Rev. Fac. Med. Hum. Octubre 2020;20(4):624-629.
DOI 10.25176/RFMH.v20i4.2951
ORIGINAL PAPER
ISSN Online Version: 2308-0531
Faculty of Human Medicine URP

SURGICAL COMPLICATIONS IN PEDIATRIC PATIENTS WITH OPEN AND LAPAROSCOPIC SURGERIES FOR COMPLICATED ACUTE APPENDICITIS AT A NATIONAL REFERENCE CENTER

COMPLICACIONES QUIRÚRGICAS EN PACIENTES PEDIÁTRICOS CON APENDICITIS AGUDA COMPLICADA EN CIRUGÍAS ABIERTAS Y LAPAROSCÓPICA EN UN CENTRO DE REFERENCIA NACIONAL

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ABSTRACT

Objective: To determine the incidence and type of complications after an appendectomy in patients with appendicitis complicated by peritonitis in relation to the type of surgical intervention and the time elapsed since the beginning of the box until surgery. **Methods:** 157 medical records of patients from the Pediatric Surgery Service of the HNGAI and diagnosed with acute appendicitis complicated with peritonitis were evaluated. The patients were between 2 and 14 years old. They were separated into two groups - 81 open surgeries and 76 laparoscopic. The variables of age, gender, type of surgery, duration of surgical intervention, hospitalization time, and postoperative complications were evaluated. Chi-square and Mann-Whitney analysis was used. **Results:** Of the total medical records, only 157 medical records met the inclusion criteria, of which 81 appendectomies were open and 76 laparoscopic. Laparoscopic surgery was longer. Complications were more frequent in open surgeries with an incidence of 30.8%, as well as prolonged hospitalization time of 12.7%. **Conclusion:** Laparoscopic surgeries have a longer duration compared to open surgeries, however, complications and prolonged hospitalization occurred more frequently in open surgeries. This data could be due to the experience of the surgeon.

Key words: Acute appendicitis; Children; Complications (source: MeSH NLM).

RESUMEN

Objetivo: Determinar la incidencia y tipo de complicaciones tras una apendicetomía en pacientes con apendicitis complicada con peritonitis en relación al tipo de intervención quirúrgica y al tiempo transcurrido desde el inicio del cuadro hasta la cirugía. **Métodos:** Se evaluaron 157 historias clínicas de pacientes provenientes del Servicio de Cirugía Pediátrica del HNGAI y diagnosticados de apendicitis aguda complicada con peritonitis. Los pacientes estaban entre los 2 y 14 años. Se separaron en dos grupos - 81 cirugías abiertas y 76 laparoscópicas. Se evaluaron las variables de edad, sexo, tipo de cirugía, duración de la intervención quirúrgica, tiempo de hospitalización y complicaciones postoperatorias. Se utilizó el análisis de Chi cuadrado y Mann-Whitney. **Resultados:** Del total de historias clínicas, sólo 157 historias clínicas cumplieron con los criterios de inclusión, de las cuales, 81 apendicetomías fueron abiertas y 76 laparoscópicas. La cirugía laparoscópica fue más prolongada. Las complicaciones fueron más frecuentes en las cirugías abiertas con una incidencia de 30,8%, así como el tiempo de hospitalización prolongado de 12,7%. **Conclusión:** Las cirugías laparoscópicas tienen una mayor duración en comparación con las cirugías abiertas, sin embargo, las complicaciones y hospitalización prolongada se presentaron con mayor frecuencia en las cirugías abiertas. Estos datos se podrían deber a la experiencia del operador.

Palabras clave: Apendicitis aguda; Niños; Complicaciones (fuente: DeCS BIREME).

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Cite as: Carolina Paz-Soldán Mesta, González – Fernández H, Paz-Soldán Oblitas C. Surgical complications in pediatric patients with open and laparoscopic surgeries for complicated acute appendicitis at a national reference center. Rev. Fac. Med. Hum. October 2020; 20(4):624-629. DOI 10.25176/RFMH.v20i4.2951

Journal home page: http://revistas.urp.edu.pe/index.php/RFMH

INTRODUCTION

In the US, 4 out of every 1000 children ≤14 years are operated on for acute appendicitis annually. The incidence increases progressively with age, from the neonatal period to adolescence, reaching a maximum peak between 12 and 18 years[1]. National reports report an incidence in the adult population of 9.6 x 10 000 inhabitants[2], there are no national pediatric statistics for this pathology.

The symptoms of acute appendicitis are characterized by pain in the epigastrium with irradiation to the right iliac fossa in 33% of pediatric patients. Vomiting occurs in 68 to 95%, associated with nausea in 36 to 90%. Anorexia in 47 to 75%, diarrhea in 9 to 16%, and constipation in 5 to 28%, which can confuse the appendicular picture, dysuria can occur in 4 to 20% of cases[3].

In children under 5 years of age, the evolution of peritonitis is rapid after appendicular perforation, because the omentum is short and cannot contain the local septic process[3]. The supply of the appendix is given by the terminal appendicular artery, contributing to rapid ischemic damage[4].

