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The Impact of the COVID-19 Pandemic on the Most Common Diagnoses in Pediatric Surgery: Abdominal Pain, Acute Scrotum, Upper and Lower Extremity Injuries—Tertiary Center Experience

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What is already known on this topic?

- *The coronavirus disease-19 (COVID-19) pandemic has brought new patterns of behavior among patients and their parents.*
- *The reorganization of the health care system has reduced the number of elective surgical procedures.*
- *The total number of operations, due to strict measures and reduction of the elective program, decreased statistically significantly in the COVID-19 period.*

What this study adds on this topic?

- *The number of most common emergency operations did not decrease statistically significantly, indicating that children with surgical emergency conditions were not neglected*
- *Negative appendectomy rate and the number of perforated appendixes did not change statistically significantly.*
- *During the COVID-19 pandemic, special attention should be paid to children with acute abdominal pain.*

ABSTRACT

Objective: The coronavirus disease-19 pandemic has brought new patterns of behavior among patients and their parents. The reorganization of the health care system has reduced the number of elective surgical procedures in Croatia. In our study, we were interested in whether the pandemic has caused a statistically significant decrease in the number of examinations of children in the emergency department according to the most common diagnoses in pediatric surgery and whether there was a decrease in the number of emergency surgeries.

Materials and Methods: We retrospectively analyzed data from the Hospital Information System. The analysis included 15 months of the pre-coronavirus disease-19 period and 15 months of the coronavirus disease-19 period. The primary outcome of the study was to determine the cumulative number of all examinations and then to determine the number of examinations according to the most common diagnoses and, consequently, to determine whether there was a statistically significant decrease. The secondary outcome was to determine the cumulative number of all operations and then to determine the number of the most common emergency operations and, consequently, to see if there was a statistically significant decrease.

Results: In the 15 months of the pre- coronavirus disease-19 period, a total of 33 646 children were examined in the emergency department, while in the coronavirus disease-19 period, 26 831 were examined ($P = .010$). Although a decrease was recorded in all categories, a statistically significant decrease was recorded for diagnoses of abdominal pain ($P = .007$) and lower extremity injuries ($P = .014$). The total number of operations, due to strict measures and reduction of the elective program, decreased statistically significantly in the coronavirus disease-19 period ($P < .0001$). The number of most common emergency operations did not decrease statistically significantly.

Conclusion: This study represents the first longer, 15-month experience of a pandemic in the only and largest children's hospital in Croatia. There is no doubt that coronavirus disease-19 had the effect of reducing the number of examinations in the emergency department for all the most common diagnoses, but the number of operations did not change significantly.

Keywords: COVID-19, pediatric surgery, appendicitis, scrotal exploration, pediatric trauma

INTRODUCTION

Due to the spread of the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2 virus), World Health Organization declared the outbreak a Public Health Emergency of International Concern on January 30, 2020, and a pandemic on March 11, 2020.[1] The first case in the Republic of Croatia was reported in Zagreb on February 25, when a patient who had come from Italy was tested positive. On the same day, the second case related to the first one

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was confirmed. In March 2020, a cluster of cases were reported in numerous Croatian cities. On March 12, the first recovery was reported, and on March 18, the first death from the virus was confirmed. Until June 1, 2021, 356 397 cases of coronavirus infection had been recorded in Croatia, while 8034 people had died.[2] Numerous authors report that during a pandemic, the pressure on emergency departments, due to conditions not caused by coronavirus disease-19 (COVID-19), was reduced.[3-5] This highlights the potential risk that children with emergencies will fall victim to a pandemic if they are not brought to medical care.[6] We are also witnesses that the media and numerous articles have just placed emphasis on the issue of inadequate treatment of emergencies that are not caused by SARS-CoV-2 infection. The most common problem of infected children is usually non-specific symptoms of an upper respiratory tract infection, such as fever and cough. The fever is usually mild to moderate. Other clinical symptoms include sore throat, nasal congestion and runny nose, weakness, myalgia, headache, and respiratory distress. Digestive system problems such as abdominal pain, vomiting, and diarrhea can also be seen. Children are less likely to develop serious illness, be hospitalized, require mechanical ventilation, and die than adults, but a number of children will develop high fever, severe abdominal pain, heart dysfunction, and circulatory disorders, which we consider to be hyperinflammation syndrome associated with excessive cytokine release—Multisystem Inflammatory Syndrome in Children (MIS-C). As the pandemic progresses, such a clinical picture is seen in an increasing number of children.[7] In our research, we were interested in the objective decrease in the number of visits to the emergency department of the Children's Hospital Zagreb and whether the decrease in the number of arrivals led to changes in the number of emergency operations. The aim of this study was to determine the objective reduction in the number of examinations in the emergency department according to the most common diagnoses: abdominal pain, acute scrotum, upper and lower extremity injuries. Also, the aim of the study was to determine whether there is a reduction in the number of the most common emergency surgeries: appendectomy, scrotal exploration, and surgical treatment of fractures. In addition to the previously mentioned data, we were interested in the share of the most common emergency surgeries in relation to the number of arrivals according to the most common diagnoses and whether there was a change in the rate of negative appendectomies and the number of perforated appendixes.

