ORIGINAL ARTICLE

Appendectomy: prognostic factors in the brazilian unified health system

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http://dx.doi.org/10.1590/1806-9282.66.11.1493

SUMMARY

INTRODUCTION: *Acute appendicitis (AA) is the most common cause of surgical acute abdomen. Postoperative complications in emergency care are reflections of the surgical procedure and pre- and postoperative factors.*

OBJECTIVE: *Define prognostic factors for patients who underwent appendectomy, comparing them with the literature.*

METHODS: *Descriptive observational study with a cross-sectional design based on data from the emergency/urgency appendectomy records between September 2018 and April 2019. Variables of interest were considered based on intrinsic patient data, clinical status, and perioperative management factors. Primary outcomes considered: postoperative complications from hospital admission discharge and prolonged hospital stay for > 2 days. Secondary outcome: death. The results were evaluated by Fisher's exact test (p <0.05).*

RESULTS: *We identified 48 patients undergoing an appendectomy. Young adults accounted for 68.7%. From the total, 58.3% were males, 6 (12.5%) had hospitalization> 2 days, 4 (8.3%) had complications and no deaths. Among the variables, the stage of AA, the time of complaint up until seeking care, and advanced age were correlated with worse prognosis during hospitalization (p <0.05). The emergence of immediate postoperative complications was correlated with longer hospital stay (p <0.05).*

DISCUSSION: *The descriptive data of the sample converge with the epidemiological profile of patients with AA in the literature, corroborating the applicability of conventional guidelines. The results strengthen the hypothesis that the patient's flow with abdominal manifestations is complicated from the first contact with SUS to the resolution of the condition.*

CONCLUSION: *Knowledge of the epidemiological profile and perioperative predictors that are most related to complications favor the appropriate management of patients.*

KEYWORDS: *Appendicectomy. Unified Health System. Postoperative complications. Prognosis. Health profile.*

INTRODUCTION

Appendectomy occupies a prominent place among surgeries, representing approximately 20% of all surgical interventions, and acute appendicitis (AA) is the most common cause for acute (surgical) abdomen (prevalence 7-10%)[1]. Although it is a condition that may affect all age groups, AA has a higher incidence among young adults[2].

The classic symptoms of AA are present in 60% of the cases[2]. Guidelines establish surgery as the gold standard for the treatment of AA[3], and mortality after

DATE OF SUBMISSION: 26-May-2020
DATE OF ACCEPTANCE: 02-Jun-2020
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appendectomy is low (0,7-4%). Some of the complications most frequently found in the postoperative period are wound infections, wall abscesses, and peritonitis[2]. With proper management, there was a dramatic reduction in mortality attributed to AA over the last 50 years; however, morbidity, which has a strong impact on health care costs, did not present a similar decrease[4], which is partially explained by the presence of postoperative complications, something that maintains its incidence, particularly in places of lower socioeconomic level[5]. Identifying predictors for postoperative complications in appendectomies is essential to reduce its morbidity. Postoperative complications should be considered when choosing the most adequate management; however, few studies have described relevant predictors to these complications.[6]

Postoperative complications in emergency AA surgeries are a reflection of the surgery itself, and of perioperative factors. Studies suggest that biological sex, presence of perforation, drainage of the abdominal cavity, stage of AA, and time until the completion of surgery are possible determinants for postoperative complications after an appendicectomy[7]. However, there are limitations: the lack of studies on prognostic factors, particularly in populations of local services; ignorance about factors that have not yet been discovered; and divergences between existing studies regarding some predictors.

This analysis aims to identify prognostic factors for postoperative complications up until hospital discharge after appendicectomies in an emergency care service of General Surgery at the Single Health System.

METHODS

Location

This study was conducted on a service linked to the Faculty of Medicine of ABC (FMABC), a reference urgency/emergency center in the region for Emergency Treatments of General Surgery of the Unified Health System (SUS): Municipal Hospital Center of Santo André (CHMSA) - Av. João Ramalho, 326 - Vila Assunção, Santo André - SP, CEP 09030-320.

