

# Risk Factors Associated with Post-Operative Complications, in Patients Undergoing Emergency Surgery for Acute Abdomen, at the Honduran Institute of Social Security, 2018

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## Abstract

**Objective:** To determine the risk factors associated with postoperative complications in patients undergoing emergency surgery for acute abdomen, at the Honduran Institute of Social Security, 2018.

**Design:** Cross-sectional, retrospective analytical study with a sample of 230 patients undergoing emergency abdominal surgery.

**Results:** The frequency of postoperative complications was 11.3%. The surgical indication was non-traumatic acute abdomen in 93.9%, with an open approach in 74.3%. 73.1% were infectious complications, according to Clavien-Dindon 26% grade II, 48% grade IIIa and 26% grade IIIb. Conclusions. Acute abdomen secondary to trauma, age from 61 to 70 years, and complicated acute appendicitis were the socio clinical characteristics associated with postoperative complications, with infections being the most frequent, according to Clavien-Dindon, most being grade IIIa. Main comorbidity associated with diabetes mellitus. The Charlson index, serum albumin and nutritional risk index were the risk factors associated with postoperative complications; being the Charlson index the most directly related factor.

**Keywords:** Surgery; Abdomen; Complications; Risk factors

## Introduction

It is estimated that approximately 4-5% of patients who go to emergency rooms consult for abdominal pain [1]. Annually, it is estimated that 234.4 million major emergency surgeries are performed worldwide and it is estimated that, in developing countries, the complications of these major surgical procedures are 17%, with mortality rates of 4-5% [2]. Emergency abdominal surgeries are due to medical conditions or trauma. In Honduras, the last published report is from 1960; 20 patients were reported, intervened for medical reasons [3]. Likewise, according to the epidemiological surveillance bulletin of the Hospital Escuela (2008), there has been a significant increase in externally caused injuries. Increased to 17,726 with significant underreporting [4]. Analyzed emergency surgery at the Honduran Social Security Institute in 1983, reporting 117 emergency surgical procedures, of which 78% were appendectomies. Currently there are no published studies on the complications of emergency surgery in Honduras, and with international trends on the modification of risk factors for them, it is necessary to analyze what these factors are in the Honduran population. Therefore, in the present study, it was proposed to determine the risk factors associated with postoperative complications, in patients undergoing emergency surgery, due to acute abdomen, at the Honduran Institute of Social Security, in order to determine the characteristics of this population, to be able to infer them, from the institutional perspective, and from the community.

## Materials and Methods

Cross-sectional, retrospective analytical study, carried out in the emergency surgery service of the Honduran Institute of Social Security, located in Tegucigalpa, Honduras, 2018. The calculated sample was 230 patients, from a universe of 574 patients undergoing emergency abdominal surgery in the study period, with an estimated error of 5%, confidence level of 95% and an attribute of 50% probability (0.5). Statistical analysis was performed using frequency distribution measures for all variables, socio-clinical, postoperative complications, comorbidities, and risk indices and scales. The analysis of the categorical variables was done using the chi square test, with a level of statistical significance of 0.05, a confidence level of 95% and a value of  $p < 0.05$ . Odds Ratio (OR) calculation was performed with CI=95%; the OR greater than 1 indicated an association between the proposed risk factor and the postoperative complication, the value of OR=1 indicated no association, and the OR less than 1 indicated an inverse association between the factor and the complication (protective factor). Risk factors were analyzed based on logistic regression. To carry out the study, approval was requested from the head of the emergency service of the Honduran Institute of Social Security, and the protocol was submitted for approval by the ethics committee of said institution.

## Results

Postoperative complications occurred in 11.3% patients who underwent emergency abdominal surgery, with a mean age of 40 years and a standard deviation of 15 years. When comparing postoperative complications according to age range, it was found that they occurred in 9.3% of the patients between 18 and 30 years old, 7.4% between 31 and 40 years old, 8.8% between 41 to 50 years old, 13.6% between 51 to 60 years old, 36.8% between 61 to 70 years old, with  $p < 0.05$  (Table 1). Of the total of this population, 58.7% were men and 41.3% women. Of the 26 patients with postoperative complications, 11.9% were men and 10.5% women, without finding statistically significant differences. Regarding the surgical indication, in the patients with postoperative complications, 10.2% were operated on for non-traumatic acute abdomen and 28.6% for some type of trauma, with chi-square test with  $p = 0.035$  ( $< 0.05$ ), and OR=3.527. Of the 4 patients with postoperative complications, operated on for acute abdomen of traumatic origin, 3 were due to collision-type accidents and one to penetrating trauma, with no statistically significant differences ( $p = 0.063$ ). Likewise, the non-traumatic acute abdomen was due to complicated acute appendicitis 30.2%, uncomplicated acute appendicitis 2.9%, perforation 100%, intestinal obstruction 40% and another etiology 16.7%; with a value of  $p = 0.000$  in the chi square test.

