‘Hot gall bladder service’ by emergency general surgeons: Is this safe and feasible?

Mohammad Imtiaz, Samip Prakash, Sara Iqbal*, Roland Fernandes, Ankur Shah, Ashish K. Shrestha, Sanjoy Basu

Department of General Surgery, William Harvey Hospital, Ashford, Kent, UK

*Joint second author

Abstract

Background: Despite NICE/AUGIS recommendations, the practice of early laparoscopic cholecystectomy (ELC) has been particularly poor in the UK offered only by 11%–20% surgeons as compared to 33%–67% internationally, possibly due to financial constraints, logistical difficulties and shortage of expertise, thus, reflecting the varied provision of emergency general surgical care. To assess whether emergency general surgeons (EGS) could provide a ‘Hot Gall Bladder Service’ (HGS) with an acceptable outcome.

Patients and Methods: This was a prospective HGS observational study that was protocol driven with strict inclusion/exclusion criteria and secure online data collection in a district general hospital between July 2018 and June 2019. A weekly dedicated theatre slot was allocated for this list.

Results: Of the 143 referred for HGS, 86 (60%) underwent ELC which included 60 (70%) women. Age, ASA and body mass index was 54* (18–85) years, II* (I-III) and 27* (20–54), respectively. 86 included 46 (53%), 19 (22%), 19 (22%) and 2 (3%) patients presenting with acute calculus cholecystitis, gallstone pancreatitis, biliary colic, and acalculus cholecystitis, respectively. 85 (99%) underwent LC with a single conversion. Grade of surgical difficulty, duration of surgery and post-operative stay was 2* (1–4) 68* (30–240) min and 0* (0–13) day, respectively. Eight (9%) required senior surgical input with no intra-operative complications and 2 (2%) 30-day readmissions. One was post-operative subhepatic collection that recovered uneventfully and the second was pancreatitis, imaging was clear requiring no further intervention.

Conclusion: In the current climate of NHS financial crunch, COVID pandemic and significant pressure on inpatient beds: Safe and cost-effective HGS can be provided by the EGS with input from upper GI/HPB surgeons (when required) with acceptable morbidity and a satisfactory outcome.

*Median

Keywords: Emergency general surgeon, hot gall bladder service, laparoscopic cholecystectomy

INTRODUCTION

Emergency surgical patients account for 50% of the general surgical workload and 80%–90% of the surgical mortalities. Despite this for decades, the provision for emergency general surgical care across the U.K. has lacked uniformity. The Royal College of Surgeons of England (RCS) and the Association of Surgeons of Great Britain and Ireland (ASGBI) in 2013 requested an urgent review of...
the provision and outcomes of emergency general surgery and explore options for new service delivery.[1]

Approximately 10%–15% of the adult UK population suffer from gallstone (GS) diseases and 20% of these become symptomatic due to biliary colic, acute cholecystitis, cholangitis, pancreatitis and obstructive jaundice.[2] Gallstone-related diseases account for one-third of emergency general surgical admissions.[3] Early laparoscopic cholecystectomy (ELC) for the acute presentation from the gallstone diseases for years were fraught with concerns of higher conversion and morbidity. Patients were routinely managed conservatively and were followed by interval cholecystectomy (>6 weeks later).[4] ELC has now been accepted as the treatment of choice for acute cholecystitis that has superseded the earlier practice of conservative management and delayed cholecystectomy.[5,6] National Institute for Health and Care Excellence (2014) recommended patients with acute cholecystitis to have a laparoscopic cholecystectomy (LC) within a week of diagnosis and patients with gallstone pancreatitis to have LC on index admission for its benefits of fewer complications and readmissions, lower hospital costs, fewer work days lost and greater patient satisfaction.[2,7] Despite positive evidence and recommendations, the rate of ELC still remains low worldwide,[8–10] possibly due to financial constraints, logistical difficulties and shortage of expertise.[2,5,8] Practice of ELC has been particularly poor in the UK offered only by 11%–20% surgeons as compared to 33%–67% internationally, once again reflecting the varied provision of emergency general surgical care.[8,11–13]

The RCS of England and the ASGBI recommends dedicated ‘Emergency Surgical Service’ delivered by dedicated team to improve patient care.[1,14] In November 2014, trust reorganised and redesigned the emergency services with the establishment of the surgical emergency assessment unit (SEAU) through the placement of a dedicated resident surgical team supervised by the on-call surgical registrar. The average monthly surgical admissions dropped by 34% by 2017 compared to the pre-SEAU era. This success encouraged the surgical division for further reconfiguration of acute general surgical care that leads to the appointment of four emergency general surgeons (EGS) from November 2017 and SEAU being led during the day by the resident dedicated consultant EGS.

