

Acute Appendicitis: Correspondence Between Adult Appendicitis Score (AAS) and Intraoperative Survey as Assessed by the Questionnaire Obtained from the Laparoscopic Appendicitis Score (LAPP) in 102 Patients in a Single-Centre

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ABSTRACT

Introduction: Despite advanced imaging techniques and several validated clinical prediction rules, correctly diagnosing a patient with acute appendicitis remains challenging. The AIR score and the AAS score 6 seem currently to be the best performing clinical prediction scores and have the highest discriminating power in adults with suspected acute appendicitis. The Laparoscopic Appendicitis Score 7 (LAPP) is an easily applicable score that can be used by surgeons to evaluate the appendix during diagnostic laparoscopy.

Scope: The aim is to verify whether an increase in the AAS score corresponds to a worse intraoperative picture certified by the postoperative questionnaire.

Materials and Method: 157 patients with abdominal pain localized in the right iliac fossa were observed. 102 patients (65%) were hospitalized with the diagnosis of acute appendicitis. Based on the AAS we divided the hospitalized patients into 3 groups.

Results: In our case series we have shown that an increase in the AAS score always corresponds to a worse intraoperative picture.

Keywords

Acute Appendicitis, Adult Appendicitis Score, Laparoscopic Appendicitis Score, Emergency surgery.

Background

Appendicitis is the most common cause of an acute surgical abdomen, with an estimated lifetime prevalence of 7-8%. Despite advances in diagnosis and treatment, it is associated with significant morbidity (10%) and mortality (1-5%) [1]. Despite advanced

imaging techniques and several validated clinical prediction rules, correctly diagnosing a patient with acute appendicitis remains challenging. Clinical score alone, e.g. Alvarado score, AIR score and the new Adult Appendicitis Score (AAS) are sufficiently sensitive to exclude acute appendicitis, accurately identifying low-risk patients and decreasing the need for imaging and the negative appendectomy rates in such patients [2]. Diagnostic laparoscopy is the ultimate diagnostic tool to evaluate the appendix. Recently published papers report a wide variation in the negative

appendectomy rate, ranging from 3% to 25%, mostly affecting women [3]. A recent meta-analysis by Varadhan et al. 2015 [4] assessed four randomized controlled trials about safety and efficacy of antibiotics compared with appendectomy for treatment of uncomplicated acute appendicitis. Similarly, the study NOTA (Non Operative Treatment for Acute Appendicitis), assessed the safety and efficacy of antibiotic treatment for suspected acute uncomplicated appendicitis and monitored the long-term follow-up of non operated patients [5].

Objective

The AIR score and the AAS score [6] seem currently to be the best performing clinical prediction scores and have the highest discriminating power in adults with suspected acute appendicitis [2]. The AIR and AAS scores decrease negative appendectomy rates in low-risk groups and reduce the need for imaging studies and hospital admissions in both low and intermediate-risk groups [2]. The Laparoscopic Appendicitis Score7 (LAPP) is an easily applicable score that can be used by surgeons to evaluate the appendix during diagnostic laparoscopy. The score consists of five questions about the presence or absence of appendicitis during diagnostic laparoscopy. If one or more of these questions are answered with yes, it is advised to remove the appendix; if all questions are negative, then it is safe not to remove the appendix. Considering that in our series we did not carry out diagnostic laparoscopy in which it was necessary to decide whether or not to remove the appendix, we did not use the five questions of the LAPP score but the questionnaire of eleven questions (Figure 1) which, in the same work cited, were referred to surgeons immediately after surgery. Starting from that questionnaire we had a score from 0 to 9 depending on the positive answers obtained. The aim is to verify whether an increase in the AAS score corresponds to a worse intraoperative picture certified by the postoperative questionnaire.

Materials and Methods

From May 2020 to July 2021, the Covid period (therefore with a reduced number of accesses to the ER), 157 patients with abdominal pain localized in the right iliac fossa were observed. 55 patients (35%), evaluated with AAS and rarely with abdominal ultrasound, were not affected by acute appendicitis and were therefore discharged.

102 patients (65%) were hospitalized with the diagnosis of acute appendicitis at the General and Oncologic Surgery Unit in Villa dei Fiori Acerra- Naples-Italy.

Of the 102 hospitalized patients, 20 patients (19.6%) underwent Non Operative Management (NOM) with antibiotic therapy with ceftriaxone 1 g iv while 82 patients (80.4%) underwent surgery. Males account for 60.7% of hospitalized patients. The mean age is 28.2 years (range 14-74 years). All hospitalized patients underwent abdominal ultrasound, blood tests and AAS. CT was performed in 34 patients (33.3%) with a mean age of 40.2 years (range 17-74 years).

Based on the AAS we divided the hospitalized patients into 3 groups:

- Group A: low risk of appendicitis, with AAS <10, consisting of 20 patients (19.6%)
- Group B: intermediate risk of appendicitis, with AAS between 11 and 16, consisting of 42 patients (41.1%)
- Group C: high risk of appendicitis, with AAS > 16, consisting of 40 patients (39.2%)

In all three groups we had patients undergoing NOM and in particular:

- Group A: 4 (3.9%)
- Group B: 10 (9.8%)
- Group C: 6 (5.8%).