**Table 1:** Socio-clinical characteristics of patients undergoing emergency surgery for acute abdomen. IHSS 2018.

Characteristics	Postoperative Complications (%)		MR (IC 95%)	P Value
	Yes	No		
Postoperative Complications	11.3	88.7		
Age Range*				0.027
18-30 years	9.3	90.7		
31-40 years	7.4	92.6		
41-50 years	8.8	91.2		
51-60 years	13.6	86.4		
61-70 years	36.8	63.2		
71-80 years	9.1	90.9		
greater than or equal to 81 years	0	100		
Sex			1.143 (0.495-2.641)	0.755
Men	11.9	88.1		
Women	10.5	89.5		
Diagnosis*			3.527 (1.02-12.195)	0.035
Acute traumatic abdomen	28.6	71.4		
Non-traumatic acute abdomen	10.2	89.8		
Type of Surgical Procedure*				0.002
Exploratory laparotomy	32	68		
Open surgery	8.2	91.8		
Laparoscopic surgery	11.8	88.2		

<b>Type of Postoperative Complication</b>				
Infectious	73.1			
Cardiovascular	3.8			
Abdominal	15.4			
More than one complication	3.8			
Other	3.8			
<b>Clavien-Dindo Classification</b>				
Grade II	26			
Grade IIIa	48			
Grade IIIb	26			
<b>Comorbidities*</b>				0
Arterial hypertension	13.6	86.4		
Diabetes mellitus	66.7	33.3		
Renal disease	100	0		
Diabetes e arterial hipertensión	0	100		
Various comorbidities	75	25		
Other	100	0		
None	6.8	93.2		

**Source:** \*Statistically significant  $p < 0.005$ .

Regarding the type of surgical approach, 74.3% underwent open surgery, 14.8% laparoscopic surgery and 10.9% required exploratory laparotomy. Of the 26 patients with postoperative complications, 8.2% underwent open surgery, 32% exploratory laparotomy, and 11.8% laparoscopic surgery, with a value of  $p = 0.002$ . When evaluating the type of postoperative complication, 73.1% were infectious, 15.4% abdominal infections, 3.8% cardiovascular complication and more than one complication (pneumonia and surgical site infection), and 3.8% another type of complication. Of the 26 patients who presented postoperative complications, 66.7% had diabetes mellitus, 13.6% arterial hypertension, 75% various comorbidities, and 100% kidney disease, with  $p = 0.000$  in the test of chi square. In the logistic regression analysis, for the association of postoperative complications with risk factors, the  $p$  value was 0.000 for the Charlson index, serum albumin and nutritional risk index, so

it was considered that there is a relationship between these and the presence of postoperative complications, with goodness of fit of the model  $p = 0.000$  ( $p < 0.005$ ). The Cox and Snell 23.4% and Nagelkerke 46.1% indices are acceptable, being greater than 1, indicating that the goodness of the model adjusts adequately. With a global percentage correctly classified of 90.9% (greater than 50%), that is to say that, with these risk factors, in this population there was a 90% risk of presenting postoperative complications. According to the significance of B, the Charlson index ( $p = 0.031$ ), was the factor most directly related to the appearance of postoperative complications, with an Exp (B) 2.304, denoting that patients with a Charlson index greater than or equal to 5, had a 2.3-fold increased risk of postoperative complications. Likewise, the concordance of the model was acceptable, having a kappa index of 0.521 with  $p = 0.000$  ( $< 0.05$ ) (Table 2).

**Table 2:** Logistic regression analysis for the association of risk factors with postoperative complications of patients undergoing emergency surgery for acute abdomen. IHSS 2018.

Risk Indices and Scale	Postoperative Complications (%)		P Value	Wald (P<0.005)	Cox and Snell Index (>1)	Nagelkerke Index (>1)	Overall Percentage Correctly Classified (>50%)	Exp (B)	Kappa Index (P<0.05)*
	Si	No							
Charlson index			0	0.000	23.4	46.1	90.9	2.304	0.521
Under 5	64.3	35.7							
Greater than or equal to 5	75	25							
Does not apply	6.6	93.4							

