DIPONEGORO MEDICAL JOURNAL
(Jurnal Kedokteran Diponegoro)
Online : http://ejournal3.undip.ac.id/index.php/medico
E-ISSN : 2540-8844
Volume 10, Number 2, March 2021

THE DIFFERENCE OF LENGTH OF STAY, SURGICAL SITE INFECTION, POST SURGICAL PAIN, AND BILE LEAK IN LAPAROSCOPIC CHOLECYSTECTOMY AND OPEN CHOLECYSTECTOMY

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ABSTRACT

Background: The incidence of cholesistolithiasis is increased due to the changes of diet to the western diet. The cholecystectomy is one of the treatments for cholecystolithiasis. It can be divided into laparoscopic cholecystectomy and laparotomy cholecystectomy. The previous study demonstrated that the laparoscopic cholecystectomy was better than laparotomy cholecystectomy for postoperative length of stay, surgical site infection, postoperative pain, and bile leak in cholecystolithiasis, but there is no official data and research yet in Indonesia **Objective:** To determine the difference of postoperative length of stay, surgical site infection, postoperative pain, and bile leak in laparoscopic cholecystectomy and laparotomy cholecystectomy. **Methods:** An analytic observational study with cross sectional design. Subject was patient who had undergone laparoscopic or laparotomy cholecystectomy from Dr Kariadi Hospital, Semarang and RSND Semarang during period of 2013 to 2019. The Mann Whitney-U test was used to determine the difference of length of stay as well the Chi Square test for determining the difference of surgical site infection, postoperative pain, and bile leak among both groups. **Results:** 34 (41.5%) men and 48 (58.5%) women with an age avarage of 49.84 ± 13.54 years were included. There were 41 subjects for laparoscopic group and 41 subjects for laparotomy group. There were a significant difference between laparoscopic and laparotomy cholecystectomy in cholecystectolithiasis cases on postoperative hospital stay (p = 0.000), postoperative pain (p = 0.000), surgical site nfection (p = 0.000), and bile leak (p = 0.013). **Conclusion:** Laparoscopic cholecystectomy was better than open cholecystectomy in postoperative hospital stay, surgical site infection, postoperative pain, and bile leak for cholecystolithiasis cases.

Keywords: bile leak , cholecystetomy, cholecystolithiasis, laparoscopy, laparotomy

INTRODUCTION

Cholecystolithiasis is a condition in which deposits of bile fluid formed into a hard stone-shaped mass inside vesica fellea [1]. About 20 million people (15% of the adult population) have suffered from Cholecystolithiasis in the United States. Each year, the number of sufferers will increase by 1%-3% of the population and as much as 1% - 3% of the number of sufferers whose disease will develop into symptomatic [2]. Each year, approximately 500,000 sufferers are indicated to undergo a cholecystectomy even with symptoms or complications [3]. There is no official data yet on the number of Cholecystolithiasis incidents in Indonesia. The estimated incidence of Cholecystolithiasis in Indonesia corresponds to the incidence rate in Asia, which is as much as 4% - 12% of the population [4]. According to previous research, there were 113 cases of Cholecystolithiasis at RSUP Prof. Dr. R. D. Kandou Manado in the period of October 2015 - October 2016 [5]. Also found 102 cases of Cholecystolithiasis in Koja Hospital at Jakarta in the period of October-December 2015 [6].

Cholecystectomy can be divided into 2 types, that is laparotomy cholecystectomy and laparoscopic cholecystectomy. Laparotomy cholecystectomy is performed by creating an incision 4 – 6 inches on the abdomen in the right upper quadrant, and taking vesica fellea through the incision. This procedure is performed in case of complications in laparoscopic cholecystectomy[7].Laparoscopic cholecystectomy is performed by inserting a laparoscope through 3- 4 small incisions. The doctor will perform the surgery through the monitor screen, then remove the vesica fellea through one of the incision that has been made. Nowadays, laparoscopic cholecystectomy has become the gold standard of symptomatic Cholecystolithiasis surgery[8].

Based on previous research, laparoscopic cholecystectomy has lower mortality, morbidity, length of stay, surgical site infections, post operative pain, and bile leak than laparotomy cholecystectomy [9,16].

The length of post surgical stay is the length of time that is calculated from the time of surgery,

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treated on the ward, until allowed to go home by the doctor from the hospital. Average patients length of stay after laparoscopic cholecystectomy was 4.75 days faster than laparotomy cholecystectomy[10].

Post operative pain can be affected by several factors, including the type of action, duration of operation, location, and number of tissue damaged due to surgery [11]. For pain quality scoring, all that is often done is to use VAS (Visual Analog Scale). Previous research has suggested that post-cholecystectomy patients have lower VAS scores than laparotomy cholecystectomy[12].

A cholecystectomy can lead to a site infection which is a short-term complication of the operation. The infection can be redness accompanied by purulent secretions or seropurulent in sites. Laparotomy cholecystectomy had a higher incidence rate of 7.6%, while laparoscopic cholecystectomy was 1%[13].

