

Impact of SARS-CoV-2 pandemic on emergency department activity at the pediatric surgery unit of a third-level hospital

L. Moratilla Lapeña¹, C. Delgado-Miguel¹, M.C. Sarmiento Caldas¹, K. Estefanía¹, M. Velayos¹, A. Muñoz-Serrano¹, M. De Ceano-Vivas², M. López-Santamaría¹, L. Martínez^{1,3}

¹Pediatric Surgery Unit; ²Pediatric Emergency Department; ³La Paz Biomedical Research Institute (IdiPaz), Maternal, Child, and Development Health (SAMID) network; La Paz Pediatric Hospital, Madrid (Spain).

ABSTRACT

Introduction. As a result of the emergence of the SARS-CoV-2 respiratory virus in Wuhan in December 2019, the Spanish Government declared the state of emergency with restrictions such as stay-at-home lockdown. The objective of this study was to analyze emergency activity at a referral pediatric surgery unit in its territory and determine whether surgical pathologies had decreased or not.

Methods. A retrospective study of pediatric patients presenting at the emergency department and referred to the pediatric surgery unit from March 14, 2020 to April 20, 2020 was carried out. The results were compared with those from the same dates of the previous year. Demographic variables, pathologies, and management strategies were studied for each case. The number of patients with abdominal pain requiring surgical assessment was also analyzed.

Results. 161 patients were included – 91 from 2019 and 70 from 2020. Of the 2020 patients, 62 (88.6%) underwent surgery and 8 (11.4%) were admitted, whereas in 2019, patient distribution was 67 (73.6%) and 24 (26.4%), which means there were fewer admissions in 2020 ($p = 0.018$). There were no differences in terms of hours to emergency department consultation – just an increase in the case of appendicular pathologies in the 2020 period, with 24 [23-48] hours vs. 24 [12-30] hours ($p = 0.045$).

Conclusion. The current pandemic has not caused emergency surgeries to decrease. It has only increased time to consultation in patients with appendicular pathologies.

KEY WORDS: SARS-CoV-2; COVID-19; Children; Emergency surgery; Pediatric surgery.

IMPACTO EN LA ACTIVIDAD DE URGENCIAS EN EL SERVICIO DE CIRUGÍA PEDIÁTRICA DE UN HOSPITAL DE TERCER NIVEL DURANTE LA PANDEMIA DE SARS-CoV-2

RESUMEN

Introducción. A raíz de la aparición del virus respiratorio SARS-CoV-2 en Wuhan en diciembre de 2019, el Gobierno de España decretó el estado de alarma con medidas que han incluido el confinamiento domiciliario. El objetivo de este trabajo es analizar la actividad urgente de un Servicio de Cirugía Pediátrica referente en su Comunidad Autónoma y comprobar si ha existido disminución o no en la patología quirúrgica.

Métodos. Estudio retrospectivo de los pacientes pediátricos que acudieron a Urgencias y fueron derivados a Cirugía Pediátrica entre los periodos del 14 de marzo hasta el 20 de abril de 2020, comparándolos con aquellos que acudieron en las mismas fechas del año previo. Se analizaron variables demográficas, la patología y el tipo de manejo en cada caso. Se analizó también el número de pacientes con dolor abdominal que precisaron valoración quirúrgica.

Resultados. Se incluyeron 161 pacientes, de los que 91 acudieron en 2019 y 70 acudieron en 2020. De estos últimos, 62 (88,6%) fueron intervenidos y 8 (11,4%) fueron hospitalizados, mientras que en 2019 fueron 67 (73,6%) y 24 (26,4%), respectivamente, observando un menor número de ingresos en 2020 ($p = 0,018$). El número de horas de evolución hasta la consulta en Urgencias del total de pacientes no demostró diferencias, únicamente existió un aumento en los pacientes con patología apendicular en el periodo de 2020, 24 [23-48] respecto al periodo del año previo 24 [12-30] ($p = 0,045$).

Conclusión. La situación actual de pandemia no ha provocado una disminución del número de intervenciones quirúrgicas urgentes. Únicamente aumentó el tiempo hasta la consulta en los pacientes con patología apendicular.

PALABRAS CLAVE: SARS-CoV-2; COVID-19; Niños; Cirugía urgente; Cirugía pediátrica.

Corresponding author: Dr. Lucas Moratilla Lapeña. Pediatric Surgery Unit, La Paz Pediatric Hospital. Paseo de la Castellana, 261. Madrid (Spain)
E-mail address: lucas.moratilla@gmail.com

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INTRODUCTION

The emergence of SARS-CoV-2 respiratory virus in Wuhan (China) in December 2019 has caused a new

pandemic. Since the first cases were reported, many articles on epidemiological characteristics and clinical management in adult^(1,2) and pediatric patients have been published^(3,4).

