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Original Research Article

Laparoscopic cholecystectomy in anemia patients: a retrospective cohort study

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ABSTRACT

Background: Preoperative anemia is associated with adverse outcomes after surgery, but no evidence study demonstrates this risk after laparoscopic cholecystectomy. This study aimed to measure the prevalence of preoperative anemia, and to assess its effect on early clinical outcome in laparoscopic cholecystectomy patients.
Methods: Data of 6342 consecutive laparoscopic cholecystectomy patients between Januarys 1995 to January 2015 were evaluated. Preoperative anemia was defined as a hemoglobin level of less than 120gm/l in female, and less than 130gm/l in male. Logistic regression used for analysis.
Results: Preoperative anemia identified in 37.4% of laparoscopic cholecystectomy patients and it more prevalence in women. Analysis showed that patients with severe [odds ratio1.83 (95% Confidence interval 1.62-3.66)], moderate [odds ratio 1.21 (95% Confidence interval 1.11-1.38)], and mild [odds ratio 1.04 (95% Confidence interval 0.91-1.13)] anemia had higher morbidity than those with normal preoperative hemoglobin.
Conclusions: Anemia is common among laparoscopic cholecystectomy patients, and it is associated with more complications.

Keywords: Anemia, Laparoscopic cholecystectomy, Preoperative

INTRODUCTION

Anemia is the most common hematological disorder during the pre-operative period.[1,2] It is an indication of underlying disease that might affect the surgical outcome, and it is identified in up to75% of elective surgical patients.[3] Anemia increase the morbidity after surgery, as it is indecently associated with myocardial infraction, decrease glomerular filtration rate, and other complications, as well as, preoperative anemia expose the patints to blood components transfusion risks.[4-5]

Although hemoglobin (Hb) levels are universally always measured before major general surgery, limited revisions studies have investigated the effects of anemia on post-operative outcome.[7-10]

To best of our knowledge, no study explores the preoperative anemia effect on laparoscopic cholecystectomy outcome, therefore author undertook a preliminary single-center retrospective cohort study to determine the prevalence and the association between preoperative anemia and morbidity in laparoscopic cholecystectomy patients.

METHODS

This was retrospective, observational, cohort study of prospectively collected data on 6342 consecutive adults (age >18 years), who underwent laparoscopic cholecystectomy between Januarys 1995 to January 2015.

Preoperative details and outcomes data were collecting from clinical databases and patient chart. The exclusion

criteria were patients who had unknown preoperative hemoglobin (Hb) levels.

Preoperative anemia defined as the last hemoglobin level measured before the surgery, with all (Hb) measurements obtained within 28 days before surgery. According to world health organization, anemia defined as a hemoglobin level of less than 120gm/dl in female, and less than 130gm/dl in male.[11]

The primary endpoint was postoperative complications, including events affecting the heart (acute myocardial infarction, cardiac arrest), respiratory tract (pneumonia), CNS (cerebrovascular accident, peripheral nerve injury), urinary tract (urinary tract infections, acute renal failure), wound infection (superficial, deep wound infections), sepsis, thrombotic complications (pulmonary embolism, deep venous thrombosis, thrombophlebitis), and return to the operating room.

All statistical analysis was performed with the use of SPSS version 23.0 software. Continuous data were presented as Mean±SD, categorical data were expressed as percentages, and P >0.0001 was considered statistically significant.

RESULTS

Table 1: Patients demographic.

Anemic patients (37.4%)				
	No anemia	**Mild**	**Moderate**	**Sever**
No. of patients (%)	3969 (62.6%)	2075 (32.7)	209 (3.3%)	89 (1.4%)
Hemoglobin, mean (SD) (range)	12.3(1.9) (12-14.6)	11(.8) (11-11.9)	9.8(1.4) (8.1-10.9)	7.2 (3.4) (4.1-8)
Age, y, mean (SD), (range)	39(11.6) (36-89)	37(13.1) (38-93)	39(14.2) (38-88)	21(9.6) (18-29)
Female (%)	69%	79%	81%	59%
ASA class (%)				
1	92%	91%	91%	78%
2	7%	8%	7%	14%
3	1%	1%	2%	7%
4	0%	0%	0%	1%
5	0%	0%	0%	0%
BMI mean	43	42	43	25
Comorbiditie No. (%)	417 (10.5%)	287 (13.8%)	21 (10.04%)	11 (12.36%)

ASA class: 1 (healthy patients), 2(mild systemic disease), 3(severe systemic disease), 4(severe systemic disease, threat to life), 5(moribund)

Data of 6342 patients were included in this work. The mean age of the anemic patients group was 37.6 years (SD 18.5, range 18-93), and 78.4% of the anemic patients group was women. Author obtained hemoglobin levels for 6234 (98.3%) patients within 28 days of the index surgery, and 5885 (92.8%) patients within 2 days pre-surgery. Two thousand three hundred seventy-two (2372) patients (37.4%) fulfilled the world health organization (WHO) definition of anemia in the preoperative period, of whom 2075 (87.5%) patients had mild anemia, and 298 (12.5%) patients had moderate to severe anemia. 3969 patients (62.6%), had no preoperative anemia (Table 1).

The Mean±SD preoperative hemoglobin level in the anemic patients was 10.8±2.4gm/dl, with values ranging from 4.1 to 11.9gm/dl. Transfusion ordered in 11% of mild anemia patients, 61% in moderate anemia patients, and in all patients with severe anemia.

