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Editorial

Laparoscopic Cholecystectomy: How are we doing?

Mark Skues, Editor-in-Chief

This final Edition of the year has something of a theme with daycase laparoscopic cholecystectomy being a subject in three of the papers published, in addition to one describing the development of emergency operating in the ambulatory environment.

A submission from South Wales describes the attempted implementation of a pathway by which orthopaedic trauma patients are transferred to an ambulatory area, undergo their operation, and then are discharged home on the same day. The results of eleven months of audit revealed a disappointing result, with only one patient being discharged on the same day as their operation. One hopes that persistence with the newly established pathway might bear more fruitful results in due course.

The surgical team from Milton Keynes, UK, present information on rates and success of laparoscopic cholecystectomy in obese patients, querying whether Body Mass Index complicates successful ambulatory management. With retrospective analysis of a cohort of 167 patients scheduled for ambulatory operations over a three year period, they found that there were no differences in rates of conversion to open operation, peri-operative complications or admission to hospital in the subsequent 30 days. Most importantly, their reported rate of successful daycase management for laparoscopic cholecystectomy was 83.2%. This figure correlates well with the overall data for Milton Keynes, where their hospital achieve between 65 and 70% for successful daycase management for this operation.

Vieira and colleagues present information regarding anaesthetic techniques for laparoscopic cholecystectomy, investigating whether there were any differences between anaesthesia provided for ambulatory or inpatient care. Somewhat reassuringly, they found nothing of significance between the various facets of anaesthetic care, beyond variation that development of guidelines would help to assuage. Significantly, their national rate for ambulatory laparoscopic cholecystectomy is cited as 12%.

An Indian perspective comes from Naresh Row, who cites the reasons why ambulatory cholecystectomies can present logistic issues in their particular Day Surgery facility. He presents a series of recommendations and advice to aid the ambulatory ethos, particularly in relation to this operation. It would seem that the greatest barrier to enhancement of ambulatory rates for laparoscopic cholecystectomy may be the patients themselves.

What data do we have to place this information into a national perspective? Claus Toftgaard wrote a paper that was published in this Journal providing data from 2009 [1], that was repeated for fewer countries in 2013 [2]. Data from England [3] indicates that the daycase rate was 52.8% for the 12 month period from April 2016 to March 2017. A recent publication from Belgium [4] has provided information on some other European countries for the most recent time period available (Table 1). While there seems to be healthy progress in the ambulatory rates for laparoscopic cholecystectomy, they would seem to indicate that there may be a need to influence surgical, anaesthetic and nursing colleagues across Europe of the potential benefit to patients of shorter stay surgery as well as the advantages that such care would accrue. Similarly,

Table 1 Ambulatory Laparoscopic Cholecystectomy rates.

| Country | Day Case rate % | | | |
|-------------------|-----------------|------|------|------|
| Year | 2007 | 2009 | 2011 | 2014 |
| Denmark | 43% | 58% | 63% | 57% |
| Finland | 25% | 28% | 28% | 36% |
| Sweden | 16% | 17% | 22% | 31% |
| Ireland | | | | 29% |
| Norway | 20% | 88% | | 26% |
| France | 0.4% | 1.1% | | 19% |
| The Netherlands** | 4.4% | 6% | 6% | |
| Belgium* | 1.9% | 3% | | 5% |
| Germany | | 0% | 0% | 0% |
| England | 14.5% | 20% | 32% | 45% |
| Scotland | 3% | 13% | 20% | |
| Spain | | 5% | | |
| Portugal | 1.1% | 15% | | |
| Italy | 1.4% | 5% | | |

* Data for 2013 (most recent data). **Data for 2010 (most recent data).

the development of comparative indices by IAAS member countries evaluating the performance of procedures suitable for ambulatory management would assist in highlighting those countries worthy of support. Preparations for this seem to be well advanced [5] with suggestions for the ideal cohort of ambulatory procedures in place. Hopefully, we will see a publication on this subject in this Journal before too long.

Mark Skues
Editor-in-Chief

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Developing a Day Surgery Trauma Pathway in a Rural District General Hospital

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Abstract

Day Surgery is fast becoming an option for Surgeons when admitting Emergency/Trauma patients who require surgical intervention. By developing a pathway for this process, patient satisfaction may be improved, and there may be more efficient planning of Emergency/

Keywords: Pathway, Emergency, Trauma.

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Trauma lists with a reduction in length of stay. Following a retrospective audit, identifying potential patients who would have been suitable for emergency day surgery, a new trauma pathway was implemented in Withybush Hospital, a small district hospital in West Wales.

Introduction

Day Surgery is constantly developing and expanding its boundaries. Over the last few years the emphasis has been on developing Emergency/Trauma pathways for the Day Surgery setting for various procedures [1]. This process benefits both patient and hospital with a shorter length of stay enhancing the patient experience and releasing hospital bed capacity for other patients. The British Association of Day Surgery (BADS) suggests the treatment of emergency surgical cases (including trauma) are ideally performed in a Day Surgery setting [2].

Withybush Hospital's catchment area covers Pembrokeshire, Carmarthenshire and Ceredigion (Hywel Dda University Health Board) in west Wales, and serves a population of around 375,000. However this number increases greatly during the summer months as our catchment area lies within a very popular tourist region. Withybush Hospital is a rural district hospital and currently has 115 Medical beds, 76 Surgical and Orthopaedic beds, and 4 operating theatres including an emergency theatre. The self-contained Day Surgery Unit comprises an operating theatre, treatment room and 11 patient spaces.

Aims

Having reviewed the literature and attended several workshops on the development of Emergency Pathways within the Day Surgery Setting, the decision was made to create such a pathway in Withybush Hospital. However, most successful emergency pathways have been developed in much larger hospitals where the pathway involves a 2nd Trauma/General Surgery team on call, allowing concurrent lists of day surgery and in-patient Trauma/Emergency [3,4]. These models of care also have several dedicated day case lists per week, which allows Trauma/Emergency patients to be booked in advance. Could an emergency ambulatory pathway be created in a small district hospital and remain sustainable with existing resources?

The practice in our hospital for potential day case trauma patients, admitted from A&E or fracture clinic, was rather disorganised. The patient flow team managed these patients and only contacted Day Surgery if there were no inpatient beds with in the hospital. If they had attended A&E they were asked to contact the patient flow team the next day to arrange admission. There was no standard process for the admission of these patients and the route of admission was variable

depending on available beds. All trauma patients had their surgery performed on the Main Theatre trauma list.

