Original Article • นิพนธ์ต้นฉบับ

Successful Discharge Rate of One-Day Laparoscopic Cholecystectomy Surgery by Modified Post-Anesthetic Discharge Scoring System in Siriraj Hospital

Tithiganya Duangrat, Chotika Soponpongpipat

Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700 Thailand

Abstract

Background: Ambulatory laparoscopic cholecystectomy (LC) could be done safely. One day surgery (ODS) is a new program supported by Thai government. It is to discharge the patient within the same day of surgery or within 24 hours from incision time. A modified post-anesthesia discharge scoring system (PADSS) is recommended.

Objective: To determine the successfully discharge rate (PADSS = 9,10) within 24 hours from incision time in normal practice LC without specific ODS protocol and to compare the anesthetic and surgical factors between the patients with PADSS = 9,10 and the patients with PADSS score < 9.

Methods: The prospective cohort, non-allocation study in elective LC from 18 years in Siriraj hospital in February-March 2020. Demographic, preoperative intraoperative and postoperative data were reviewed from the hospital chart. PADSS evaluation were done at 24 hours after incision. The number of patients with PADSS = 9,10 reported by percentage and 95% CI. Comparing factors between two groups using a t-test.

Results: Patients with PADSS = 9,10 were found 44 from 55 cases (80.0%) (95%CI 67-89.6%): 100.0%, 87.0% and 65.2% of ASA I, II and III, respectively. Patient's age (59.6±13.8 years vs 71.7±16.0 years, *P*=0.016), operative time (84.4±34.6 min vs 112.3±35.2 min, *P*=0.021) and anesthetic duration (152.3±36.6 min vs 121.5±36.8 min, *P*=0.016) in the PADSS score 9,10 group were significantly lower than in the PADSS score < 9 group.

Conclusions: In normal practice of elective LC in Siriraj Hospital, we could discharge patients within 24 hours after incision by using modified PADSS (score = 9,10) in 80.0% of cases. The major problem of delayed discharge time was ambulation. Important factors are ASA physical status, age, operative time, and anesthetic time.

Keywords: ambulatory, laparoscopic cholecystectomy, modified post-anesthetic discharge scoring system, one day surgery

Correspondence to: Tithiganya Duangrat, E mail: Tithiganya2907@gmail.com

Received August 21, 2022, Revised September 9, 2022, Accepted September 9, 2022

Introduction

One day surgery (ODS) project in Thailand is a new program supported by Thai government to improve quality of healthcare services. By definition of Thailand one day surgery compared to western ambulatory is to discharge patient within same day of surgery or within 24 hours from incision time.[1] Shorter hospital stay has many benefits including low hospital cost, more operations can be done, and decrease patient waiting list. There is a guideline in the ODS project including proper patient selection by both surgical and anesthetic criteria, patient and caregiver agreement, preparation and education for patient and caregiver, good flow and care of in-hospital management without complication, good criteria for discharge, post hospital discharge follow up and emergency readmission plan.[1,2] One of the recommendations is to use minimal safety discharge criteria which is modified post anesthetic discharge scoring system (PADSS) score more than 8.[1] PADSS includes 5 items (vital signs, bleeding, ambulatory, nausea/vomiting and pain) with score 0-2 in each item.[3] Anesthesia also plays a role in the ambulatory care.[4-6]

Laparoscopic cholecystectomy (LC) is safe, low morbidity and mortality and rapid recovery after gall bladder surgery. Many studies in Western countries show that the recovery from an ambulatory case is not different from in-hospital patients.[7-14] Siriraj Hospital is a tertiary university hospital which has done LC for many years. Case volumes during 2015-1019 are about 655 cases per year. Whether ODS platform and protocol are not officially implemented in the hospital yet, our team experience might be a good start to set up the system in the future. The primary objective of this study is to determine the successful discharge rate within 24 hours from incision time by modified PADSS in normal practice LC patients in Siriraj Hospital. The secondary objective is to determine the anesthesia and surgical factors between the two groups.

