Establishment the Cost-Effectiveness through Set Criteria of Laparoscopic Cholecystectomy

Sakchai Ruangsin MD*, Vicha Jaroonrach MD*,
Chit Petpichetchian MD*, Puttisak Puttawibul MD*,
Somkiat Sunpaweravong MD*, Siripong Chewatanagongun MD*

** Department of Surgery, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand*

***Objective**: To assess the set criteria of laparoscopic cholecystectomy (LC) in reducing the length of hospital stay (LOHS), and total treatment expenditure.*

***Material and Method:** The measurement outcomes were prospectively analyzed through the medical record, and self questionnaire of the patients.*

***Results**: During the 1-year trial, a total of 122 patients were scheduled for LC. Among these, 85 cases had met the set criteria of low risk clients of; both preoperative indicator of a) American Society of Anesthesiologists (ASA) class 1 or 2, and postoperative indicators of b) no surgical drainage, and c) no immediate complication, while 37 cases were excluded due to ASA class 3 or 4, and various reasons. Distributed by the duration of hospital stay, the patients were classified in to three groups; group A was overnight hospital stay, 15 of 85 subjects (17.6%), group B was short hospital stay (within 3 days), 51 of 85 subjects (60.0%), and group C was long hospital stay (more than 3 days), 19 of 85 subjects (22.4%). The mean length of hospital stay (LOHS) was 24 $\pm$ 1.61 hours in group A, 55 $\pm$ 11.16 in group B, and 108 $\pm$ 21.59 in group C, while the average total expenditure was 531.22 $\pm$ 111.09, 665.5 $\pm$ 133.35 and 812.33 $\pm$ 158.62, respectively. For the overnight hospital stay group, the LOHS and the total treatment expenditure was significantly lower the other groups ($p < 0.001$). The majority of the overnight hospital stay group had rated the patient satisfaction as excellent.*

***Conclusion**: The set criteria of laparoscopic cholecystectomy (LC) are helpful and establish the cost-effectiveness in terms of reduction of LOHS and total treatment expenditure.*

***Keywords:** Laparoscopic cholecystectomy, Set criteria, Length of hospital stay*

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Gallbladder disease is the most common and most costly of all digestive disorders requiring hospitalization, and affect 10 to 15 percent of adults with 500,000 cholecystectomy annually in the USA[1,2]. Gallstones are often asymptomatic, increasing in prevalence with age. At 60 years of age approximately 30% of women and approximately 15% of men in European populations have gallstones[3].

Laparoscopic cholecystectomy (LC) has been routinely performed since 1989 and it is now considered the "gold standard" treatment for symptomatic gallstones and acute cholecystitis[4-6]. It is less traumatic than open cholecystectomy resulting in fewer postoperative complaints, rapid recovery, shorter hospital stay, and minimal cosmetic disfigurement[7-11].

In modern practice, it is recommended that standard LC patients should be admitted to the hospital for a total of 3 days, however a recent retrospective data of Songklanagarind Hospital has accounted the average length of hospital stay (LOHS) for LC patients was 5 days[12].

To develop the model of LOHS shortening and total treatment expenditure reduction, the set criteria for selection of low risk clients undergoing laparoscopic cholecystectomy was developed and complied in surgical procedure, considering cost-effectiveness.

Correspondence to: Ruangsin S, Department of Surgery, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand. Phone: 074-451-401, Fax: 074-429-384. E-mail: rsakchai@medicine.psu.ac.th

Material and Method

Although laparoscopic cholecystectomy, removal of gallbladder through keyhole surgery, can

save treatment cost with patient safety. The set criteria varied, but most included only patients without other disease, and low risk basis. The recent set criteria, developed by the surgical patient care team of Songklanagarind Hospital since January 2007 and the consensus had been approved by the multilateral parties, involving surgeons and supporting staff. The criteria included; both preoperative indicator of a) American Society of Anesthesiologists (ASA) class 1 or 2 and postoperative indicators of b) no surgical drainage and c) no immediate complication.

The clients who had the fulfilled criteria voluntarily participated in the study, followed by documented informed consent procedures. According to the easy reach of the hospital and with a responsible adult to take care of them, the patients were offered the option to choose overnight hospital stay or short hospital day (within 3 days). The subjects were informed that the alternative choice hospitalization can be flexible and changeable, owing to the condition of postoperative surgical drainage and immediate complication.

The study was carried on from April 2007 to March 2008. Following surgical modality, the client was kept on a liquid diet, and given oral medication, normally paracetamol 500 mg 2 tablets every 6 hours, ibuprofen 400 mg 1 tablet three times daily and/or other non-steroidal anti-inflammatory drugs (NSAID), depending on the individual attending surgeon. Intravenous analgesics and/or other medications might be used at the surgeon's discretion.