The first SARS-CoV-2 case in Spain was diagnosed on January 31, 2020 in La Gomera, while the first positive patients in the Iberian Peninsula were detected on February 24, 2020. Owing to the growing number of infections, the Spanish Government enforced the state of emergency on March 14, 2020, which applied freedom of movement restrictions and stay-at-home lockdown to all citizens, including the pediatric population. Since then, the number of positive patients has increased to 209,465, with 23,521 deaths (as of April 27, 2020). Of all patients, only 1,858 (0.88%) were aged 0-19. 461 of them required hospital admission, which accounts for 0.55% of the total patients admitted, regardless of age⁽⁵⁾.

Since the stay-at-home lockdown was implemented, pediatric consultations at the emergency department have decreased, probably due to parents' fear of getting infected in a hospital environment⁽⁶⁾.

Few studies on patients with emergency surgical pathologies have been published since the emergence of SARS-CoV-2. Therefore, the objective of this study was to analyze emergency activity at a pediatric surgery unit and compare it with the same period of the previous year.

MATERIALS AND METHODS

A retrospective study of pediatric patients (0-18 years) requiring surgical management (emergency surgery or admission) or abdominal pain consultation at the emergency department and abdominal pain interconsultation at the pediatric surgery unit from March 14, 2020 to April 20, 2020 was carried out. The results were compared with those from the same dates of the previous year. Surgical pathologies with outpatient resolution were excluded.

Demographic variables (age and sex), reason for consultation, type of surgical pathology, progression time (hours), and treatment type (surgery or admission) were analyzed. In patients undergoing surgery, pathologies were classified according to presentation as acute (foreign body aspiration, foreign body intake, esophageal impaction, burns, and surgical newborns) and subacute in terms of progression time and symptom assessment. Given their high prevalence, appendicular pathologies were considered as an independent category for analysis purposes.

Data were collected using Microsoft Excel 365 (Redmond, WA, USA). Statistical analysis was performed using SPSS v25.0 (Chicago, IL, USA). Kolmogorov-Smirnov test was used to verify variables' normal distribution. Continuous variables following a normal

Table 1. Demographic variables

	2020 group	2019 group	<i>p</i> value
	70	91	
	Mean ± SD		
Age	7.82±4.95	7.74±5.15	0.867
	N (%)		
Sex			
Male	39 (55.7)	53 (58.2)	0.748
Female	31 (44.3)	38 (41.8)	
No. of patients managed			
Surgery	62 (88.5)	67 (73.6)	0.018
Admission	8 (11.5)	24 (26.4)	
No. of patients surgically managed	62	67	
Acute pathology	15 (24.2)	18 (26.9)	0.728
Subacute pathology	47 (75.8)	49 (73.1)	

distribution were expressed as mean with standard deviation. Continuous variables not following a normal distribution were expressed as median with interquartile range. Non-ordinal qualitative variables were analyzed using the chi-squared test or Fisher's exact test. Finally, quantitative variables were analyzed using Student's t-test or Mann-Whitney U test. Statistical significance was established at $p < 0.05$.

RESULTS

A total of 161 patients were included – 91 from 2019 and 70 from 2020. No significant differences were found between groups in terms of demographic variables (Table 1). In the 2019 period, 67 (73.6%) patients underwent surgery, and 24 (26.4%) were admitted, whereas in the 2020 period, 62 (88.6%) patients underwent surgery and 8 (11.4%) were admitted, with statistically significant differences between periods ($p = 0.018$) (Table 1).

Time from symptom onset to emergency department consultation was similar in both groups ($p = 0.446$) (Table 2), both in patients who underwent surgery in 2020 and 2019 ($p = 0.30$) and in patients admitted who did not require surgical treatment ($p = 0.336$). Progression time in acute and subacute surgical pathologies showed no differences between groups ($p = 0.275$ and $p = 0.183$). When analyzing appendicular pathologies separately, progression time from symptom onset was longer in the 2020 period than in the 2019 period, with significant differences between periods ($p = 0.045$). A > 48 h progression time was recorded in 62.2% of patients from the 2019 period, and in 68.6% of patients from the 2020 period.

The pathologies observed in both periods are shown

Table 2. Symptom progression times.

	2020 group		2019 group		p value
	n	Hours*	n	Hours*	
Surgery	62	24 (12-30)	67	20 (6-24)	0.302
Appendicular pathologies	34	24 (23-48)	43	24 (12-30)	0.045
Other acute pathologies	15	3 (2-12)	18	6 (4-24)	0.275
Other subacute pathologies	13	20,5 (5,25-24)	6	24 (15-216)	0.183
Admission without surgery	8	72 (12-144)	24	24 (13-48)	0.336
TOTAL	70	24 (12-48)	91	24 (12-30)	0.446

*Hours expressed as median and interquartile range

Table 3. Pathologies in the 2020 and 2019 periods.

