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7-1-2005

Diagnostic Laparscopy Clinical Guidelines

H Paul Redmond
Cork University Hospital

E Andrews
Cork University Hospital

Arnie DK Hill
St. Vincent's University Hospital

Citation
HP Redmond, E Andrews, ADK Hill. Diagnostic Laparscopy Clinical Guidelines. Dublin: Royal College of Surgeons in Ireland, 2005.

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FOREWORD

The Clinical Guidelines Committee is pleased to present these guidelines, prepared by a working sub-group, on diagnostic laparoscopy.

As is always the case with clinical guidelines it should be emphasised that they are not strict protocols and at all times leave scope for independent judgement by the clinician. It is the intention of the Clinical Guidelines Committee to review and renew these and other guidelines as new evidence based information becomes available.

In preparing these guidelines, the working sub-group has drawn extensively from the international literature and great credit must go to Mr. Emmet Andrews for his co-ordination of this process. The Clinical Guidelines Committee is most grateful to him for his efforts. The authors are also very grateful to Professor Niall O'Higgins, President of the Royal College of Surgeons in Ireland and former Chairman of the Clinical Guidelines Committee, for his help and guidance.

I would also like to acknowledge the efforts made by the other members of the Clinical Guidelines Committee in the preparation of this important document.

July 2005
Professor H. Paul Redmond
Chairman, Clinical Guidelines Committee

Working Party Members

Professor H. P. Redmond
Cork University Hospital

Mr. E. Andrews
Cork University Hospital

Mr. A. D. K. Hill
St. Vincent's University Hospital

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LEVELS OF EVIDENCE

(The Canadian Task Force on the periodic health examination. Can Med Assoc J 1979; 121: 1193)

Grading of evidence	
Ia	Evidence obtained from meta-analysis of randomised controlled trials
Ib	Evidence obtained from at least one randomised controlled trial
IIa	Evidence obtained from at least one well-designed controlled study without randomisation
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study
III	Evidence obtained from well-designed non-experimental descriptive studies, correlation studies and case studies
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Grading of Recommendations	
A	Requires at least one randomised controlled trial as part of the body of literature of overall good quality and consistency addressing the specific recommendations (Levels Ia, Ib)
B	Requires the availability of well-conducted clinical studies but no randomised clinical trials on the topic of recommendation (Levels IIa, IIb, III)
C	Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable clinical studies of good quality (Level IV)

SUMMARY OF RECOMMENDATIONS

Technique

It is recommended that the open technique is used for insertion of the first port.
Grade B

Acute Appendicitis

With a clinical diagnosis of acute appendicitis, it is reasonable to confirm the diagnosis with laparoscopy and laparoscopic appendicectomy is an acceptable approach.
Grade A

It is recommended that women of child-bearing age suspected of having acute appendicitis be considered for diagnostic laparoscopy prior to the planned appendicectomy. Open appendicectomy is acceptable following diagnostic laparoscopy.
Grade B

It is recommended that the macroscopically normal appendix is left in situ.
Grade B

Trauma

Diagnostic laparoscopy has limited application in patients with blunt abdominal trauma.
Grade B

Diagnostic laparoscopy is helpful in assessing haemodynamically stable patients with penetrating abdominal trauma.
Grade B

TECHNIQUE

Diagnostic laparoscopy is safe, well tolerated and is performed under general anaesthesia (Sleeman, et al, 1995 III). During the procedure, the patient should be continuously monitored (American Society for Gastrointestinal Endoscopy, 1989) and resuscitation capability must be immediately available. Laparoscopy must be performed using sterile technique along with high level disinfection of the laparoscopic equipment.

Instruments used in diagnostic laparoscopy should include, but are not limited to, a laparoscope, trocar, and grasping biopsy and retracting instruments. Most instruments range in size from 2-10 mm in diameter. Personnel should include a surgeon trained in laparoscopy and an anaesthestist.