Methods

This prospective cohort, non-allocation study was approved by the Institutional Review Board (Si 1068/2020). Patients age from 18 years scheduled for elective LC under general anesthesia in Siriraj Hospital during February to April 2020 were enrolled. Exclusion criteria was elective opened or emergency cholecystectomy. Withdrawal criteria was patients not willing to be interviewed preoperative or postoperative period. After informed consent, patients were preoperatively interviewed. Demographic data, intraoperative data, anesthetic record and postoperative management were reviewed from hospital chart. All patients were received normal practice of standard anesthesia and operation. Postoperative interview and the evaluation of modified PADSS were done at 24 hours after incision.

Analytic and statistical methods, a sample size of 55 patients was determined to detect 70.0% successful discharged by PADSS at 24 hours assumption by the previous experience (*P*-value=0.7, 95%CI 70.0%±12.0%). Data were analyzed using SPSS program. Demographic data were summarized using descriptive statistics. Categorical variables were presented as number (%). The number of patients that can be safely successful discharged determined by

PADSS 9,10 reported by percentage and 95%CI. Comparing factors between "could be discharged safely" (PADSS = 9,10) group and "could not be discharged safely" (PADSS < 9) group using Chi-square test.

Results

Fifty-five patients were recruited in this study without withdrawal. Patient demographic diagnosis and perioperative data were summarized in Table 1. Patient mean age was 62.2±14.9

Table 1 Patient and clinical characteristics

	Total (n=55)
Age (yr), mean±SD (range)	**62.2±14.9 (27-92)**
Female, n (%)	**34 (61.8)**
Body weight (kg), mean±SD (range)	**64.5±18.1 (38.9-127.3)**
BMI (kg/m^2), mean±SD (range)	**25.6±5.8 (16.4-45.2)**
ASA physical status, n (%)	
I	9 (26.4)
II	23 (41.8)
III	23 (41.8)
Comorbid disease, n (%)	
HT	31 (56.4)
DM	14 (25.5)
Cerebrovascular disease	11 (20.0)
Obesity	9 (26.4)
Cancer	5 (9.1)
Diagnosis, n (%)	
Gallstone	31 (56.4)
Cholecystitis	11 (20.0)
Bile duct stone	10 (18.2)
Gallstone pancreatitis	2 (3.6)
Gallbladder cancer	1 (1.8)
Operative duration (min), mean (range)	**90.0 (25.0-175.0)**
Anesthetic duration (min), mean (range)	**127.0 (50.0-225.0)**
Intraoperative pressure (cmH_2O), mean (range)	**13.6 (8.0-16.0)**
Preoperative drugs, n (%)	
Paracetamol	43 (78.2)
NSAIDs	3 (5.5)
Intraoperative drugs, n (%)	
Opioid	55 (100.0)
Opioid and NSAIDs	18 (32.7)
Ondansetron	53 (96.4)

BMI = body mass index, ASA = American Society of Anesthesiologists physical status, NSAIDs = non-steroidal anti-inflammatory drug

years. Mean body weight and BMI were 64.5±18.1 and 25.6±5.8 kg/m^2, respectively. Most patients were ASA class II and III (41.8% and 41.8%). The majority of comorbidity diseases was hypertension (56.4%). Most of these patients was diagnosed with gall stone (56.4%). Mean operative time was 90.0 minutes while mean anesthetic time was 127.0 minutes. All patients were received general anesthesia with endotracheal tube, balanced technique with inhalation and muscle relaxation. Paracetamol was given during preoperative period for 78.2% of all cases while NSAIDS was given only for 5.5%. Intraoperative and postoperative various opioids were used in every patient. Intraoperative NSAIDS was used about one third of cases (38.1%). Thirty-eight patients (69.0%) were not received any opioids at post-operative period. Almost all of the patients were received ondansetron (96.4%).

