The influence of the COVID-19 pandemic on the management of pediatric appendicitis; an international study

CONNECT-study

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Abbreviations:

CI: Confidence interval

EUPSA: European Pediatric Surgeons' Association

IAA: Intra-abdominal abscess

IQR: Interquartile range

NOT: Non-operative treatment

SSI: Surgical site infection

Introduction

The COVID-19 pandemic had a huge impact on healthcare system across the world forcing policymakers to reorganize hospital resources to increase capacity. Recommendations were made by surgical societies to postpone elective surgery and apply non-operative alternatives if available for surgical diseases.[1-3] The aim of our multicenter international study was to investigate the impact of the COVID-19 pandemic on pediatric appendicitis, specifically the proportion of children with complex appendicitis, alterations in the diagnostic work-up and treatment strategies and its outcomes.

Methods

An international retrospective study was conducted at 40 hospitals from 23 countries (supplement 1). The study was overseen by an international study steering group (RG/AZ/AP/NH/TW/FM/AG/PA) that developed the study protocol. This study was endorsed by the European Pediatric Surgeons' Association (EUPSA) which assisted in the recruitment of participating hospitals through the EUPSA Network Office. Principal investigators of participating sites obtained local ethical approval in accordance with local requirements. The study was reported according to the STROBE guidelines.[4]

Patients (<18 year) treated for acute appendicitis between January 2019 and December 2020 were screened for eligibility. Those treated non-operatively without imaging confirmed diagnosis of acute appendicitis were excluded. Diagnosis of acute appendicitis was defined as intraoperative and histopathological confirmation of appendicitis, and in case of non-operative treatment (NOT; see supplement 2 for definition) based on clinical, biochemical and radiological criteria. Local investigators were asked to define the start of the COVID-19 pandemic at their institution based on the start of the time period in which regular healthcare was affected by the pandemic. The COVID-group was defined as those patients treated between the start of the COVID period and December 31st, 2020. The control group

consisted of patients treated during the corresponding time period in 2019. To understand healthcare protocols and management strategies for acute appendicitis before and during the pandemic at each center, all participating sites were asked to complete a survey that was sent March 23rd, 2021. (Supplement 3)

Variables of interest and their definitions were agreed by the study steering group during protocol development and were based on the globally supported Core Outcome Set for studies reporting the treatment of acute simple appendicitis in children.[5-8] Primary outcomes were the proportions of children treated for complex appendicitis, children that underwent imaging procedures for confirmation of appendicitis, children treated with non-surgical treatment strategies, and complications directly related to treatment. Secondary outcomes and definitions are displayed in supplement 2.

Comparative analyses were performed by calculating differences in proportions and 95% confidence intervals (CI). Subgroup analyses based on time period of presentation, age, and region were performed for appendicitis severity and complications. For all subgroup analyses, Bonferroni correction was applied to adjust for multiple testing. Statistics were performed using IBM SPSS statistics version 26 (IBM SPSS 26.0, Armonk, NY).

Results

Between January 2019 and December 2020 10655 children were treated for acute appendicitis, of which 2062 were excluded due to various reasons (Supplement 4). Therefore, 8593 patients were included, 4113 in the COVID-group and 4480 in the control group. Baseline characteristics of both groups were similar (Supplement 5).

The survey showed that, in the majority of participating centers, NOT and same day discharge were not standard of care during the pandemic and that there was no change in referral pathways or shift of patients with complex disease to the participating centers (Supplement 1).

Appendicitis severity

In the COVID-group 47.7% of patients were treated for complex appendicitis versus 45.0% in the control group (difference:2.7%;95%CI:0.6 to 4.8%;*p*=0.014) (Table 1). This increased proportion of complex appendicitis was only apparent during the first three months of the pandemic (difference:5.6%;95%CI:1.8 to 9.3%;*p*=0.003;adjusted *p*=0.007) and was predominantly caused by an absolute decrease of patients with simple appendicitis. The subgroup analysis based on region showed that the proportion of patients treated for complex appendicitis increased with 3.5% (95%CI:1.2 to 5.8%;*p*=0.004;adjusted *p*=0.020) in Europe. No significant differences were found for other continents (Table 2).