Evidence has confirmed hot gallbladder surgery to be safe and cost-effective[15–18] and is associated with reduced hospital stays with no difference in conversion rates, morbidity and/or mortality.[19] Inspired by the positive outcome of the SEAU, the appointment of the EGSs and obtainment of a dedicated weekly theatre list led to the establishment of a dedicated ‘Hot Gall Bladder Service (HGS)’ from July 2018 to address patients of acute symptomatic gallstone diseases in line with the NICE/AUGIS recommendations.

The primary aim of this prospective observational study was to ascertain whether EGSs with laparoscopic experience could provide a safe and effective HGS. The secondary aim was to review intra operative and post-operative complications, conversion rates, length of stay (both total and post-operative) and 30-day readmissions.

PATIENTS AND METHODS

This was a 12-month study of the acute management of patients of gallstone diseases presenting to a district general hospital (DGH) in the southeast of England from July 2018 to June 2019.

Following approval from the local ethical committee, this study was strictly protocol-driven that was devised to triage patients with gallstone diseases appropriate for the ‘Hot Gallbladder Service’ incorporating the national guidelines as regards their time of intervention.

Inclusion criteria included: Patients aged 18 and above presenting to the hospital with symptoms related to proven gallstones: Recurrent biliary colic and those within 7 days of onset of acute cholecystitis, gallstone pancreatitis and patients with gallstone disease but clear biliary tree (following MRCP/ERCP). Exclusion criteria were: Patients below 18 years, fails the inclusion criteria, inability to provide consent and those not fit for operative intervention.

Surgical emergency assessment unit

The emergency general surgical care for our patients changed following the appointment of four emergency general surgical consultants from November 2017. They are competent laparoscopic general surgeons with <2-years’ experience as consultant surgeons. A typical week was split into Monday to Thursday and Friday to Sunday. The four EGSs followed a rolling 1:4 rotating on-call from Monday to Thursday that was designed to ensure on-site consultant presence free from all elective commitment 10 h a day (0800–1800P. M) with twice daily ward rounds. The night (0800–1800P. M) and weekends (Friday to Sunday) were shared with the other five non-EGSs (four colorectal and one upper gastrointestinal). This allowed sub-specialist elective commitment to continue uninterrupted.

The general surgical division was successful in acquiring a dedicated weekly Thursday ‘Hot Gall Bladder’ list from
July 2018 and this allowed the department to roll out the ‘Hot Gall Bladder’ service [Figure 1] with the help of the EGSs and on-site availability of the senior upper gastrointestinal surgeon (>10 year consultant experience) for advise and expertise, if required. This theatre list was run on a rolling 1:6 rota participated also by the two other non-EGSs.

A dedicated referral form [Figure 2] was designed for the study that needed to be completed by the admitting team and submitted to the secretary’s office that was governed by two surgical care practitioners. The deadline for submission was 12 noon every Tuesday allowing the ‘operating surgeon for the week’ time for review and decision on the operating Thursday list. The consent form used by the EGSs was the same as for delayed LC.

The data that were collected was prospectively entered into a secure online database (snapsurveys.com) ran by the trust audit department and included: Patient demographics, indications for surgery, reason for rejection, previous admissions, ASA grade, operative duration and difficulty, intra and post-operative complications, hospital stay (total and post-operative) and 30-day re-admissions. The data were analysed using standard statistical methods.

Nassar grading system was used to describe the degree of difficulty in performing the LC with grade 1 being the least and grade 4 being the most difficult based on the operative findings.[20]

RESULTS

Between 2018 (July) to 2019 (June), 299 laparoscopic cholecystectomies were performed at our DGH of the 299, 86 (29%) were performed in the ‘Hot Gall Bladder List’.