Bile leak is the occurrence of leakage of bile fluid due to bile duct trauma. Bile duct trauma usually occurs as a result of post surgical complications involving the biliary system and hepatic system [14]. The incidence of bile leak is more risky in patients with anatomical variation and severe inflammation in vesica fellea [15]. Based on previous research, bile leakevents occur more in laparotomy cholecystectomy than laparoscopic cholecystectomy[16] .

Due to the lack of data and further research in terms related to complications in the act of cholecystectomy, for example such as post surgical pain, surgical site infections and length of stay information for each procedure in Indonesia. Therefore, researchers are interested in examining differences in laparotomy cholecystectomy with laparoscopic cholecystectomy against length of stay , and complications of procedures such as post surgical pain surgical site infection, ang bile leak

METHODS

This type of research used cross sectional with observational-analytical, for research samples in the form of medical records of post surgical cholecystectomy patients with laparatomy or laparoscopic techniques at RSUD Dr Kariadi and at RSND Semarang (n = 82). The selection of research subjects has been conducted by purposive sampling and eliminated based on inclusion criteria, namely having complete medical record data covering age, gender, date of operation, operator, and integration sheet containing the infection of surgical sites, VAS scores representing post surgical pain, and bile leak and surgical techniques used. Subjects will be excluded if they have comorbidities diseases such as immune system disorders and coagulation disorders; has a history of adhesive small bowel obstruction, abdominal surgery history, and incomplete medical records.

Researchers have used medical records, these medical records are obtained from the medical record installation section at RSUP Dr Kariadi Semarang and RSND Semarang. This data carried out on patients who performed cholecystectomy with laparatomy or laparoscopic techniques at RSUD Dr Kariadi Semarang in period of 2013-2019 and at RSND Semarang in period of 2015-2019.

Post-cholecystectomy patient confidentiality as a research subject remains guarded by not including the patient's identity.

The data obtained is analyzed with bivariate analysis. For numerical data such as length of stay and age, a distribution normality test was conducted using the Kolmogorov Smirnov test first. Length of stay was non normal distribution data and age variable was normal distribution data, so length of stay is presented with median and age variable is presented with mean.

After that, it was further analyzed through mann whitney tests for length of stay and independent t tests for age variables. Nominal data such as surgical site infections, surgical site pain, and bile leak analyzed with the Chi Square test to determine differences in both groups

RESULTS

Characteristics of Research Subjects

The characteristics of the research subjects are in table 1. The table showed that the research subjects had more female sex than men in both laparoscopic cholecystectomy and laparotomy cholecystectomy groups. The average age of the laparotomy group was greater than the laparoscopic group. The data analysis found that there was no significant link between gender and age to differences in cholecystectomy techniques.

Post-surgical length of stay

Post-surgical length of stay in laparoscopic group (3 days) shorter as much as 4 days compared to laparotomy group (7 days). The comparative test result of the length of stay between laparoscopy and laparotomy is p = 0.000 so that the hypothesis is

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acceptable, there was a significant difference in length of stay between laparoscopic cholecystectomy and laparotomy cholecystectomy.

Table 1. Characteristics of Research Subjects

Variable	Cholecystectomy		P Value
	Laparoscopy	Laparotomy	
Gender			
Men	15	19	0,370
Women	26	22	
Age (years) (Mean + SD)	48,07(±12,98)	51,61(±14,016)	0,731
Length of stay (Days) (Median (Min-Maks))	3 (1-8)	7 (3-23)	0.000*)
Surgical site infection	1	16	0.000*)
Post surgical pain			
Mild	35	14	0,000*)
Moderate-Severe	6	27	
Bile leak	1	9	0,013

*) p=0.005

Post Surgical VAS Score

Pain is a sensory or motor experience that is felt uncomfortable due to tissue damage. VAS scores are used as subjective indicators against post surgical pain. VAS scores are obtained from the patient's medical record data. Most of the study subjects in the laparoscopic group experienced mild pain, while most laparotomy groups experienced moderate-severe pain. Based on non-parametric tests worth as p = 0.000 (<0.05), it can be concluded that the difference in the quality of site pain is significant between laparoscopic cholecystectomy and laparotomy cholecystectomy.

Surgical Site Infection

Surgical site infection is an infection that appears in post surgical sites characterized by redness and purulent secretions or seropurulen in the site. Surgical site infections occurred more in the laparotomy group (16 cases) compared to the laparoscopic group (1 case). Based on non-parametric tests worth p = 0.000 (<0.05), it can be concluded the difference in the number of occurrences of surgical site infections is meaningful between laparoscopic cholecystectomy and laparotomy cholecystectomy.

Bile leak

Bile leak is the occurrence of leakage of bile fluid due to bile duct trauma. The bile leak data obtained from medical records. Bile leak was more common in laparotomy groups (9 cases) compared to laparoscopic groups. Based on non-parametric tests worth as p = 0.013 (<0.05), it can be concluded there is a significant difference in the number of bile leak incidences between laparoscopic cholecystectomy and laparotomy cholecystectomy.