MATERIALS AND METHODS

Design and Data Collection

For research purposes, we retrospectively analyzed data from the Hospital Information System (IN2 BIS®). The analysis included 15 months of the pre-COVID-19 period (November 2018-January 2020) and 15 months of the COVID-19 period (March 2020-May 2021). For the purpose of comparing the pre-COVID-19 and COVID-19 periods, we did not take into account the month of February 2020 (given that part of the month can be considered pre-COVID-19 and part COVID-19, given the first case in the Republic of Croatia). A comparison of the following quarters was also made; 3rd, 4th, and 5th and 10th, 11th, and 12th months of 2019 and 2020, considering the peak of new cases in the mentioned period.

Including and Excluding Criteria

The inclusion criteria were all patients from 0 to 18 years of age, male, and female, who were examined in the emergency department of the Children's Hospital Zagreb, Croatia. At the emergency department, examinations were performed by pediatric surgeons or pediatric surgery residents. The emergency surgery department consists of 2 clinics, and children, at the time of the pandemic, are admitted to the isolation department until the arrival of the polymerase chain reaction (PCR) test. The operations were performed in an emergency after a clinical examination and the necessary laboratory and radiological examination, which depended on the judgment of the surgeon. The exclusion criteria were reoperations due to complications.

Perioperative Procedures

Radiological examination for acute abdomen most often included ultrasound and, if necessary, native x-ray of abdomen and computed tomography, for acute scrotum ultrasound and for fractures x-ray. Differential blood counts and C-reactive protein were the most commonly sought laboratory tests for abdominal pain.

Outcomes

The primary outcome of the study was to determine the cumulative number of all examinations and then to determine the number of examinations by the following most common diagnoses: R10—abdominal and pelvic pain, N44/N45—acute scrotum, S40-S69—upper extremity injuries, S70-S99—lower extremity injuries. Spearman's correlation coefficient between the total number of examinations and examinations by individual most common diagnoses was also calculated. The secondary outcome was to determine the cumulative number of all operations and then to determine the number of the next most common emergency operations; appendectomy, scrotal exploration, and surgical treatment of fractures. The correlation between the most common emergency surgeries and the number of examinations in the emergency department according to the most common diagnoses leading to possible surgery was also calculated. The proportion of appendectomies from the total examined children with abdominal pain and negative appendectomy rate was also determined.

Statistical Analysis

The obtained data were analyzed using the Microsoft Excel® software program (XLSTAT®) for Windows, version 2020.5.1 (Microsoft Corporation, Redmond, Wash, USA). Differences in variables (number of examinations and number of operations) between observed groups were examined through total percentage change. Variables of interest were assessed for normality using the Shapiro–Wilk test. Categorical variables are expressed as frequency and were analyzed using Fischer's exact test. Continuous variables are expressed as means with standard deviation and were analyzed using the Student's *t*-test or Mann–Whitney *U*-test (as appropriate). The significance level of .05 was used.