Laparoscopy is performed under general anaesthesia, and thus exposes the patient to certain risks. The patient is placed in the supine position. However, a lithotomy position may be necessary for pelvic organ assessment. A peri-umbilical port site with camera cannula serves most diagnostic procedures adequately. The open technique should be used for insertion of the first port site. Use of a trocar or the Veress needle should be abandoned due to the higher rate of bowel and major vessel injury associated with its use (Van Der Voort et al., 2004 III). This periumbilical position should be modified in the presence of a scar or other known lesions. The telescope is inserted and depending on the intraabdominal findings one or two secondary cannulae are then placed in either the upper abdomen (for upper abdominal conditions) or lower abdomen (for lower abdominal conditions). The exact number, site and size of the secondary cannulae depend on the patient's size and nature of the diagnostic procedure. Pneumoperitoneum is maintained by insufflating CO2 to a pressure of 12 to 15 mmHg pressure.

As for laparotomy, general inspection of the peritoneal cavity is followed by specific inspection of the suspected area of pathology. Routine laparoscopic examination of the abdomen should include evaluation of peritoneal surfaces, diaphragm, liver, spleen, gallbladder, stomach, small intestine, colon, pelvic organs, and retroperitoneal tissues and organs. Exposure is improved by head-up tilt for upper abdominal procedures, Trendelenburg for lower abdominal, and lateral tilts for lateral abdominal inspections.

An angled lens (30/45°) may also facilitate the view. Liver, gallbladder, gastrointestinal tract and pelvic organs may require manipulation using palpation probes, atraumatic grasping forceps, retractors, or an ultrasound probe. The entire length of the small bowel can be inspected from ileocaecal valve to duodenojejunal flexure using two pairs of atraumatic grasping forceps. Steep Trendelenburg or lateral tilts may be required to assist para-aortic or iliac node inspection and biopsy. The pancreas can be exposed through a window in an avascular area of the gastrocolic omentum and by lifting the stomach and left lobe of the liver upwards (Najmaldin and Guillou, 1998).

Recommendations:
The patient undergoing laparoscopy should be fully monitored.
Grade C

Laparoscopy should be performed by a surgeon trained in laparoscopy.
Grade C

Pneumoperitoneum should be maintained by insufflating CO2 to a pressure of 12 to 15mmHg.
Grade C

COMPLICATIONS

Complications may occur during creation of the pneumoperitoneum, trocar insertion, or during the diagnostic examination. These complications include, but are not limited to, cardiac arrhythmias, haemodynamic instability due to decreased venous return, bleeding, perforation of a hollow viscus, laceration of a solid organ, vascular injury, gas embolism, and subcutaneous or extraperitoneal dissection of the insufflation gas. Bladder injury may also occur during diagnostic laparoscopy but complications are under reported (Orlando and Lirussi, 2001).

Contraindications

Contraindications may include a known ruptured diaphragm, haemodynamic instability, mechanical or paralytic ileus, uncorrected coagulopathy, generalized peritonitis, severe cardiopulmonary disease, large hiatal hernia, abdominal wall infection, multiple previous abdominal procedures, and pregnancy (Halpern, 1998 III, Gurbuz and Peetz, 1997 III). However, the final decision is determined not only by the clinical conditions, but also by the surgeon's judgement.

INDICATIONS

Acute abdomen

Few studies have examined the role of diagnostic laparoscopy in the acute abdomen. Diagnostic laparoscopy may aid placement of an appropriate incision in selected patients with a generalised acute abdomen (no intestinal obstruction or perforation) (Cuesta et al, 1998 III, Ahmad, 2001 III, Sozuer et al., 2000).