The diagnosis of acute appendicitis is clinical. Abdominal ultrasound is the first imaging exam when there is no clear diagnosis, with a specificity of 91-98%, but it is operator dependent. The ultrasound signs of appendicitis are: pain in the area on ultrasound compression, presence of periappendicular fluid, non-compressible appendix with a diameter greater than 6 mm, presence of appendicolith, and increased pericycle echogenicity due to inflammation[5].

Computerized axial tomography (CT) has less dependence on the operator, better visualization of the retrocecal appendix, less interference from intestinal gases, ideal for obese patients or patient pain, and sensitivity with image quality, being a safe method, but with high irradiation of the patient[6,7].

The initial medical treatment of acute appendicitis is based on the hydration of the patient and surgical intervention with open or laparoscopic appendectomy[8].

The most frequent postoperative surgical complications in pediatrics are the formation of wall abscesses in 5.9% to 12.3%, intra-abdominal abscesses in 7.9% to 8.1%, and their incidence is related to the time elapsed from the onset of the symptoms to surgery[6]. Likewise, Bratton et al. report a higher incidence of complications in children under 5 years of age[9].

METHODS

An observational, retrospective - longitudinal study. 173 records of pediatric patients with a diagnosis of complicated acute appendicitis were evaluated for two consecutive years, of which complete data were only obtained in 157 records, 81 of which were open surgeries and 76 laparoscopic. The age range was between 2 and 14 years.

All patients were operated under general anesthesia. They were divided into two groups: Group A with 76 patients diagnosed with acute appendicitis complicated by peritonitis and operated with laparoscopic surgery. The intervention was performed with open pneumoperitoneum through a 10 mm incision at the level of the umbilical region, two trocars more than 5 mm were placed, one in the suprapubic region, and the other in the left flank. The appendix was identified, the mesoappendix was electrocuted, and the appendix base was linked with vicryl. Aspiration of purulent content and cavity lavage, adhesion release, omentectomy, and placement of a drain were performed in those cases that were required.

Group B consisted of 81 patients with acute appendicitis complicated by peritonitis who underwent an open appendectomy. The approach was performed according to the Mc Burney technique, and drains were left through the incision in some cases, closing the abdominal wall in planes.

The study variables were collected from the medical records. They included age, gender, type of surgery, duration of surgery, length of stay, and postoperative complications.

The classification of postoperative complications was carried out with the current criteria according to the extended Clavidien-Dindo classification of the Japanese Oncology Group (ECD JCOG)(10) (Table 1).

Table 1. Postoperative complications of laparoscopic (Group A) and open (Group B) appendectomy in pediatric patients according to the Clavidien-Dindo Extended Classification of the Japanese Oncological Group of surgical.

Complications Postoperative complications	Group A	Group B
Site infection operative	I	I
Intra-abdominal abscesses	II	II
Intestinal subocclusion / intestinal obstruction	IIIa	IIIa
Operative wound seroma	-	I
Evisceration	-	I
Enterocutaneous fistula	-	I

RESULTS

We retrospectively evaluated 173 medical records of pediatric patients under 14 years of age with a diagnosis of acute appendicitis complicated by localized or generalized peritonitis, of which only 157 met the inclusion criteria. All of them underwent an emergency appendectomy, being 81 open surgeries, and 76 laparoscopic.

100 (63.7%) boys and 57 (36.3%) girls were operated on. The age ranges ranged from 2 to 14 years. The group with the highest incidence was 6 to 10 years with 77 children (49%), followed by the group of 11 to 14 years with 38 (24.2%), 3 to 5 years with 36 children (22.9%), and 6 children (3.8%) under 2 years.

Group A was made up of patients undergoing laparoscopic surgery, with a total of 76. The mean age was 8.1 years. There were 34 (44.7%) patients with localized peritonitis and 42 (55.3%) with generalized peritonitis. Drains were left in 13 (17%) cases. The mean surgery time was 142 minutes and hospitalization was 6.1 days. No case was converted to open surgery. (Table 2) The incidence of postoperative complications was in 17 (22.3%) patients. Within them, operative wound infection occurred in 7 cases (9.2%), requiring only conservative management. The incidence of intra-abdominal abscesses was 3 (3.9%), managed with antibiotics. Subocclusion occurred in 2 patients (2.6%) and intestinal obstruction in 5 (6.6%) cases, requiring reoperation to release the flanges and adhesions. None had an operative wound seroma, evisceration, or enterocutaneous fistula. (Table 3).

Group B consisted of patients with acute appendicitis and peritonitis who underwent open surgery, with a total of 81 patients. The mean age was 7.9. 53 (65%) patients with localized peritonitis and 28 (35%) with generalized peritonitis were found. Drains were left in 73 (90%) cases. The mean surgery time was 83 min and hospitalization time was 6.9 days. (Table 2). The incidence of postoperative complications was 30.8%, with 25 cases. Operative wound infection occurred in 5 (6.2%) cases, requiring conservative management. The incidence of intra-abdominal abscesses was 2 (2.5%), managed with antibiotics. The incidence of subocclusion was 4 patients (4.9%) and intestinal obstruction was 9 (11.1%), requiring reoperation to release the flanges and adhesions. The incidence of evisceration was 1 (1%), 1 (1%) patient presented an enterocutaneous fistula and 3 (3.7%) presented an operative wound seroma. (Table 3).