RESULTS

Number of Children Examined Through the Emergency Department

The number of new cases of coronavirus in the Republic of Croatia is shown in Table 1. We emphasize the fact that Croatia was in a more pronounced lockdown during the 3rd, 4th, and 5th months

Table 1. Number of Patients Examined, Number of Operations, and Number of New Cases Per Month

	Total Number of Examinations in Emergency Department	Abdominal Pain	Acute Scrotum	Upper Extremity Injuries	Lower Extremity Injuries	Total Number of Operations (Emergency+Elective)	Appendectomy	Scrotal Exploration	Surgical Treatment of Fractures	Number of New COVID-19 Cases (Croatia)
November 2018	2356	342	32	574	435	190	27	7	18	-
December 2018	2074	360	22	441	369	156	25	9	14	-
January 2019	2003	343	23	421	380	219	34	4	18	-
February 2019	2228	340	35	558	461	186	18	9	18	-
March 2019	2780	373	25	758	597	168	19	12	19	-
April 2019	2510	309	34	663	417	241	29	12	29	-
May 2019	2751	310	33	780	550	216	37	6	30	-
June 2019	2376	205	23	653	450	161	22	7	28	-
July 2019	1744	167	27	399	325	180	13	9	16	-
August 2019	1577	145	22	377	312	106	11	4	25	-
September 2019	2324	217	33	653	507	206	14	7	37	-
October 2019	2655	244	19	785	502	218	24	5	30	-
November 2019	2102	288	32	507	402	178	23	9	18	-
December 2019	2020	298	27	462	366	164	22	13	12	-
January 2020	2146	341	26	515	401	193	20	6	19	-
February 2020	2147	325	28	448	458	202	14	8	19	7
March 2020	1453	170	17	378	221	133	20	6	16	956
April 2020	998	67	11	262	135	94	13	7	25	1129
May 2020	1828	151	26	500	266	129	29	13	34	162
June 2020	2097	142	19	622	360	151	20	2	33	570
July 2020	1469	127	21	396	258	96	18	6	20	2372
August 2020	1325	112	25	337	247	105	15	6	28	5251
September 2020	1964	172	20	595	377	108	19	9	24	6352
October 2020	1889	198	23	546	384	137	20	12	28	34 881
November 2020	1462	183	28	389	259	96	22	10	11	79 562
December 2020	1193	194	17	298	180	63	25	1	9	80 856
January 2021	1410	228	45	298	211	107	35	5	9	20 437
February 2021	2008	324	36	540	385	127	35	8	24	10 554
March 2021	2620	367	27	736	571	136	29	6	30	31 027
April 2021	2209	278	23	614	408	143	31	7	22	60 247
May 2021	2906	313	30	840	606	109	24	5	20	21 823

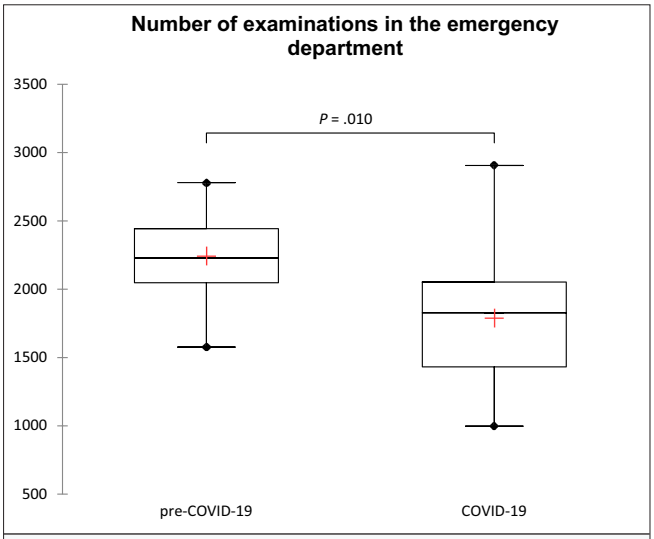

Figure 1. Number of examinations in the emergency department in the pre-COVID-19 and COVID-19 period.
COVID-19, coronavirus disease-19.

and in the 10th, 11th, and 12th months of 2020. The total number of new cases in the first lockdown was 2247, while in the second, it was 195 299. In the 15 months of the pre-COVID-19 period, a total of 33 646 children (2243.06 ± 346.66) were examined in the emergency department, while in the COVID-19 period, 26 831 (1788.73 ± 531.96) were examined ($P = .010$) (Table 1) (Figure 1). The total percentage change is −20.26%. For 3rd, 4th, and 5th months, the total percentage change is −46.78%, while for the 10th, 11th, and 12th months is −32.95%. The largest decline in the number of examinations was in April 2020 (−60.24%). When comparing the 3rd, 4th, and 5th months of 2019 and 2021, the total percentage drop is only 3.8%.