In our study, anesthetic complications were found in 10 patients including bradycardia (n=6), difficult intubation (n=2), intraoperative arrhythmia (n=1) and couldn't extubate/unplanned ICU admission (n=1). Six surgical complication cases (9.0%) were turn to open cholecystectomy; 2 cases (3.6%) causing from adhesion and the vessel tear as well as bile leakage without open abdomen 4 cases (7.3%).

Patients with PADSS = 9 ,10 (could be safely discharged) at 24 h after incision were found in 44 of 55 cases (80.0%) (95%CI 67.0-89.6%). From these 44 cases, 32 cases (72.7%) had PADSS = 10. Among 12 cases with PADSS = 9, 8 cases had one point of score reduction with needed the assistance for ambulation and 4 cases had moderate bleeding with 1-2 times of dressing change.

In PADSS score <9 (could not be discharged safely) group (n=11), we found 8 patients had PADSS score = 8 and 3 patients have PADSS score = 7. No patients had PADSS score less than 7. The main problem was ambulation. All 11 patients in this group could not ambulate as preoperative baseline. Six cases had an ambulated item score as 0. Only one case developed unstable vital signs with score 1 in the vital sign item. Only two cases had a problem in nausea/vomiting. One case with moderate degree (score 1) and one case with severe symptom (score 0) were noted. Additionally, one case had a severe pain (score 0). Figure 1 showed the number of patients by items in the PADSS <9 group.

All ASA I patients had a PADSS score 9 or 10. In addition, there were 87.0% of ASA II and 65.2% of ASA III in the PADSS 9,10 group. Patient's age (59.6±13.8 vs 71.7±16.0, P=0.016), operative duration (84.4±34.6 vs 112.3±35.2, P=0.021) and anesthetic duration (152.3±36.6 vs 121.5±36.8, P=0.016) in the PADSS score 9,10 group were significantly lower than in the PADSS score <9 group. Other patient and surgical factors as well as anesthetic medications were not significantly different between the two groups. The other factors were also shown in Table 2.

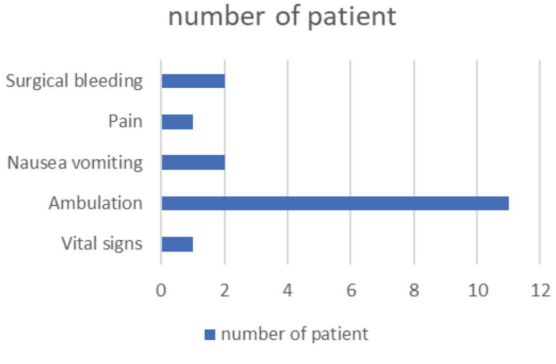


Figure 1 PADSS <9 group

Table 2 The number and factors of patients with PADSS <9 and PADSS 9,10 at 24 hours after incision

