INCIDENCE OF POSTOPERATIVE ATELECTASIS IN ELECTIVE VERSUS EMERGENT LAPROSCOPIC CHOLECYSTECTOMY: A TERTIARY HOSPITAL EXPERIENCE.

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ABSTRACT

INTRODUCTION

The exact mechanism behind postoperative atelectasis remains uncertain, but a few reasons have been suggested, and one of those reasons is pain. In laparoscopic cholecystectomy, there is a noticeable difference in pain between patients who undergo elective procedures compared to emergent ones. Unfortunately, no previous research has been done to compare between the incidence of postoperative atelectasis in patients undergoing elective versus emergent laparoscopic cholecystectomy. Thus, this study was aimed to compare the incidence of postoperative atelectasis in patients undergoing emergent versus elective laparoscopic cholecystectomy in a large cohort of patients at a single tertiary referral hospital.

METHODS

An IRB-approved retrospective chart review was performed on all patients who underwent laparoscopic cholecystectomy between January 2016- March 2017 and met the inclusion criteria. Patients who converted to open cholecystectomy or had symptoms of acute cholecystitis for more than four days were excluded. Incidence of atelectasis postoperatively in emergent versus elective laparoscopic cholecystectomy was identified, demographics of the patients, diagnosis, and outcomes were determined, and post-operative complications including atelectasis, pneumonia, infection, and coagulable state after the surgery were addressed. Frequencies and percentages were used for categorical variables, means and standard deviations were for continuous variables.

RESULTS

In total, 839 patients underwent laparoscopic cholecystectomy, with postoperative atelectasis occurring in 26 patients (3.1%). Postoperatively, atelectasis was significantly higher in patients underwent emergent cholecystectomy compared to elective cases (P=0.029), accounting for 4.6% of all emergent cases. Among patients who underwent non-emergent cholecystectomy, there was a significant association between length of stay and incidence of atelectasis (P= 0.01). Additionally, development of atelectasis was significantly higher in patients who were diagnosed preoperatively with cholecystitis (P = 0.015). A chi-square testing showed statistically significant association between hypertension and postoperative atelectasis (P = 0.027).

CONCLUSION

All in all, Postoperative atelectasis was significantly higher in patients who underwent emergent cholecystectomy compared to elective cases, this may be attributed to the pain or inflammatory process that is associated with emergent cases. A significant association between postoperative atelectasis and hypertension needs further investigation.

INTRODUCTION

Postoperative pulmonary complications are one of the most commonly encountered problems following abdominal surgeries. Their incidence has been found to range from 5 to 80 percent, with the variation attributed to the differences in populations and criteria used to define each complication.[1] Among these complications is atelectasis, which is considered as benign diminished volume affecting all or part of the lung. It typically presents after the patient leaves the post-anesthetic care unit, peaks during the second night and persists until the 4th or 5th day.[2] The exact mechanism behind postoperative atelectasis remains uncertain, but a few reasons have been suggested. Some of the reasons include: decrease in lung tissue compliance, impair in regional ventilation, excessive airway secretions due to cough suppression, use of analgesia and also, pain. Pain contributes to postoperative atelectasis by inhibiting deep breathing and coughing, for they both can exacerbate the patient's discomfort. [3,4] In laparoscopic gallbladder resection (cholecystectomy), there is a noticeable difference in pain between patients who undergo elective laparoscopic cholecystectomies and those who undergo emergent ones. Unlike patients undergoing elective cholecystectomy, where there are gallstones with no inflammation involved, emergent cholecystectomy is usually done in cases where acute inflammation is present such as in acute cholecystitis, biliary colic, and biliary pancreatitis. In all of the latter, inflammation results in pain that is more severe and prominent. Unfortunately, no previous research has been published to compare between the two. In this study, we aim to compare the incidence of postoperative Atelectasis in patients undergoing elective versus emergent laparoscopic cholecystectomy at King Abdulaziz Medical City in Riyadh, Saudi Arabia.