Number of Children Examined According to the Most Common Diagnoses

The number of children examined in the pre-COVID-19 and COVID-19 period according to the most common diagnoses is as follows: abdominal pain [4282 (285.46 ± 72.58); 3026 (201.73 ± 85.10)], acute scrotum [413 (27.53 ± 5.22); 368 (24.53 ± 8.31)], upper extremity injuries [8546 (569.73 ± 139.45); 7351 (490.07 ± 171.81)], and lower extremity injuries [6474 (431.60 ± 80.98); 4868 (324.53 ± 135.42)] (Figure 2). The total percentage

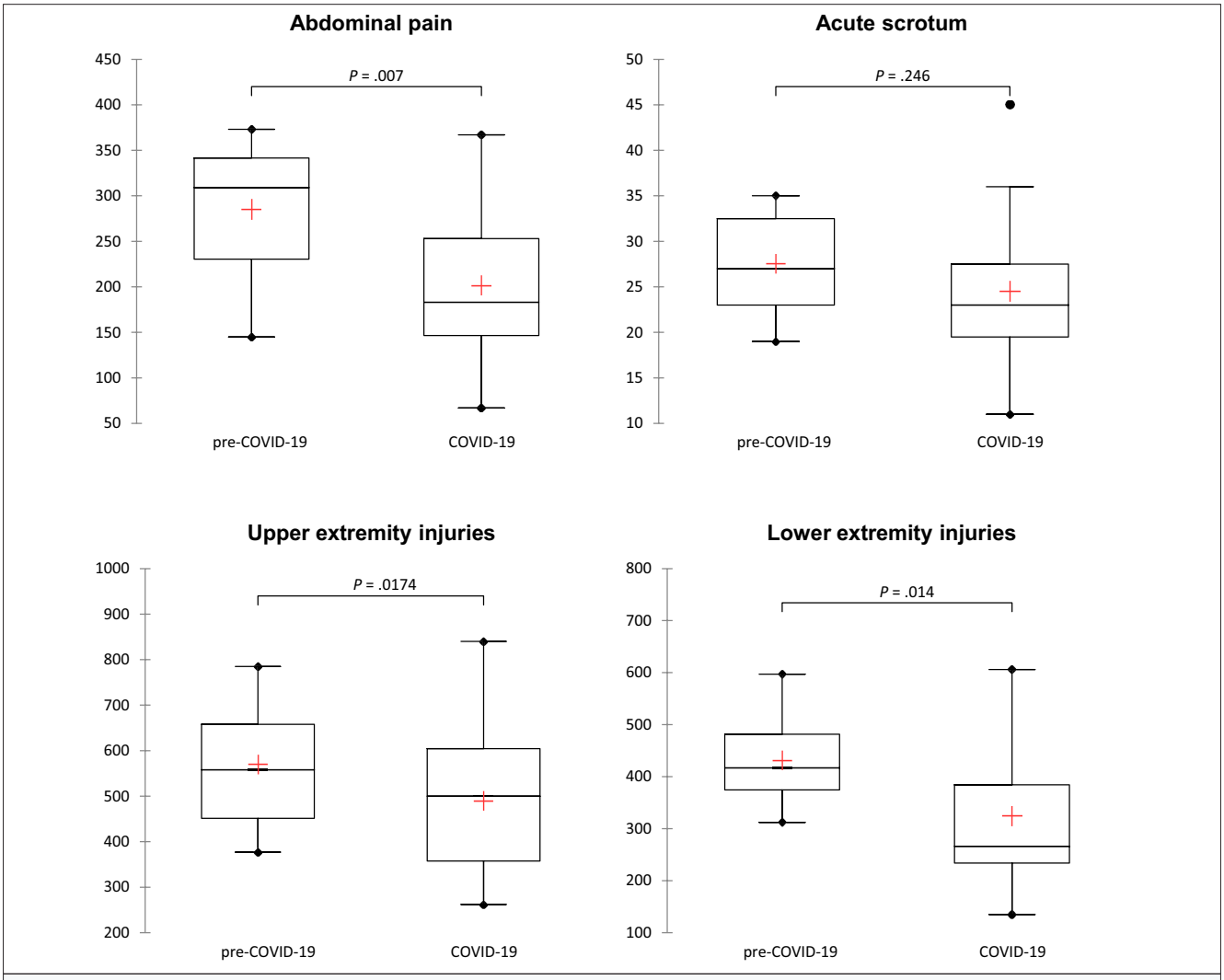

Figure 2. Number of children examined in the emergency department by the most common diagnoses.