Table 2. Characteristics of patients, diagnosis, and perioperative management (Group A) and open (Group B).

Variable	Group A	Group B
Total	76	81
Average age (years)	8.1	7.9
Gender (male / female)	56 / 25	44 / 32
Peritonitis localized (n ° /%)	34 / (44.7)	53 / (65)
Peritonitis generalized (n ° /%)	42 / (55.3)	28 / (35)
Peritoneal drainage (n ° /%)	13 / (17)	73 / (90)
Mean time of surgery (minutes)	142	83
Mean time of hospitalization (days)	6.1	6.9

Table 3. Postoperative complications of laparoscopic (Group A) and open (Group B) appendectomy in pediatric patients

Complications Postoperative	Group A N ° / (%)	Group B N ° / (%)
Total	17 / (22.3)	25 / (30.8)
Surgical site infection	7 / (9.2)	5 / (6.2)
Intra-abdominal abscess	3 / (3.9)	2 / (2.5)
Intestinal subocclusion	2 / (2.6)	4 / (4.9)
Intestinal obstruction	5 / (6.6)	9 / (11)
Evisceration	-	1 / (1.1)
Enterocutaneous fistula	-	1 / (1.1)
Seroma of operative wound	-	3 / (3.7)
Perforation of hollow viscus	-	-

DISCUSSION

A national report mentions a higher incidence rate of acute appendicitis with localized peritonitis among the 12 and 17 years, with rates of 44.6, 42.4, and 42 x 100,000 inhabitants in 2009, 2010, and 2011 respectively. Similar to our study, appendicitis with localized peritonitis was more frequent than generalized in all age groups[11].

In the present study, males had a higher incidence with a 2: 1 ratio similar to the study by Stein et al., With a higher incidence of complicated acute appendicitis in males[12]. This has already been explained by Napolitano, Majetschak, and Oberholzer, who explain that the role of female sex hormones in response to sepsis decreases the risk of complications in acute inflammatory diseases, such as appendicitis[11].

In a systematic review of adult and pediatric patients, the laparoscopic technique was shown to decrease the frequency of wound infections and hospitalization time, but with an increase in the incidence of intra-abdominal abscesses, similar to that obtained in our study[9,13].

The incidence of complications was higher in open surgeries of 30.8%, while in laparoscopic surgeries it was 22.3%, with similar results being observed in the Loockkart study with an incidence of 18.3% and 9.9% in open and laparoscopic surgeries respectively[14]. Galán - Luis also obtained a lower incidence of complications in laparoscopic surgeries of 7.8%. while in open surgeries it was 9.8%[15].

The incidence of intra-abdominal abscesses in laparoscopic surgery was 3.9% and in open surgery, 2.5%, results similar to those published by Low in 2019 in a meta-analysis with 7.9% and 8.1% in laparoscopic and open surgery respectively[9].

Regarding the duration of surgery, there is a significant difference with a P-value <0.05. The mean time of open surgery was 83 minutes and laparoscopic 142 minutes. Results similar to those of Loockkart[14] with a duration of laparoscopic surgeries of 80.3 min and 58.2 minutes in open interventions. Galán-Luis also published a shorter surgical time in the open approach with an average of 84.3 min[15]. Low concludes in his meta-analysis that there is a significant difference in operative time between both techniques, being less in laparoscopic surgeries[9].

Regarding hospitalization time, 12.7% of patients operated with open surgery were hospitalized for more than 8 days in the postoperative period, while only 7% of patients with laparoscopic surgery were hospitalized, not obtaining significant differences. Results similar to those published by Lee et al. with shorter hospitalization time with laparoscopic surgeries[16], as well as Ikeda[3], Miyano[17], and Wang[18], with a range of 7.8 to 16 days for open surgery and 6.5 to 14 days for laparoscopic appendectomy.

Variables such as postoperative pain, tolerance time to the oral route, time of return to daily activities, and cosmetic results of the intervention were not explored; however, the literature also mentions the superiority of the laparoscopic technique in all these aspects[19].

CONCLUSION

The group with the highest incidence was the one between 6 and 10 years old and the one with the lowest incidence under 2 years of age.

Laparoscopic surgeries last longer than open surgeries. Hospitalization longer than 8 days, as well as postoperative complications, were more frequent in open surgeries.

As limitations, we mention that the HNGAI is a teaching venue, so many of the surgeries are performed by surgeons in training. Consequently, the times and complications could also be related to the experience of the operator.

Author's Contributions: The authors participated in the genesis of the idea, project design, data collection and interpretation, analysis of results, and preparation of the manuscript of this research work.

Funding: Self-financed.

Conflicts of interest: The authors declare that they have no conflict of interest.

Received: May 02, 2020

Approved: August 10, 2020

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