MATERIALS & METHODS

This is a retrospective cohort study of all patients who underwent cholecystectomy in King Abdulaziz Medical City (KAMC) between January 2016 and March 2017 to identify the incidence of atelectasis in emergent versus elective laparoscopic procedures. Patients who were converted to open cholecystectomy were excluded as well as patients with symptoms of acute cholecystitis (fever and pain) for more than four days. Approximate number of subjects that met the criteria was about 839 patients. The study protocol was approved by King Abdullah International Medical Research Center (KAIMRC)'s institutional review board. Patient's information was collected manually by the co-authors. Patient's demographics including the date of birth, gender, body mass index, pregnancy, smoking status, hemodynamics of the patient, diagnosis, type of intervention and imaging interpretation were obtained. Length of stay and post-operative complications including atelectasis, pneumonia, urinary tract infections, any other type of infections, and the coagulable state after the surgery was collected using the attached data collection sheet in the appendices. The incidence of atelectasis postoperatively in emergent versus elective laparoscopic cholecystectomy has been identified along with the demographics of the patients and the outcomes. Categorical variables have been described using frequencies and percentages, and descriptive analysis was used to describe the continuous variables.

RESULTS

The sample consisted of 839 patients that underwent laparoscopic cholecystectomy within January 2016 and March 2017. Female to male ratio was 2.4:1 and obese patients comprised 53.2% of the sample. Emergent cases constituted 40.8% of the sample with atelectasis occurring in 3.1% of the total sample. Total complication rate from other factors was below 3% (full descriptive data are shown in table 1).

Chi2 testing was done to evaluate the association of demographic characteristics and comorbidities of patients and the occurrence of atelectasis. Type of cholecystectomy (Emergent/Elective) showed a significant association with atelectasis with a *p*-value of 0.029 towards emergent cases. Moreover, In subgroup analysis excluding the emergent cases, there was a significant association between the length of stay and the incidence of atelectasis in patient underwent elective laparoscopic cholecystectomy with (P= 0.01). Also, Mean age and mean length of stay were significantly higher in patients who developed postoperative atelectasis compared to those with no complications, (P= 0.0075, P= 0.001), respectively. Furthermore, hypertension and exact diagnosis at presentation to the hospital showed significant associations with *p*-values of 0.027 and 0.015, respectively. Other tested variable failed to show significant association (Table 2 shows full chi2 results).

Stepwise logistic regression was utilized to further analyze the associations between the demographic characteristics and comorbidities of the sample with atelectasis but failed to show association between atelectasis with the other factors included in the model.

	Emergent (n=342)	Elective (n=497)	p
Age group, y			0.133
<30	104	75	
30-50	256	153	
>50	137	113	
Gender			0.002*
Female	371	222	
Male	126	120	
BMI group			0.401†
Underweight	2	3	
Normal weight	79	51	
Overweight	143	114	
Obese	273	173	
Smoking	29	26	0.309
Yes	26	468	
No	468	316	
Hypertension			0.007*
Yes	88	89	
No	254	407	
Atelectasis			0.029*
Yes	16	10	
No	326	487	

Table 1. demographics in emergency VS Elective cases

	Atelectasis (n=26)	No atelectasis (n=813)	p
Type			0.029*
emergent	16	326	
Elective	10	478	
Comorbidity conditions			
Hypertension			0.027*
Yes	10	167	
No	16	646	
Diabetes Mellitus			.0114
Yes	8	150	
No	18	663	
Dyslipidemia			0.278
Yes	6	124	
No	20	689	
Hypothyroidism			1.00†
Yes	2	86	
No	24	727	
COPD/asthma			0.559†
Yes	4	102	
No	22	711	

Table 2. Atelectasis vs non atelectasis

CONCLUTIONS

All in all, post-op atelectasis was significantly higher in patient underwent emergent cholecystectomy compared to elective cases (P<0.05), and a significant correlation was found between hypertension and post op atelectasis (P = 0.027), in which further researches on the direct relationship between atelectasis and hypertension can be established.

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