change by diagnosis is as follows: abdominal pain (−29.33%), acute scrotum (−10.90%), upper extremity injuries (−13.98%), and lower extremity injuries (−24.80%). When only 3rd, 4th, and 5th and 10th, 11th, and 12th months are compared, the decline in the number of examinations is as follows: abdominal pain (−60.89%; −30.72%), acute scrotum (−41.30%; −12.82%), upper extremity injuries (−48.20%; −29.70%), and lower extremity injuries (-60.23%; -35.20%). Although a decrease was recorded in all categories, a statistically significant decrease was recorded for diagnoses of abdominal pain ($P = .007$) and lower extremity injuries ($P = .014$). The correlation between the total number of examinations in the emergency department and the most common diagnoses proved to be significantly better in the COVID-19 period; it is excellent for injuries of the upper and lower extremities ($r_s = 0.98$, $r_s = 0.96$), and it is good for abdominal pain ($r_s = 0.61$) while it is weak for acute scrotum ($r_s = 0.38$) (Table 3).

Number of Operations Performed

The total number of operations (emergency+elective), due to strict measures and reduction of the elective program, decreased statistically significantly in the COVID-19 period [185.47 ± 33.09 to 115.60 ± 23.57 ($P < .0001$)]. The total percentage change is −37.67%. When only the 3rd, 4th, and 5th and 10th, 11th, and 12th months are compared, the decrease in the number of operations is −43.04% and −47.14%, respectively. Table 2 shows that the number of most common emergency operations did not change statistically significantly. The total percentage change by operations is as follows: appendectomy (+5.02%), scrotal exploration (−13.44%), and surgical treatment of fractures (+0.60%). When only the 3rd, 4th, and 5th months and the 10th, 11th, and 12th months of the pre-COVID-19 and COVID-19 periods are compared, the number of most common emergency operations decreases in all categories, but none is statistically significant; appendectomy [28.33 ± 9.02 to 20.67 ± 8.02 ($P = .5$)/23.00 ± 1.00 to 22.33 ± 2.52 ($P = .8$)], scrotal exploration [10.00 ± 3.46 to 8.67 ± 3.79 ($P = .8$)/9.00 ± 4.00 to 7.67 ± 5.86 ($P = 1.0$)], and surgical treatment of fractures [26.00 ± 6.08 to 25.00 ± 9.00 ($P = 1.0$)/20.00 ± 9.16 to 16.00 ± 10.44 ($P = .4$)]. Total percentage change by operations for these months is as follows: appendectomy (−27.06% ; −2.90%), scrotal exploration (−13.33% ; −14.81%), and surgical treatment of fractures (−3.85%; −20%). Regarding the correlation between the most common emergency operations and the number of examinations in the emergency department according to the diagnoses leading to the most common emergency operations, only for appendectomies did the correlation become excellent ($r_s = 0.79$, $P = .000$) (Table 3). The share of appendectomies from all examined patients with a diagnosis of abdominal pain increased statistically significantly in the COVID-19 period (8.00 ± 2.00 to 12.73 ± 3.42 ($P < .0001$)). There was a slight increase in the rate of negative appendectomies (+11.11%) but was statistically insignificant ($P = .869$), while a slight decrease in the number of perforated appendixes was observed (−15.51%), also statistically insignificant ($P = .247$) (Table 2) (Figure 3). The share of perforated appendixes from pathohistologically confirmed appendicitis decreased in the COVID-19 period [19.70 ± 9.75 to 15.02 ± 9.00 ($P = .191$)].

DISCUSSION

The COVID-19 pandemic has led to unprecedented clinical, economic, logistical, and social challenges in all branches of the healthcare system, and so, pediatric surgery was no exception. In our study, we found that there was a statistically significant decrease in the number of examinations of children in the emergency department, while the number of emergency operations did not decrease statistically significantly. The study by Sheath et al[8] included 4 months pre-COVID-19 and COVID-19 periods. It was the first study to evaluate the impact of a

Table 2. Mean Values of the Total Number of Children Examined, the Number of Children Examined by Diagnoses, the Total Number of Operations, and the Total Number of the Most Common Operations

