Should Delayed Cholecystectomy Following Acute Calculous Cholecystitis Be Discouraged in a Resource-restricted Setting?

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ABSTRACT

Background: *Early cholecystectomy for acute calculous cholecystitis (ACC) reduces hospital stay and complications during the waiting period. The purpose of this study is to establish the patterns of management of ACC at the University Hospital of the West Indies (UHWI) and to evaluate the advantages of early versus delayed cholecystectomy.*

Methods: *This was a retrospective chart review of patients admitted with a diagnosis of ACC. Data collection included demographics, management strategy, timing to cholecystectomy, significant events while awaiting cholecystectomy and duration of hospital stay. Mann-Whitney U and Chi-square tests were used for analysis.* P-*value of < 0.05 was considered significant.*

Results: *A total of 102 patient charts were extracted, 59 of which were managed conservatively and 43 managed with early cholecystectomy. The mean time to surgery after conservative management was 173 days. About 30% of persons managed conservatively had significant attacks while awaiting surgery, which included need for re-admission and earlier intervention. There was a trend toward longer mean total hospital stay in the conservative group (x_{sx} = 5.03, x_{Cons} = 6.12;* p = *0.054).*

Conclusion: *Conservative management of ACC results in significant delays in definitive management and risks of complications during the waiting period. Early cholecystectomy should be encouraged even in a resource-restricted setting.*

Keywords: Acute, anastomosis, calculous cholecystitis, cholecystectomy, colorectal, leakage

¿Debe Desalentarse la Colecistectomía Retardada después de una Colecistitis Calculosa Aguda en un Entorno de Recursos Limitados?

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RESUMEN

Antecedentes: *La colecistectomía temprana en el caso de la colecistitis calculosa aguda (CCA) reduce la estancia hospitalaria y las complicaciones durante el período de espera. El propósito de este estudio es establecer las normas para el manejo de la CCA en el Hospital Universitario de West Indies (HUWI), así como evaluar las ventajas de la colecistectomía temprana frente a la colecistectomía retardada.*

Métodos: *Se trató de un estudio retrospectivo de las historias clínicas de pacientes ingresados con diagnóstico de CCA. Los datos recopilados incluyeron información demográfica, estrategia de manejo, tiempo para la colecistectomía, eventos significativos en la espera de la colecistectomía, y duración de la estancia hospitalaria. Se utilizaron Pruebas U de Mann-Whitney y Chi-cuadrado para el análisis. El valor P de < 0.05 se consideró significativo.*

Resultados: *Se extrajeron un total de 102 historias clínicas de pacientes, 59 de los cuales fueron tratados de manera conservadora y 43 tratados con colecistectomía temprana. El tiempo promedio para la cirugía tras el manejo conservador fue de 173 días. Aproximadamente el 30% de las personas tratadas de manera conservadora tuvieron ataques significativos mientras se esperaba la cirugía, que incluía la necesidad de reingreso y de intervención más temprana. Hubo una tendencia a un promedio total más largo de estancias hospitalarias en el grupo conservador (x_{sx} = 5.03, x_{Cons} = 6.12;* p = *0.054).*

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Conclusión: *El manejo conservador de la CCA trae como resultado retrasos significativos en el manejo definitivo y riesgos de complicaciones durante el período de espera. Se recomienda la colecistectomía temprana incluso en un entorno de recursos limitados.*

Palabras claves: Aguda, anastomosis, colecistitis calculosa, colecistectomía, colorrectal, fuga

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INTRODUCTION

Acute calculous cholecystitis (ACC) is one of the most common emergencies in general surgery. Its course may range from mild inflammation (grade I/mild) to fulminant infection (empyema, gangrene, perforation – grade II/moderate) and systemic organ dysfunction [grade III/severe] (1). Current best practice for moderate and severe ACC is urgent intervention (either cholecystectomy or drainage). However, the best practice for treatment of mild ACC varies. Patients may either be managed with a period of conservative treatment (nil by mouth status, analgesia +/- antibiotics) followed by delayed cholecystectomy at least six weeks later or they are managed by early cholecystectomy [usually in the index admission] (2).

Randomized controlled trials and meta-analyses of early laparoscopic cholecystectomy *versus* conservative treatment with delayed cholecystectomy for ACC have demonstrated that although both options are safe, early cholecystectomy results in overall shorter hospital stay and reduced risk of significant attacks during the waiting period for elective surgery while not increasing surgical morbidity and mortality (3–12). The Tokyo Guidelines recommend early laparoscopic cholecystectomy for mild and moderate ACC (13).

Conservative management with delayed cholecystectomy is a viable and safe option for the treatment of ACC, and early cholecystectomy can place an additional resource burden on an already limited system. Therefore, choosing between these two treatment options can be difficult in a resource-restricted setting. The purpose of this study is to describe the practice patterns and outcomes of management of mild ACC at an institution in a resource-restricted setting.