Acute Appendicitis

There is one Cochrane Collaboration Review that compares the diagnostic and therapeutic effects of laparoscopic and conventional "open" surgery in the treatment of suspected acute appendicitis. Forty-five randomised studies were suitable for inclusion, of which 39 compared laparoscopic appendicectomy (with or without diagnostic laparoscopy) with open appendicectomy in adults. Wound infections were about half as likely after laparoscopic appendicectomy than after open appendicectomy, but intra-abdominal abscesses were increased nearly threefold after laparoscopic appendicectomy. The duration of surgery was 14 minutes longer for laparoscopic appendicectomy. Pain on Day 1 after surgery was reduced after laparoscopic appendicectomy by 8 mm on a 100 mm visual analogue scale. Hospital stay was reduced by 0.7 days. Return to normal activity, work and sport were 6 days, 3 days, and 7 days earlier after laparoscopic appendicectomy than after open appendicectomy. While the operation costs of laparoscopic appendicectomy were significantly higher than that of open appendicectomy, the costs outside hospital were reduced. Strong heterogeneity was found for most outcomes, but not for wound infections and intra-abdominal abscesses. In children, much less data were available, but the results seem similar to the adult experience. Pain which was measured blindly in two paediatric trials, was similar after laparoscopic appendicectomy and open appendicectomy. In trials on unselected patients, diagnostic laparoscopy led to large but variable reductions in the rate of negative appendectomies. In parallel, the rate of unestablished diagnoses was significantly decreased after laparoscopy. In fertile women, these effects were even more pronounced. The reviewers concluded that in those clinical settings where surgical expertise and equipment are available and affordable, diagnostic laparoscopy and laparoscopic appendicectomy (either in combination or separately) seem to have various advantages over open appendicectomy. The clinical benefits of laparoscopic appendicectomy, however, are small and of limited relevance. In spite of the variable quality of the available research data, it is a reasonable approach to use laparoscopy and laparoscopic appendicectomy in patients with suspected appendicitis unless laparoscopy itself is contraindicated or not feasible. In gangrenous or perforated cases, however, laparoscopic appendicectomy carries a higher risk of intra-abdominal infections (Sauerland et al., 2002 Ia).

The removal rate of a histologically normal appendix in premenopausal women lies between 22% and 47% (Andersson et al., 1992 III, Chang et al., 1973 III) and is significantly higher than that for men 7% to 15%. A prospective study in 161 consecutive adult female patients under 50 years of age with a clinical diagnosis of acute appendicitis underwent diagnostic laparoscopy prior to the planned appendicectomy. After laparoscopy, 55% of the patients required appendicectomy for appendicitis while in 23% a gynaecological abnormality was found. Fourteen percent had a normal laparoscopy. The removal rate of a histologically normal appendix after laparoscopy was 5% due to two false positives and eight laparoscopy failures. Their conclusion was that all women of child-bearing age suspected of having acute appendicitis should undergo diagnostic laparoscopy prior to the planned appendicectomy, regardless of the certainty of the pre-operative diagnosis (Borgstein et al., 1997 III). Similar findings of reduced rates of unnecessary appendicectomy were demonstrated by Thorell et al. in a study of 94 women aged between 15 and 40 years with suspected appendicitis assessed with diagnostic laparoscopy. They demonstrated no differences in duration of postoperative hospital stay or complications and concluded that diagnostic laparoscopy could substantially reduce the rate of unnecessary appendicectomies (Thorell et al., 1999 III).

Recommendation:
With a clinical diagnosis of acute appendicitis laparoscopy can confirm the diagnosis and laparoscopic appendicectomy be undertaken.
Grade A

It is recommended that premenopausal women suspected of having acute appendicitis should be considered for diagnostic laparoscopy prior to the planned appendicectomy. Open appendicectomy is acceptable following diagnostic laparoscopy.
Grade B

Removal of a macroscopically normal appendix

The Adelaide and Meath Hospital, Dublin published a study in which emergency laparoscopy was done for 254 patients over an eight year period. No abnormality was detected in 41. Full follow up was available on 34 patients (83%). Twenty-one patients have remained entirely free of symptoms. Of the 13 patients who had recurrent symptoms, 2 subsequently had a histologically normal appendix removed, yet still had symptoms; 2 had a second laparoscopy that showed no abnormality; 5 had ultrasound; and 4 had colonoscopy or a barium enema examination. Removal of an appendix that looks "normal" at emergency laparoscopy for right iliac fossa pain is unjustified (Teh et al., 2000 III). Van den Broek et al. also concluded that it is safe to leave a normal looking appendix in place when a diagnostic laparoscopy for suspected appendicitis is performed, even if another diagnosis cannot be found at laparoscopy (Van den Broek et al., 2001 III).

This policy has been disputed by a retrospective review of 48 patients who had visually normal appendices removed at completion of diagnostic laparoscopy for lower abdominal pain (Chiarugi et al., 2001 III). No procedure-related drawback and no subsequent complications were recorded. Symptoms subsided in all the patients, who had a mean hospital stay of 2.1 days. Pathological changes were observed in 58% of the appendix specimens, giving a negative predictive value for diagnostic laparoscopy of 41%. Their conclusion was that due to the consistently false negative rate of diagnostic laparoscopy, and the low morbidity rate for laparoscopic appendicectomy, incidental appendicectomy should be performed in patients with lower abdominal pain.