Diagnostic work-up and initial treatment

In the COVID-group 86.0% of children underwent imaging during diagnostic work-up compared to 84.4% in the control group (difference:1.6%;95%CI:0.1 to 3.1%;*p*=0.037).

During the pandemic, 7.7% of patients were treated non-operatively compared to 7.3% in the control period (difference:0.4%;95%CI:-0.7 to 1.5%;*p*=0.495). Outcomes of NOT are displayed in supplement 6.

Of those treated surgically, 74.3% in the COVID-group and 71.2% in the control group underwent laparoscopic appendectomy (difference:3.1%;95%CI:1.2 to 5.1%;*p*=0.002). (Table 1.)

Complications

Both the primary and subgroup analyses found no differences in the number of patients experiencing any complication between the COVID and control group, nor in the severity of

complications. In both groups, an intra-abdominal abscess was the most frequent postoperative complication. (Table 1/2.)

Discussion

This international study found that the number of patients presenting with simple appendicitis decreased during the first months of the pandemic, resulting in a higher proportion of complex appendicitis compared to the control period. The proportion of patients treated non-operatively and the proportion of complications were comparable to the control period.

Several small single center studies have reported contradicting results on the influence of the pandemic on the proportion of patients treated for complex appendicitis. Some showing increased proportions of complex appendicitis (7-18%), whereas others could not detect any difference.[9-14] In our study, the increased proportion of complex appendicitis seems to be the result of an absolute decrease of patients with simple appendicitis. A possible explanation could be the resolution of mild cases of simple appendicitis that did not seek medical care and recovered spontaneously or were treated with antibiotics by general practitioners.[15, 16] After the first months of the pandemic, proportions of simple and complex appendicitis were comparable to the control group, which was predominantly the result of an absolute increase of patients with simple appendicitis. This could be explained by the fact that the threshold to seek medical care for mild cases of appendicitis possibly decreased after the first months of the pandemic, as lockdown measures were slowly lifted and fear for COVID-19 declined. Our findings are in line with other population based studies that found an absolute decrease in both adult and pediatric patients presenting with simple appendicitis in the early pandemic period.[17-19]

This international multicenter study is limited by possible information and selection bias, which is inherent to retrospective selection of patients and data collection. Furthermore, the regional subgroup analysis was limited by a skewed distribution, as the majority of patients

were included in Europe. Lastly, our survey found no shift of patients with complex disease to participating centers, but this might still have occurred.

Major strength of our study is the international collaboration and subsequent large sample size of more than 8500 patients. Further strengths are the usage of the international core outcome set for acute appendicitis, development of a study protocol with predefined definitions of variables of interest, and an objective definition of appendicitis severity based on surgical and histopathological criteria.

In conclusion, this large international study showed that during the first months of the COVID-19 pandemic the proportion of pediatric patients treated for complex appendicitis was higher compared to the control period in 2019, which was predominantly caused by an absolute decrease of patients presenting with simple appendicitis. The management and outcomes of patients with acute appendicitis were relatively unaffected by the pandemic, reflecting the resilience of the participating centers.

Conflict of Interest Disclosures (including financial disclosures): The authors have no conflicts of interest to disclose for the submitted work.

Funding/Support: Tomas Wester received a grant from the Swedish Medical Research Council.

Role of Funder/Sponsor: The Swedish Medical Research Council had no role in any part of the study.

Acknowledgements

This study was endorsed by the European Pediatric Surgeons' Association (EUPSA) and participating hospitals were mainly recruited via the EUPSA Network Office. Requests for

data sharing will be considered by study steering group upon written request to the corresponding author. Deidentified participant data will be made available after receipt of a written proposal and a signed data sharing agreement.