	Total	Number of patients with PADSS < 9	Number of patients with PADSS 9,10	95% CI	P-value
All patients, n (%)	55	11 (20.0)	44 (80.0)	67.0-89.6	
ASA physical status, n (%)					
I	9	0	9 (100.0)		
II	23	3 (13.0)	20 (87.0)		
III	23	8 (34.8)	15 (65.2)		
Age, yr (mean±SD)		71.7±16.0	59.6±13.8	2.3-21.5	0.016**
Sex, n (%)					0.502
Male	21	3 (14.3)	18 (85.7)		
Female	34	8 (23.5)	26 (76.5)		
Comorbid disease, n (%)					
HT	31	8 (25.8)	23 (74.2)		0.314
DM	14	4 (28.6)	10 (71.4)		0.443
Cerebrovascular disease	11	2 (18.2)	9 (81.8)		1.000
Obesity	9	3 (33.3)	6 (66.7)		0.362
Cancer	5	2 (40.0)	3 (60.0)		0.259
Operative duration, min (mean±SD)		112.3±35.2	84.4±34.6	4.349-51.333	0.021**
Anesthetic duration, min (mean±SD)		152.3±36.6	121.5±36.8	5.953-57.069	0.016**
Surgical factor				0.440-2.350	
IAP, cmH_2O (mean±SD)		14.3±1.8	13.4±1.9		0.175
Foley catheter, n (%)	6	3 (50.0)	3 (50.0)		0.087
Drain insertion, n (%)	8	3 (37.5)	5 (62.5)		0.335
Surgical complication, n (%)	6	3 (50.0)	3 (50.0)		0.087
Intraoperative medication, n (%)					
Fentanyl	23	6 (26.1)	17 (73.9)		0.682
Morphine	2	0	2 (100.0)		0.682
Fentanyl and Morphine	22	5 (22.7)	17 (77.3)		0.682
NSAIDs	18	2 (11.1)	16 (88.9)		0.307
Ondansetron	53	10 (18.9)	43 (81.1)		0.363
Medication at recovery room, n (%)					
Opioid	44	8 (18.2)	36 (81.8)		1.000
Metoclopramide	29	4 (13.8)	25 (86.2)		0.485
Medication at ward, n (%)					
Opioid	17	8 (47.1)	9 (52.9)		0.300
Metoclopramide	29	4 (13.8)	25 (86.2)		0.485

Among 10 patients with anesthetic complications, 8 patients with intraoperative bradycardia and difficult intubation have PADSS score 9 and 10. Among 6 patients with surgical complications, 2 cases with opened cholecystectomy have PADSS = 8 (ambulate item score = 0). Four patients who have bile leakage without open abdomen, 2 cases have PADSS = 10, 1 case has PADSS = 9 and 1 case has PADSS = 7.

Discussion

PADSS was an objective scoring system which was developed and had been evaluated the validity and reliability for discharged ambulatory surgery patient undergoing general anesthesia since 1995 by Chung and co-workers.[2] While modified Aldrete score which was used for discharge the surgical patients from post-anesthetic care unit to ward did not address pain, nausea/vomiting and incisional site bleeding. The modified PADSS has 5 elements including vital sign, activity level, nausea/vomiting, pain and surgical bleeding. Blood pressure and heart rate must be stable and consistent with age and preoperative baseline. Activity level must be able to ambulate at preoperative level. Minimal nausea and vomiting and, minimal or no pain which could be controlled by oral medication and acceptable by patient are determined. Post-operative bleeding should consistent with expected blood loss before discharge. The recommend safety discharge criteria in Thailand ODS program is modified PADSS more than 8.[1] Our study demonstrated that 80.0% of ASA I-III LC patients without ODS protocol in Siriraj Hospital had a PADSS score 9 or 10. These of them (72.3%) had a PADSS score = 10 at 24 hours after the incision time.

Thailand ODS guideline generally recommends to select the patients with ASA I-II at the beginning. In our study, at 24 hours from incision time, all of ASA I patients and 87.0% of ASA II patients had a PADSS score 9 or 10 which could be safely discharged. About 40.0% of ASA III patients had a PADSS score <9. Although less than 50.0% of ASA III cases, this demonstrated that we need better perioperative protocol more than our normal practice to take care this group of patients for the better outcome. In our study, age ranged from 27 to 92 years old. Although ODS guideline not limit the age of patient, we found that age was significantly different between PADSS = 9,10 and PADSS <9 groups (P=0.016). Definition of elderly is varied. This term generally refers to someone who is at least 60 or 65 years of age.

A previous study analyzed the reasons for delayed discharge after day-surgery LC.[15] This need to have more study to define proper selection cut point or proper care for elderly in our hospital in the future. The ODS guideline recommended that an overall operative time was no longer than 2 hours. Our study demonstrated that longer operative and anesthetic times had an impact on PADSS at 24 hours post-operatively. Operative and anesthetic times in the PADSS score 9,10 group were statistically significantly lesser than in the PADSS score <9 group. The duration of anesthesia might need to be counted on in the future.