	Pre-COVID-19		COVID-19		
	Mean	SD	Mean	SD	*P*
Total number of examinations in emergency surgical admission	2243.06	346.66	1788.73	531.96	.010*
Abdominal pain	285.47	72.58	201.73	85.10	.007*
Acute scrotum	27.53	5.22	24.53	8.31	.246
Upper extremity injuries	569.73	139.45	490.07	171.81	.174
Lower extremity injuries	431.60	80.98	324.53	135.42	.014*
Total number of operations (emergency+elective)	185.47	33.09	115.60	23.57	<.0001*
Appendectomy	22.53	7.31	23.67	6.84	.664
(Appendectomy/abdominal pain)×100	8.00	2.00	12.73	3.42	<.0001*
Negative appendectomy rate	1.20	1.15	1.33	2.32	.869
(Negative appendectomy rate/appendectomy) ×100	5.39	5.41	4.33	6.98	.362
Perforated appendixes	3.87	1.46	3.27	1.83	.247
[Perforated appendixes/(appendectomy −negative appendectomy rate)] ×100	19.70	9.75	15.02	9.00	.191
Scrotal exploration	7.93	2.84	6.87	3.25	.347
(scrotal exploration/acute scrotum) ×100	29.08	10.23	30.23	16.82	.894
Surgical treatment of fractures	22.07	7.22	22.20	8.11	.962
(Surgical treatment of fractures/upper and lower extremity injuries) ×100	2.22	0.61	2.93	1.34	.148

*$P < .05$.

Table 3. Correlation of the Total Number of Examinations in the Emergency Department, Appendectomy, Scrotal Explorations, and Fracture Operations in Relation to the Most Common Diagnoses That Occur in the Emergency Department

	Abdominal Pain		Acute Scrotum		Upper Extremity Injuries		Lower Extremity Injuries	
	Pre-COVID-19	COVID-19	Pre-COVID-19	COVID-19	Pre-COVID-19	COVID-19	Pre-COVID-19	COVID-19
Total number of examinations in emergency surgical admission	$r_s = 0.27$	$r_s = 0.61$	$r_s = 0.23$	$r_s = 0.38$	$r_s = 0.97$	$r_s = 0.98$	$r_s = 0.91$	$r_s = 0.96$
	$P = .328$	$P = .016^*$	$P = .406$	$P = .165$	$P = .000^*$	$P = .000^*$	$P = .000^*$	$P = .000^*$
Appendectomy	$r_s = 0.49$	$r_s = 0.79$						
	$P = .066$	$P = .000^*$						
Scrotal exploration			$r_s = 0.41$	$r_s = 0.14$				
			$P = .121$	$P = .611$				
Surgical treatment of fractures					Pre-COVID-19		COVID-19	
					$r_s = 0.66$		$r_s = 0.39$	
					$P = .006^*$		$P = .151$	

*$P < .05$.

pandemic on pediatric patients who presented with pain in the right iliac fossa and appendicitis. Similar to the results of our research, they also noticed a significant reduction in the total number of admissions with abdominal pain during a pandemic. It is interesting to note that they did not notice a negative rate of diagnostic laparoscopies. In our study, we observed a slight increase in negative appendectomy rates but without statistical significance. It is an indisputable fact that complications can occur with a late arrival at the hospital.[9] Given the pandemic and the reduced number of arrivals, a statically significant increase in the number of perforated appendicitis was to be expected. The study by Sheath et al. showed that the rate of complicated appendicitis was higher but without a statistically significant increase over the previous year. They thought that by increasing the samples, the rate would be statistically higher. In our study, which covered a period of 15 months, the mean value of the perforated appendixes was lower but also statistically insignificant. However, one should be careful in comparing the above results, since in the mentioned study, gangrenous and perforated appendixes were considered complicated appendicitis, while in our study, only perforated appendixes were considered complicated appendicitis. The fact that in the 15 months of the COVID-19 period, there are large oscillations in the number of new cases from month to month must also be taken into account. The study by Gaiter Tristán et al[10] also did not record a statistically significant increase in the number of complicated appendicitis. COVID-19 did not increase the incidence of complicated appendicitis, and children who developed complicated appendicitis had no worse clinical outcomes. The study by Kvasnovsky et al[11] also reports that compared to the same period in previous years, a similar number of patients with acute appendicitis were treated during the pandemic. In relation to the mentioned study, we must state the fact that we did not have to adjust our spatial hospital capacities to the treatment of adult COVID-19 patients since we are exclusively a children's hospital, and thus, we were not forced to treat some patients with antibiotics. Bonilla et al[12] emphasize the fact that the time from the moment of admission to the emergency department to the operation increased statistically significantly. The cause lies in the fact that the PCR test for SARS-CoV-2 had to be waited for. In our study, we did not calculate the stated time, but we would certainly get similar results given that the waiting time for PCR diagnostic results on SARS-CoV-2 is 4-6 hours. The study did not show statistically significant differences in the rate of complicated appendicitis but increased the rate of periappendicitis, which is attributed to the waiting time for the PCR test. Based on all the above, the results must be interpreted with regard to the organization and capacity of the hospital. Some hospitals have decided to test all children for SARS-CoV-2, with the use of antibiotics until the findings arrive. Some hospitals have taken the position of reducing non-operative management as it prolongs hospitalization time. Certain systems opted for immediate surgical treatment, without waiting for a test for SARS-CoV-2, to allow patients to have surgery earlier and thus be discharged from the hospital earlier. For this approach, hospitals must provide a sufficient number of resources in the form of protective equipment and adequate operating rooms.[13] Given the organization and capacity, we decided to wait for the PCR test results, except for children who have peritonitis. In the United Kingdom and Ireland,[14] during the pandemic, a higher rate of antibiotic