After overnight observation, the clinical condition of the patient was evaluated, and if they were able to tolerate a soft diet, without nausea or vomiting, and/or other complaints or complications.

Whatever, the postoperative pain was satisfactorily controlled by oral analgesic medication, and comfortable with home stay. The client was positively advocated for having home care, as well as the patient information about the serious advert events, wound care, fat diet control, were provided and the patient was proposed to readmission any time of unplanned condition.

The statistical analysis was examined with Statistical Package for the Social Sciences (SPSS), with results expressed as mean, standard deviation, range, and frequency. Univariate comparisons were carried out using Chi-square test for discrete variables and student's t-test for continuous variables. A two-tailed p-value less than 0.05 was considered statistically significant.

Results

During the 1-year prospective study, there were 122 elective LC patients who met the pre and postoperative set criteria. Of these, 85 cases (69.7%) had met the set criteria of low risk clients, preoperative ASA class 1 or 2. While 37 cases (30.3%) were excluded due to ASA class 3 or 4 (4 cases), immediate post-operative complications (3 cases), postoperative drainage (29 cases), and more than one surgical procedure (2 cases).

After surgical procedure, among 85 cases of low risk clients, there were 66 cases (77.6%) who had met the set criteria of low risk clients; postoperative indicators of no surgical drainage, nor immediate complication. These patients can optionally choose to have the overnight hospital stay or short hospital stay, within 3 days. The remainder were considered to have the long hospital stay, more than 3 days. Ultimately, the subjects were categorized into three groups due to the duration of hospital stay; group A was overnight hospital stay, 15 of 85 subjects (17.6%), group B was short hospital stay (within 3 days), 51 of 85 subjects (60.0%) and group C was long hospital stay (more than 3 days), 19 of 85 subjects (22.3%).

The mean age of the subjects, enrolling in the study, was 53.02 $\pm$ 12.36 years (range of 27-79 years), 66 of 85 cases (77.6%) were female, and 11 of 85 cases (12.9%) had body mass index (BMI) of 30 kg/m^2 or more. The surgical characteristics of low risk patients undergoing laparoscopic cholecystectomy are

Table 1. Surgical characteristics of low risk patients undergoing laparoscopic cholecystectomy

Data (n = 85)	Number (%)
American Society of Anesthesiologists	
Class 1	15 (17.6)
Class 2	70 (82.4)
Indication for surgery	
Symptomatic gallstones	73 (85.9)
Chronic cholecystitis	7 (8.2)
Post-removal of common bile duct stone	1 (1.2)
Post-acute cholecystitis	1 (1.2)
Calcified gallbladder	1 (1.2)
Polyp	1 (1.2)
Asymptomatic gallstones	1 (1.2)
Pathological report	
Chronic cholecystitis	82 (96.5)
Acute cholecystitis	1 (1.2)
Normal	1 (1.2)
Not sent	1 (1.2)

Table 2. Comparison of length of hospital stay and cost of treatment in each group

Item (mean ± SD)	Overnight hospital stay (n = 15)	LOHS less than 72 hr (n = 51)	Chose not to accept the new protocol (n = 19)
LOHS (hours)	24.00 ± 1.61*	55.00 ± 11.16	108.00 ± 21.59
Total cost (USD)	531.22 ± 111.09*	665.50 ± 133.35	812.33 ± 158.62
Room cost (USD)	25.20 ± 19.84*	84.63 ± 57.74	146.71 ± 81.86

* $p < 0.001$
LOHS = length of hospital stay

demonstrated in Table 1. The majority of the subjects (82.4%) were ASA class 2 and 85.9% were symptomatic gallstones with chronic cholecystitis (96.5%).

The mean operative time was 117.4 minutes (range of 70-225 minutes). The overall surgical complication was 7 of 85 cases (8.3%); 5 cases (5.9%) had superficial surgical site infection, 1 case (1.2%) had sterile intra-abdominal collection and 1 case (1.2%) had ascites leakage.

The mean length of hospital stay (LOHS) was 24 ± 1.61 hours, range of 22 to 26 in group A, 55 ± 11.16, range of 42 to 73 in group B, and 108 ± 21.59, range of 75 to 143 in group C, while the average total expenditure was 531.22 ± 111.09, range of 238.31 to 727.43, 665.5 ± 133.35, range of 444.34 to 1,220.91 and 812.33 ± 158.62, range of 549.4 to 1,086.06, in group A, B and C, respectively, as shown in Table 2. In the overnight hospital stay group, the LOHS and total expenditure had significantly lower than the other groups ($p < 0.001$). The readmission rate was 2 of 85 cases (2.4%); one in the overnight hospital stay group, and one in the long hospital stay group. The majority of the overnight hospital stay group, 10 in 15 cases (66.6%), had rated their patient satisfaction as excellent.

