Official Journal of Erciyes University Faculty of Medicine

DOI: 10.14744/cpr.2023.39974
J Clin Pract Res 2023;45(5):487–93

Healing Factors in Perforated and Unperforated Pediatric Appendectomies: A Descriptive Study

Ayşegül Şimşek,[1] Işıl Ar,[2] Suzan Yıldız,[3] Bihter Öztürk Yıldırım[4]

[1]Department of Midwifery, İstinye University Faculty of Health Sciences, İstanbul, Türkiye
[2]Department of Nursing, Kocaeli University Faculty of Health Sciences, Kocaeli, Türkiye
[3]İstanbul University-Cerrahpaşa, Florence Nightingale Faculty of Nursing, İstanbul, Türkiye
[4]Department of Pediatric Surgery, Kocaeli University Training and Research Hospital, Kocaeli, Türkiye

This study was presented as a poster presentation at the 43rd Pediatrics Days and 22nd Pediatric Nursing Days with international participation, between May 30 and June 2, 2021

Cite this article as:
Şimşek A, Ar I, Yıldız S, Öztürk Yıldırım B. Healing Factors in Perforated and Unperforated Pediatric Appendectomies: A Descriptive Study. J Clin Pract Res 2023; 45(5): 487–93.

Address for correspondence:
Ayşegül Şimşek.
Department of Midwifery, İstinye University Faculty of Health Sciences, İstanbul, Türkiye
Phone: +90 850 283 60 00
E-mail:
aysegul.simsek@istinye.edu.tr

Submitted: 09.05.2023
Revised: 16.05.2023
Accepted: 28.08.2023
Available Online: 21.09.2023

Erciyes University Faculty of Medicine Publications - Available online at www.jcpres.com

ABSTRACT

Objective: Appendicitis is the most common surgical emergency in childhood and requires urgent intervention. The goal of this research was to identify the factors influencing healing in perforated and non-perforated appendectomy procedures.

Materials and Methods: This descriptive research involved 75 children who underwent appendectomy. Information was collected during the preoperative and postoperative stages using a data collection form and a pain assessment scale. Both parents and children hospitalized with appendicitis contributed to this information.

Results: The primary complaints leading children to the hospital were nausea and vomiting, which started, on average, 2.7 days prior to admission. While 96% of the children underwent open surgery, 77.3% presented with non-perforated appendicitis. Feeding was ceased 9 hours pre-operation and recommenced in the 15th postoperative hour. A significant difference was noted between perforation status and discharge time. Factors influencing healing included the length of hospital stay, perforation status, preoperative information, time of postoperative oral feeding initiation, and intravenous fluid therapy.

Conclusion: The study suggests that early feeding, mobilization, and patient counseling can reduce pain and expedite recovery and discharge.

Keywords: Appendectomy, child, nutritional status, healing, operation.

INTRODUCTION

Acute appendicitis is defined as an inflammation of the internal membrane of the vermiform appendix. The inflammation typically originates there and spreads throughout the organ. Luminal obstruction is a common factor in the etiology of this disease. Luminal obstruction triggers the inflammatory process and results in obstruction of the venous outflow. Ischaemia develops in the wall of the appendix. The organ becomes susceptible to pathogens, and the presentation of appendicitis emerges.[1–4] The general appendectomy rate in children is reported to be 8.4%. Appendicitis can occur at any age. However, it is most common between the ages of 10 and 19 years.[3–5] In girls and children under the age of six, the rate has been reported to be higher.[1,6]

At diagnosis, the most common treatment is surgery, which remains the mainstay of treatment in most hospitals.[3,5–8] Whether the surgery is laparoscopic or open depends on the child's examination findings.[4]

A multidisciplinary team approach involving doctors and nurses is essential for treating appendicitis. various factors, from patient characteristics to the type of surgery, play a role in the planning of care standards.[4,9,10] Care planning also includes preoperative preparation of the gastrointestinal system, informing the child and family about the procedure, postoperative nutrition, mobilization, and medical treatment.[9] Timely identification of perforation status in preoperative planning and tailored care can improve the patient's response to treatment, expedite recovery, and shorten hospital stays, thus reducing mortality and morbidity rates.[6,11] Mobilization, analgesia, intravenous antibiotic and fluid administration, and the initiation of nutrition are other key aspects of care. Both individual and environmental factors influence how changes in these practices impact the healing process.