Recommendation:
A macroscopically normal appendix may be left in situ.
Grade B

Recommendation:
The patient should be informed that the appendix is still in place.

DIAGNOSTIC AND STAGING LAPAROSCOPIC PROCEDURES IN CANCER

Indications

During the last decade, laparoscopy has replaced open laparotomy as the preferred approach in patients who require surgical diagnosis and staging of cancer. The role of laparoscopy as a biopsy tool is reserved primarily for patients in whom a tissue diagnosis is needed to direct therapy but cannot be obtained by image-guided needle biopsy or by endoscopic means. Laparoscopy allows a surgeon to diagnose and obtain information about dissemination of disease and to diagnose patients with equivocal abdominal findings (Mansi et al., 1982 III, Gandolfi et al., 1985 III).

The liver and peritoneal surfaces are the most readily accessible sites for laparoscopic tumour biopsy. Other sites, which may be accessible to the laparoscope but may require more dissection for exposure and access include the intestinal mesentery and the retroperitoneum. Lymph nodes or other lesions in the para-aortic and caval regions of the retroperitoneum are especially difficult to access, whereas coeliac and iliac nodes are more readily biopsied. Laparoscopy has also been used as a second-look procedure to evaluate responses to therapy. Aspiration of ascites or peritoneal lavage can be performed and fluid sent for cytological analysis for possible intra-peritoneal shedding of tumour.

Staging Laparoscopy

Staging laparoscopy has become an important tool in the evaluation of patients with certain gastrointestinal malignancies who are being considered for curative resection. The magnified view of the laparoscope enables the surgeon to detect small liver or peritoneal metastases that are not visible with current non-invasive imaging modalities. In addition, the use of laparoscopic ultrasound may allow imaging of occult liver metastases or local tumour invasiveness that would preclude curative resection. In large series

of patients with mixed upper gastrointestinal malignancies undergoing staging laparoscopy, the incidence of occult metastases not seen on preoperative imaging has been approximately 20% (Hunerbein et al., 1998, van Dijkum et al., 1999). The accuracy of pre-operative staging was improved by laparoscopy in 41% of patients in one series of 389 patients, including several patients who had suspicious lesions on preoperative imaging that proved benign (Hunerbein et al., 1998).

Laparoscopic staging can be helpful in lymphoma, oesophageal cancer (Bogen et al., 1996), gastric cancer, pancreatic adenocarcinoma (Andren-Sanderg et al., 1998), hepatocellular carcinoma, carcinoma of the gallbladder, extrahepatic bile duct cancer, and selected periampullary cancers as well as in second look operations after chemotherapeutic regimens.

Most occult metastases are identified by laparoscopy with biopsy alone; however, the addition of laparoscopic ultrasound to the staging protocol may allow detection of disease elsewhere, particularly vascular invasion, that would also contraindicate resection. Some authors have advocated that diagnostic laparoscopy and laparoscopic ultrasonography should be used as an adjunct to pre-operative imaging studies in all patients with primary or metastatic intra-abdominal neoplasms (Tsioulias et al., 2001 III) because as compared with pre-operative imaging, the combination of diagnostic laparoscopy and laparoscopic ultrasonography provides more accurate information regarding staging and resectability, thereby helping to determine the extent of operation and reduce the number of unnecessary laparotomies.

Oesophageal tumours

A patient with suspected distal oesophageal carcinoma represents a challenge to the treating physicians. Most patients present with an advanced stage of disease, and in the majority of cases only palliative treatment can be offered. Various treatment modalities are available, which are applied according to the TNM stage of the disease and the performance status of the patient. A precise histological diagnosis and highly accurate tumour staging of a patient with oesophageal carcinoma is a prerequisite for the selection of the most suitable treatment option. Endoscopic ultrasound has emerged as the most accurate diagnostic modality for loco-regional staging. Ultrasound, computed tomography, and possibly magnetic resonance imaging are the diagnostic tools of choice for tumour staging. After excluding advanced tumour stage and severe concomitant diseases, diagnostic laparoscopy with intra-abdominal ultrasound should be performed in patients with adenocarcinoma of the distal oesophagus prior to oesophagectomy (O'Brien et al, 1995, III). Intra-abdominal metastases which can be missed preoperatively in some cases have to be ruled out in order to avoid unnecessary surgery (Meyenberger and Fantin, 2000 III).

