1
Index cholecystectomy rates in mild gallstone pancreatitis – a single centre experience.

Reuban J. Butler* (MBBS, BPhty) and David A. Grieve*† (MBBS, M.Med, FRACS).

*Department of General Surgery, Sunshine Coast University Hospital, Queensland, Australia and
†School of Medicine, The University of Queensland, Brisbane, Queensland, Australia.

The corresponding author was not a recipient of a research scholarship or grant. The manuscript has not been submitted or accepted for publication elsewhere.

Two figures and one table are included within this manuscript.

Word Counts:
Abstract: 222
Text: 1408

Corresponding author:
Dr Reuban Butler
Email Reuban.butler@health.qld.gov.au
Address: Sunshine Coast University Hospital, 6 Doherty Street, Birtinya, 4575.
Telephone: +61403924809.

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/ans.15887

This article is protected by copyright. All rights reserved.
Abstract

Background: Gallstone pancreatitis (GSP) has evidence based guidelines regarding management. Both the International Association of Pancreatology/American Pancreatology Association and American College of Gastroenterology recommend index admission cholecystectomy (IAC) in patients presenting with mild GSP. The aim of this study was to examine guideline adherence and GSP recurrence rate when IAC was not performed. A comparison between admitting specialty was also performed to examine the difference in compliance rates.

Methods: A retrospective chart review was conducted on all patients who presented to the Sunshine Coast Hospital and Health Service with GSP from December 2013 to December 2016. Patient demographics, timing of surgery, admitting specialty, laboratory and imaging results were recorded.

Results: Ninety-five patients were identified with a first presentation of mild GSP during the study period. Sixty-six (69.5%) underwent IAC. Twenty-nine (30.5%) were discharged prior to cholecystectomy with ten of those patients receiving index admission endoscopic sphincterotomy. Five patients (17%) who didn’t receive IAC were readmitted with gallstone related complications with the mean time to re-presentation 12.8 days (range 7 – 21 days). Patients were more likely to receive IAC when admitted under Surgery compared with Gastroenterology (76% versus 20%, P<0.001).

Conclusions: Two out of three patients presenting with mild GSP underwent IAC in accordance with evidence based management guidelines. Patients should be admitted under a surgical service to prevent delay in definitive management.

Key Words

Biliary pancreatitis, gallstone pancreatitis, cholecystectomy, guidelines.
Introduction

Acute pancreatitis is a common acute surgical presentation and its incidence is increasing worldwide. Gallstone disease is the predominant aetiology making up 30-60% of presentations for acute pancreatitis. This number is also increasing, likely related to lifestyle factors and worsening levels of obesity. The definitive treatment for gallstone pancreatitis (GSP) is cholecystectomy. Currently, both the International Association of Pancreatology/American Pancreatology Association (IAP/APA) and the American College of Gastroenterology (ACG) management guidelines for GSP recommend index admission cholecystectomy (IAC) in patients with mild GSP who are suitable surgical candidates.

The reasoning for this recommendation is the high recurrence rate of GSP and other biliary events (cholecystitis, choledocholithiasis, and cholangitis), in the order of 20-30%, whilst awaiting definitive treatment. Compliance to these management guidelines from nationwide audits shows considerable variance, ranging from 32-69%. Numerous reasons for this incomplete compliance have been postulated including lack of emergency theatre operating time and surgical reluctance citing increased intraoperative complications. This theoretical surgical risk has been disproved with recent studies showing that IAC for mild GSP is both safe and effective.

Aims

The primary aim of this study was to investigate the level of adherence to GSP management guidelines of patients within the Sunshine Coast Hospital and Health Service (SCHHS), namely IAC for first presentation GSP. The secondary aims were twofold: to examine the readmission rate when IAC was not performed and to compare the difference in guideline adherence and readmission rates between admitting specialty (Surgery versus Gastroenterology).
Methods

A retrospective chart review was conducted on all patients (>18 years of age) admitted to the SCHHS with a first episode of GSP from December 2013 to December 2016. Patients were identified from Medical Records using the ICD-10 diagnostic code K85.1 (acute pancreatitis relating to gallstones). Data were collected on patient demographics, timing of cholecystectomy – index admission or otherwise, procedures including endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (ES), laboratory and radiological results and admitting specialty. Readmission to hospital with GSP recurrence or other related gallstone pathology whilst awaiting cholecystectomy was also recorded.

Each patient admission was reviewed to confirm the diagnosis of GSP and to exclude incorrectly coded admissions. The diagnosis of pancreatitis required at least two of the following three features: epigastric pain, serum lipase >3x upper limit of normal, and characteristic findings of acute pancreatitis on imaging. Using the Revised Atlanta classification, mild pancreatitis was defined as the absence of organ failure and/or local complications. A biliary cause was defined by the presence of gallstones or sludge on imaging. Patients with previous episode/s of pancreatitis or prior cholecystectomy were automatically excluded.

To determine suitability for cholecystectomy the American Society of Anaesthesiologists (ASA) grade and age were taken into account. All patients who were ASA grade 4 and ASA grade 3 patients over 75 years of age were excluded due to their inherently increased risk of surgical or anaesthetic complications (figure 1). One hundred and fifty-nine patients were identified during the study period of which sixty-four were excluded (figure 1). Data were missing for one patient due to lack of surgeon consent.
Statistical analysis was performed using STATA 12, Statacorp, Texas, USA. Categorical data were compared using \( \chi^2 \) tests and numerical data using T tests. A P value of <0.05 was interpreted to be significant.