MATERIALS AND METHODS

Purpose and Design of the Study

This study was designed as a descriptive study and conducted at a single center. The goal was to identify the characteristics of children who underwent appendectomy surgeries and the factors influencing their hospital stay and recovery times. The difference between perforated and non-perforated appendectomies was of secondary importance. The study took place in the pediatric surgery clinic of Kocaeli University Hospital and was organized according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Participants

All children diagnosed with appendicitis between May 2019 and May 2020 were considered for this study. Children who met the inclusion criteria, were hospitalized during this period, and consented to participate formed the sample. Inclusion criteria were a diagnosis of appendicitis, being between the ages of 6 and 18, having no walking disability, and no musculoskeletal system illness. The study was completed with 75 children after one child was excluded due to immobility.

Data Collection Tools

The study utilized a researcher-developed questionnaire and pain scale. The questionnaire included a sociodemographic information form (covering age, gender, medical diagnosis, presence of chronic disease, family history of appendectomy).[2,12–14] and an operation information form (type of operation, duration, onset of complaints, post-operative mobilization and nutrition practices, medical treatment details).[2,13]

The Visual Analogue Scale (VAS) was used to assess the pain experienced by children. On the VAS, scores range from 0–10, where a higher score indicates increased pain severity. A score of 0 indicates no pain, while 10 denotes severe pain.[14]

Data Collection

After receiving permission from the hospital, the study was approved by the ethics committee. Patients and their parents, who met the study's inclusion criteria, were informed about the trial after securing local ethics committee approval. Upon receiving the information, those who agreed to participate in the study provided both written and verbal informed consent.

In the lead-up to surgery, after admitting the child to the hospital with a diagnosis of appendicitis, the descriptive information on the data collection form was obtained. Subsequently, the patient underwent an appendectomy. The postoperative data collection form was supplemented with additional details obtained through observation, questions, and responses. No intervention outside the study's scope were made with the patient. They were monitored continuously after surgery until discharge. During the postoperative period, and until discharge, patients were asked to rate their pain level every four hours. As part of the hospital's routine procedure, a pain assessment was conducted both before and after the patient was mobilized. The data collection form was completed based on the gathered information.

Data Analysis

To discern the characteristics of children who underwent an appendectomy and to pinpoint variables influencing recovery and duration of hospital stay, the collected data was analyzed using the Statistical Package for the Social Sciences, version 25 (SPSS, v25) software (IBM Company, USA). The information gathered on the children who underwent appendectomy was analyzed. Mean values of continuous variables (age, hospital stay, etc.) were computed, while the number and percentage ratios of categorical variables (gender, operation type, etc.) were recorded. Kruskal-Wallis (KW) and Mann Whitney-U (MU) tests were used for in-group and between-group comparisons based on normality distributions. In the study, a simple linear regression analysis model was employed to determine the factors predicting the length of hospital stay after appendectomy. Significance at the 95% confidence interval was assessed as $p<0.05$.

The analyses led to the identification of distinctive characteristics among the children who underwent appendectomy and those related to the procedure. Additionally, the variables affecting the length of hospitalization and the perforation status were determined.

Table 1. Descriptive characteristics of the patients (n=75)