Serum albumin			0					1.5332	
Under 3.5g/dL	60	40							
Greater than or equal 3.5g/dL	50	50							
Unrealized	3.5	96.5							
Nutritional risk index			0					1.749	
Severe malnutrition <83.5	80	20							
Moderate malnutrition 83.5-97.5	50	50							
Mild malnutrition >97.5	66.7	33.3							
No malnutrition >100	50	50							
Does not apply	0	100							
Not calculable	2.7	97.3							

**Source:** \*Statistically significant  $p < 0.005$ .

## Discussion

Postoperative complications occurred in 26(11.3%) patients undergoing emergency abdominal surgery, in the study population, being similar to that reported in previous studies [5]. United States, studied postoperative complications in general surgery patients, finding that the range varies from 5.8% to 43.5%. Likewise, they state that 0.4% presented two or more complications. Postoperative complications in patients undergoing emergency abdominal surgery are an important cause of morbidity, prolonged hospital stay and mortality in surgical patients, reporting up to 15 to 17% of cases worldwide [6]. At the international level, study of 2904 patients undergoing emergency gastrointestinal surgery, 45.7% of them were between 60 to 79 years of age, 24.2% between 40-59 years, 17.7% older than 80 years and 12.5% between 118 and 39 years, similarly, in this study, the highest number of complications was found in patients between 61 and 70 years, with statistically significant differences [7]. Within the analyzed population, men were the ones who underwent emergency abdominal surgery more frequently, without showing statistically significant differences between the presence of postoperative complications and gender. In a study 2904 patients undergoing emergency gastrointestinal surgery, 49% men, in general Reported 20,659,684 trauma discharges in the United States between 2000 and 2011, representing 4.4% of all hospital discharges, reporting complication rates of up to 53% [8,9], Mexico, found that the main cause of surgical acute abdomen was acute appendicitis (62.5%), of which 23.3% were complicated [9]. In this study, it was shown

that patients who underwent surgery for acute abdomen due to trauma had a 3,527 times greater risk of presenting postoperative complications, and a greater association with postoperative complications due to complicated acute appendicitis, with statistically significant differences.

Exploratory laparotomy showed a statistically significant association for postoperative complications. It has been reported that 71% of patients undergoing emergency laparotomy had at least one complication, reporting that the most frequent complications after emergency laparotomy are infectious, pulmonary and gastrointestinal. Cardiovascular complications occur in up to 8.3% of patients and are predictors of mortality [10]. Similarly, in this study, the most frequent postoperative complications were infectious, followed by abdominal and cardiovascular complications. Superficial infection of the surgical site and grade IIIa postoperative complication, according to the Clavien-Dindo classification, were the most frequent in this study. Tevis S. and Kennedy G. in United States, studied postoperative complications in general surgery patients, reporting that the overall rate of complications was 37%, and according to the Clavien-Dindo classification, 25.7% grade I, 48.6 % grade II, 17.1% grade III, 5.7% grade IV and 2.9% grade V. Mutharaju KR (2015), India, studied 250 cases of acute abdomen, between September 2015 and January 2017; the most frequent postoperative complication being surgical site infection (46.59%), followed by enterocutaneous fistula (9%), anastomosis leak (7.9%), respiratory complications (6.5%), frozen abdomen (5.6%), site infection of drainage (5.6%) and postoperative gastrointestinal

bleeding (1.1%) [11,12] Studies in 2,904 patients undergoing emergency gastrointestinal surgery, reporting that 72% (2,088 of 2,904) of patients had one or more comorbidities [13] (2016) reported 20,659,684 trauma discharges in the United States from 2000 to 2011, finding that patients who died during hospital stay, patients had significantly more comorbidities than patients who survived (1.14 vs 0.70,  $p < 0.0001$ ) [13]. In the present study, the presence of diabetes mellitus had a statistically significant association with postoperative complications.

In Finland 2014, in their cohort study of 44 emergency operated patients, found that 49.6% of the patients suffered some type of complication, related to the type of procedure they underwent. The factors that were shown to be independent predictors of complications were the Charlson comorbidity index, preoperative organ dysfunction, and laparotomy or open surgery. The logistic regression analysis showed that a patient with hypoalbuminemia, malnutrition and a Charlson index greater than 5, is an individual at high risk of suffering from postoperative complications in this population space [14].

## Conclusion

Acute abdomen secondary to trauma, age range from 61 to 70 years, and complicated acute appendicitis were the socio clinical characteristics associated with postoperative complications. Additionally, postoperative infectious complications were the most frequent, corresponding mostly to superficial infections of the surgical site, followed by abdominal infections and pneumonia. Comorbidities related to postoperative complications were diabetes mellitus, high blood pressure and kidney disease. The Charlson index, serum albumin and nutritional risk index were the risk factors associated with postoperative complications; being the Charlson index, the factor most directly related to them.

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