Discussion

The recent set criteria used in the selection of the low risk clients undergoing laparoscopic cholecystectomy, and safely and significantly demonstrated the LOHS shortening and expenditure reduction in overnight hospital. The advantage of these criteria is it has comprised of dynamic compliance, with both preoperative and postoperative indicators.

The next step of set criteria development, should forward to day-surgery cholecystectomy, and requires not only home care facilities and support but also the additionally selective indicators to maximize the recovery of the clients[4,13]. Firstly, the evidence based information accounted that the patient with BMI more than 32 kg/m^2 was considered not eligible for day-surgery setting[6,14], although a study suggested that BMI of more than 35 kg/m^2 was not a good candidate for day-surgery cholecystectomy[15].

Secondly, the routine laparoscopic cholecystectomy is contraindicated in the presence of obstructive jaundice due to gallstones or dilated ducts on ultrasound. Such a situation requires preoperative endoscopic retrograde cholangiopancreatography (ERCP) or perioperative laparoscopic exploration of the common bile duct[16]. Finally, the success depends on well-trained staff and skilful operative technique together with safe anesthesia and, finally, it depends on appropriate patient selection and education[17]. The selection of patients is important, especially at the initial development of the service; with experience, selection criteria may be broadened to wider spectrum of patients.

At present, there was no significant difference between day-case and overnight hospital stay group as regards complications, prolongation of hospital stay, re-admission rates, pain, quality of life, patient satisfaction, and return to normal activity and work. Day-case elective laparoscopic cholecystectomy seems to be safe and effective treatment in selected patients with symptomatic gallstones. Because of the decreased hospital stay, it is likely to save costs[13].

In conclusion, the set criteria of laparoscopic cholecystectomy (LC) are helpful and establish the cost-effectiveness in terms of reduction of LOHS and total treatment expenditure.

References

1. National Institutes of Health Consensus Development Conference statement on gallstones and laparoscopic cholecystectomy. Am J Surg 1993; 165: 390-8.
2. Leitzmann MF, Rimm EB, Willett WC, Spiegelman D, Grodstein F, Stampfer MJ, et al. Recreational

physical activity and the risk of cholecystectomy in women. N Engl J Med 1999; 341: 777-84.
3. Jorgensen T. Treatment of gallstone patients. Copenhagen: National Institute of Public Health, Denmark, and Danish Institute for Health Technology Assessment; 2000.
4. Victorzon M, Tolonen P, Vuorialho T. Day-case laparoscopic cholecystectomy: treatment of choice for selected patients? Surg Endosc 2007; 21: 70-3.
5. Barkun JS, Barkun AN, Sampalis JS, Fried G, Taylor B, Wexler MJ, et al. Randomised controlled trial of laparoscopic versus mini cholecystectomy. The McGill Gallstone Treatment Group. Lancet 1992; 340: 1116-9.
6. McMahon AJ, Russell IT, Baxter JN, Ross S, Anderson JR, Morran CG, et al. Laparoscopic versus minilaparotomy cholecystectomy: a randomised trial. Lancet 1994; 343: 135-8.
7. The Southern Surgeons Club. A prospective analysis of 1518 laparoscopic cholecystectomies. N Engl J Med 1991; 324: 1073-8.
8. Schirmer BD, Edge SB, Dix J, Hyser MJ, Hanks JB, Jones RS. Laparoscopic cholecystectomy. Treatment of choice for symptomatic cholelithiasis. Ann Surg 1991; 213: 665-76.
9. NIH Consensus conference. Gallstones and laparoscopic cholecystectomy. JAMA 1993; 269: 1018-24.
10. Gadacz TR. U.S. experience with laparoscopic cholecystectomy. Am J Surg 1993; 165: 450-4.
11. Perissat J. Laparoscopic cholecystectomy: the European experience. Am J Surg 1993; 165: 444-9.
12. Ruangsin S, Wanasuwannakul T, Sangkhathat S. Laparoscopic cholecystectomy in Songklanagarind Hospital. Songklanagarind Med J 2007; 25: 315-21.
13. Gurusamy KS, Junnarkar S, Farouk M, Davidson BR. Day-case versus overnight stay for laparoscopic cholecystectomy. Cochrane Database Syst Rev 2008; (3): CD006798.
14. Gurusamy K, Junnarkar S, Farouk M, Davidson BR. Meta-analysis of randomized controlled trials on the safety and effectiveness of day-case laparoscopic cholecystectomy. Br J Surg 2008; 95: 161-8.
15. Davies KE, Houghton K, Montgomery JE. Obesity and day-case surgery. Anaesthesia 2001; 56: 1112-5.
16. Khan MA, Hall C, Smith I. Day case laparoscopic cholecystectomy: Preliminary experience. J One-day Surg 2002; 11: 66-8.
17. Kapoor VK. Bile duct injury repair: when? what? who? J Hepatobiliary Pancreat Surg 2007; 14: 476-9.