Features	Median	Min–Max
Age (years)	12	6–17
Time of onset of complaints (days)	2	0–14
Time of feeding before the operation	8	1–48
Operation time (hours)	1	1–2
Body weight (kg)	45	1–130
Length of hospital stay (days)	2	1–7
Postoperative feeding time (hour)	10	4–60
Postoperative mobilization time (hour)	8	4–24
Postoperative intravenous fluid administration time (days)	1	1–5
Mobilization time (minute)	10	2–30
Pain score (VAS, 0–10)		
Before mobilization		2
After mobilization		1
	n	**%**
Gender		
Girl	26	34.7
Boy	49	65.3
Diagnosis of the other patient in the room		
Other diagnosis	25	33.3
Same diagnosis	21	28
Medical diagnosis		
Non-perforated	58	77.3
Perforated	17	22.7
Complaints		
Nausea	30	17.8
Limitation of movement	11	6.5
Diarrhea	5	3
Vomiting	34	20.1
Weakness	14	8.3
Constipation	4	2.4
Stomachache	62	36.7
Increase in body temperature	9	5.3
Preoperative information		
Yes	58	77.3
No	17	22.7
Operation method		
Open operation	72	96
Laparoscopic	3	4
Postoperative invasive tools		
Drain	13	13.3
Nasogastric tube	2	2
Urinary catheter	9	9.2
Development of hypotension at first mobilization		
Yes	16	21.3
No	59	78.7
Status of requesting mobilization		
Yes	41	54.7
No	34	45.3
Reason for not wanting mobilization		
Pain	22	29.3
Fall	8	10.7
Nausea-Vomiting	4	5.3
Total	75	100

Min: Minimum; Max: Maximum; VAS: Visual Analogue Scale.

Ethical Aspects of the Research

Written and verbal informed consent were obtained from the children and their parents after obtaining approval from the Kocaeli University Non-Interventional Clinical Research Ethics Committee (approval number: GOKAEK 2019/13.04-2019/96) before commencing the research. Data were collected from patient files and through face-to-face interviews with patients and their relatives, conducted by the researchers. The research was conducted out in accordance with the principles of the Declaration of Helsinki.

RESULTS

The study was completed with 75 children aged 6–17 years, with an average age of 11 years, who had undergone appendectomy. The introductory characteristics of the patients, appendectomy, and the post-operative period are presented in Table 1 and Table 2.

It was determined that all patients received a single dose of Ampicillin Sulbactam intravenously before the operation. The treatment was continued with intravenous antibiotic therapy three times a day until postoperative discharge. After discharge, antibiotic treatment was continued with oral Amoxicillin-Clavulanate for seven days.

A comparison of the postoperative characteristics of the patients based on their medical diagnosis is presented in Table 2. Accordingly, a statistically significant difference was observed

Table 2. Comparison of postoperative features according to medical diagnosis

Features	Medical diagnosis						Test value p
	Non-perforated		Perforated		Total		
Postoperative feeding time (hour)	11.48		27.52		15.12		[a]**4.399**
	4–48 (8)		6–60 (24)		4–60 (10)		**0.000**
Postoperative mobilization time (hour)	7.58		7.64		7.6		[a]1.730
	4–24 (6)		4–12 (8)		4–24 (8)		0.084
Time mobilized (minutes)	9.53		8.41		9.28		[a]-0.724
	2–30 (10)		3–20 (5)		2–30 (10)		0.469
Pain score (VAS)							
Before mobilization	2.05		1.9		2.02		[a]-0.262
	0–8 (2)		0–6 (2)		0–8 (2)		0.793
After mobilization	1.06		1.0		1.05		[a]-0.161
	0–6 (0)		0–4 (0)		0–6 (0)		0.872
	n	**%**	**n**	**%**	**n**	**%**	
Operation method							
Open	55	94.8	17	100	72	96	[b]0.916
Laparoscopic	3	5.2	0	0	3	4	1.000
Total	58	100	17	100	75	100	

a: Mann Whitney-U Test; b: Chi Square Test; p<0.05; VAS: Visual Analogue Scale.

between the time of initiating postoperative feeding and the presence of perforation (p<0.00). This significance was attributed to patients diagnosed with perforated appendicitis.

When comparing the medical diagnosis of the patient with the duration of hospital stay, a significant difference was observed in terms of perforation status (MU: -4.513; p=0.00). It was found that this significance was attributed to the non-perforated group, comprising 58%. There was no statistical significance between the operation method, analgesic intake, and length of hospital stay (p>0.05).