Methods

The concept of a Day Case Emergency Trauma Pathway was explained to the Trauma and Orthopaedic consultants and received in a positive manner. Thereafter a 'stakeholder' meeting was held to discuss thoughts and ideas. The success of the project required an integrated and enthusiastic team, consisting of: Senior Nurse Day Surgery Ward and Day Theatres, Clinical Lead for Orthopaedics, Senior Nurse Manager Orthopaedics, Trauma Pathway Nurse, Senior Nurse Manager Day Surgery, Anaesthetic lead for Day Surgery, Surgical Nurse (Orthopaedics) Practitioner and Senior Sister Main Theatre, and terms of reference were agreed.

A retrospective audit was conducted to assess the number of successful Emergency Trauma patients treated on a day case basis and how many potential cases could have received day case treatment had a new pathway been implemented.

The new pathway involved the identification of patients, suitable for the day case pathway, at the daily trauma meeting where patients admitted over the previous 24 hours are discussed. After identifying appropriate ambulatory patients, admission is arranged by contacting the patient directly either by the Trauma Pathway Nurse or the coordinator of the Day Surgery Unit. At this stage a patient health screen is conducted by phone to identify any contraindications to ambulatory surgery. This ensures the patient is likely to be fit for theatre and that they are fully informed of their admission process, thereby reducing their anxiety. The trauma list can then be compiled with planned operation details and ward location.

Results

The retrospective audit over an eleven month period showed that 19 patients received their surgery on a day case basis. Only 1 patient was successfully discharged on the day of surgery while 14 stayed overnight.

The injuries requiring surgery are shown in Table 1.

Thirteen patients were admitted with fractures, either upper or lower limb, while the remaining 6 patients sustained soft-tissue injuries only.

Table 1 Sustained Trauma in Day Surgery Pathway Patients and their Outcome.

| Modality | N | Same Day Discharge | One Night Stay | Ward Transfer | Hospital Transfer |
|---------------------|---|--------------------|----------------|---------------|-------------------|
| Upper Limb Fracture | 5 | 1 | 3 | 1 | |
| Upper Limb Injury | 3 | | 3 | | |
| Lower Limb fracture | 8 | | 5 | 3 | |
| Lower Limb Injury | 4 | | 2 | 1 | 1 |

The correlation between the type of injury and length of stay is shown again in Table 1. Patients with fractures appeared to have a longer length of stay than those with soft tissue injuries.

A retrospective audit over 5 months February to June 2017 indicated that 37 patients could have potentially undergone day case rather than inpatient surgery following their admission for trauma.

As a result, a new but simple day surgery trauma pathway was instituted as a pilot study as shown in Figure 1. Patients considered suitable for Day case Emergency Surgery were identified at the morning trauma meeting where all patients admitted in the previous 24 hours are discussed. Due to restrictions of staff, the new pathway runs Monday to Friday with weekend admissions admitted to an inpatient facility as before.

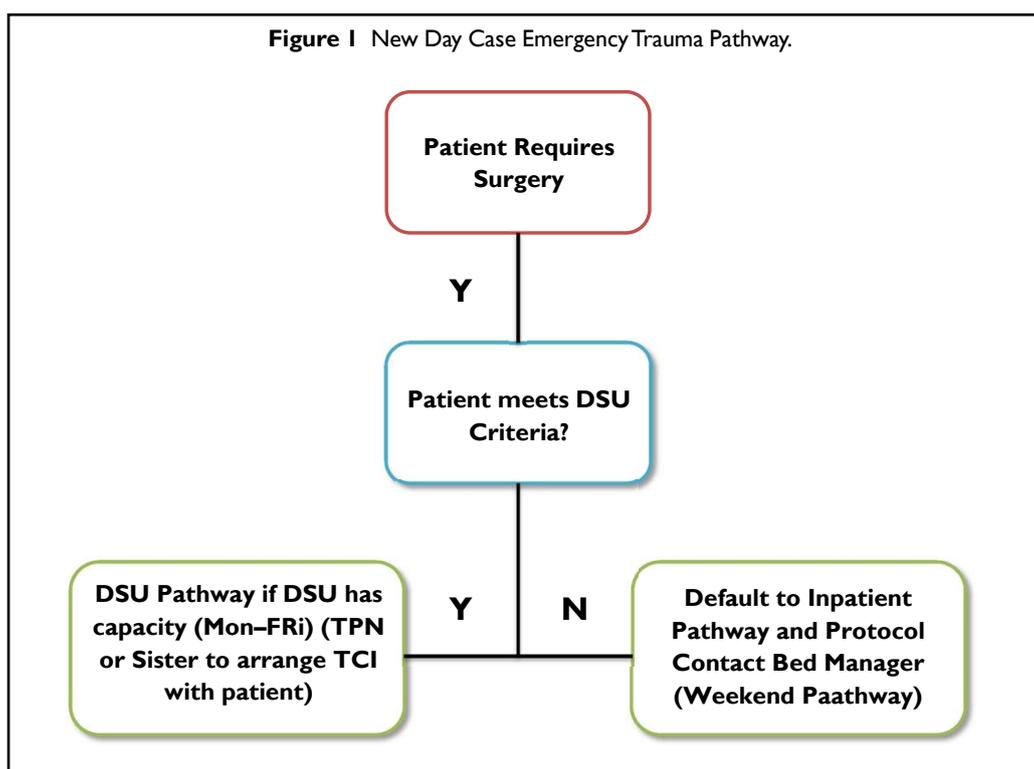
Discussion

The results of the 11 month retrospective audit of same-day discharge of trauma procedures following surgery is disappointing. The reasons for failed discharge include the usual problems of postoperative pain,

PONV, and late return from theatre. However the 5 month audit of potential day-of-surgery discharges shows that approximately one patient per week could benefit from discharge on the day of surgery.

While this saving in terms of hospital resource does not seem significant, it constitutes an annual saving of at least 63 in-patient bed days and possibly more if some patients stay more than one night in hospital. In a small district hospital, with seasonal variation in demand due to tourism, any bed-savings are at a premium and any patient who can be diverted through day surgery is beneficial in maintaining patient flow through the trauma department.

By keeping the pathway simple, adoption by clinical personnel is more likely. The key to success of this pilot project is the function of the Trauma Pathway Nurse, liaising with the orthopaedic surgeons and scheduling patients appropriately. As all trauma admissions are discussed at the morning trauma meeting, patients are allocated for immediate surgery or delayed surgery. Patients are also assessed regarding day surgery criteria, and if suitable, allocated early on the trauma list. If surgery can be delayed, the patient can be allocated a day surgery admission the following day and the Trauma Pathway Nurse informs the patient of all relevant instructions regarding



fasting, location and time of admission. Although this pilot is in its infancy, it is felt that this pathway will standardise the process of the trauma patients within Witherby Hospital and raise patient satisfaction while freeing up inpatient beds and decreasing length of stay. While a dedicated day case trauma list would be the ideal situation, this may not be cost-effective due to variable workload.