Patients undergoing appendectomy were:

- Group A: 16 (15.6%)
- Group B: 32 (31.3%)
- Group C: 34 (33.3%).

The time elapsed between diagnosis and surgery averaged 24 hours (range 0-96 hours).

Of the 82 patients who underwent appendectomy, 2 (2.4%) were converted from laparoscopy to laparotomy: 1 patient underwent ileocecal resection and 1 was pregnant with spontaneous bicornuate uterus rupture. Laparoscopic surgery was performed in supine decubitus, light Trendelenburg (15 °) and left lateral; first and second operator to the left of the patient. Access by intraumbilical open laparoscopy and placement of two additional 5 mm trocars in the suprapubic region and in the left iliac fossa. Synthesis of the mesentery with bipolar energy or Sonicision. We used endoloops for the stump closure in 84% of cases. We used endostaplers when the base of the appendix was macerated or perforated. Drainage in Douglas used only in case of appendicular perforation or endostaplers used.

Average duration of the intervention of about 24 minutes (range 12-95 min). After the surgery, the 5 surgeons of the operative unit filled out the questionnaire consisting of 11 questions proposed by Jenneke T et al in the work "Evaluation of the appendix during diagnostic laparoscopy, the laparoscopic appendicitis score: a pilot study Published on Surg Endosc (2013) 27: 1594-1600" (Figure 1).

We eliminated question 11 as the LAPP score was administered after appendectomy and no appendix were left in place. Instead, we considered on its own question n° 3 on the stiffness of the appendix, excluding it from the overall score.

By attributing a point to each positive response for each patient we had a score expressed in a range from 0 to 9.

In the three groups under analysis we had on average:

- Group A: average LAPP score 3.25 (range 0-5); to question n° 3 an average of 3

Surgeon and assistant/supervisor 1. _____ 2. _____

	<u>Yes</u>	<u>No</u>
1. Was the mesentery of the appendix thickened?	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the appendix thickened?	<input type="checkbox"/>	<input type="checkbox"/>
3. On a scale of 0 to 10 how did you quantify the stiffness of the appendix (whole appendix or segment of it)? (mark with a line below)		
	<u>Yes</u>	<u>No</u>
4. Were there injected blood vessels on the serosa of the appendix?	<input type="checkbox"/>	<input type="checkbox"/>
5. Was there an adhesion?	<input type="checkbox"/>	<input type="checkbox"/>
6. Was there fibrin on or around the appendix?	<input type="checkbox"/>	<input type="checkbox"/>
7. Was there pus or dirty fluid around the appendix?	<input type="checkbox"/>	<input type="checkbox"/>
8. Was the appendix perforated?	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there necrosis of the appendix?	<input type="checkbox"/>	<input type="checkbox"/>
10. Did you think the appendix was inflamed?	<input type="checkbox"/>	<input type="checkbox"/>
11. Did you remove the appendix?	<input type="checkbox"/>	<input type="checkbox"/>

In doubt

Figure 1: Laparoscopic polypectomy by minor colotomy and section by Echelon Flex™ 45.

- Group B: 5.62 (range 3-9); to question n° 3 an average of 6
 - Group C: 7.17 (range 4-9); to question n° 3 an average of 8
 The mean hospital stay was: 4.56 days (range 2-10)
 No complications occurred

Results

By comparing the scores of the AAS with the surgical picture highlighted by the questionnaire extracted from the LAPP score we were able to highlight that the cases of perforated appendicitis or with partial necrosis were all in group C (AAS > 16). Of the 13 cases (15.8% of operated patients) of complicated appendicitis, 10 belong to group C.

Thickening of mesenteric and appendix was a constant in groups B and C.

At the histological level, appendicitis was defined by the presence of at least (local) ulceration with infiltration of polymorphonuclear neutrophils into the mucosa and submucosa (endo-appendicitis), either or not in combination with transmural inflammation, necrosis, perforation and periappendicular inflammation.

In group A we had 2 cases (2.5% of operated patients) of negative appendectomy; all patients in group A had already started home antibiotic therapy before entering the emergency room.

In NOM patients, the score was influenced by two main factors: antibiotic therapy in progress before access to the emergency room and number of visits to the emergency room for the same reason in a few days.

Conclusion

There are still controversies on the use of scoring systems in the intra-operative grading of acute appendicitis and whether a macroscopically normal appendix should be removed during laparoscopy. The World Society of Emergency Surgery (WSES) Jerusalem 2020 guidelines [2] recommend the routine adoption of the intra-operative grading system for acute appendicitis as this system has been shown to be in good agreement with histopathology.

We used the post-operative questionnaire of the LAPP score with the aim not to decide whether to carry out the appendectomy but to have criteria (perforation, necrosis, adhesion, thickened appendix or mesentery etc) by which the surgeons could describe in an intraoperative context in reference to the pre-operative AAS score.

In our case series we have shown that an increase in the AAS score always corresponds to a worse intraoperative picture. The limits due to the antibiotic therapy started before accessing the emergency room and those of the LAPP score remain. In fact, as stated by the authors themselves: during the operation, the surgeon was the only person who evaluated the appendix, therefore the LAPP score might be self-affirming [7].

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