Female is more common in the normal, mild and moderate anemia as expected (gall stones is more common in female) (Table 1). While, the female in severe anemia (blood disorder) account for 59%.

Initial logistic regression analysis amongst these 6342 patients showed a maximum risk of complications at preoperative hematocrit levels less than 27%. Hematocrit level below 32% is an independent factor for the post-operative complications, and minimum risk at hematocrit level above 37% (Table 2).

Table 2: Regression analysis of anemia and postoperative complications.

Parameter	**OR (95%CI)**	**P value**
Anemia		
Severe	1.83 (1.62-3.66)	0.0001<
Moderate	1.21(1.11-1.38)	
Mild	1.04 (0.91-1.13)	
Hematocrit (%)		
<27%	2.31(1.54-3.12)	0.0001<
>27 - <32%	1.52(1.07-2.21)	
>37%	1-02(0.98-1.06)	

OR: Odds Ratio, (95%CI): 95% Confidence interval

Patients with severe anemia are only seen in blood disorders patients. They were young, female, and all received blood transfusion. Patients with low preoperative hemoglobin levels were discharge from the hospital later compare to patients with normal hemoglobin levels. Hospital length of stay was longer in patients suffering severe anemia when match to moderate anemia, mild anemia, and normal preoperative hemoglobin levels.

DISCUSSION

The prognostic effects of low hemoglobin values in patients underwent laparoscopic cholecystectomy are not studied. However, in this large single-center cohort study, patients with pre-operative anemia who underwent laparoscopic cholecystectomy had an increased risk for post-operative complications as compared with non-anemic patients. Author found that pre-operative anemia in the female patients undergoing emergency surgery is

independently correlated with an increased risk of 30-day morbidity. Earlier studies have revealed physiologic tolerance to anemia in healthy adults, and Previous analyses studies have categorized pre-operative anemia as risk factor only in patients undergoing specific major surgeries.[12-14] Anemia was considered a predictor of poor outcomes in various subgroup of surgical patients, Karkouti et al multicenter cohort study proves it in cardiac surgery patients, Wu et al cohort study confirms it in elderly patients underwent non-cardiac surgery, Leichtle et al multicenter database analysis demonstrate it after colon surgery.[8,10,15] All their outcomes show that preoperative anemia is independently associated with an increased risk of 30-day morbidity and mortality in their patients.

This study as well, revealed that the increased risk of postoperative complications occurs more in anemic group even in a common procedure like laparoscopic cholecystectomy however, the complications figures in other groups (Table 3) is similar to those reported in local and international literatures.[16,17]

Table 3: complications and clinical variables between anemic patients and those without anemia.

Anemic patients (37.4%)					
	No anemia	**Mild**	**Moderate**	**severe**	**P value**
No of patients (%)	3969(62.6%)	2075(32.7)	209(3.3%)	89(1.4%)	
Wound infection No. (%)	115 (2.9%)	122 (5.9%)	16 (7.2%)	9 (10.1%)	0.0001<
Respiratory No. (%)	44 (1.1%)	39 (1.9%)	8 (3.8%)	12 (13.5%)	0.0001<
Urinary tract infection No. (%)	3(0.075%)	4(0.2%)	4(1.9%)	7(7.9%)	0.0001<
Venous thromboembolism No. (%)	1(0.025%)	0(0%)	0(0%)	1(1.1%)	0.001<
Cardiac	1 (1.1%)	1 (1.1%)	0 (0%)	0 (0%)	0.001<
Operating time, mean, min	76	83	81	93	0.001<
Hospital stay, mean (range), days	1.3 (1-3)	1.5 (1-3)	1.7 (1-3)	3.3 (3-8)	0.0001<
Emergency (%)	15%	15%	16%	23%	0.0001<
Blood transfusion	0%	11%	61%	100%	0.0001<

Table 4: Relationship between preoperative anemia and adverse composite outcome in different studies.

	OR (95% CI)
Beattie et al[4]	2.43(1.65-3.60)
Musallam et al[5]	1.42 (1.31-1.54)
Wu et al[8]	1.6 (1.1-2.2)
Karkouti et al[10]	3.6 (2.7-4.7)
Leichtle et al[15]	1.83(1.05-3.19)
Baron et al[22]	2.82(2.06-3.85)
Mulhim	1.83 (1.62-3.66)

Similar to other studies, this study showed that the emergency procedure in anemic patients had more effect on the outcome than elective (Table 3).[4,5]

The calculated ORs compare to Beattie et al, Musallam et al, Wu, Karkouti, Leichtle, and Baron et al (Table 4).[4,5,8,10,15]

The anemia detected in (37.4%) of present study population (laparoscopic cholecystectomy), and it is within the range found in the Saudi community as reported by different studies.[19-22]

Pre-operative anemia is the strongest predictor for blood transfusion, this conclusion confirmed by Benoist et al, Beattie et al, and Abu-Ghanem et al and others.[4,23,24] This study is similarly indicating that blood transfusion occur more frequently in anemic patients undergoing laparoscopic cholecystectomy. Therefore, these anemic patients are exposing to additional harm, as there are many well-documented hazards of blood transfusion.[5]

CONCLUSION

Present results propose that anemic patients are more likely to expose to invasive procedures, radiological examinations, and intensive care admission than patients with normal hemoglobin are, because they stay longer in hospital (Table 3). Present study limitations are the retrospective nature of data collection, and on the other hand, the crucial strength of this study was the large number of patients in single center, and author study only one common operative procedure.

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