SUBJECTS AND METHODS

This is a retrospective chart review of all patients admitted to the surgical service of the University Hospital of the West Indies (UHWI) with a diagnosis of mild ACC between January 2008 and December 2010. The Tokyo Guidelines (1) were used to identify patients with mild ACC (Table 1). Patients aged < 12 years, diagnosed with moderate or severe acute

Table 1: Criteria for acute cholecystitis based on the Tokyo Guidelines (1)

Mild (grade I) acute cholecystitis	"Mild (grade I)" acute cholecystitis does not meet the criteria of "severe (grade III)" or "moderate (grade II)" acute cholecystitis. Grade I can also be defined as acute cholecystitis in a healthy patient with no organ dysfunction and only mild inflammatory changes in the gallbladder, making cholecystectomy a safe and low-risk operative procedure.
Moderate (grade II) acute cholecystitis	"Moderate" acute cholecystitis is accompanied by any one of the following conditions: 1. Elevated white blood cell count (> 18000/mm^3) 2. Palpable tender mass in the right upper abdominal quadrant 3. Duration of complaints > 72 hours 4. Marked local inflammation (biliary peritonitis, pericholecystic abscess, hepatic abscess, gangrenous cholecystitis, emphysematous cholecystitis)
Severe (grade III) acute cholecystitis	"Severe" acute cholecystitis is accompanied by dysfunctions in any of the following organs/systems: 1. Cardiovascular dysfunction (hypotension requiring treatment with dopamine ≥ 5 ug/kg per min, or any dose of dobutamine) 2. Neurological dysfunction (decreased level of consciousness) 3. Respiratory dysfunction (PaO_2/FiO_2 ratio < 300) 4. Renal dysfunction (oliguria, creatinine > 2.0 mg/dL) 5. Hepatic dysfunction (PT-INR > 1.5) 6. Haematological dysfunction (platelet count < 10000/mm^3)

cholecystitis, who underwent emergency cholecystectomy, or who were diagnosed with acalculous cholecystitis were excluded.

Data collection included patient demographics, management strategy, timing to cholecystectomy, surgical approach (open or laparoscopic), operative time, conversion rate (for laparoscopic cases), complications, total hospital stay (inclusive of cancelled operations) and the nature of significant attacks while awaiting surgery. Patients were separated into two groups – conservative management with delayed cholecystectomy and early cholecystectomy (surgery during the index admission).

Statistical analysis performed aimed to determine the differences between groups with respect to surgical approach, operative time, conversion rate, complications and total hospital stay. The frequency and nature of attacks while awaiting surgery and the default rate were also determined. Mann-Whitney U and Chi-squared tests were used for non-parametric scale and categorical variables, respectively. *P*-value of < 0.05 was considered significant.

RESULTS

During the two-year study period, 116 admissions were identified. Fourteen cases were excluded due to legitimate reasons for conservative management, including evidence of choledocholithiasis and uncontrolled co-morbidities with high anaesthetic risk. Therefore, 102 cases were included in the analysis. Fifty-nine patients were managed conservatively (Table 2).

Of this group, 25 went on to have delayed cholecystectomy (Table 2). Twenty-three patients had not had surgery or had defaulted from follow-up (Table 3).

There were no differences between groups with respect to age, gender distribution, operating time, complications or conversions (Table 2). Twenty of 25 patients undergoing delayed cholecystectomy had a laparoscopic approach as compared to 12 of 43 patients in the early cholecystectomy group (Table 2; $p < 0.001$). There was a trend toward longer total hospital stay (including cancelled operations) in the conservative group (6.12 days) as compared to the early cholecystectomy group (5.03 days; $p = 0.054$).

The mean time to delayed cholecystectomy following conservative management was 173 days. During this waiting period, 18 of 59 (30.5%) patients had a significant episode related to cholelithiasis, warranting either a visit to the emergency room and/or hospital admission. These significant attacks included 14 episodes of biliary colic, 11 episodes of acute cholecystitis, two episodes of acute pancreatitis and one episode of choledocholithiasis. There was no associated mortality related to these attacks.

DISCUSSION

The present study demonstrates that the majority of patients with mild ACC are being managed conservatively at our institution, with a view to undergoing delayed cholecystectomy. A

Table 2: Patient distribution and outcome measures according to management of acute calculous cholecystitis

	Conservative management with delayed cholecystectomy	Early cholecystectomy	*P*-value
Total number of cases	59	43	-
Mean (± SD) age (years)	39.39 (12.86)	40.47 (13.9)	0.688
Male [n/total n]	5/59	6/43	0.776
Laparoscopic [n/total n]	20/25	12/43	< 0.001
Mean (± SD) duration of operation (minutes)	120.00 (10.61)	156.83 (59.85)	0.395
Mean (± SD) length of stay (days)	6.12 (2.74)	5.03 (1.95)	0.054
Complication [n/total n]	2/25	2/43	-
Converted [n/total n]	2/20	2/12	

Table 3: Disposition of patients managed conservatively who had not undergone delayed cholecystectomy

Disposition	Number of patients
Re-admission for repeat attack with early or emergency cholecystectomy	7
Failed conservative management – required early cholecystectomy	2
Not yet had surgery at completion of study	17
Defaulted from follow-up	6
Missing information	2

significant proportion of these patients still had not undergone their cholecystectomy or had defaulted from follow-up by the end of the study time-frame. During the waiting period for surgery, a large proportion of this group required re-admission or a visit to hospital. Laparoscopic cholecystectomy is the predominant approach for delayed cholecystectomy but is an uncommon approach in the acute setting.