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Table 1. Diagnostic work-up, treatment, and outcomes

Characteristics	**COVID-19 group (n= 4113)**	**Control group (n= 4480)**	**Difference in proportions (95%CI)**	***p*-value**
Severity of appendicitis				
- Simple	1973 (48.0%)	2229 (49.8%)		
- Complex	1962 (47.7%)	2017 (45.0%)	2.7% (0.6 to 4.8%)	0.014
- Non-inflamed	168 (4.1%)	220 (4.9%)		
Missing values	*10 (0.2%)*	*14 (0.3%)*		
Patients screened for COVID-19			-	-
- Yes	3095 (75.2%)	-		
- No	997 (24.2%)	-		
Missing values	*21 (0.5%)*	-		
Test results				
- Test positive	71 (1.7%)	-		
- Test negative	2998 (72.9%)	-		
Inconclusive/unknown	26 (0.6%)	-		
No. of patients that underwent diagnostic imaging, n (%)	3535 (86.0%)	3780 (84.4%)	1.6% (0.1 to 3.1%)	0.04
Type of imaging, n (%)			-	-
- Ultrasound (US)	3205 (77.9%)	3450 (77.0%)		
- MRI	9 (0.2%)	5 (0.1%)		
- CT	88 (2.1%)	66 (1.5%)		
- US + MRI	59 (1.4%)	63 (1.4%)		
- US + CT	161 (3.9%)	164 (3.7%)		
- MRI + CT	1 (<0.1%)	1 (<0.1%)		
- US + MRI + CT	1 (<0.1%)	3 (0.1%)		
- *Missing*	*11 (0.3%)*	*28 (0.6%)*		
Treatment strategy				
- Non-operative treatment	316 (7.7%)	327 (7.3%)	0.4% (-0.7 to 1.5%)	0.50
- Surgical treatment	3797 (92.3%)	4153 (92.7%)	0.4% (-0.7 to 1.5%)	0.48
Surgical approach				
- Laparoscopic	2748 (66.8%)	2889 (64.5%)	2.3% (0.3 to 4.3%)	0.03

- Open	967 (23.5%)	1191 (26.6%)	3.1% (1.3 to 4.9%)	0.001
- Laparoscopic converted to open	75 (1.8%)	69 (1.5%)	-	-
- Other	7 (0.2%)	4 (0.1%)	-	-
Negative appendectomy	168 (4.1%)	220 (4.9%)	0.8% (-0.8 to 1.7%)	0.08
Missing	*10 (0.2%)*	*14 (0.3%)*		
Initial length of stay (d), median (IQR)	3 (2-6)	3 (2-6)	-	0.75
Missing	*2 (<0.1%)*	*41 (0.9%)*		
Total length of stay (d), median (IQR)	4 (2-6)	4 (2-6)	-	0.37
Missing	*2 (<0.1%)*	*42 (0.9%)*		
Hospital readmission	226 (5.5%)	232 (5.2%)	0.3% (-0.7 to 1.3%)	0.53
Missing	*5 (0.1%)*	*4 (0.1%)*		
No. of patients with a complication	478 (11.6%)	496 (11.1%)	0.5% (-0.8 to 1.8%)	0.43
Missing	*4 (0.1%)*	*8 (0.2%)*		
Patients with a minor complication (CD I-II)	325 (7.9%)	323 (7.2%)	0.7% (-0.4 to 18%)	0.22
Patients with a severe complication (CD III-IV)	149 (3.6%)	168 (3.7%)	0.1% (-0.7 to 8.9%)	0.81
Death (CD V)	1 (<0.1%)	1 (<0.1%)	0% (-0.1 to 0.1%)	>0.99
Missing	*8 (0.2%)*	*12 (0.3%)*		
Type of complication			-	-
- Intra-abdominal abscess	254 (6.2%)	242 (5.4%)		
- Surgical Site Infection	110 (2.7%)	102 (2.3%)		
- Small bowel obstruction	52 (1.3%)	43 (1.0%)		
Need for reoperation	72 (1.8%)	102 (2.3%)	0.5% (-0.1 to 1.1%)	0.08
No. of patients with at least one outpatient visit	1898 (46.1%)	2791 (62.3%)	16.2% (14.1 to 18.3%)	<0.001
Missing	*3*	*6*		
No. of patients with a telephone check-up	777 (18.9%)	416 (9.3%)	9.6% (8.1 to 11.1%)	<0.001
Missing	*5 (0.1%)*	*11 (0.2%)*		