Comparing the medical diagnosis of another patient in the child's room with the duration of hospitalization revealed a statistically significant difference (KW: 6.062; p=0.04). This significance was attributed to patients hospitalized with a diagnosis of non-perforated appendectomy, at a rate of 77.3%. Parameters predicting the duration of hospital stay after an appendectomy are listed in Table 3. In conclusion, the time to initiate feeding after the surgery influenced the discharge time by 57.7% (R^2=0.333), intravenous fluid administration post-surgery by 39.9% (R^2=0.159), the patient's medical diagnosis by 63% (R^2=0.389), and the preoperative information provided by 23.8% (R^2=0.044), as shown in Table 3.

DISCUSSION

Appendicitis incidence is known to correlate with the age and gender of children.[15] Similar to various studies and our own research, appendicitis is most frequently observed in the 10–18 years age group.[13,16,17] However, in our study, no statistically significant differences were found concerning age, gender, or medical diagnosis. Yet, another study reported significant differences in these areas, contrasting with out findings.[18] While these variations might arise from regional and inter-hospital discrepancies, it suggests that the need for an appendectomy is not strictly based on age or gender. Factors like religion, race, ethnicity, and genetics could also play a role.

Any patient who hasn't undergone a prior appendectomy and experiences acute abdominal pain should consider appendicitis as a potential diagnosis.[19] Diagnosing appendicitis in children can be more challenging than in adults due to communication barriers.[20] Infants and younger children may display fewer symptoms, leading to diagnosic delays. Classical symptoms often include pain, nausea, vomiting, and a low-grade fever.[15] Upon reviewing the literature, we observed that the most common symptom of appendicitis

Table 3. Factors predicting the length of hospital stay after appendectomy

Features	B	SD	β	t	p	R	R^2	F	p
Age (years)	0.037	0.045	0.097	4.226	0.000	0.097	0.009	0.689	0.409
Time of feeding before the operation	-0.045	0.029	-0.175	-1.522	0.132	0.175	0.031	2.316	0.132
Operation time (hours)	1.480	0.747	0.226	1.982	0.051	0.226	0.051	3930	0.051
Postoperative feeding time (hour)	0.074	0.012	0.577	6.044	0.000	0.577	0.333	36.525	**0.000**
Postoperative mobilization time (hour)	0.040	0.057	0.082	0.702	0.485	0.082	0.007	0.492	0.485
Postoperative intravenous fluid administration time (days)	0.900	0.242	0.399	3.717	0.000	0.399	0.159	13.816	**0.000**
Mobilization time (minute)	-0.049	0.031	-0.183	-1.586	0.117	0.183	0.033	2.516	0.117
Gender	-0.055	0.380	-0.017	-0.145	0.885	0.017	-0.013	0.021	0.885
Medical diagnosis	2.323	0.335	0.630	6.931	0.000	0.630	0.389	48.043	**0.000**
Preoperative information	0.877	0.419	0.238	2.093	0.040	0.238	0.044	4.382	**0.040**
Operation method	-0.069	0.922	-0.009	-0.075	0.940	0.009	-0.014	0.006	0.940

B: Regression loadings; SD: Standard deviation; Beta: Standardized coefficients; t: Independent Sample T-Test; p: Significance; R: Regression; R^2: Regression square; F: One way Analysis of Variance (ANOVA) test; $p<0.05$.

was abdominal pain, corroborating our study's findings, followed by nausea, vomiting, fever, and loss of appetite.[3,4,17] This underscores that gastrointestinal symptoms in children, extending beyond abdominal pain and nausea, may also indicate conditions like appendicitis.

Swift identification of signs and symptoms in appendicitis cases is crucial.[6] Delays in the perioperative phase can induce complications, including perforation and peritonitis. Based on our research and other studies, the rate of perforated appendicitis oscillated between 26–77%.[3,13,17] In a retrospective study involving 360 patients over the age of 18, the rate of non-perforated appendicitis was 62.8%.[6] Another study with 8,206 patients over the age of 16 showed a 62.1% rate of perforated appendicitis,[7] while a study of 9,507 children under the age of 18 who underwent appendectomy indicated a rate of 70.1%.[21] Given this data, it is evident that an early diagnosis can prevent complications and aid in faster postoperative recovery.