Good flow of in-hospital management includes best practice in anesthesia and surgical care by procedure. Adverse events and complications play a major role in failure to discharge for ambulatory cases.[16] We found that all 10

anesthetic complications were intraoperative bradycardia and difficult intubation cases. All cases had PADSS = 9,10. This implied that our anesthetic practice managed these complications well and could be discharged as ODS case. Moreover, the surgical complication has an impact for management patients as an ODS case.[17,18] The proper surgical selection and treatment after complication needed to be discuss in the future as a multidisciplinary team. Proper second plan to handle complication is the most important safety in laparoscopic surgery. In our study patients still had good recovery after changed to opened surgery or needed drainage after bile leakage.

Several previous studies demonstrated that post LC problems that interfered ODS care are pain[19] and nausea/vomiting.[20,21] In patients with PADSS < 9 of our study, the major problem was ambulation more than pain and nausea/vomiting. It could be implied that postoperative nausea/vomiting prophylaxis and treatment and pain control in our normal practice quite effective even though there is no protocol. Fifty-three from 55 cases (96.0%) received prophylaxis ondansetron intraoperative, 29 cases received metoclopramide as a treatment at recovery room and 29 cases received metoclopramide at ward. However, more further studies needed to be done for selective nausea/vomiting prophylaxis and treatment for ODS LC cases by the practical guideline. To date, there are many guidelines recommended both in adult and pediatric population.

The latest international guideline from Gan and colleagues for PONV in children in 2020 including all process (1) identify reliable predictors of risks (2) establish interventions which reduce the baseline risk (3) assess the efficacy of pharmacological and nonpharmacological treatment for PONV prophylaxis (4) consider the efficacy of post-operative and post-discharge PDNV treatment (5) determine the optimal dose and time for prophylaxis drug (6) consider cost effectiveness strategies (7) design a protocol including the risk stratification, risk reduction, prophylaxis, and treatment of PONV (8) evaluate in an enhanced recovery program and (9) propose a research design for future studies.[21]

Royal College of Anesthesiologist of Thailand also established the "Prevention and treatment guideline for postoperative nausea and vomiting" in 2021.[22] Normal anesthesia practice in Siriraj Hospital for LC patients during the study period included preanesthetic consultation for patients with ASA III or higher, hospital admission before surgery, premedication order at ward, and balanced general anesthesia with endotracheal tube. Generally, propofol for induction, avoidance of nitrous oxide, prophylactic intravenous administration of ondansetron before or at the end of the procedure and adequate patient hydration are a standard of practice. Premedication with paracetamol per oral, intraoperative opioids and all pre- or post-incisional infiltration of portal sites are also a common technique in our institute. After post-operative care in post-anesthetic care unit, the patient could be discharged to ward by using modified Aldrete score. Preprint checklist order for pain and nausea/vomiting by an anesthesia acute pain service is used by the surgeon. However, post-operative drinking and eating as well as early mobilization are still different in surgeon's decision.

Early post-operative ambulation has shown the benefits including shorter length of stay and fewer complications. Further studies need to be done to find factors and program making patients immobile postoperatively. Good pain and nausea/vomiting control help for patient mobility.[23] Early mobilization or ambulation is a multidisciplinary factor. Interestingly, there are quite extensive researches in nursing care. Several previous studies established that not eating and/or drinking enough were the factors.[24,25] A previous study showed that psychologic factors such as low confidence or motivation, fear of falling, and fear of bothering staff or seeking help were obstacle for ambulation.[26] Consequently, physical hospital environment is also a factor.