The process has been positively welcomed by all the Orthopaedic Surgeons, as prior to the commencement of the pathway there was no standard pathway for minor trauma, leading to frustration and stress in the on-call team. The initial feedback regarding the new ambulatory pathway is positive from both staff and patients, with agreement to list the minor ambulatory trauma patients at the beginning of the operating day. Time will tell if our new ambulatory trauma pathway can create sustainable change in our district hospital.

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The Impact of High BMI on Outcomes after Day Case Laparoscopic Cholecystectomy: A United Kingdom University Hospital Experience

Mazhar H. Raja, Louise Dunphy, Elamin El-Shaikh, Douglas McWhinnie

Abstract

Introduction: Approximately 12-15% of the United Kingdom adult population have gallstones and patients with a high BMI are at an increased risk [1]. These individuals are considered to pose a high risk of anaesthetic and surgical complications. The authors performed a 3-year retrospective cohort study to evaluate both primary and secondary outcome measures in patients undergoing a laparoscopic cholecystectomy, stratified by BMI. A specific focus on the safety and success of the operation in obese and morbidly obese patients was performed.

Methods: A retrospective audit of 167 cholecystectomies performed at Milton Keynes University Hospital by a single surgical team over a three-year period from January 1st 2011–December 31st 2013. The patients were divided into six BMI groups: underweight ($<18.5\text{kg/m}^2$), desirable weight ($18.5\text{--}24.9\text{kg/m}^2$), overweight ($25\text{--}29.8\text{kg/m}^2$), obese class I ($30\text{--}34.9\text{kg/m}^2$), obese class II ($35\text{--}39.9\text{kg/m}^2$) and morbidly obese Class

III ($>40\text{kg/m}^2$).

Results: A total of 167 patients (49 males, 118 females) with ages ranging from 18–83 years were included in this study. Our overall conversion rate to open was 4.8%. The mean operating time, recorded from incision to the completion of the surgical closure, was 75 minutes. However, the operating time increased to a mean of 90 minutes in patients with a BMI >40 . A total of 139 patients (83.2%) were discharged the same day and 13 (7.8%) within 2 days. The readmission rate within 30 days of surgery was 2.3%.

Conclusions: The authors conclude that day case laparoscopic cholecystectomy is a feasible, cost effective and safe treatment modality for symptomatic gallstones in individuals with a high BMI. It is important to pre-assess all individuals carefully identifying any anaesthetic concerns, with patient safety remaining a priority.

Keywords: laparoscopic cholecystectomy, day case, Body Mass Index.

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Introduction

Approximately 12-15% of the UK adult population have gallstones, with up to 4% becoming symptomatic every year [1]. A high body mass index is a well-established risk factor. As a result, a large proportion of patients who require a cholecystectomy for symptomatic cholelithiasis fall into the overweight, obese or morbidly obese categories [2]. Laparoscopic cholecystectomy has become the gold standard for the treatment of symptomatic gallstones, offering a shorter length of hospital stay and reduced post-operative pain. The British Association of Day Surgery recommends that 75% of laparoscopic cholecystectomies could be performed as day cases annually [3]. Previous studies have shown similar rates of postoperative complications in obese and non-obese groups, with an increased operating time being the only consistent difference [4,5].

Patients and Methods

A retrospective cohort study was undertaken over a 3 year period from January 1st 2011–December 31st 2013, on patients receiving their operation by a single surgical team. Data was retrieved from the theatre logbooks and the Electronic Medical Records System.

Parameters including co-morbidities and the American Society of Anaesthesiology grade were recorded. The patients were divided into six BMI groups: underweight ($<18.5\text{kg/m}^2$), desirable weight ($18.5\text{--}24.9\text{kg/m}^2$), overweight ($25\text{--}29.8\text{kg/m}^2$), obese class I ($30\text{--}34.9\text{kg/m}^2$), obese class II ($35\text{--}39.9\text{kg/m}^2$) and morbidly

obese Class III ($>40\text{kg/m}^2$). All patients underwent VTE (venous thromboembolism) assessment and subcutaneous low molecular weight heparin and/or anti-embolic stockings administered where appropriate. Anaesthesia was induced with propofol in all cases and maintained using sevoflurane. Anti-emesis was provided with intravenous cyclizine, dexamethasone along with intravenous fluids. Intravenous antibiotics were not routinely administered and were only given in cases of bile leak or empyema. Intravenous paracetamol was the drug of choice for preoperative and postoperative analgesia. On discharge, patients were advised to contact their general medical practitioner, the Surgical Assessment Unit or the Emergency Department if they had any concerns. The Clavien-Dindo classification was used to classify postoperative complications occurring within 30 days of the primary procedure [6].

Inclusion and Exclusion Criteria

At pre-assessment clinic, all individuals with symptomatic uncomplicated gallstones [no history of severe pancreatitis] and an ASA grade of I-3 with adult company at home for 24 hours post operatively were considered for a day case procedure. Those individuals with complicated gallstones following a thorough assessment, were offered a day case procedure with the provision of overnight admission if required.

Those individuals with severe obstructive sleep apnoea requiring CPAP and those individuals with a high ASA grade of 4 were not considered for a day case procedure.

Discharge Criteria

Patients were discharged on the same day of surgery if they were haemodynamically stable, mobilising safely, eating and drinking, passed urine and without significant pain, nausea or vomiting. Those individuals with a surgical drain remained overnight.

Primary Outcomes Measures

Primary outcomes were classified as a successful day case laparoscopic cholecystectomy with discharge on the same day.

Secondary Outcome Measures

Secondary outcomes were considered as a failed day case discharge in patients identified as a day case procedure pre-operatively. The reasons for a failed discharge were assessed.

Results

A total of 167 patients [49 males, 118 females], with ages ranging from 18-83 years were booked for an elective day case procedure over a three-year period (Table 1). There were no significant demographic differences between the 6 BMI groups. The patients' BMI and co-morbidities were recorded (Tables 2,3). ASA grade was categorised as ASA I in 39 patients, ASA II in 95 and ASA III in the remaining 33 patients. Only 35 patients were classified as "desirable weight", with 15 patients morbidly obese. A total of 143 individuals had a pre-operative ultrasound scan and 11 underwent a CT scan of the abdomen. Liver function tests were performed in all cases. If a common bile duct stone was suspected on ultrasound scan, magnetic resonance cholangio-pancreatography was performed, followed by endoscopic retrograde cholangiopancreatography for clearance of the common bile duct. Balloon trawl and sphincterotomy were performed in 17 cases. The indication for LC was cholelithiasis or acute cholecystitis in 165 cases, with the other 2 patients requiring cholecystectomy for gallbladder polyps.