A significant proportion of patients were treated at the co-located Sunshine Coast University Private Hospital (SCUPH) as part of a treatment agreement. Ethics approval was obtained from both The Prince Charles Hospital Human Research Ethic Committee for SCHHS patients and Greenslopes Research and Ethics Committee for SCUPH patients.

**Results**

Ninety-five patients were identified with a first presentation of mild GSP during the study period that met inclusion criteria. The average age was 57 years and 56% were female. Sixty-six patients (69.5%) underwent IAC adhering to current guidelines (figure 2). This rate was consistent in each 12 month period of the study (+/- 2%). Of those 66 patients, 35 (53%) received IAC at the co-located SCUPH.

Twenty-nine patients (30.5%) were discharged prior to cholecystectomy (non-adherent group) with ten of these patients receiving index admission endoscopic sphincterotomy (ES). Of the 29 patients who didn’t undergo IAC, five patients were readmitted with gallstone related complications (17%), four of those being GSP recurrence (figure 2). The mean time to readmission was 12.8 days (range 7 – 21 days). Two of the readmitted patients had received index admission ERCP/ES.

A total of 24 patients in the non-adherent group underwent an interval cholecystectomy with a mean time from discharge to surgery 49.1 days (range 2 - 210 days). This gave an overall cholecystectomy rate of 94% within 7 months of presentation. Almost all patients in the non-adherent group (93%) were discharged with planned interval cholecystectomy or outpatient surgical review.
Of the total 95 patients in the study, 84 patients (88.4%) were admitted under General Surgery, 10 patients (10.5%) under Gastroenterology and one patient (1.1%) admitted under Cardiology. Patients were much more likely to receive IAC when admitted under General Surgery compared with Gastroenterology, which resulted in higher readmission rates in the Gastroenterology subgroup (table 1). ERCP/ES was performed on 14.7% patients, more frequently when admitted under Gastroenterology (table 1).

Discussion

The 69.5% adherence rate of IAC for mild GSP in this study compares favourably with the literature (7-9, 15) and is close to the recent recommendation of 75% IAC rate as an indicator of good surgical care for acute biliary disease (16). This reflects a positive change in practice in light of recent evidence supporting IAC in mild GSP (6). However it must be taken into account that during the study period Queensland Health, by contract, had beds and theatre access at the co-located private hospital SCUPH. Given that theatre access is often reported as a significant factor preventing IAC (17, 18) and that over half of the IACs were performed in the private sector, the 69.5% rate likely represents the upper limit of current adherence. Whether this public/private model of care presents an opportunity as a more permanent solution to theatre access issues would require further research, but it would likely be financially viable given the expected savings to hospital bed days and representation.

During the study period there were no local guidelines or protocols for management of acute pancreatitis. The 30.5% interval cholecystectomy rate appears to be influenced by surgeon preference, given that a subset of non-adherent patients were discharged with planned interval cholecystectomy. However the retrospective nature of this study makes it difficult to determine whether this decision was purely surgeon preference or influenced by theatre access/bed pressures. More recent changes within this institution include booked emergency lists to increase
theatre access for patients with conditions like GSP. A hospital wide protocol would provide further clarity to surgeons and also work on an executive level to advocate for timely theatre space.

Gallstone pancreatitis is a surgical issue however patients are still admitted under other specialties in certain circumstances. A subset of patients were admitted under Gastroenterology (10.5%) during the study period. This occurred when a patient with GSP had suspected or known choledocholithiasis requiring endoscopic intervention. Prior studies have demonstrated that this increases time to cholecystectomy for GSP, which is rarely performed during index presentation, and subsequently increases readmission rates.\(^9\)\(^{,}\)\(^{19}\) Our results reinforce this view (table 1) and provide further evidence that GSP is best managed under specialist surgical care. This has been proven to increase IAC compliance rates, which not only reduce patient morbidity but also result in lower overall healthcare costs.\(^{17}\)

The current study has a number of limitations. Firstly it is retrospective in nature and thus prone to the inherent bias of retrospective work. Patients were identified from the hospital database using ICD-10 coding raising the potential for missed cases as a consequence of diagnostic coding error. This was also a small audit (n=95) from a single institution which reduces the generalisability and reliability of the study results. However, the readmission rate of 17% found in this study for GSP when not IAC is not performed, is reflective of larger bodies of research in the field.\(^{6,}\)^{11}

**Conclusion**

Two out of three patients presenting with GSP underwent IAC albeit with availability of co-located private beds and theatre access. Room for improvement exists in guideline adherence, particularly given the high readmission rate when IAC was not performed. A formal hospital wide protocol-based management plan advocating IAC for GSP with mandatory admission under a surgical service would help to further increase compliance.
Conflicts of Interest

None declared.

References


**Figure Legends**

**Figure 1.** Patient inclusion criteria. GSP – Gallstone pancreatitis.

**Figure 2.** Large pie - Index admission cholecystectomy (IAC) rate for first episode gallstone pancreatitis (GSP). Small pie – Readmission rate in patients not receiving IAC.

**Table 1.** Characteristics between admitting specialty

<table>
<thead>
<tr>
<th></th>
<th>General Surgery (n=84)</th>
<th>Gastroenterology (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>58 (18-97)</td>
<td>51 (18-76)</td>
</tr>
<tr>
<td>Female sex</td>
<td>50 (60%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>IAC†</td>
<td>64 (76%)</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Readmission‡</td>
<td>2 (2.4%)</td>
<td>3 (30%)</td>
</tr>
<tr>
<td>Endoscopic sphincterotomy</td>
<td>8 (9.5%)</td>
<td>6 (60%)</td>
</tr>
</tbody>
</table>

This article is protected by copyright. All rights reserved.
† Index admission cholecystectomy
‡ Readmitted patients who didn’t receive index admission cholecystectomy