การวางรากฐานของประสิทธิภาพเมื่อเปรียบเทียบกับค่าใช้จ่ายผ่านชุดเกณฑ์ของการผ่าตัดถุงน้ำดีด้วยการส่องกล้อง

ศักดิ์ชาย เรืองสิน, วิชา จรูญรัตน์, ชิต เพชรพิเชฐเชียร, พุฒิศักดิ์ พุทธวิบูลย์, สมเกียรติ สรรพวีรวงศ์, สิริพงศ์ ชีวธนากรณ์กุล

วัตถุประสงค์: *เพื่อประเมินชุดเกณฑ์ของการผ่าตัดถุงน้ำดีด้วยการส่องกล้องในการลดวันนอนโรงพยาบาลและค่าใช้จ่ายทั้งหมดในการรักษาพยาบาล*

วัสดุและวิธีการ: *การวัดผลที่ได้รับเป็นการวิเคราะห์แบบไปข้างหน้าด้วยบันทึกทางการแพทย์ และแบบสอบถามตนเองของผู้ป่วย*

ผลการศึกษา: *ระหว่างการทดลองใช้ 1 ปี ผู้ป่วยรวมทั้งหมด 122 ราย ได้รับนัดหมายสำหรับการผ่าตัดถุงน้ำดีด้วยการส่องกล้อง ในจำนวนนี้ ผู้ป่วย 85 คน เข้ากับชุดเกณฑ์ของผู้ป่วยความเสี่ยงต่ำ ตัวชี้วัดก่อนผ่าตัด ก) American Society of Anesthesiologists (ASA) ระดับ 1 หรือ 2 และตัวชี้วัดหลังผ่าตัด ข) ไม่มีการผ่าตัดระบาย และ ค) ไม่มีภาวะแทรกซ้อนกะทันหัน ในขณะที่ผู้ป่วย 37 ราย คัดออกเนื่องจาก ASA ระดับ 3 หรือ 4 และเหตุผลอื่น กระจายตามระยะเวลาวันนอนโรงพยาบาล ผู้ป่วยแบ่งเป็น 3 กลุ่ม กลุ่ม เอ เป็นกลุ่มนอนโรงพยาบาลคืนเดียวจำนวน 15 ใน 85 ราย (ร้อยละ 17.6) กลุ่ม บี เป็นกลุ่มนอนโรงพยาบาลระยะสั้น (ภายใน 3 วัน) จำนวน 51 ใน 85 ราย (ร้อยละ 60.0) และกลุ่ม ซี เป็นกลุ่มนอนโรงพยาบาลระยะยาว (มากกว่า 3 วัน) จำนวน 19 ใน 85 ราย (ร้อยละ 22.4) วันนอนโรงพยาบาลเฉลี่ยเท่ากับ 24 $\pm$ 1.61 ชั่วโมงในกลุ่ม เอ เท่ากับ 55 $\pm$ 11.16 ชั่วโมงในกลุ่ม บี และเท่ากับ 108 $\pm$ 21.59 ชั่วโมงในกลุ่ม ซี ขณะที่ค่าใช้จ่ายทั้งหมดเฉลี่ยเท่ากับ 531.22 $\pm$ 111.09 ดอลลาร์สหรัฐในกลุ่ม เอ เท่ากับ 665.5 $\pm$ 133.35 ดอลลาร์สหรัฐในกลุ่ม บี และเท่ากับ 812.33 $\pm$ 158.62 ดอลลาร์สหรัฐ ในกลุ่ม ซี ตามลำดับ สำหรับกลุ่มนอนโรงพยาบาลคืนเดียว วันนอนโรงพยาบาล และค่าใช้จ่ายทั้งหมด ในการรักษาพยาบาลลดลงอย่างมีนัยสำคัญส่วนใหญ่ของกลุ่มนอนโรงพยาบาลคืนเดียวให้ระดับความพึงพอใจของผู้ป่วยในระดับยอดเยี่ยม*

สรุป: *ชุดเกณฑ์ของการผ่าตัดถุงน้ำดีด้วยการส่องกล้องมีประโยชน์ และวางรากฐานของประสิทธิภาพเมื่อเปรียบเทียบกับค่าใช้จ่ายในด้านการลดวันนอนโรงพยาบาล และค่าใช้จ่ายทั้งหมดในการรักษาพยาบาล*