The success of this Thailand project comes from the appropriate practice in every process and multidisciplinary team.[27] Other countries with ambulatory experience already expand the ambulatory program to much more higher risk patients and operations with more extensive specific and individualized protocols.[28-30] To implement ODS LC platform in our hospital, we need to have more proper patient selection by both surgical and anesthetic criteria, patient and caregiver agreement, better preparation and education[31], specific flow of in-hospital management, PADSS criteria with specific discharge order and specific disease post-hospital discharge follow up.[32] PADSS evaluation is only a part of discharge criteria. Holistic and discharge criteria of specific diseases have to concern for the surgical and social factors. Finally, this study design is a cohort study, not a randomized controlled trial, so there are many factors that are not controlled. Other factors that affect the patient discharge need for the further studies. However, the result of this study could be initiated and applied for one-day LC patients in the other hospitals. Importantly, a better anesthetic technique and a well-planed program might be utilized for high-risk cases such as ASA III, aged more than 60 years old and the operative time more than 2 hours in the near future..

Conclusion

In normal practice for elective LC under general anesthesia in Siriraj Hospital, we could discharge the patient within 24 hours after incision by using modified PADSS (score = 9 or 10). In PADSS < 9 group, the key problem was the ambulation. The important patient factors were ASA physical status and age. The most surgical factor was the operative time. In addition, the majority of anesthetic factor was the anesthetic time. Further studies needed to be done for finding other domains including surgical inclusion criteria, psychosocial factor and other additional programs especially for implementation of early ambulation.

Reference

1. ทวี รัตนชูเอก. ข้อเสนอแนะด้านการพัฒนาระบบบริการการผ่าตัดแบบวันเดียวกลับ. กรมการแพทย์ 2560:8-10. AHRQ safety program for ambulatory surgery. Available from https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/hais/tools/ambulatory-surgery/sections/ambulatory-surgery-report.pdf. [Accessed May 2017].

2. Chung F, Chan VWS, Ong D. A post-anesthetic discharge scoring system for home readiness after ambulatory surgery. J Clin Anesth. 1995:7:500-6.
3. White PF, Eng M. Fast-track anesthetic techniques for ambulatory surgery. Curr Opin Anaesthesiol. 2007;20:545-57.
4. Lee JH. Anesthesia for ambulatory surgery. Korean J Anesthesiol. 2017;70:398-406.
5. Hansen J, Rasmussen LS, Steinmetz J. Management of ambulatory anesthesia in older adults. Drugs Aging. 2020;37:863-74.
6. Rosen MJ, Malm JA, Tarnoff M, Zuccala K, Ponsky JL. Cost-effectiveness of ambulatory laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech. 2001;11:182-4.
7. Serra AS, Roig MP, Lledo JB, et al. The learning curve in ambulatory laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech. 2002;12:320-4.
8. Johansson M, Thune A, Nelvin L, Lundell L. Randomized clinical trial of day-care versus overnight-stay laparoscopic cholecystectomy. Br J Surg. 2006;93:40-5.
9. Tenconi SM, Boni L, Colombo EM, Dionigi G, Rovera F, Cassinotti E. Laparoscopic cholecystectomy as day-surgery procedure: current indications and patients' selection. Int J Surg. 2008;6(Suppl1): S86-8.
10. Pérez MAL, Villarreal GC, Cumplido PL, Obregón RA. Comparative study of ambulatory laparoscopic cholecystectomy verus management of laparoscopic cholecystectomy with conventional hospital stay. Cir Esp. 2013;91:424-31.
11. Tang H, Dong A, Yan L. Day surgery versus overnight stay laparoscopic cholecystectomy: a systematic review and meta-analysis. Dig Liver Dis. 2015;47:556-61.
12. Lledó JB, Castro PG, Gavara IGI, Cirión JLI, Andújar RL, Granero EG. Twenty-five years of ambulatory laparoscopic cholecystectomy. Cir Esp. 2016;94:429-41.
13. Teixeira UF, Goldoni MB, Machry MC, Ceccon PN, Fontes PRO, Waechter FL. Ambulatory laparoscopic cholecystectomy is safe and cost-effective: a Brazilian single center experience. Arq Gastroenterol. 2016;53:103-7.
14. Cao J, Liu B, Shi J, et al. Safety of ambulatory laparoscopic cholecystectomy in the elderly. ANZ J Surg. 2021;91:597-602.
15. Cao J, Liu B, Li X, et al. Analysis of delayed discharge after day-surgery laparoscopic cholecystectomy. Int J Surg. 2017;40:33-7.
16. Seyednejad N, Goecke M, Konkin DE. Timing of unplanned admission following daycare laparoscopic cholecystectomy. Am J Surg. 2017;214:89-92.
17. Rosero EB, Joshi GP. Hospital readmission after ambulatory laparoscopic cholecystectomy: incidence and predictors. J Surg Res. 2017;219:108-15.
18. Barazanchi AWH, MacFater WS, Rahiri JL, Tutone S, Hill AG, Joshi GP. Evidence-based management of pain after laparoscopic cholecystectomy: a PROSPECT review update. Br J Anaesth. 2018;121:787-803.
19. Odom-Forren J, Reed DB, Rush C. Postoperative symptom distress of laparoscopic cholecystectomy ambulatory surgery patients. J Perianesth Nurs. 2018;33:801-13.
20. López JLT, Cadahía DP, Noalles MJA, Cortés TS, Navarro PA. Perioperative factors that contribute to postoperative pain and/or nausea and vomiting in ambulatory laparoscopic surgery. Rev Esp Anestesiol Reanim (Engl Ed). 2019;66:189-98.
21. Gan TJ, Belani KG, Bergese S, et al. Fourth consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg. 2020;131:411-48.
22. แนวทางเวชปฏิบัติสาหรับการป้องกันและรักษาภาวะคลื่นไส้อาเจียนหลังการผ่าตัด Prevention and treatment guideline for postoperative nausea and vomiting. Available from https://www.rcat.org/_files/ugd/82246c_3ca7253020344933ae10a7aaa20ecdc9.pdf. [Accessed 2 August 2022].

