repair or primary unilateral hernias in adequately trained surgeons (B).

Techniques of repair

The RCSE guidelines recommended layered, sutured (the Shouldice operation) or prosthetic reconstruction for primary inguinal hernias. Newer methods utilising prosthetic material and laparoscopy (Fig. 3) were recommended to be evaluated by a limited number of experts. Predictably, the rush to put these new methods into clinical practice preceded the clinical trials. The first UK case series of the

Figure 4 Surgeons at the Lichtenstein Clinic: Dr Alex Shulman, Dr Irving Lichtenstein and Dr Parviz Amid.

Lichtenstein operation (Fig. 4) was reported in 1994 from Liverpool.¹⁸ This confirmed that the operation was easy to perform under local anaesthesia on an ambulatory basis with a fast recovery. The study concluded that the operation was simple, easily learned and taught, and quick to perform. Subsequent randomised trials compared this technique with other flat meshes, plug repairs and light-weight meshes demonstrating equivalence to, but no superiority over, standard flat meshes.^{19–25}

Fifteen years later, the EHS guidelines recommend the open Lichtenstein and laparoscopic TAPP and TEP techniques (A). A mesh technique should be used in young men (18–30 years) irrespective of the type of inguinal hernia (C). Lightweight material or reduced pore size material (less than 100 μm) mesh should be used (B). An endoscopic approach is preferred in female herniorrhaphy (D).

Local anaesthesia

RCSE guidelines recommended this to be a valuable option, which was however not suitable for obese, anxious or unco-operative patients or those with complex hernias. Intra-operative monitoring, intravenous access and pulse oximetry were essential, especially if intravenous sedation was being administered. A systematic review of groin hernia surgery published by the RCSE in 1998 addressed the topic of local anaesthesia from 11 randomised studies. It concluded that local anaesthesia was as safe and effective as general anaesthesia and had less adverse effects on respiratory function.²⁴ The Plymouth Hernia Service has championed the use of local anaesthesia in inguinal hernia surgery.^{25–27}

In 2008, the EHS recommended that local anaesthesia should be considered for all adult patients with a primary reducible unilateral inguinal hernia (A). The use of spinal anaesthesia should be reduced (B). General anaesthesia with short-acting agents and combined with local infiltration anaesthesia may be a valid alternative to local anaesthesia (B).

Figure 5 A serious postoperative complication: extensive groin and scrotal haematoma.

Aftercare, complications and outcome

In 1993, the RCSE recommended Bupivacaine blocks for the operation, and suggested that regular simple analgesia should usually meet requirements for pain relief in the postoperative period. Wound complications should occur in only 2% of patients (Fig. 5). Early ambulation was essential and recurrence rate of 0.5% at 5 years should be aimed for (in retrospect, an unrealistic expectation). In a study of 206 patients, it was demonstrated that dispositional pessimism predicts delayed return to normal activities after inguinal hernia surgery.²⁸ Outlook on life was assessed using the Life Orientation Test and a regression analysis showed a highly significant relationship between delayed return to normal activities and dispositional pessimism. Therefore, when counselling patients pre-operatively, positive encouragement should be given to those with a negative affect.

It remains controversial as to whether mesh is a causative factor in chronic post-herniorrhaphy groin pain. More patients are aware of a feeling of a foreign body with standard weight meshes; therefore, light-weight meshes may have some beneficial effect in reducing discomfort during physical exercise.^{29–31} However, one study has demonstrated a higher incidence of recurrence after the use of light-weight mesh.³² The current consensus is that the principal mechanism involved in the development of post-herniorrhaphy groin pain is neuropathic pain arising from nerve damage during surgery. Nerves are most likely to be injured when the surgeon is unaware of their location and fails to recognise them during surgery. We adopt a pragmatic approach to cutaneous nerve division, cutting nerves if they obstruct the technical procedure and this results in all nerves being preserved in 65% of patients and cutaneous nerves being divided in 19% (ilio-inguinal nerve), 8% (iliohypogastric nerve) and 7% (genital nerve). The incidence of groin pain is then in the region of 1%.