143 patients were referred to the HGS with evidence of gallstone diseases. 86 (68%) were considered suitable and the remaining 57 (40%) were rejected for the hot gallbladder list. Of the 86, 70% (60) were women and the median age, ASA and body mass index (BMI) was 54 years, II and 27 respectively [Table 1]. Thirty-seven percent (21) of rejections (57) were due to patients’ symptoms being more than 7 days in patients with acute cholecystitis [Table 2].
On ultrasonography, 36 patients had gall bladder wall thickness ranging between 4 and 20 mm and the remaining 50 patients had normal wall thickness. Eight patients underwent pre-operative ERCP due to abnormal liver function tests and USS and MRCP findings of dilated biliary tree/stones in the biliary tree and subsequently went for surgical intervention.

Eighty-six included 46 (53%), 19 (22%), 19 (22%) and 2 (3%) patients presenting with acute calculus cholecystitis, gallstone pancreatitis, biliary colic and acalculus cholecystitis, respectively.

The median number of previous admissions was 2 (1-4), Eighty-six patients had single/multiple previous admissions due to their gall bladder diseases that resulted in them spending extra 204-bed days in the hospital [Table 3].

Eighty-five (99%) patients underwent successful LC and a single patient had conversion to an open procedure. 26 (30%) and 60 (70%) patients had their gall bladder surgery between 3 and 7 days and between 2 and 3 days of their presentation, respectively [Table 4]. Median grade of surgical difficulty [Table 5] was 2 (1-4) and duration of surgery was 68 (30–240) min. Technique adapted for grade-4 difficult cases has previously been described and the author would like to refer readers to the published article.[21]

Abdominal drain in the right upper quadrant was required in 13 patients. The median total and post-operative length of stay was 2 (1-18) days and 0 (0–13) days, respectively. Eight (9%) patients required input from senior surgeons for safe operative intervention. There were no intra-operative complications and 2 (2%) patients had 30-day readmissions. One was due to post-operative collection that recovered uneventfully on conservative management. The second patient was due to pancreatitis, subsequent imaging was clear and thus required no further intervention.

Histology confirmed acute on chronic cholecystitis in 20 and chronic cholecystitis in the remaining 66 patients.

**DISCUSSIONS**

Hot GB surgery for acute gallstone disease in the past was deferred for concerns of higher conversion and increased morbidity, however, all recent evidence support their early intervention.[16] Delayed intervention puts one-third of patients at increased risk of recurrent acute episodes, repeated admissions and severe complications, further delaying their elective intervention. The practice of ELC for acute gallstone disease has been extremely variable within the NHS. Variation in the workforce, organisational and operational problems, lack of logistic support have been identified as factors responsible for poor uptake of early interventions.[17] The lack of theatre space and availability of appropriately trained workforce has been the most important deterrents for ELC.[3] The RCS in October 2016 set a standard that aimed for 80% of eligible, admitted patients to have their gall bladder surgery within 8 days of presentation at the hospital, in support of the NICE guidance.[19]

Evidence of improved cancer surgery outcomes based on the centralisation of upper gastrointestinal and hepatopancreatobiliary services to specialised units with large catchment areas has resulted in the lack of the adequate number of experienced upper gastrointestinal/HPB surgeons in the not designated upper gastrointestinal/HPB cancer hospitals. This organisational change designed

### Table 1: Patient demographics

| Demographics          | Median (Range) |
|-----------------------|----------------|
| Age (years) (range)   | 54* (18-85)    |
| Sex, n (%)            |                |
| Male                  | 26 (30)        |
| Female                | 60 (70)        |
| ASA                   | II* (I-III)    |
| BMI                   | 27* (20-54)    |

ASA: American Society of Anesthesiologists, BMI: Body mass index

### Table 2: Rejected cases

| Causes of rejection                                      | n (%) |
|---------------------------------------------------------|-------|
| Duration of symptoms >7 days (%)                        | 21 (37) |
| Patient factor (%)                                      | 16 (28) |
| Deranged liver function tests and awaiting images (%)   | 9 (16) |
| Inadequate documents (%)                                | 6 (10) |
| High BMI (%)                                            | 5 (9)  |
| Total                                                   | 57    |

BMI: Body mass index

### Table 3: Previous admissions (days)

| Prior admissions | n (%) |
|------------------|-------|
| No prior admissions | 26 (30) |
| One prior admission | 38 (44) |
| Two prior admissions | 19 (22) |
| >2 prior admissions | 3 (4)  |
| Total             | 86    |