Table 1 Laparoscopic cholecystectomies performed from 2011–2013.

| | 2011 | 2012 | 2013 | Total |
|---------------------------|------|------|------|-------|
| Elective Day Case | 46 | 33 | 84 | 163 |
| Emergency Day Case | 1 | 0 | 3 | 4 |
| Total | 47 | 33 | 87 | 167 |

Table 3 Documented co-morbidities in 167 patients.

| | Overweight 25–29.9kg/m² | Obese Class I 30–34.9kg/m² | Obese Class II 35–39.9kg/m² | Morbidly Obese Class III >40kg/m² |
|---|---|--|---|--|
| Endocrinological [diabetes,thyroid] | 5 | 3 | 5 | 2 |
| Cardiac [HTN,AF,CABG] | 9 | 6 | 15 | 10 |
| Active malignancy [colon, prostate] | 2 | 4 | 5 | 0 |
| Respiratory [asthma] | 5 | 4 | 4 | 2 |
| Chronic kidney disease | 1 | 0 | 2 | 4 |
| Gastrointestinal [cirrhosis] | 1 | 0 | 1 | 0 |

Laparoscopic cholecystectomy was performed by a single team of four Consultant General Surgeons using a standard four port technique. Access to the abdomen was obtained by the open technique. Longer ports were available if required. Two cases of bile leak were observed intra-operatively. These patients had a recorded BMI of 29kg/m² [overweight] and 43kg/m² [morbidly obese] respectively.

Intra-operative antimicrobials were administered in 18 cases: IV co-amoxiclav [16] and if penicillin allergic, teicoplanin and gentamicin. Abnormal ductal anatomy, including Mirrizzi Syndrome and dense adhesions led to open conversion in 8 patients (4.8%) as shown in Table 4. The mean operating time, recorded from incision to the completion of the surgical closure, was 75 minutes. However, the operating time increased to 90 minutes with BMI >40 (Table 5). Five patients had a Robinson drain inserted (4 in overweight patients and 1 obese class 2). All were removed within 48 hours. The average length of hospital stay ranged from 1 to 10 days. The factors influencing a prolonged hospital stay included converting to an open procedure (n=8), drain insertion (n=5) and ongoing sepsis (n=4). There were no cases of gallbladder cancer on histology.

Four patients (2.3%) required readmission within 30 days of their operation (2 patients with pain, 1 with nausea and 1 with transient jaundice). No patient required immediate readmission within 48 hours.

Discussion

Conventional abdominal surgery in the grossly obese individual is associated with an increased rate of wound infection, atelectasis, respiratory tract infection and thrombo-embolic events in the post-operative period. In addition, technical problems such as difficulty with access and retraction of the abdominal wall and viscera are encountered. Cholecystectomy remains the preferred treatment option for symptomatic cholelithiasis with laparoscopic cholecystectomy now considered the gold standard for more than two

Table 2 Recorded BMI in all 167 patients.

| | | |
|---------------------------------|-------------|----|
| Underweight | < 18.5 | 5 |
| Desirable weight | 18.5 – 24.9 | 35 |
| Overweight | 25 – 29.9 | 49 |
| Obese Class I | 30 – 34.9 | 41 |
| Obese Class II | 35 – 39.9 | 22 |
| Morbidly obese Class III | >40 | 15 |

Table 4 Indications for conversion to an open procedure.

| Indication for conversion | No. of patients | Underweight | Desirable | Overweight | Obese Class I | Morbidly Obese |
|---------------------------|-----------------|-------------|-----------|------------|---------------|----------------|
| Abnormal ductal anatomy | 1 | | | | 1 | |
| Mirizzi Syndrome | 1 | | | | | 1 |
| Adhesions | 3 | | | 1 | 2 | |
| Situs Ambiguous | 1 | 1 | | | | |
| Perforation at fundus | 1 | | | | | |
| Haemangioma of liver | 1 | | | 1 | | |
| Total | 8 [4.8%] | 1 | 1 | 2 | 3 | 1 |

Table 5 Operating times and the mean duration of hospital stay.

| BMI | <18.5 | 18.5–24.9 | 25–29.9 | 30–34.9 | 35–39.9 | >=40 |
|-------------------------------------|-------|-----------|---------|---------|---------|------|
| Completed as daycase | 2 | 33 | 42 | 39 | 17 | 6 |
| Overnight stay | | | | | | |
| 2 nights | | 1 | 6 | 2 | 1 | 3 |
| 3 nights | 2 | | | | | 2 |
| 4 nights | 1 | | | | 2 | 3 |
| 5 nights | | 1 | | | | |
| 6 nights | | | | | 2 | |
| 8 nights | | | 1 | | | 1 |
| Duration of Surgery (min) | | | | | | |
| Laparoscopic | 60 | 70 | 75 | 80 | 89 | 90 |
| Open | | 120 | | 160 | | 180 |
| Clavien Dindo Classification | | | | | | |
| Grade II [HAP] | | | 1 | 1 | | |
| Biliary Stent | | | 1 | | | |
| Urology | | | | 1 | | |
| Post-Partum | | | 1 | | | |

decades. In 2011, the Association of Anaesthetists of Great Britain and Ireland published joint guidance, recommending that patients' fitness for surgery should not be limited by assessment of BMI alone [7]. Our study, although limited by its retrospective design has shown that day case LC is safe in both obese and morbidly obese patients, with no increase in the rate of overnight stay.

Several studies reviewing the impact of BMI on laparoscopic cholecystectomies have suggested that the operation itself is no more difficult in obese patients and the laparoscopic approach is better suited to this patient cohort [8]. This is further supported by the findings of Tandon, with no significant differences in extension to overnight stay, rates of intra-abdominal collection or readmission between the BMI groups [9]. Tandon also showed an increase in the mean duration of surgery with increasing BMI and the difficulties encountered included port insertion and wound closure [9]. In our study, the mean difference in operating times between the desirable BMI and morbidly obese groups was 20

minutes. Although the amount of fat in the triangle of Calot may be greater in the grossly obese, careful dissection still allows identification of the relevant structures and their safe management.

Admittedly, some difficulty can be encountered in closing the fascia in the epigastric and infra-umbilical wounds, but this was avoided in our cases by using a purse string suture. The conversion rate reported in grossly obese patients ranges from 1.1% to 11.4%, but most reports show no significant difference from the rate in the non-obese [9].

