

# Comparison of immediate results between laparoscopy and open approach in 1500 appendectomies

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## Introduction

Acute appendicitis is the most frequent cause of acute surgical abdomen and early surgical intervention considerably improves the results. The diagnosis of appendicitis can be complicated, so a high level of suspicion is important to prevent the serious complications of this disease. Both the diagnosis and the surgical management of appendicitis have been influenced in the last 30 years by the introduction of modern imaging techniques and minimally invasive surgery. With the aim of comparing the open and laparoscopic approach in acute appendicitis and determine the advantages and disadvantages of both surgical techniques in terms of hospital stay and postoperative complications, both infectious and non-infectious, we present this work with a series of approximately 1537 appendectomies, in a service with freedom to choose any of the two approaches.

## Material and Methods

A retrospective study on a prospectively maintained database of 1537 consecutive appendectomies between 2007 and 2013. Sex, age, surgeon's experience and postoperative stay were evaluated. Postoperative complications were classified according to the Clavien-Dindo scale.

## Results

The mean age was  $34.5 \pm 0.5$  years (mean  $\pm$  standard error), predominantly male (59.3%). 24 (1.5%) patients the initial approach was by means of a mean laryngo and were excluded, leaving 1513 patients for analysis. The approach was open (ABI) in 848 (56%) and laparoscopic (LAP) in 665 (44%) patients (Fig. 1). Fifty (7.5%) laparoscopic open approaches were converted. LAP was used more frequently in women than in men (52% vs. 38.4%,  $P < 0.0001$ ). The mean postoperative stay was  $4.0 \pm 0.1$  days, with significantly longer stay after laparoscopic approach ( $3.6 \pm 0.1$  vs.  $4.2 \pm 0.2$  days,  $P = 0.011$ ), due to stays of the LAP group for the converted patients ( $n = 50$ ), and / or with deep infection / organ-space of the surgical site ( $n = 35$ ) and / or reoperation ( $n = 11$ ) (Table 1). The time elapsed since the surgeon's degree ( $R1 = 1$ ) was  $5.2 \pm 0.5$  years, with significant differences between ABI and LAP ( $5.3 \pm 0.3$  vs.  $7.8 \pm 0.3$  years;  $P < 0.001$ ). The resident physicians performed more ABI approaches than the adjunct surgeons (61% vs. 43%,  $P < 0.01$ ) and there was an annual increase in the proportion of residents who performed the intervention as a surgeon. The appendectomies performed by resident physicians had a lower number of complications than those performed by assistant surgeons (16.3% vs. 24.9%,  $P < 0.001$ ), a trend that remains the same for the LAP approach (17.8% vs. 23.6%,  $P < 0.04$ ) as for the ABI approach (15.4% vs. 26.7%,  $P < 0.001$ ). Although the mean age of the patients was eight years younger for the ABI group than the LAP ( $30.6 \pm 0.6$  vs.  $38.6 \pm 0.7$  years;  $P < 0.0001$ ), excluding the younger patients of age and repeat all the comparisons, no differences were observed in the exposed results (Table 2). There were no substantial interannual variations in the prevalence of appendicitis, but in the proportion of LAP, with modal peak in 2010 (61.2%,  $P < 0.001$ ). 285 patients presented complications (19.2%), with a small difference between ABI and LAP (17.9% vs. 20.0%,  $P = 0.00001$ ). 42.3% corresponded to Clavien I (No treatment); 26.7% to Clavien II (Pharmacological treatment); 22.3% to Clavien IIIa (Intervention / Drainage without anesthesia); 6.7% to Clavien IIIb (Re-intervention with anesthesia); 1.3% to Clavien IVa (Severe, requires ICU) and 0.7% to Clavien V (Exitus). There were no statistically significant differences between ABI and LAP for Clavien complication types ( $P = 0.28$ ), although the rate of reintervention was somewhat lower in the ABI group than in the LAP (0.9% vs. 1.6%,  $P = 0.25$ ) and the overall rate of surgical site infections was similar (5.4% vs. 5.2%,  $P = 0.9$ ) (Fig. 2).