Data is displayed as count (percentage of total)

Table 2. Subgroup analyses on severity of appendicitis and complications

Characteristics	COVID-19 group (n= 4113)	Control group (n= 4480)	Difference in proportions (95%CI)	Adjusted *p*-value
Patients treated for complex appendicitis				
Time period				
- First three months	672/1287 (52.2%)	669/1436 (46.6%)	5.6% (1.8 to 9.3%)	0.007
- Rest of the year	1290/2816 (45.8%)	1348/3030 (44.5%)	1.3% (-1.3 to 3.9%)	0.64
Missing	*10*	*14*		
Age				
- <6 years old	357/501 (71.3%)	399/590 (67.6%)	3.7% (-1.8 to 9.1%)	0.56
- 6-12 years old	1018/2227 (45.7%)	1025/2354 (43.5%)	2.2% (-0.7 to 5.1%)	0.40
- >12 years old	587/1375 (42.7%)	593/1522 (39.0%)	3.7% (0.1 to 7.3%)	0.13
Missing	*10*	*14*		
Region				
- Europe	1632/3406 (47.9%)	1593/3585 (44.4%)	3.5% (1.2 to 5.8%)	0.02
- North-America	136/334 (40.7%)	154/355 (43.4%)	2.7% (-4.7 to 10.0%)	>0.99
- South-America	22/47 (46.8%)	59/102 (57.8%)	11.0% (-6.0 to 27.3%)	0.63
- Africa	86/117 (73.5%)	108/157 (68.8%)	4.7% (-6.3 to 15.2%)	>0.99
- Asia	86/199 (43.2%)	103/267 (38.6%)	4.6% (-4.4 to 13.5%)	0.95
Missing	*10*	*14*		
Subgroup analysis on patients experiencing a complication				
Time period				
- First three months	176/1291 (13.6%)	173/1435 (12.1%)	1.5% (-1.0 to 4.0%)	0.48
- Rest of the year	302/2818 (10.7%)	323/3037 (10.6%)	0.1% (-1.5 to 1.7%)	>0.99
Missing	*4*	*8*		
Age				
- <6 years old	75/503 (14.9%)	100/589 (17.0%)	2.1% (-2.3 to 6.4%)	>0.99
- 6-12 years old	246/2230 (11.0%)	252/2361 (10.7%)	0.3% (-1.5 to 2.1%)	>0.99
- >12 years old	157/1376 (11.4%)	144/1522 (9.5%)	1.9% (-0.3 to 4.2%)	0.28

Missing	*4*	*8*		
Region				
- Europe	404/3408 (11.9%)	386/3592 (10.7%)	1.2% (-0.2 to 2.7%)	0.57
- North-America	28/334 (8.4%)	34/354 (9.6%)	1.2% (-3.2 to 5.5%)	>0.99
- South-America	5/47 (10.6%)	24/102 (23.5%)	12.9% (-1.0 to 23.8%)	0.33
- Africa	24/121 (19.8%)	32/157 (20.4%)	0.6% (-9.1 to 9.9%)	>0.99
- Asia	17/199 (8.5%)	20/267 (7.5%)	1.0% (-3.9 to 6.4%)	>0.99
Missing	*4*	*8*		