In a study by Champault, a conversion rate of 4.5% in obese patients and 1.8% in non-obese patients was found [10]. Farkas showed that compared with normal weight patients, obese and even morbidly obese patients have no increased risk of conversion to open surgery, nor is there an increased risk of perioperative complications [11]. In our study, the conversion rate to an open procedure was 4.8%, stratified for BMI as follows: underweight (1), desirable weight (1), overweight (2), obese class III (3) and morbidly obese (1).

Our conversion rate compares favourably with published figures of 5-10% [12]. In our study, a bile leak was recognised in 2 cases at cholecystectomy and it has been reported that 25-32.4% of bile duct injuries are recognised at the index surgery [13].

In 2013, the Royal College of Surgeons England implemented a commissioning guide on gallstone disease, recommending a quality standard of <10% readmission rate after cholecystectomy within 30 days [14]. Several studies indicate a 30-day readmission rate of between 2-6%, due to abdominal pain and wound infection, usually at the umbilicus. Our readmission rate of 2.4%, attributed to nausea and non-specific abdominal pain, compares favourably with published figures [15,16]. Although the incidence of wound infection and pulmonary complications may be higher following open abdominal operations, most recent reports of LC in obese and non-obese patients showed no significant difference in complication rate or hospital stay.

Our study demonstrates that elective day case laparoscopic cholecystectomy is a safe and feasible treatment option in patients with a high BMI leading to a reduction in the costs associated with an inpatient stay, a reduction in the risk of hospital acquired infections and thromboembolic events. We do not feel that the small increase in the operating time has a significant impact on the running of the operating list.

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Challenging the Anaesthetic Technique for Laparoscopic Cholecystectomy in Ambulatory Surgery

Sara Bernardo, Artur Vieira, Vicente Vieira

Abstract

Laparoscopic cholecystectomy (LC) is the gold standard procedure for the surgical treatment of lithiasic gallbladder disease and acute cholecystitis, with this procedure now increasingly performed in ambulatory setting with minimal morbidity. In Portugal, 17% of LCs are performed in the outpatient setting, which frequently includes overnight stay. Many different anaesthetic regimens have been suggested but currently there is still insufficient data to conclude which is superior. We conducted an observational retrospective study that included all patients submitted to elective LC in 2015 with the purpose to evaluate

Keywords: Anaesthesia; Laparoscopic cholecystectomy; Ambulatory surgery.

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if there were significant differences in the anaesthetic technique used in ambulatory and inpatient settings. A total of 261 patients were analysed. Of all the variables tested, only few showed statistical significance, those being age, ASA physical status, dose of fentanyl administered, neuromuscular and depth of anaesthesia monitoring and PONV prophylaxis. Still, we can conclude that there was not a significant difference between the anaesthetic technique in ambulatory and inpatient groups. Consequently, it would be expected that the number of patients proposed for ambulatory LC were to be higher.

Introduction

Laparoscopic cholecystectomy (LC) is the gold standard procedure for the surgical treatment of lithiasic gallbladder disease and acute cholecystitis, after several studies demonstrated similar complications and mortality rates compared with the open approach, although with a reduction in hospital stay and convalescence time [1,2]. After initial concerns regarding patient safety, this procedure is now increasingly performed in ambulatory setting with minimal morbidity [3,4], due to improvements in anaesthesia and perioperative care.

In Portugal, 17% of LCs are performed in an outpatient setting [5], which frequently includes overnight stay. Nevertheless, this proportion still falls short of the numbers described in the literature, with the cause probably being multifactorial, with a combination of anaesthetic, surgical or social factors.

Many different anaesthetic regimens have been suggested for use in ambulatory LC, but currently there is still insufficient data to conclude which is superior [6]. The effect of anaesthesia may persist after completion of surgery and can delay or impede discharge.

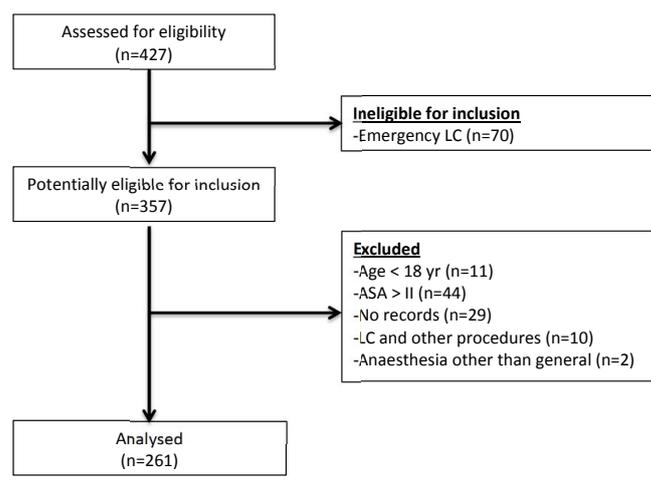
Our study aimed at finding if the anaesthetic approach for LC is different between day-case and inpatient surgery.

Materials and Methods

We conducted an observational retrospective study that included all patients submitted for elective LC in 2015 under general anaesthesia, aged more than 18 and with American Society of Anesthesiologists (ASA) physical status class 1 and 2 (Figure 1). Patients were divided in group A (Ambulatory) and group I (Inpatient), considering the surgical setting. Our decision to include only ASA 1 and 2 patients was an attempt to have a homogeneous sample between these two groups, since ASA 3 patients were more frequent in the group I.

The purpose of this study was to evaluate if there were significant differences in the anaesthetic technique used in ambulatory and inpatient settings. The following variables were tested: gender, age, ASA physical status, administered dose of fentanyl and neuromuscular

Figure 1 Inclusion/Exclusion Criteria.



blocking agent, neuromuscular block reversal agent preferred, airway management device, analgesia protocol, number of drugs for postoperative nausea and vomiting (PONV) prophylaxis, neuromuscular and depth of anaesthesia monitoring and anaesthesia duration.

Statistical analysis was conducted using GraphPad Prism (version 7 GraphPad Software Inc., San Diego, CA). Both groups were characterized with descriptive analysis and continuous data are expressed as mean \pm standard deviation. Comparison of continuous data was performed with the student t-test, while comparison of categorical data was performed using the chi-square test. A level of $p < 0.05$ for statistical significance was used.

Results

A total of 261 patients were analysed and subsequently divided into two groups: group A (N= 112; 43%), and group I (N=149; 57%) (Table 1).

Table 1 Results of Ambulatory and Inpatient Groups.