23. Asada J, Ida M, Sato M, Okamoto N, Kawaguchi M. Associated factors with delayed ambulation after abdominal surgery. J Anesth. 2019;33:680-4.
24. Dermody G, Kovach CR. Barriers to promoting mobility in hospitalized older adults. Res Gerontol Nurs. 2018;11:17-27.
25. Zisberg A, Syn-Hershko A. Factors related to the mobility of hospitalized older adults: a prospective cohort study. Geriatr Nurs. 2016;37:96-100.
26. Brown CJ, Williams BR, Woodby LL, Davis LL, Allman RM. Barriers to mobility during hospitalization from the perspectives of older patients and their nurses and physicians. J Hosp Med. 2007;2:305-13.
27. Ahn Y, Woods J, Connor S. A systematic review of interventions to facilitate ambulatory laparoscopic cholecystectomy. HPB (Oxford). 2011;13:677-86.
28. Gregori M, Miccini M, Biacchi D, de Schoutheete JC, Bonomo L, Manzelli A. Day case laparoscopic cholecystectomy: safety and feasibility in obese patients. Int J Surg. 2018;49:22-6.
29. Sala-Hernández A, Castro PG, Orón EM, et al. Evaluation of patient safety and satisfaction in a program of ambulatory laparoscopic cholecystectomy program with expanded criteria. Cir Esp (Engl Ed). 2019;97:27-33.
30. Marinis A, Stamatakis E, Tsaroucha A. et al. Safety and effectiveness of outpatient laparoscopic cholecystectomy in a teaching hospital: a prospective study of 110 consecutive patients. BMC Res Notes. 2010;22;3:207.
31. Magdaleno HS, Tarragó AC, Casas CO, et al. Evaluation of the impact of preoperative education in ambulatory laparoscopic cholecystectomy. a prospective, double-blind randomized trial. Cir Esp (Engl Ed). 2018;96:88-95.
32. Balciscueta I, Barberà F, Lorenzo J, Martínez S, Sebastián M, Balciscueta Z. Ambulatory laparoscopic cholecystectomy: systematic review and meta-analysis of predictors of failure. Surgery. 2021;170:373-82.