Data is displayed as count (percentage of total)

Supplement 1. Definition of COVID period and healthcare regulations

Country	Site	Number of patients	Start date COVID-19	NOT standard of care	Same day discharge standard of care	Shift of patients with acute appendicitis
Austria	Graz	352	March 2020	No	No	No
	Vienna	224	March 2020	No	No	COVID+ patients were referred to another hospital
Bangladesh	Dhaka	56	March 2020	No	No	No
Belgium	Brussels	120	March 2020	No	No	No
	Leuven	161	March 2020	No	No	No
Brazil	Sao Paolo	149	March 2020	No	No	No
Canada	Toronto	511	April 2020	No	No	No
Denmark	Odense	171	March 2020	No	No	No
Finland	Helsinki	279	March 2020	No	No	No
France	Angers	235	March 2020	No	No	No
	Paris	328	March 2020	No	Yes	Patients (both simple and complex appendicitis) were referred from peripheral hospitals to this hospital due to reduced OR capacity
Israel	Ber Sheva	292	April 2020	No	No	No
Italy	Alessandria	103	March 2020	No	Yes	No
	Brescia	289	March 2020	Yes	No	No
	Florence	242	March 2020	No	Yes	No
	Messina	150	March 2020	No	No	COVID+ patients were referred to another hospital
	Padua	106	March 2020	No	No	No
	Pavia	96	March 2020	No	No	Patients (both simple and complex appendicitis) were referred from peripheral hospitals to this hospital
	Rome	528	March 2020	No	No	No
	Treviso	146	February 2020	No	No	No
Latvia	Riga	191	February 2020	Yes	No	No

Malaysia	Kuala Lumpur	27	February 2020	No	No	No
North-Macedonia	Skopje	244	March 2020	No	No	No
Norway	Oslo	208	March 2020	No	No	No
Portugal	Lisbon	580	March 2020	No	No	No
Serbia	Belgrade	307	March 2020	No	No	Patients (both simple and complex appendicitis) were referred from peripheral hospitals to this hospital
South-Africa	Cape Town	278	March 2020	Yes	No	All pediatric cases were referred to this hospital
Spain	Madrid	554	March 2020	No	No	Emergency pediatric surgery was concentrated in this hospital
	Zaragoza	387	March 2020	No	No	No
Sweden	Stockholm	297	March 2020	Yes	No	No
The Netherlands	Amsterdam	29	March 2020	No, only in trial setting	No	No
	Heerlen	117	March 2020	No, only in trial setting	No	No
	Maastricht	45	March 2020	No	No	No
	Nijmegen	7	March 2020	No	No	No
	Rotterdam	33	March 2020	No	No	No
	The Hague	145	March 2020	No, only in trial setting	No	No
Turkey	Denizli	91	March 2020	Yes	No	No
United Kingdom	Birmingham	196	April 2020	No	No	No
	Southampton	141	April 2020	No, surgeon discretion	No	No
United States	Baltimore	178	April 2020	Yes	Yes	COVID+ cases were transferred to this hospital

Non-operative treatment protocols:
Brescia, Italy: Intravenous (IV) ceftriaxone for 7 days in case of simple appendicitis, ceftriaxone + metronidazole IV for complicated appendicitis.
Riga, Latvia: IV ampicillin + metronidazole for 72 hours followed by 7 days oral augmentin to complete a course of 10 days. Discharge criteria: Clinical improvement, decreased c-reactive protein, and no deterioration on repeat ultrasound.
Cape Town, South-Africa: IV augmentin for 24-48 hours followed by oral augmentin + amoxicillin to complete a course of 10 days. Discharge criteria: Clinical improvement and after confirmation that caregivers have clear understanding of symptoms to prompt early return to hospital as well as easy access to transport back to the hospital.
Stockholm, Sweden: IV piperacillin/tazobactam for 24 hours followed by oral ciprofloxacin + metronidazole to complete a course of 10 days. Discharge criteria: Clinical improvement after 24 to 48 hours.
All centers, The Netherlands: IV augmentin + gentamicin for 48 hours followed by 5 days oral augmentin. Discharge criteria: Clinical improvement, decreased leukocytes and c-reactive protein and no deterioration on repeat ultrasound.