Study design

An observational and cross-sectional study that sought to establish, after formal authorization by the clinical board of the Municipal Hospital Center of Santo André (CHMSA) and approval by the local ethics committee, a database of data from the medical records of patients undergoing emergency/urgency appendectomy between September 2018 and April 2019.

Population

The sample comprised patients between 5 (five) and 60 (60) years of age who underwent an appendectomy in a context of emergency or urgency, whose necessary information was recorded. Were excluded patients younger than 5 years or older than 60 years, and those who did not have data relating to the variables of interest to this work, as described below.

Retrieval of the data and definition of variables

The physical records were requested. The variables chosen to determine the demographic profile were age, biological sex, and presence of comorbidities (diabetes), and were selected based on scores for the diagnosis of AA available in the literature[8].

The variables chose to determine possible prognostic factors after appendectomy included a review of the literature, which defined analysis of the leukocyte count, duration of symptoms, time of admission to hospital until surgery, perioperative antibiotic therapy, the use of postoperative drain, the reintroduction of diet, and stage of appendicitis[9].

The combined primary outcomes considered in this study were in-hospital postoperative complications up until hospital discharge and/or extension of the length of hospital stay by over two days. The secondary outcome considered was death up until hospital discharge during the postoperative hospital stay. The complications considered were the most frequently described in the literature: infection of the operative wound, evisceration, the need for patient referral to the ICU in the same hospitalization, intracavitary abscess, and prolonged ileus (defined as fasting for more than 24 hours after the end of the surgery)[7].

Informed Consent Form

Informed consent did not apply because the study was conducted based on database analysis.

Statistical analysis

The data collected were recorded in a Excel (Microsoft) spreadsheet. For the descriptive analysis of quantitative variables that had a normal distribution (Shapiro-Wilk test, $p>0.05$), we used mean and standard deviation and compared them by Student's *t*-test;

for non-normal distribution, we used median and interquartile intervals, compared by the Mann-Whitney test. Categorical variables were expressed by numbers and percentages (frequencies) and were compared by Fisher's exact test. The confidence interval used was 95% and the level of significance was $p<0.05$. The statistical software used was the Data Analysis and Statistical Software for Professionals (Stata) version 13.0.

RESULTS

We included 48 patients who underwent appendectomy during the period of the study. Male patients accounted for 58.3% of the sample; 29.2% of the patients were aged less than 21 years; 27.1% between 22 and 29 years; 20.8% between 30 and 39 years; 20.8% between 40 and 59 years; and only 2.1% above 60 years. Only one patient (2.1%) had diabetes mellitus.

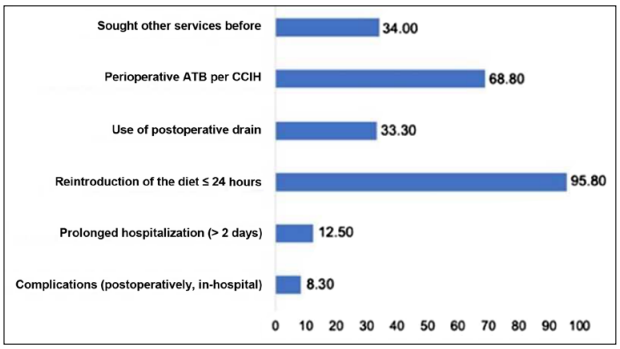
Regarding the perioperative data (Table 1), 68.8% of the cases presented a complaint time of up to two days up to the time of hospitalization, and 66.6% had leukocytosis over 11,000 cells/mm^3. The time between hospital admission and completion of surgery was 6 to 12 hours in 54.2% of the cases, followed by a time of >12 hours (25%) and, finally, of a time of up to six hours of waiting (20.8%). Other perioperative data can be seen in Figure 1.