	2020 group	2019 group
Surgical pathologies	62	67
	n (%)	
Acute appendicitis	34 (54.8)	43 (64.1)
Burn	6 (9.6)	4 (5.9)
Surgical newborn	6 (9.6)	5 (7.4)
Foreign body aspiration	0 (0)	3 (4.4)
Foreign body intake	0 (0)	2 (2.9)
Dog bite	2 (3)	1 (1.5)
Bleeding ovarian cyst	2 (3)	0 (0)
Esophageal food impaction	7 (11.3)	1 (1.5)
Ovarian torsion	3 (4.8)	1 (1.5)
Others	2 (3)	7 (10.4)
Non-surgical pathologies	8	24
	n (%)	
Overall abdominal pain	2 (25)	9 (37.5)
Post-appendectomy abscess	1 (12.5)	2 (8.3)
Intestinal intussusception	0 (0)	2 (8.3)
Others	5 (62.5)	9 (37.5)

in Table 3. Appendicitis represented 56.6% of emergency activity in the 2019 period, and 43.4% in the 2020 period. Regarding the other pathologies featured in Table 3, an increase in esophageal impaction and a decrease in foreign body aspiration and foreign body intake was found, without statistically significant differences. No eosinophilic esophagitis was noted in esophageal impaction patients in the 2020 period.

Regarding admissions without surgery, 9 out of the 24 patients (37.5%) were admitted as a result of widespread abdominal pain in the 2019 period, whereas in the 2020 period, the proportion was 2 out of 8 (25%), without differences between periods ($p=0.681$). The comparison

Table 4. Reason for admission and abdominal pain consultations.

	2020 group	2019 group	p value
Admissions	8	24	
	n (%)		
Abdominal pain	2 (25)	9 (37.5)	0.681
Other causes	6 (75)	15 (62.5)	
Abdominal pain consultations at the emergency department	101	305	
	n (%)		
Surgical interconsultation	42 (41.5)	68 (22.3)	0.696
Surgical admission	36 (35.6)	52 (17)	

of abdominal pain surgical admissions with abdominal pain interconsultations showed no significant differences. However, abdominal pain consultations did decrease at the emergency department (Table 4).

DISCUSSION

This article demonstrates that, in the context of a state of emergency and an exceptional pandemic situation, emergency surgeries in our healthcare facility remained stable.

The current situation and the rapid evolution observed in the last months of the SARS-CoV-2 pandemic have spread fear of getting infected among the population^(7,8). Fear of presenting at the hospital's emergency department is not a negligible variable within the current context, since it may delay consultation and cause more severe surgical presentations, which could increase the percentage of peritonitis patients, for instance^(9,10).

In our healthcare facility, the number of emergency surgeries has not changed in spite of the state of emergency in Spain. In fact, acute appendicitis, which is the most

frequent surgical pathology, did not decrease as compared to the previous period.

Although surgical interconsultations did not fall, a reduction in abdominal pain consultations at the emergency department was noted. Such decrease could be explained by the fact they were mild, self-limiting conditions, such as mesenteric adenitis, which represents one of the main differential diagnoses in patients presenting with abdominal pain^(11,12). The same rationale could explain why admissions without surgery as a result of abdominal pain consultations also went down as compared to the previous year. However, no significant differences were found, maybe as a result of the few admissions recorded in the 2020 period.

The number of burns increased in a non-significant manner. This could be explained by the fact people could not leave their homes during lockdown, since most burns occur in the domestic environment, with scald and contact burns being predominant^(13,14). However, these findings may be biased as only burns eligible for surgery were analyzed.

The increase in esophageal impaction endoscopies should also be noted. Even though there were few of them, this could be due to eating habits such as quick intake or lack of mastication caused by pandemic-related stress^(15,16). However, a decrease in foreign body intake and foreign body aspiration consultations was observed, most likely as a result of increased parental supervision given the stay-at-home lockdown.

Finally, it should be highlighted that, in terms of total time to emergency department management, parents did not hesitate to take their children to the hospital in spite of the national emergency declared. However, a significant rise in progression hours was noted in patients with appendicular pathologies, with an increase in the percentage of patients presenting at the emergency department at least 48 hours following symptom onset.

This was also the case with patients requiring admission without surgery. These patients may have started with mild presentations, but in the absence of spontaneous healing, they eventually presented at the emergency department. However, the statistical analysis demonstrated no differences, most likely as a result of the few patients admitted in the 2020 period.

The main limitations of this research lie in the fact it is a retrospective, single-center study with few instances in certain pathologies, which hampers comparison between periods. It should be noted that freedom of movement restrictions and fear of getting infected were dynamic along the study period. The state of emergency was extended until June 21, 2020, which could be a source of bias or confusion when it comes to analyzing progression time to the first emergency department consultation. However, we believe the total number of surgeries and abdominal pain consultations suffices to demonstrate differences between periods.

CONCLUSION

During the stay-at-home lockdown enforced as a result of the SARS-CoV-2 pandemic, emergency surgeries remained stable, without differences as compared to the same period of the previous year. Only time to consultation in acute appendicitis was significantly longer during the pandemic period, with cases originating at least 48 hours earlier increasing by 6.4%.

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