The EHS adopted the following recommendations. The risks of development of chronic groin pain should be explained to the patient preoperatively (B). The inguinal nerves at risk should be identified at open surgery (B). A multidisciplinary approach should be considered for treatment (C). Light-weight mesh results in better pain outcome (C). Endoscopic surgery (if a dedicated team is available) is superior to open mesh for postoperative pain (C).

Information for patients

The RCSE recommended that easily readable information for patients was essential. Early return to daily activity was to be encouraged. Sedentary occupations could resume work within 2 weeks and patients with manual jobs within 4 weeks. Fifteen years later, the EHS recommended that no limitation should be placed on patients following an inguinal hernia operation; patients are free to resume activities on a 'do what you feel you can do' basis (C).

Incisional hernia

Incisional hernias present a more heterogeneous problem for the abdominal wall surgeon (Fig. 6). They range from small defects of no more than a few centimetres to huge

Figure 6 A complex incisional hernia resulting from multiple laparotomies complicated with fistulas following intra-abdominal sepsis.

complex hernias with significant loss of domain requiring a multidisciplinary approach with plastic surgeons and specialist anaesthetists and intensivists.^{54–57} For hernia defects greater than 10 cm, we prefer open mesh repair. Open repair has the advantages of reconstituting abdominal wall anatomy and returning physiological function to the abdominal wall. Laparoscopic repair does not achieve these two objectives but covers the hole (defect) internally with a dual mesh to reduce the incidence of adhesion between the prosthesis and bowel. The two choices of technique for open repair are the onlay or sublay methods and we favour the onlay technique for the majority of repairs. Hybrid operations (partial abdominal wall closure with exposure of the mesh to the viscera, i.e. partial intraperitoneal placement of mesh) are not recommended since they have the major drawback of exposing bowel to prosthetic mesh. The case for the use of light-weight mesh in incisional hernia has not been proven: in a randomised trial comparing light-weight composite mesh with polyester or polypropylene light-weight mesh, the recurrence rate was nearly three times higher for light-weight mesh compared with heavy-weight mesh without conferring any benefit on abdominal wall compliance or postoperative pain.⁵⁸

We employ selective use of the Ramirez components separation technique and the use of fibrin sealant.⁵⁹ In a 24-month period, 116 patients with major incisional hernias were treated and assessed at follow-up with a quality-of-life questionnaire. Seromas occurred in 9.5% of patients, deep wound infection in 1.7% and recurrences in 3.4% at 15.4 months of follow-up. The onlay open method of incisional hernia repair is technically easy to perform, it avoids any risk of visceral contact between mesh and peritoneal cavity contents, it is easily combined with components separation, and can be applied to defects of the midline and all areas of the abdominal wall.

'Operation Hernia' in Africa (Ghana)

Sub-Saharan Africa has neither the man-power nor the resources to tackle its burden of surgical disease. It has been estimated that two-thirds of young Ghanaian doctors leave the country within 3 years of graduation. As a result, with a population of 20 million, Ghana has nine doctors per 100,000 population. Therefore, because inguinal hernia is a common condition in Africa there is a large pool of unoperated patients who have no hope of receiving elective surgery. For instance in Western Ghana with a population of 1.5 million there is one regional hospital which is staffed by three general surgeons and one anaesthetist. There are many small peripheral clinics staffed by medical officers with no surgical training who are only able to provide basic postoperative care. 'Operation Hernia' with the help of funding from the British High Commission has established

Figure 7 'Operation Hernia' in Ghana.

a Hernia Treatment Centre in Ghana's third city on the Gold Coast at Takoradi (Fig. 7). In collaboration with the EHS, 15 teams from hospitals in the UK, Europe and Africa have treated over 1000 patients since 2005. A second hernia treatment centre is being opened in Carpenter, Ghana and it is hoped to expand into Nigeria and Malawi.⁵⁹

Conclusions

Increasing knowledge and new technologies in the 21st century will make it inevitable that surgeons will specialise in abdominal wall surgery to an increasing extent. Already, some surgeons, including the author, have a substantial practice in this area to the benefit of patients and surgeons without the technical skills or organisation to treat these difficult patients. For main-stream surgeons, the European Hernia Surgery guidelines outlined above provide an excellent basis for routine surgical practice.

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