TABLE 1. CHARACTERISTICS OF PERIOPERATIVE FACTORS

Variable	N	%
Time of complaint		
Up to 2 days	33	68.8
From 2 to 5 days	13	27.1
Over 5 days	2	4.2
Total leukocyte		
Leukopenia (<4,500/mm3)	0	0
Normal values (4,500 - 11,000/mm3)	7	14.6
Leukocytosis (>11,000/mm3)	32	66.6
Not collected	9	18.8
Time between admission and surgery		
Up to 6 hours	10	20.8
From 6 to 12 hours	26	54.2
Over 12 hours	12	25
Appendicitis stage classification		
I	12	25
II	16	33.3
III	12	25
IV	8	16.7
N Total	48	100

Source: Data from the study.

FIGURE 1. PERCENTAGE OF PATIENTS WHO HAD A PERIOPERATIVE FACTOR OBSERVED (MARCEL GUTIERREZ ET AL)



With regards to the perioperative variables studied, the time of complaint up until seeking medical care was correlated with a worse prognosis in comparison to prolonged hospitalization (Fisher's exact test, p=0.046) and in comparison with the presence of complications (Fisher's exact test, p=0.008). The presentation stage of acute appendicitis recorded in the surgical description could also be correlated to an increase in the presence of complications (Fisher's exact test, p=0.012) and increased time of hospitalization after surgery (Fisher's exact test, p<0.001). The presence of postoperative and in-hospital complications was directly proportional to a prolonged hospitalization (Fisher's exact test, p<0.001).

In addition to the relationship between these perioperative factors and outcomes, advanced age was associated with a worse prognosis in comparison to the onset of complications (Mann-Whitney test, p=0.033 / Fisher test, p=0.103) and prolonged hospitalization (Mann-Whitney test, p=0.0027/Fisher test, p=0.03). The correlations found are presented in Table 2.

DISCUSSION

The study population converges with the epidemiological profile of patients with AA described in the literature[4]. In the study by Lima et al.[10], also carried out in the context of the SUS, males accounted for 65.2% of the population, while young adults accounted for 60.03%. The rare presence of comorbidities, diabetes mellitus being the main one, was also consistent with the literature[9].

We observed three main findings. First, it is possible to say that the greater the time of patient complaint at the time of hospitalization, the worse the prognosis in relation to prolonged hospitalization and

TABLE 2. DISTRIBUTION OF OUTCOMES IN RELATION TO CORRELATED PROGNOSTIC FACTORS

Variable	Hospital stay > 2 days N (%)	P-value	Presence of complications N (%)	P-value
Time of complaint				
Up to 2 days	2 (33.3)	0.046	0 (0)	0.008
From 2 to 5 days	3 (50)		3 (75)	
Over 5 days	1 (16.7)		1 (25)	
Appendicitis stage classification				
I	0 (0)	<0.001	0 (0)	0.019
II	0 (0)		0 (0)	
III	1 (16.7)		1 (25)	
IV	5 (83.3)		3 (75)	
Age (years)				
< 21	0 (0)	0.03	0 (0)	0.103
22 - 29	1 (16.7)		1 (25)	
30 - 39	0 (0)		0 (0)	
40 - 59	5 (83.3)		3 (75)	
> 60	0 (0)		0 (0)	

Source: Data from the study.

the presence of complications. Likewise, the greater the classification of acute appendicitis presentation stage in the surgical description and the greater the age of the patient, also the greater the chances of complications and increased time of hospitalization after surgery.

Findings on the AA stage and the age of patients corroborate previous studies that evaluate prognostic factors in the perioperative period after appendicectomies[7]. The AA stage, in more advanced stages, indicates a possible more severe state of the organ, which may present an abscess, necrosis or perforation, favoring the onset of postoperative complications and prolonged hospitalization[10].