Current evidence is conflicting regarding whether or not conservative management with delayed cholecystectomy remains an appropriate option for the management of mild ACC (14–16). In the era of open cholecystectomy, randomized trials demonstrated that early cholecystectomy was safe and provided the advantages over delayed cholecystectomy of cost-effectiveness, reduced operative time, complication rate, hospital stay and return to normal activity (17–20). Since the establishment of laparoscopic cholecystectomy as the standard of care for elective gall bladder surgery (21), attention has turned to its use in the acute setting. The advantage of shorter hospital stay has been established while concerns regarding increased complication rates and conversion rates have been dispelled by randomized controlled trials and meta-analyses (3–12). In addition, up to 20% of patients will fail conservative management and up to 25% of patients will relapse while awaiting definitive surgery (22), contributing to morbidity and increased costs and further favouring early cholecystectomy. The overwhelming evidence has resulted in guidelines recommending early cholecystectomy as preferable in the management of mild ACC (13).

Despite the evidence, the global uptake of early cholecystectomy is low. In the United Kingdom, only 11% of surgeons routinely treated patients with early cholecystectomy (23). In Japan, even following the institution of the Tokyo Guidelines, only 41.7% to 62.3% of surgeons opted for early cholecystectomy (24). These results are consistent with our study findings, which demonstrate that conservative management followed by delayed cholecystectomy is the most common management approach for patients with mild ACC at our institution.

There are clearly barriers to early cholecystectomy in resource-restricted settings. Internationally, surgeon surveys have cited unavailability of staff, lack of theatre space and time, concerns about missing the window period (with increased complications) and staff reluctance due to variability in surgeon practice (23, 25) as common barriers. We believe that concerns regarding the appropriate use of resources, limited operating time and the attitudes of staff play the most important roles in our setting.

With current evidence supporting laparoscopy as the standard of care of gall bladder surgery (21) and laparoscopic cholecystectomy as the ideal approach to early cholecystectomy (13), there are increased expectations from patients for the use of laparoscopy, even in resource-restricted settings. However, there is limited laparoscopic equipment at our institution. As such, there are genuine concerns about the increased use of such equipment, with risk of 'wear and tear', in the acute setting. Surgeons may opt for a delayed approach to laparoscopic cholecystectomy as a compromise to this issue. Limited operating time does not allow for patients undergoing early cholecystectomy to be placed on an elective list. These patients are likely to be placed on an emergency list. It may be argued that these patients are not true emergencies, can be managed non-operatively and that emergency operating time is being used injudiciously. In any institution where laparoscopy is new and open surgery is the current standard of care, there will be potential resistance to change from staff members. Laparoscopy is used rarely in our institution for emergency procedures. Such an approach is associated with longer operating times and can be criticized as inappropriate in a resource-restricted setting.

Understanding the barriers to early cholecystectomy is critical and requires further study. It is possible that the desire to offer patients a laparoscopic approach takes precedence over offering early cholecystectomy. Naraynsingh *et al* suggested an alternative that may be applicable in such a situation: a mini-laparotomy cholecystectomy, where an open incision of median length 4.8 cm, appeared to offer similar benefits to laparoscopic cholecystectomy (26). Additional research is required to further describe the use of mini-laparotomy in this setting.

Our study demonstrated that despite conservative management being an effective option for the management of mild ACC (only two patients failed conservative management), this approach is not innocuous. Compared to current evidence, the surgical wait time was at the higher end of the currently reported range, resulting in a large proportion of patients experiencing relapse while awaiting surgery (14, 15, 27). Furthermore, the risk of significant interval attacks requiring re-admission or intervention fell within the reported ranges of 14.0% to 35% previously published (14, 16, 27–30). This results not only in morbidity, but increased overall costs (28) which is a significant issue in an already resource-restricted setting.

A significant proportion of patients managed conservatively either had not had surgery or had defaulted from follow-up. Cultural views regarding fears of surgery (31) are likely to play a significant role. In addition, lack of operating time and cancellations are common-place in resource-restricted settings (32). These factors must be considered as part of surgeons' decision-making at the time of initial management.

This study is not without limitations. This is a retrospective study and is therefore not immune to errors from data abstraction. A second abstractor reviewed patients' charts to ensure consistency of the information collected. In addition, no data were collected on the rationale for management approach, including patient preference (*eg* cultural views) and limiting circumstances in the hospital setting (*eg* laparoscopic equipment availability, operating theatre availability). This information would have allowed for further interpretation of the results.

The evidence discouraging conservative management of mild ACC and delayed cholecystectomy is strong. Our study supports the detrimental effects of such an approach. As such, early cholecystectomy should be encouraged even in a resource-restricted setting. We recognize that a laparoscopic approach to early cholecystectomy is recommended. Future work should focus on the identification of the barriers limiting the use of early laparoscopic cholecystectomy and provide context-specific solutions.

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