Denizli, Turkey: IV ampicillin/sulbactam + gentamicin + clindamycin for 5 days followed by oral augmentin + metronidazole to complete a course of 10 days.
Southampton, United Kingdom: No written protocol, but a minimum of 24 hours of IV antibiotics.
Baltimore, United States: IV ceftriaxone + metronidazole for at least 24 hours followed by oral Levaquin + metronidazole to complete a course of 10-14 days. Discharge criteria: toleration of oral diet, afebrile, pain improved. In case of complicated appendicitis interval appendectomy was planned 6 to 8 weeks after discharge.

Supplement 2. Outcomes and definitions

Secondary outcomes

Children developing complex appendicitis after non-operative treatment (NOT): The proportion of children that were initially treated non-operatively for simple appendicitis and subsequently developed complex appendicitis (either during initial admission or due to recurrence of disease) within 30 days after initial treatment.

Children with recurrent appendicitis after NOT: Recurrent appendicitis was defined as histopathological confirmed acute appendicitis within 30 days after initial NOT.

Hospital readmissions: The number of patients that were readmitted for a complication related to appendicitis treatment within 30 days after initial treatment.

Need for reoperation: The number of patients that underwent a second surgical procedure in the same site for the same indication within 30 days after primary appendectomy.

Length of hospital stay: The total duration of hospital stay during the first admission (initial length of hospital stay) combined with admission due to complications related to appendectomy or appendicitis.

Number of outpatient visits: The number of regular visits and telephone check-ups related to appendicitis treatment.

Other definitions

Non-operative treatment (NOT): Non-operative treatment of simple appendicitis consisted of a minimum of 24 hours intravenous antibiotics with or without a subsequent course of oral antibiotics, according to local protocol. Non-operative treatment of complex appendicitis consisted of intravenous antibiotics with or without percutaneous drainage (in case of appendiceal abscess).

Successful NOT: Successful NOT was defined as no need for appendectomy during the 30-day follow-up period of the study.

Simple appendicitis: Simple appendicitis was defined as the macroscopic appearance of an increased diameter of the appendix and microscopic transmural inflammation, ulceration, or thrombosis, without signs of necrosis or perforation.[6]

Complex appendicitis: Complex appendicitis was defined as appendicitis with macroscopic or microscopic signs of transmural inflammation with necrosis (gangrenous appendicitis) or perforation, or appendicitis with abscess or mass.[6]

Appendiceal perforation: Perforation was defined as a visible hole in the appendix or a free fecalith in the abdominal cavity.[7]

Intra-abdominal abscess (IAA): IAA was defined as a radiologically confirmed accumulation of purulent fluid in a walled-off space within the abdominal cavity.

(Adhesive) bowel obstruction: The diagnosis of (adhesive) bowel obstruction was based on clinical signs and symptoms such as history of constipation, nausea, vomiting, and distended abdomen.

Surgical site infection (SSI): Superficial and deep SSI were defined according to the CDC criteria.[8]

Supplement 3. Survey: Changes in healthcare protocols and treatment of appendicitis

1. Please indicate the start date of the COVID-19 pandemic in your region (based on the start of the time period in which healthcare in your hospital was affected by the pandemic)

2. Did you experience different peaks in the number of patients treated for COVID-19 in your hospital? If so, please define the start and end dates of these COVID-19 peaks.

3. Please indicate the percentage of reduced operation room capacity in your hospital during the COVID-19 pandemic

4. Did your hospital change any surgical healthcare protocols regarding the treatment of acute appendicitis during the COVID-19 pandemic?