Recommendation:
Diagnostic laparoscopy with intra-abdominal ultrasound is useful in patients with adenocarcinoma of the distal oesophagus prior to oesophagectomy.
Grade B

Gastric cancer

A high percentage of patients with gastric adenocarcinoma have advanced or unresectable disease at the time of presentation. Laparoscopic staging has detected unsuspected metastases in 21% to 41% of patients with gastric cancer who were thought to be candidates for resection on the basis of preoperative imaging (D'Ugo, 1997 III, Ascencio et al., 1997 III, Burke et al., 1997 III). Burke et al. performed staging laparoscopy in 111 patients with resectable gastric cancer as revealed by preoperative imaging (Burke et al., 1997 III). Occult metastases, most of which were peritoneal tumour implants, were identified in 37% of patients. The mean postoperative length of hospitalisation in the 24 patients who underwent laparoscopy only was 1.4 days as compared with 6.4 days in patients who had exploratory laparotomy without resection. Median survival after laparoscopy in those patients with only occult metastases was six months, and no patient required re-operation for palliation. Patients with gastric cancer who are being considered for neo-adjuvant therapy should also be considered for laparoscopic staging before initiation of therapy to exclude patients with occult metastatic disease from the treatment protocol.

Patients with gastric cancer who probably do not benefit from laparoscopy are those with T1 tumours, because of the low likelihood of metastases, or patients with obstruction or bleeding because of the need for resection regardless of disease status.

Peritoneal seeding or liver metastases found at laparotomy usually preclude curative treatment in patients with gastric adenocarcinoma. Such exploratory laparotomies may be avoided by diagnostic laparoscopy. However, routine diagnostic laparoscopy does not benefit those patients who proceed to laparotomy after negative laparoscopy. One study prospectively evaluated the selective use of laparoscopy in uncertain situations. One hundred and twenty consecutive patients with primary gastric adenocarcinoma were studied. Diagnostic laparoscopy was performed in patients with clinical T4 tumours or suspected metastases, unless laparotomy was required for symptomatic disease. Ninety-six of 120 patients were selected for immediate laparotomy with curative intent (n = 81) or for palliation (n = 15). In two of the 81 patients gastrectomy was abandoned because of unexpected peritoneal carcinomatosis. Fifteen patients underwent diagnostic laparoscopy, which identified intra-abdominal metastases in six; the other nine patients proceeded to laparotomy, which revealed peritoneal metastases not detected at laparoscopy in four patients. The remaining nine patients had overt metastases and were referred for systemic chemotherapy without abdominal exploration. Diagnostic laparoscopy in selected patients effectively limits the number of unnecessary invasive staging procedures but the routine use of diagnostic laparoscopy in all patients with gastric adenocarcinoma is not warranted (Lehnert et al., 2002 III).

Diagnostic laparoscopy for staging is effective and widely practiced, but laparoscopic gastric resections are mostly limited to benign lesions. Currently, early malignant lesions are laparoscopically treated mainly in Japan, whereas more advanced lesions are laparoscopically resected in only a few centres around the world. Full endorsement of these procedures, by randomised controlled trials, although desirable, is unlikely soon, due to the technical complexity and low prevalence of these pathologies in western countries (Rosin et al., 2001 III).

Recommendation:
Diagnostic laparoscopy provides additional staging information in patients with gastric carcinoma prior to laparotomy.
Grade B

Pancreatic tumours

Laparoscopic staging has had a major impact on the management of patients with pancreatic cancer. Occult metastases or locally invasive tumours that render patients unresectable have been found at laparoscopy in 31% to 41% of cases (John et al., 1995 III, Conlon et al., 1996 III, Jimenez et al., 2000 III). As a result of the combination of high-resolution CT and staging laparoscopy, the resectability rate for pancreatic cancer in recent large series has ranged from 74% to 91% (Conlon et al., 1996 III, Jimenez et al., 2000 III).