(ASA - American Society of Anesthesiologists; F - Female; M - Male;
 NMB - Neuromuscular Block; NSAID - Nonsteroidal Anti-Inflammatory Drug;
 PONV - Post-Operative Nausea and Vomiting)

| | Group A Ambulatory | Group I Inpatient |
|--|---------------------------|--------------------------|
| Number of Procedures | 112 | 149 |
| Gender (M/F) | (37/75) | (58/91) |
| Age in years (Mean+/-SD) | 50.3+/-1.3 | 59.4+/-1.4 |
| ASA Physical Status | | |
| ASA 1 (n,%) | 42/112 (37.5%) | 30/149 (20.1%) |
| ASA 2 (n,%) | 70/112 (62.5%) | 119/149 (79.9%) |
| Analgesia protocol | | |
| Fentanyl dose (mcg) (Mean+/-SD) | 192+/-4 | 206+/-4 |
| Acetaminophen + Port Site Infiltration | 0/110 | 2/145 (1%) |
| + Other opioids only (n,%) | 14/110 (12.5%) | 19/145 (12.8%) |
| +NSAID only (n,%) | 13/110 (11.6%) | 9/145 (6.0%) |
| + Other opioids + NSAID (n,%) | 83/110 (74.1%) | 115/145 (77.2%) |
| PONV Prophylaxis | | |
| No Agent (n,%) | 2/112 (1.8%) | 2/149 (1.3%) |
| One Agent (n,%) | (5.4%) | 24/149 (16.1%) |
| Two Agents (n,%) | 59/112 | 80/149 (53.7%) |
| Three Agents (n,%) | 45/112 (40.2%) | 43/149 (28.9%) |
| Airway Management | | |
| Tracheal Tube (n,%) | 96/110 (87.2%) | 131/139 (94.2%) |
| Laryngeal Mask (n,%) | 14/110 (12.7%) | 8/139 (5.8%) |
| Neuromuscular Blocker Use | | |
| Rocuronium use (n,%) | 91/109 (83.4%) | 114/141 (80.9%) |
| Rocuronium dose (mg) (Mean+/-SD) | 44+/-1 | 45+/-1 |
| Use of NMB Monitors (n, %) | 25/109 (22.9%) | 54/141 (38.3%) |
| NMB Reversal | | |
| None (n,%) | 31/109 (28.4%) | 26/141 (18.4%) |
| Atropine/Neostigmine | 26/141 (18.4%) | 93/141 (80.1%) |
| Sugammadex | 4/109 (5.2%) | 19/141 (16.5%) |
| Both | 3/109 (3.9%) | 3/141 (2.6%) |
| Duration of Anaesthesia (min+/-SD) | 90.1+/-2.7 | 94.9+/-2.8 |

The population was predominantly female (67% in group A and 61% in group I) and the average age was 50.3 ± 1.3 years in group A and 59.4 ± 1.4 years in group I, with this difference being statistically significant ($p < 0.0001$) (Table 1). No valid reason was found to the predominance of the female population in Group A.

Most of the patients were ASA 2 (63% in group A and 80% in group I), also with statistical significance ($p = 0.0019$) (Table 1).

The fentanyl dose administered was $192 \pm 4 \mu\text{g}$ in group A compared with $206 \pm 4 \mu\text{g}$ in the group I. Although this difference was statistically significant ($p = 0.0262$), we assume that a difference of $14 \mu\text{g}$ is not clinically significant.

Regarding the use of neuromuscular blocking agent, it was used in 97% of surgeries in group A and 95% of surgeries in group I. The most used agent was rocuronium in both groups (83.5% and 81.4%, respectively) and its dose was $43 \pm 1 \text{ mg}$ in Group A and $45 \pm 1 \text{ mg}$ in Group I. Reversal of neuromuscular blocking was preferred in Group A (71% vs 82%), with neostigmine/atropine the selected agents in the majority of cases. 28% and 18% of the patients in Groups A and I respectively received no reversal agents.

A multimodal strategy was used for analgesia but there was no specific protocol for this procedure. We found that in the Group I there was a greater use of different analgesics combinations [acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDs), other opioids in addition

to fentanyl (eg tramadol or morphine) and local anaesthetic port-site infiltration] (Table 1).

As for PONV prophylaxis, the group I also used more anti-emetics than group A, with statistical significance ($p=0.0119$) (Table 1).

Concerning the airway management, the endotracheal tube (ETT) was preferred in 87% of the cases in group A and 94% in group I, whereas the laryngeal mask airway (LMA) was utilized in the remaining cases. In 12 patients (2 in Group A and 10 in Group I), there were no data regarding the airway approach.

Neuromuscular block was monitored with TOF-scan® in 23% (Group A) vs 38% (Group I) and depth of anaesthesia using BIS® or Sedline® was monitored in 11% (Group A) vs 32% (Group I), with both of these variables showing statistical significance ($p=0.0154$ and $p<0.0001$, respectively) (Table 1).

The anaesthesia duration was 90 ± 3 minutes for Group O and 95 ± 3 minutes for Group I.

Discussion

The best anaesthetic regimen should ideally cause the fewest adverse effects and enable the surgery to be completed in the ambulatory setting. Additionally, different anaesthetic regimens have different patient acceptability and recovery profiles, which may also vary depending on pre-existing medical conditions that the patient may have. Thus, the anaesthetic choice can definitely influence the recovery and discharge, implying vast implications to the patient and healthcare funder.

The preferred opioid agent for this procedure was fentanyl, with a short acting action, and whose dose was not clinically significant between the two groups.

A neuromuscular blocking agent was administered in most cases in order to achieve muscle paralysis. Its use, albeit permitting a better surgical field and ventilation, also increases the risk of residual post-operative neuromuscular blockade, which is associated with increased respiratory morbidity [7,8]. Consequently, quantitative neuromuscular monitoring (e.g. acceleromyography) should be used to exclude residual neuromuscular blockade and to guide reversal agent administration [9]. Sugammadex has obvious advantages in ambulatory surgery [10], but in our reality it is still judiciously administered. Factors such as costs are still preponderant in our current practice.

Despite lesser as compared to open procedure, postoperative complications such as pain, nausea and vomiting are still significant and may even delay the recovery process and subsequent discharge [11,12].

Pain after LC has several origins: incisional, local visceral, peritoneal and referred, thus, a multimodal approach seems to be beneficial in treating postoperative pain. Several analgesic regimens have been studied [13,14]. The PROSPECT working group recommends intra-operative administration of NSAIDs, short-acting strong opioids, and port-site infiltration and/ or intraperitoneal instillation of local anaesthetics. In our study, different protocols were used with no significant differences between them, but the small number of patients in each group biased the statistical analysis, and also no data was collected from the post-operative phase.