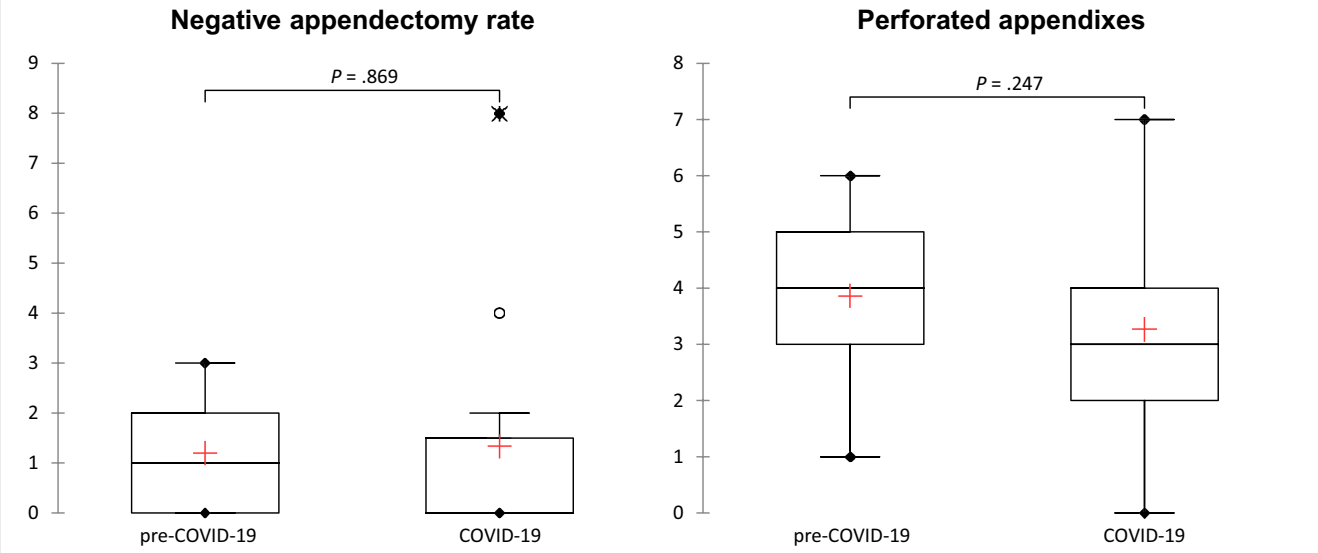

Figure 3. Negative appendicectomy rate and number of perforated appendixes in the pre-COVID-19 and COVID-19 period. COVID-19, coronavirus disease-19.