Exposure to laparoscopic surgery has been demonstrated not to adversely affect survival in a cohort of elderly patients with pancreatic cancer who had a diagnostic procedure but no pancreatic resection (Urbach et al., 2002 III).

Recommendation:
Diagnostic laparoscopy is useful in all patients with potentially curable pancreatic cancer prior to resection.
Grade B

Peripancreatic and periampullary tumours

The use of diagnostic laparoscopy is controversial (Vollmer et al., 2002) although in a study performed in Memorial Sloan-Kettering Cancer Center the addition of diagnostic laparoscopy to dynamic CT scanning identified an additional 10% of selected patients with unresectable disease. The authors believe that laparoscopy should be used in a selective manner for preoperative staging of patients suspected of having nonpancreatic periampullary tumours (Brooks et al., 2002).

Recommendation:
Diagnostic laparoscopy is useful in selected patients with potentially curable peripancreatic and periampullary tumours prior to resection.
Grade B

Bile duct tumours

Tumour staging in patients with a malignant obstruction of the proximal bile duct is focused on selecting patients who could benefit from a resection. Diagnostic laparoscopy has been used routinely in some centres in patients with a malignant obstruction of the proximal bile duct, even though data in the literature with regard to its additional value are conflicting.

In one study in patients with a suspected malignant proximal bile duct tumour and in whom "potential resectability" was demonstrated by means of conventional radiological staging methods (i.e., ultrasound combined with Doppler imaging, Computed Tomography, endoscopic retrograde cholangiopancreatography, and percutaneous transhepatic cholangiography), laparoscopy revealed histologically proven incurable disease in 44 (41%) of the 110 patients (31 with metastases and 13 with extensive tumour ingrowth), thereby avoiding exploratory laparotomy (Tilleman et al., 2002 III).

Recommendation:
Diagnostic laparoscopy is useful in patients with radiologically resectable proximal bile duct tumours.
Grade B

Liver tumours

Laparoscopy is helpful in the early detection and staging of primary hepatic malignancy. Evaluation of suspected hepatic malignancies, either primary or secondary, may be enhanced with laparoscopy (Coupland et al., 1981 III, Brady et al., 1987 IIb), since 80-90% of lesions are on the liver surface and two-thirds of the liver surface can be inspected. Laparoscopically-guided biopsy is particularly helpful when hepatic neoplasm is suspected and blind percutaneous biopsy is negative. When surgical resection is a therapeutic option, laparoscopy may reveal small (less than 2 cm) satellite lesions, which might not be detected using other modalities.

Recommendation:
Laparoscopy is useful in the evaluation of suspected hepatic malignancies.
Grade B

Lo et al. used laparoscopy and laparoscopic ultrasonography to evaluate 91 patients believed to have potentially resectable hepatocellular carcinoma, based on abdominal ultrasound and computed tomography (CT), as well as hepatic angiography. Fifteen patients were deemed unresectable, thus avoiding unnecessary laparotomy. There were no procedure-related complications, although the operative time was extended by an extra 20-25 minutes (Lo et al., 1999 III).

Recommendation:
Laparoscopy with laparoscopic ultrasound is recommended prior to planned laparotomy aimed at hepatic resection for patients with hepatocellular carcinoma.
Grade B

ABDOMINAL TRAUMA

Blunt abdominal trauma

The role of laparoscopy in blunt abdominal trauma is controversial with concerns regarding missed injuries and safety (Chelly et al., 2003 III, Poole et al., 1996 III). There have been no randomised controlled trials on the application of diagnostic laparoscopy in trauma.

In a review with an analysis of 11 reports on a total of 355 blunt abdominal trauma patients, the sensitivity and specificity of diagnostic laparoscopy in predicting the eventual need for therapeutic laparotomy were 94% and 98% respectively, with an overall accuracy of 97% (Leppaniemi and Elliott, 1996 III). Diagnostic laparoscopy could be useful in selecting patients with minor or non-bleeding injuries for conservative management after positive peritoneal lavage or computed tomography, and in excluding occult bowel and diaphragmatic injuries in patients with equivocal findings, thereby reducing the number of unnecessary laparotomies. The review did conclude that at that time (1996), laparoscopy could not be recommended as a routine tool for evaluating patients with blunt abdominal trauma.