Figure 1. Surgical approaches

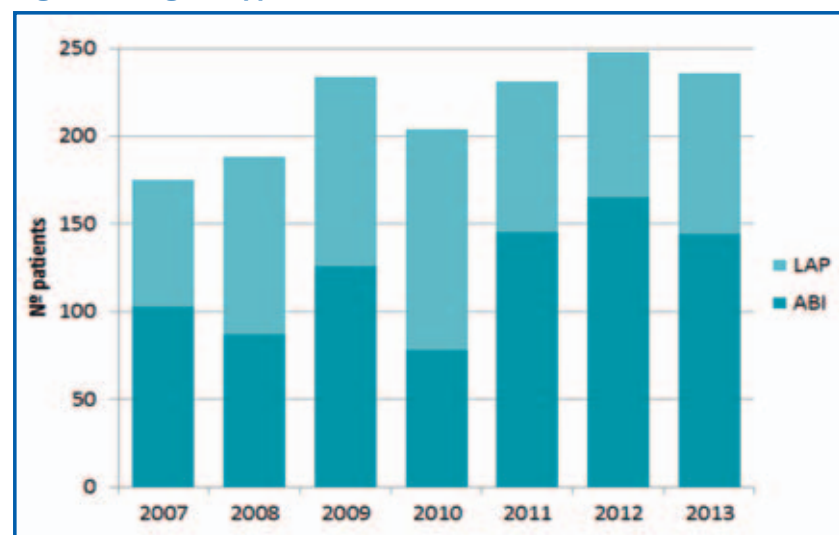


Figure 2. Clavien- Dindo Scale

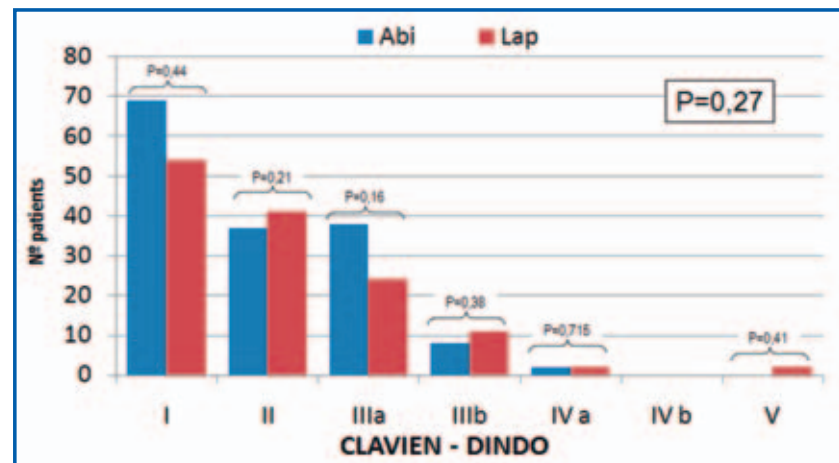


Table 1. Site infections

	ABI N = 848	LAP N = 665	P
Global	65 (7%)	43 (6.4%)	0.37
Deep infection	52 (6,1%)	24 (3,6%)	0,026
Organ-space	15 (1,8%)	21 (3%)	0,78

Table 2. Sex, Age, Surgeons experience. Postoperative stay

	ABI N = 848	LAP N = 665	P
Sex			
Male	552 (65%)	344 (52%)	0,001
Female	296 (35%)	321 (48%)	
Age	$30,56 \pm 0,6$	$38,6 \pm 0,6$	0,0001
Surgeons experience			
Resident physicians	642 (76%)	398 (60%)	0,001
Surgeons	206 (24%)	267 (40%)	
Postoperative stay ( $3,87 \pm 0,1$ days)	$3,64 \pm 0,1$	$4,17 \pm 0,2$	0,016

## Conclusions

We can conclude that the patients operated on by laparoscopy were older, more frequently women and with more advanced appendicitis than those operated on by open route. Resident physicians performed less open approach than assistant surgeons. The open approach presents more surface infections of the surgical site (approximately 3%). The mean postoperative stay is significantly higher after laparoscopic approach ( $\approx 1/2$  day) even after excluding extreme values. And finally, according to the final report of the histopathology, the number of appendectomies in white is increased with the laparoscopic technique, probably, because more diagnostic laparoscopy is performed due to suspicion of appendicitis.