As previously stated, PONV prophylaxis is a key factor that influences same day discharge [11,12]. Interestingly, Group I received more anti-emetics despite this being the inpatient group, and with apparent similar comorbidities. Further studies need to address the incidence of PONV between these two groups.

It was noted that the use of the ETT was predominant in both groups, despite growing evidence (and not necessarily recent) that support the use of LMA during laparoscopic surgery, including CL [15–17]. The use of LMA has several advantages when compared to the ETT, such as quick and easy placement and lesser need of neuromuscular blockade. The increased risk of regurgitation and pulmonary aspiration is present but several studies demonstrated the safety of these devices with no increase in incidence of these events [15,16]. The adequacy of optimal ventilation under pneumoperitoneum was also questioned also with no evidence against [17].

This study is not without its limitations. First, it is a retrospective study. Retrospective analyses are prone to bias related to available data quantity and quality. Second, it is a single-centre study in Portugal with predominantly healthy patients, and thus the findings cannot be generalised. Third, we cannot exclude that our analyses include unmeasured confounders (for instance, severity of surgery). Finally, the study was limited to intra-operative variables, and no data was collected during the immediate post-operative period, namely adequacy of the analgesic strategies, incidence of PONV and duration of post anaesthesia care unit stay.

Conclusions

The ideal anaesthetic regimen for LC in ambulatory surgery should include short acting agents that produce anxiolysis, lack of awareness during the procedure, adequate neuromuscular relaxation, good analgesia and PONV prophylaxis, enabling a fast recovery and no adverse effects. Thus, the anaesthetic regiment includes different components that can interfere with the adequate recovery and timely discharge.

Of all the variables tested, only few showed statistical significance ($p<0.05$), those being age, ASA physical status, dose of fentanyl administered, neuromuscular and depth of anaesthesia monitoring and PONV prophylaxis. Still, we can conclude that there was not a significant difference between the anaesthetic technique in ambulatory and inpatient groups. Consequently, it would be expected that the number of patients proposed for ambulatory LC were to be higher.

Furthermore, it is necessary to analyse the post-operative period, mainly to understand if indeed there are no differences between these two groups.

Finally, we also concluded that the use of LMA is still infrequent, despite numerous authors supporting its use, as with the neuromuscular and anaesthesia depth monitoring, aspects that may be improved in the future.

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Day Case Laparoscopic Cholecystectomy (DCLC) in a Developing Country

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Keywords: Laparoscopic Cholecystectomy, Day surgery, One Day Surgery, Stand alone, Day Care Surgery.

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Introduction

Laparoscopic Cholecystectomy started in 1990 in India, but, Day Case Laparoscopic Cholecystectomy (DCLC) is not an established norm. The review of literature from India, throws up just a handful of studies, usually as retrospective analyses of single individual centres. The attitude of healthcare providers and the patients usually is 'What difference does it make?' which defeats the purpose of Day Surgery all together.

One of the oldest published data from India, had found 313 cases fit for DCLC, and concluded that it is a safe and feasible procedure for a developing country, provided they develop their own guidelines based on local patient demography [1].

Surgeons' point of view

Usually, most are single surgeon teams, working in small set-ups across the country. There are very little data on DCLC from India, mostly based on individual experience from private sources and are dependent on western data. Therefore, it is an extra effort on the part of the surgeon to create a team, which will work in unison and follow the set pattern.

Safe guidelines will need to be set in place as they are non-existent as of now. Also, the training provided for Lap surgeries are available only in larger towns and Metro cities, so, opportunities for training for DCLC does not exist. Objections have been raised about several aspects of training where day care surgery has been used [2,3].

Patients' point of view

The process of consultation, investigations, review, medical/ anaesthesia fitness, surgery and follow-up, entails several visits to the hospital. Cost and inconvenience are compounded for all concerned. Therefore, considering these facts, there is not much difference in the cost of a hospitalised patient, versus Day Surgery patient. In fact, it is less inconvenient for a patient who is hospitalised, as the pre-operative processes get everything done in one single admission.

The unexplained and unknown, probably fear of non-existent or notional complications of surgery and thereafter, is considered more at home than in the hospital. Or the belief, that a hospital stay is 'safe' till complete recovery, is the idea sold to the patient and their relatives since time immemorial. This idea is so deeply ingrained by the medical fraternity, probably based on misguided facts, that we are now struggling to change it to the contrary.

Healthcare managers

For successful Day Surgery, especially laparoscopic surgery, early scheduling is considered ideal in most cases. In a stand-alone centre, kick starting the day is challenging for even the most efficient managers. The fear of last minute cancellation and rescheduling of cases can be a daunting task everyday. Training of staff and expecting super-efficiency, is again, not easy.

Protocols followed

Patient Selection: most centres follow a simple Patient Selection criteria based on western information. ASA 1 and 2 are usually selected as suitable for Day Surgery. These patients are medically and anaesthetically suitable for discharge on the same day as they are normal or near normal, with or without medication.

Age limit is 65 years, considering them to be 'young', mentally and physically, so as to be able to take care of themselves in the post-operative, recovery phase, without being overtly dependent on healthcare personal or 'responsible adult' at home. In any eventuality, presence of a responsible adult definitely makes it easier for monitoring the patients' recovery and make sure that the medication and diet is kept under reasonable control.

Telephone access was noted down in the patients' pre-op assessment chart earlier, that is, several years ago, this has become virtually redundant with the rapid advancement of information and technology all over the world.

To be on the safe side, the presence of private mode of transport or at least easy accessible public transport, round the clock, is a value add to patients' safety for obvious reason. In case of an emergency, transporting the patient to the hospital or the nearest medical centre, can be crucial.

Distance from a Day Surgery Centre is significant in case of major cases, where, same day travel, could be strenuous to the patient. Therefore, keeping in mind patient comfort, 20 km has been taken as the outer limit for such cases. Also, it will also reflect the time taken for the patient to reach the hospital, if necessary, for an emergency. In fact, with consideration to the magnitude of the surgery, every patient should be with driving distance from any medical facility.

Investigation should be done in the immediate pre-operative days, as validity may change over time. Routine investigations performed are the haemogram, along with liver function test to rule out active hepatic function derangement. Ultrasonography, especially of the common bile duct, should suffice, except in exceptional case of borderline increase in the diameter of the CBD, mandating an MRCP with CBD clearance if necessary, pre-operatively. Importance of blood tests, Cardiogram and Chest X-ray is in relevance to the General Anaesthesia that is required for Lap Chole.