In a prospective controlled study Elliott et al. found that diagnostic laparoscopy had no clear advantage in its ability to diagnose specific injuries over diagnostic peritoneal lavage and computed tomography in blunt trauma. But despite the technique being unreliable in identifying specific injuries, it possessed excellent sensitivity (96%) and specificity (100%) in determining the need for therapeutic laparotomy (Elliott et al., 1998 IIa).

Several non-controlled trials have suggested laparoscopy has a role in haemodynamically stable patients following blunt abdominal trauma.

In a study of 78 haemodynamically stable patients (15 to 79 years, 49 males and 29 females) with suspicious abdominal injuries, Chol and Lim performed diagnostic or therapeutic laparoscopy.

Fifty-two patients were evaluated for blunt trauma and 26 had sustained a stab wound. Preoperative evaluation with enhanced abdominal computed tomography (CT) showed some significant injuries in all cases. On the basis of the laparoscopic findings, diagnostic laparoscopy was sufficient for 13 patients, and therapeutic laparoscopy was performed in 65 patients (83%) for gastric wall repair [8], small bowel repair [15], small bowel resection-anastomosis [19], ligation of bleeding vessels in the mesentery and omentum [8], sigmoid colon repair [4], Hartmann's procedure [5] cholecystectomy [2], distal pancreatectomy [2], and splenectomy [2]. No significant abdominal injuries were missed as a result of laparoscopy, and no conversion to exploratory laparotomy was noted. The short-term results from this study suggest that laparoscopy is a safe, feasible, effective procedure for the evaluation and treatment of haemodynamically stable patients with abdominal trauma, and that it can reduce the number of non-therapeutic laparotomies performed.

Taner et al. evaluated 99 haemodynamically stable abdominal trauma patients (28 blunt and 71 penetrating injuries) among 428 patients admitted with abdominal trauma who underwent diagnostic laparoscopy prior to laparotomy. The diagnostic laparoscopy was negative in 60.7% of the patients with blunt abdominal trauma and in 62.0% of the patients with penetrating abdominal trauma. Only patients with positive laparoscopic findings (Group 1) underwent immediate laparotomy. The use of diagnostic laparoscopy reduced the rate of unnecessary laparotomies from 60.7% to 0 in blunt abdominal trauma and from 78.9% to 16.9% in penetrating abdominal trauma. The mean hospitalisation time was 2.75 days for patients with a negative diagnostic laparoscopy, whereas it was 7.4 days and 5.2 days in patients who underwent a therapeutic and non-therapeutic laparotomy, respectively following an initial positive diagnostic laparoscopy. Diagnostic laparoscopy might be used in selected patients to exclude significant intra-abdominal injuries (Taner et al., 2001 IIb).

Recommendation:
Diagnostic laparoscopy can be useful in haemodynamically stable patients with blunt abdominal trauma where CT has demonstrated a significant finding.
Grade B

Penetrating abdominal trauma

In a retrospective analysis from three trauma centres of 510 patients with penetrating trauma who were haemodynamically stable, laparoscopy was found to have an important diagnostic role. Laparotomy was avoided in 277 of the 510 patients (54%) and the mean hospital stay was 1.7 days (Zantut et al., 1997 IIb). A prospective study on haemodynamically stable patients with penetrating injuries to the anterior abdominal and lower chest found a significant decrease in both the rate of negative laparotomy, and the length of hospital stay following a negative evaluation (Guth and Pachter, 1998 III). Diagnostic laparoscopy was also found to be useful in patients with abdominal gunshot wounds who did not have obvious indications for laparotomy such as peritonitis or shock to exclude significant intra-abdominal injuries (Block et al., 1998 III). Similar findings have been reported by other centres (Ditmars and Bongard, 1996 III, Marks et al., 1997 III, Ertekin et al., 1998 III) and diagnostic laparoscopy has been found to reduce the costs associated with penetrating abdominal injuries (Marks et al., 1997 III, Block et al., 1998 III).

Recommendation:
Diagnostic laparoscopy is helpful in assessing haemodynamically stable patients with penetrating abdominal trauma.
Grade B

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