5. Was non-operative treatment preferred for children with simple appendicitis according your adjusted protocol?

6. Was same day discharge preferred for children with simple appendicitis according to your adjusted protocol?

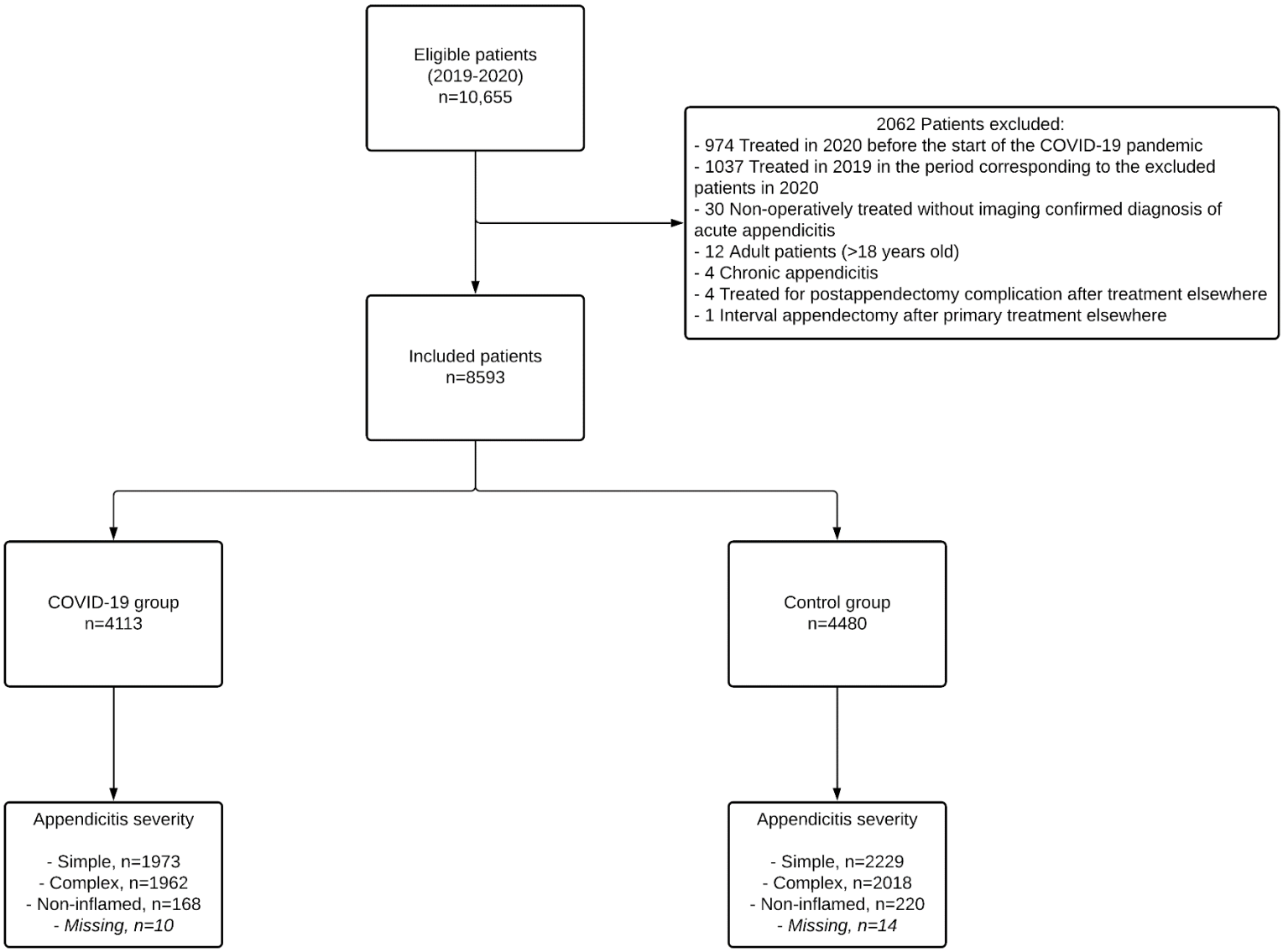
7. Did the changes in surgical protocols and/or reduction of operation room capacity affect the treatment of children with acute appendicitis in any other way?