Discharge: what was found important from the literature was the mention of intra-operative findings by the surgeon. No intra-op complication was encountered by the surgeon; therefore, patients can be discharged on the same day. The other criteria looked into were PONV, or absence of it. Minimal or controlled pain, ability to walk to the toilet and able to dress himself/herself, as being important to signify that the patient is on the way to recovery and will be able to manage most of the routine activity without being dependent on a care giver at home. Confidence of going home is also considered as one of the criteria for discharge. Our criteria for discharge are therefore, satisfactory; the discharge parameters, based on published criteria, also appear to be reliable [4].

Average discharge time was 8 hrs. +/-2 hrs. A routine phone call the next day, by one of the staff, was a routine followed in all cases, the outcome noted and reported to the surgical team. Additionally, pilot studies have demonstrated a 4 to 6 hours observation interval to be sufficient to detect early complications [5].

Cause for cancellation

Among the various causes of cancellation of a Day Surgery case, or the conversion to inpatient, we have found the following reasons to be surprisingly frequent:

- Non-availability of recovery beds. These were due to the spill over of inpatient cases on to DS recovery beds. Delay in discharge of previous days surgeries which had to be converted to inpatient, was also seen on some days.
- Patient not showing up for surgery, this was one of the most distressing reasons with the whole team waiting and patient, for reasons only known to them, decides to cancel the surgery and 'forgets' to inform the hospital.
- In some cases, patient turns up for surgery, but is not fasting, as there has been a communication gap and patient has understood differently. Leading to delay in the surgery and/or rescheduling, wasting valuable time.
- Shortage of staff, especially nurses, are one of the issues in some major hospitals and the most to get affected are the DS cases.
- A busy surgeon or anaesthetist, usually stuck in an emergency case, can delay the start of DS cases for that day. Therefore, scheduling of cases and staff, need to be managed for efficient running of the Centre.
- Delay in starting of cases on the day of surgery, upsetting the list, can cause delay in discharge and hence converted to inpatient with overnight stay, in some percentage of cases.
- In a developing country like India, with out-of-pocket expenditure for health care being around 80%, a delayed appointment for surgery, can see a change in the financial status of the patient. That is, money, however little it may be, may be required to support another urgent expense, leading to delay or postponement of routine and planned surgical case. This can happen without notice; therefore, patient may not be aware of the eminent, expenditure.

These causes of delay are usually seen more in Public hospital than Private ones, due to over work, less staff and casual approach.

Re-admission

The biggest issue for any DSC is to tackle overnight stay or re-admission. In our review, we found conversion to open surgery as the

most common cause. This is because of undiagnosed adhesions from previous cholecystitis, which were treated as an 'acidity' attack. Most of these patients take self-medication and avoid a visit to the GP or any investigations. During history taking, if it is revealed that there have been several dyspeptic episodes then adhesions should be taken into consideration. Bleeding during surgery, doubt of CBD injury and anomalies of the biliary tree, are the other reasons for conversion to open surgery. Surgery on the inflamed gallbladder carries a much higher risk of conversion to the open procedure, due to the difficulty of identifying the common bile duct, the cystic duct and the cystic artery in an inflamed operative field. In addition, a really inflamed gallbladder may be more technically challenging to the surgeon and may result in a prolonged operative procedure, although this will not inevitably result in an unplanned overnight admission [6].

PONV, is a problem world over, as the patient is under general anaesthesia, some patient do not respond to basic medication for PONV and have to be kept nil-by-mouth for a longer time with IV fluid support. Changes in anaesthetic practice would seem to make day-case laparoscopy a more acceptable procedure than previously reported [7].

Instillation of drains in the operation site due to spillage or bleeding, will definitely warrant that the patient is admitted for overnight observation.

Therefore, any intra-op eventuality that causes some type of concern to the surgeon, should be observed overnight, is the dictum followed.

Shortcomings

DCLC is not an established norm for treating Gall bladder stones. Surgeons and patients, in general, still would like to stay in the hospital for 24 hrs or more. Though this is being changed to 12 hrs or 23 hrs stay, it will still take a few years to become the norm.

Another major concern is lack of standardisation of treatment across the nation. It varies from centre to centre, surgeon to surgeon and city to city. Such variable treatment offered usually confuses the patient and in absence of standard protocol, pushes the patient indoor to be on the 'safe' side.

There is very little data which can establish safety and efficacy of DCLC as a norm. Most of the literature is based on western data. Whatever little data that we see published is on individual experiences and not a validated model or a case-wise standard protocol.

Several published studies have testified to the safety and feasibility of day care laparoscopic cholecystectomy (DCLC). These reports, however, emanate from developed countries with well-established norms for day care surgery with rigorously monitored outcomes [8–13].

We have too little data as of now to set standards of treatment for DCLC.

Summary

To summarise, under developed healthcare system, low literacy rates, marginal difference in the cost of indoor LC versus DCLC, have dogged the progress of Day surgery itself in the country.

To add to this, poorly developed communication system, lack of proper transport facilities in the rural areas, along with absence of organised referrals, make it near impossible to promote Day Surgery. Day care laparoscopic cholecystectomy under general anaesthesia is

feasible and safe and can be practiced in uncomplicated symptomatic cases of benign gall bladder pathologies [14].

There has been some progress made, but on individual basis. There will be a long wait before DCLC will be the gold standard, so to speak. However, published work from other developing countries have been encouraging and have increased safety and feasibility of DCLC by improved case selection [15].

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Erratum:

Safety and efficacy of sedation/analgesia administered by the urologist for minimally invasive transurethral procedures

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An error occurred in the transcription of Table 2, where the ASA grade of patients was incorrectly inserted at the proofing stage of the edition.

The correct table is shown below:

Table 2 Procedure-related measures (n = 77).

| Measure | Patients, n |
|--------------------------------------|---------------|
| ASA grading | |
| I | 31 |
| II | 37 |
| III | 9 |
| Self-report pain score (0–10) (n=71) | |
| 1 | 4 |
| 2 | 1 |
| 4 | 1 |
| Highest blood pressure (mmHg) | |
| Mean (SD) | 152.4 (20.6) |
| Median (IQR) | 151 (140–168) |
| Lowest blood pressure (mmHg) | |
| Mean (SD) | 123.5 (18.5) |
| Median (IQR) | 124 (110–134) |
| Highest pulse (bpm) | |
| Mean (SD) | 82.7 (15) |
| Median (IQR) | 81 (72–91) |
| Lowest pulse (bpm) | |
| Mean (SD) | 67.7 (10.1) |
| Median (IQR) | 65 (60–74) |
| Lowest oxygen saturation (%) | |
| Mean (SD) | 94.2 (2) |
| Median (IQR) | 94 (93–96) |

SD = standard deviation; IQR = interquartile range.

Mark Skues
Editor-in-Chief

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