treatment was observed which was not common in the pre-COVID-19 period. There was also a trend that the number of laparoscopic surgeries was significantly reduced given the recommendations of professional bodies that laparoscopy could increase the risk of SARS-CoV-2 virus transmission. The study showed a low rate of negative appendectomies analogs to our results, but we must point to the fact that our results were based on pathohistological findings, while theirs were based on intraoperative findings. In Croatia, surgeons are still more inclined to operative treatment than to non-operative management, and the COVID-19 period did not change this attitude. Regarding appendicitis, from our study, we must emphasize the fact that the proportion of appendicitis of the total examined children with abdominal pain, in the period of COVID-19, increased statistically significantly, which supports the fact that the number of unnecessary arrivals of children with abdominal pain, to the emergency department, reduced. Of all patients who underwent appendectomy, in the period of COVID-19 (n = 355), 4 of them presented with MIS-C (1.13%). In the world, several cases have been misdiagnosed as appendicitis, but there have also been cases where MIS-C and appendicitis were present at the same time.[15-19] In our series of 4 patients, 1 child died, while 1 required inotropic and respiratory support. The conclusion is that surgeons should be vigilant when a child who has undergone an appendectomy develops prolonged fever and hypotension with specific blood test results. It is also important to note that radiological ultrasound findings in children with MIS-C often suggest periappendicitis, which may prompt surgeons to opt for an appendectomy that can only exacerbate an existing condition. Regarding the number of examinations with diagnoses that could potentially indicate an acute scrotum, the number of the same decreased but not statistically significantly. The number of scrotal explorations also decreased but not statistically significantly. The proportion of scrotal explorations from all emergency department examinations under diagnoses of acute scrotum increased slightly but also not statistically significant. Although our research included all conditions that represent the acute scrotum, most authors focused on testicular torsion. Littman et al[20] found that there was no statistically significant difference in the average duration of symptoms until hospitalization ($P = .78$) and that there was no statistically significant change in the number of orchidectomies ($P = .17$). Although it would be expected that, due to the lockdown, it would be more difficult for parents to decide to go to the emergency department and that, as a result, there could be statistically significantly more orchidectomies, the same did not happen. This was probably due to greater contact between parents and children, and indirectly to increased parental awareness. Analogs to the previous study, Nelson et al[21] also did not find a statistically significant difference in the time from onset of symptoms to presentation in the emergency department ($P = .47$) and the rate of orchidectomy ($P = .39$). As in the study by Nabian et al.[22] we also observed a decrease in the number of traumatic patients. While they recorded a decline of 52%, we recorded a decline of 19% over a 15-month period (statistically significant for lower extremity injuries). As in the above study, we noticed that fractures of the distal radius, middle third of the forearm, and supracondylar fracture were in the lead. It is interesting to note that they recorded a statistically significant decline in open fractures. The decline was attributed to closed schools, kindergartens, and sports activities. Olech et al[23] investigated distal radius fractures in the pre-COVID-19 and COVID-19 periods. They noticed a decrease of 3.8% in the number of hospitalized children and an increase of 18.2% in surgically treated children, while we recorded an increase of 0.6%. We must note that our data refer to a 15-month period and all fractures. Based on 6 weeks of lockdown, Sugand et al[24] noticed a decrease in the number of pediatric trauma by two-thirds (67.9%). Analogs to the above study, when comparing the 3rd and 4th months of 2019 and 2020, based on our data, we record a decrease of 59%. The percentage of those admitted or underwent surgical intervention remained relatively unchanged. Observing elbow and shoulder injuries in the pediatric population, in the first 30 days of the pandemic, Gumina et al[25] also recorded a decline of 65%. When all types of injuries were taken into account, the decline was even greater, as much as 84.6%.

CONCLUSION

In conclusion, this study represents a 15-month experience of a pandemic in the only and largest children's hospital in Croatia. This is the first study in the field of pediatric surgery which encompassed a COVID-19 period of more than a year. There is no doubt that COVID-19 had the effect of reducing the number of examinations in the emergency department for all the most common diagnoses, but the number of emergency operations did not change significantly. This clearly indicates that conditions that required surgical treatment were adequately taken care of, with no increase in the number of complications due to a possible delay in arriving at the emergency department. It is also important to note that special care should be taken when setting an indication for appendectomy in children with SARS-CoV-2 infection. A number of children will certainly present with a clinical presentation of an acute abdomen, without a pathohistological substrate of appendicitis, and the operation itself in such children may exacerbate pre-existing conditions.

Ethics Committee Approval: No ethical permission is required for this research.

Informed Consent: Informed consent is not necessary due to the retrospective nature of this study.

Peer Review: Externally peer-reviewed.

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