### Table 4: Time of intervention from onset of symptoms

| Days | Number of patients, n (%) |
|------|----------------------------|
| 2-3  | 60 (70)                   |
| >3≤7 | 26 (30)                   |

### Table 5: Degree of operative difficulty

| Degree of difficulty | Number of patients, n (%) |
|----------------------|----------------------------|
| 4                    | 5 (6)                      |
| 3                    | 9 (10)                     |
| 2                    | 41 (48)                    |
| 1                    | 31 (36)                    |

*Median
to enhance outcome for one group of patients (cancer sufferers) has led to disadvantaging other groups of patients although with more severe benign disease presentations are being transferred to these specialised centres for their improved outcome.\textsuperscript{[20,21]}

Bile-duct injury is the most dreaded complication during cholecystectomy, which can be fatal.\textsuperscript{[22]} The main reason for conversion in ELC is the inflammation that obscures the view of the Calot’s triangle;\textsuperscript{[23]} whereas in delayed LC it is the fibrotic adhesions in the Calot’s triangle that raises concerns of safe surgery.\textsuperscript{[24]}

Experience of the operating surgeon for ELC is vital as the surgery for ELC is more complex and conversion rates higher in acute cholecystitis than in uncomplicated symptomatic gallstone disease. ELC often requires technical modification like higher gall bladder decompression than in a delayed cholecystectomy.\textsuperscript{[25]} Thus, LC when performed by upper GI surgeons have lower conversions and shorter hospital stay compared to those performed by non-upper GI surgeons and evidence supports ELC to be performed in units with the ready availability of appropriate surgical expertise and adequate laparoscopic experience.\textsuperscript{[18]}

This is a DGH that undertakes between 295 and 300 laparoscopic cholecystectomies a year. ELC was performed in <10% of cases before 2018. ‘Hot Gall Bladder Service’ was only implemented after the acquisition of a dedicated weekly theatre list and definite availability of the upper gastrointestinal surgeon for advice and support in theatres, if required. This allowed 29% of cases to be performed as ELC and there is an opportunity for acquisition of more dedicated weekly theatre slots in the future with further scope of improvement of this figure.

Ninety-nine percent of patients had successful laparoscopic intervention with no record of intra-operative and post-operative complications and there were low acceptable 30-day readmissions. 84% patients were graded as ≤2 as regards operative difficulty, conversion to open was required only in a single patient (1%) and input from a senior upper gastrointestinal surgeon was required in 9% of cases. Support from the senior upper gastrointestinal surgeon was invaluable as this helped learning, improve the technical skills and confidence of the EGS for better patient safety and care. Gallbladder bed collections that is reported in 14% of patients post-cholecystectomy\textsuperscript{[26]} was found only in a single patient (1%) requiring readmission with an uneventful recovery. The median post-operative stay was 0 day. 70% of our patients had required previous hospital admissions related to their gall stone disease requiring 204 hospital bed day admissions. The average cost for the NHS for a day in hospital amounts to ≤300, thus, costing the trust an unnecessary extra ≤61,200 only for this period.

Meta-analysis in 2010 stated that LC is appropriate up to 7 days after the onset of symptoms.\textsuperscript{[27]} Our data showed 37% of patients were rejected as they fell beyond the 7-day cut-off point. Limited theatre access is responsible and we believe the availability of more dedicated theatre slots would help to improve this figure. Sixteen percent patients were rejected awaiting imaging. Once again better and easy access to advanced imaging like MRCP would address this limitation. Ten percent of patients who were refused due to poor documentation would improve with education and training of the trainees and better communication. Nine percent of patients were rejected for higher BMI. This is an individual surgeon choice and an area that would improve with increased exposure and surgical experience in dealing with patients of higher BMI with acute presentations.

CONCLUSION

This prospective observational study despite its limitations of being small with a slightly high rejection rate and not being randomised, thus, lacking comparison with a DLC group still highlighted the positives and benefits and once again challenges the previous erroneous myths of ELC. The study concludes in the current climate of NHS financial crunch, COVID pandemic and pressure on inpatient beds: Safe, efficient and cost-effective ‘Hot Gall Bladder Service’ can be provided by the EGSs with input from senior upper GI/HPB surgeons (when required) with acceptable morbidity and a satisfactory outcome and support its wider implementation and acceptance in the NHS.

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Conflicts of interest
There are no conflicts of interest.

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