DISCUSSION

Cholecystolithiasis can be increased due to the changing diet of Indonesians because it follows a high-fat foods from western country. Cholecystectomy, one of the procedures of Cholecystolithiasis divided into laparoscopy and laparotomy. Based on previous research, it was concluded that laparoscopy is better than laparotomy in terms of length of stay, surgical site infection, post surgical pain, and bile leak[9,16]. There is no data and similar research in Indonesia. The limitations of the data and the study made researchers interested in examining differences in length of stay, surgical site infections, post surgical pain, and bile leak in laparoscopic cholecystectomy and laparotomy cholecystectomy.

Based on gender, cholecystectomy patients are more female-dominated than men. However, there was no significant influence on the differences in cholecystectomy techniques performed. Similar results were also found in Kim et al researchs that examined the risk of asymptomatic cholecistolitiasis , while in this research examined the group of cholecistolitiasis who needed to undergo a cholecystectomy. Women are more at risk due to the absence of the hormone esterogen, this hormone can increase cholesterol saturation in bile fluids [17].

Based on average age, cholecystolithiasis patients who needed to undergo laparotomy cholecystectomy were older than in the laparoscopic group. Similar results were obtained by Serban et al. where laparotomy cholecystectomy was more widely performed in the elderly population (>60 years)[18] and by Coelho et al. where laparoscopic cholecystectomy was more performed in the younger population (<60 years)[19]. The difference between the two research and this research is that it compares the two techniques of cholecystectomy, while the two previous research examined the

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influence of age on the outside results of each technique. Older age is more risky, this is due to exposure to other risks such as chronic diseases that occur longer and are accompanied by the aging process [20]. Old age is also one of the factors affecting late surgery, as it requires some number of presurgery actions such as laboratory and radiology examinations, and the risk of post surgical complications will increase by 2% per year [21].

The length of stay in the laparoscopic group was faster than the laparotomy group with median results toward the laparoscopic stay length was 3 days while the median result toward the length of stay in the laparotomy group was 7 days. The average score and difference were not much different from the research conducted by Zacks et al. where the average laparoscopic group was 4.1 days while the average laparotomy group was 7.4 days[22]. The same interpretation is derived from a meta-analysis conducted by Paula et al. using four databases of research journals, that is Medline, Embase, Cochrane and Lilacs[23]. The difference between this research and the two previous studies is that zacks et al. use the cohort method and Paula et al. use the meta-analysis method.

Patients in the laparoscopic group experienced milder pain than pain in the laparotomy technique group. The same results were also obtained by Alvin et al. who conducted prospective cohort studies on 607 patients in several hospitals (multi center)[24]. The difference in pain experience depends on the extent of the incision site indicating tissue damag [25].

The laparotomy group had more cases of surgical site infection compared to laparoscopic group. Factors that affect the number of surgical site infections based on the technique are the area of the site that indicates tissue hypoxia and the difference in the duration of surgery in each technique [26]. Similar results were also obtained by Warren et al., where laparotomy cholecystectomy was more at risk of surgical site infection than laparoscopic cholecystectomy [26]. The difference in this research is its research method, in which Warren et al use retrospective cohort methods.

Bile leak is more common in cases of laparotomy cholecystectomy compared to laparoscopic cholecystectomy. Similar results were obtained by Shahwan et al. and Karvonen et al. [27,28]. Previous research and this research have differences, that is on the criteria of the research subject. The factor that influences the incidence of bile leak indirectly is a complex case that is generally addressed with laparotomy technique[29].

This research used secondary data and used purposive sampling that still have bias, because there is no randomization and there is a human error factor either from the researchers in the selection of the research subject or the filling of medical records as a secondary data source. This research also has not analyzed the correlation between existing variables, so the information obtained is still incomplete.

CONCLUTION

Laparoscopic cholecystectomy is better in length of stay, surgical site infections, post surgical pain, and bile leak compared to laparotomy cholecystectomy in cases of Cholecystolithiasis.

Ethical Approval

All research procedures have been approved with the publication of Ethical Clearance No. 161/EC/KEPK/FK-UNDIP/VII/2020 from the Medical and Health Research Ethics Commission (KEPK) faculty of Medicine in Diponegoro University Semarang.

Conflicts of Interest

The authors declare no conflict of interest

Funding

No specific funding was provided for this article

Author Contribution

Writing-original draft preparation, Dilla Putri ; writing-review and editing, Dr. dr. Sigit Adi Prasetyo, M.Si Med, Sp. B-KBD, dr Agung Aji Prasetyo, M.Si Med, Sp.BA , and dr. Santoso, M.Si Med, Sp. N.

Acknowledgement

This work was supported by Departement of Medicine, Faculty of Medicine, Diponegoro University, Medical Record Installation and Medical Record Information System of RSUP Dr. Kariadi Semarang and RSND Semarang.

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