Regarding age, patients of more advanced age are more prone to comorbidities and other conditions that may justify the onset of complications and increased time of hospitalization[6]. However, the comorbidity with a greater correlation with worse prognoses in the literature was diabetes mellitus, and in our sample, it was not possible to demonstrate the influence of this comorbidity on the prognosis. Since our data demonstrated a significant correlation between advanced age and prolonged hospital stay but a weak correlation between advanced age and presence of complications, it is speculated whether age alone would be a factor to keep the patient hospitalized for longer due to a concern of the health team regarding other comorbidities not investigated in this study. Advanced age is also described as being correlated with more atypical presentations of symptoms, which can influence late diagnosis, increase cases of complicated appendicitis, and increase the time of hospitalization[10].

The relationship between time of the complaint and prolonged hospital stay and the presence of complications deserves to be highlighted, since, despite the significant correlation in our study, it is a factor that presents many disagreements in the literature. While the study by Andert et al.[11] did not find any correlation between the time from the onset of symptoms to admission with the outcomes, the study by Kim et al.[12] found a relationship between the time and both the presence of complications and the risk of appendix perforation. Other studies prove this latter finding[2]. This fact can be explained, since, theoretically, a greater time of complaint favors the development of the inflammatory process, highlighting the simple conduct that seems to be the fast and accurate diagnosis of AA and the immediate referral to an emergency appendectomy.

The mortality rate in our study was zero, smaller than the indices reported in the literature[9].

Some limitations present in our study are: reduced patient sample size when compared with similar studies mentioned herein; cross-sectional and observational nature of the study, allowing to establish correlations but not necessarily a causal link between the data; and the presence of bias and confounders, other variables that could not be controlled due to the observational nature of the study.

CONCLUSION

The AA presentation stage, time of complaint up until seeking assistance, and advanced age are considered prognostic factors for appendectomy because they are correlated with a worse prognosis during the hospital stay, increasing the length of hospitalization and the presence of postoperative complications.

Author's Contribution

All authors participated in the design, execution, data collection, and analysis of this study and approved the final version. The authors have confirmed that they have no conflicts of interest related to this study, nor financial interests.

RESUMO

INTRODUÇÃO: *Apendicite aguda (AA) é causa mais comum de abdome agudo cirúrgico. Complicações pós-operatórias na emergência são reflexos do ato cirúrgico e fatores pré e pós-operatórios.*

OBJETIVO: *Definir fatores prognósticos para paciente pós apendicectomia, comparando com a literatura.*

MÉTODOS: *Estudo observacional descritivo e analítico com formação de base transversal de dados dos prontuários de apendicectomias de emergência/urgência entre setembro de 2018 e abril de 2019. Variáveis de interesse foram consideradas a partir dos dados intrínsecos ao paciente, quadro clínico e manejo perioperatório. Desfechos primários combinados considerados foram complicações pós-operatórias da internação até alta hospitalar e prolongamento da internação > dois dias. Desfecho secundário foi óbito. Resultados avaliados pelo teste exato de Fisher (p<0,05).*

RESULTADOS: *Identificaram-se 48 pacientes submetidos à apendicectomia. Adultos jovens corresponderam a 68,7%. Do total, sexo masculino (58,3%), seis (12,5%) tiveram internação > dois dias, quatro (8,3%) cursaram com complicação e nenhum óbito. Dentre as variáveis consideradas, fase de apresentação da AA tempo de queixa até procura do atendimento e idade avançada correlacionaram com pior prognóstico durante internação (p<0,05). Surgimento de complicações pós-operatórias imediatas correlacionou-se com maior tempo de internação (p<0,05).*

DISCUSSÃO: *Dados descritivos da amostra convergem com perfil epidemiológico de pacientes com AA na literatura, corroborando aplicabilidade das diretrizes convencionais. Resultados fortalecem a hipótese de que o fluxo do paciente com manifestações abdominais é complicado desde o primo-contato com o SUS até a resolução do quadro.*

CONCLUSÃO: *Conhecimento do perfil epidemiológico e dos preditores perioperatórios que mais se relacionam com complicações favorecem manejo adequado dos pacientes.*

PALAVRAS-CHAVE: *Apendicectomia. SUS. Complicações pós-operatórias. Prognóstico. Perfil de saúde.*

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