8. Were any healthcare protocols implemented in your country that ordered a shift in appendicitis treatment from tertiary (academic) hospitals to peripheral hospitals or vice versa?

9. If so, did this shift of patients affect treatment of children with appendicitis in your hospital? Did your hospital treat more or less children with acute appendicitis due to the adjusted healthcare protocols?

10. Do you have any additional comments regarding changes in your healthcare protocols and management strategies for acute appendicitis during the COVID-19 pandemic?

Supplement 4. Patient flowchart



Supplement 5. Baseline characteristics

Characteristics	COVID-19 group (n= 4113)	Control group (n= 4480)	*p*-value
Age, y*	9.8 ± 3.6	9.9 ± 3.7	0.55
Male sex	2558 (62.2%)	2689 (60.0%)	0.04
Days abdominal pain^	1 (1-2)	1 (1-2)	0.41
Missing values	*36*	*62*	
Temperature at presentation*	37.2 ± 0.9	37.2 ± 0.9	0.09
Missing values	*138*	*151*	
Leukocytes*	15.1 ± 5.5	15.1 ± 5.6	0.61
Missing values	*136*	*184*	
CRP^	24.0 (5.0-73.0)	20.0 (3.6-67.9)	0.001
Missing values	*160*	*231*	
Severity of appendicitis			0.02
- Simple	1973 (48.0%)	2229 (49.8%)	
- Complex	1962 (47.7%)	2017 (45.0%)	
- Non-inflamed	168 (4.1%)	220 (4.9%)	
Missing values	*10 (0.2%)*	*14 (0.3%)*	
Patients screened for COVID-19			-
- Yes	3095 (75.2%)	-	
- No	997 (24.2%)	-	
Missing values	*21 (0.5%)*	-	
Test results			
- Test positive	71 (1.7%)	-	
- Test negative	2998 (72.9%)	-	
Inconclusive/unknown	26 (0.6%)	-	

Data displayed as count (percentage of total group count)
*Data displayed as mean ± standard deviation
^Data displayed as median (interquartile range

Supplement 6a. Outcomes of NOT for simple appendicitis

Characteristics	COVID-19 group (n=211)	Control group (n=208)
Need for appendectomy within one month	27 (12.8%)	27 (13.0%)
Reason for appendectomy		
- Primary failure of NOT	17 (8.1%)	19 (9.1%)
- Recurrent appendicitis	10 (4.7%)	7* (3.4%)
Patients developing complex appendicitis	9 (4.3%)	2 (1.0%)
- Primary	7 (3.3%)	2 (1.0%)
- Secondary	2 (0.9%)	0

* One patient with a suspicion of recurrent appendicitis had a non-inflamed appendix at histopathological examination
Data is displayed as count (percentage of total)

Supplement 6b. Outcomes of NOT for complex appendicitis

Characteristics	COVID-19 group (n=105)	Control group (n=119)
Indication for NOT		
- Appendix mass	26 (24.8%)	33 (27.7%)
- Appendiceal abscess	63 (60.0%)	70 (58.8%)
- Unknown	16 (15.2%)	16 (13.4%)
Need for appendectomy within one month	14 (13.3%)	18 (15.1%)
Reason for appendectomy		
- Primary failure of NOT	6 (5.7%)	8 (6.7%)
- Recurrent appendicitis	7 (6.7%)	8 (6.7%)
- Interval appendectomy	0	2 (1.7%)
Missing	*1 (1.0%)*	*0*

Data is displayed as count (percentage of total for each subgroup)