Comprehensive postoperative planning, which includes aspects like nutrition, excretory mobilization, and pain relief, is pivotal for recovery[5,10,22,23] and can reduce the duration of hospitalization.[24] It is crucial to initiate nutrition early, and this decision should be based on the perforation status.[25] In our study, feeding began on the first postoperative day. However, another study noted that this initiation was delayed to two days.[26] The American, Canadian, and European Society of Anesthesiologists have recommended that solid foods be stopped 4–6 hours and clear liquids 2 hours before surgery.[11,12,27]

Hospitalization not only presents risks of infection but can also be a distressing experience for the child. Several factors influence the speed of recovery, including the patient's individual characteristics, the surgical method used, and the quality of preoperative and postoperative nursing care.[28] Our study found that the medical diagnosis significantly impacted the duration of the hospital stay, a finding that other studies have also supported.[4,17,21]

Literature suggests that early mobilization can diminish pain, reduce the need for analgesics, and hasten recovery.[28,29] In our study, patients began mobilizing on average seven hours after surgery. Pain was identified as the primary deterrent to mobilization, a finding that aligns with other studies. Based on this data, it is imperative to identify and address factors that hinder mobilization.

CONCLUSION

This study highlights theat appendicitis, often seen in childhood, can be difficult to diagnose and treat. In cases of acute appendicitis, after fluid resuscitation, analgesic, and antibiotic treatment, either laparoscopic or open surgical treatment is performed. Initiating oral nutrition and mobilization early post-surgery is crucial. Furthermore, properly informing the patient, alleviating parents' anxieties, and timely antibiotic administration are paramount. Future studies should focus on early mobilization and the transition to oral feeding, ideally with larger sample sizes. The establishment of a criteria-based discharge protocol in hospitals could standardize postoperative care and facilitate earlier discharges.

Peer-review: Externally peer-reviewed.

Ethics Committee Approval: The Kocaeli University Non-Interventional Clinical Research Ethics Committee granted approval for this study (date: 23.07.2019, number: GOKAEK 2019/13.04 - 2019/96).

Informed Consent: Written informed consent was obtained from the families of the patients who participated in this study.

Author Contributions: Concept – AŞ, IA, SY, BÖY; Design – AŞ, IA, SY, BÖY; Supervision – AŞ, IA, SY, BÖY; Resource – AŞ, IA, SY, BÖY; Materials – AŞ, IA, SY, BÖY; Data Collection and/or Processing – AŞ, BÖY; Analysis and/or Interpretation – AŞ; Literature Search – AŞ, IA, SY, BÖY; Writing – AŞ, IA, SY, BÖY; Critical Reviews – AŞ, IA, SY, BÖY.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Emre A, Akbulut S, Bozdag Z, Yilmaz M, Kanlioz M, Emre R, et al. Routine histopathologic examination of appendectomy specimens: retrospective analysis of 1255 patients. Int Surg 2013; 98(4): 354–62. [CrossRef]
2. Almaramhy HH. Acute appendicitis in young children less than 5 years: review article. Italian J Pediatrics 2017; 43(1): 1–9. [CrossRef]
3. Ekpemo SC. Complicated appendicitis in children in Aba, Nigeria. Innovative J Med Health Scien 2019; 9(11): 661–4. [CrossRef]
4. Minneci PC, Hade EM, Lawrence AE, Sebastião YV, Saito JM, Mak GZ, et al; Midwest Pediatric Surgery Consortium. Association of nonoperative management using antibiotic therapy vs laparoscopic appendectomy with treatment success and disability days in children with uncomplicated appendicitis. JAMA 2020; 324(6): 581–93. [CrossRef]
5. Stringer MD. Acute appendicitis. J Paediatr Child Health 2017; 53(11): 1071–6. [CrossRef]
6. Akbulut S, Koç C, Şahin TT, Şahin E, Tuncer A, Demyati K, et al. An investigation into the factors predicting acute appendicitis and perforated appendicitis. Ulus Travma Acil Cerrahi Derg 2021; 27(4): 434–42. [CrossRef]
7. Akbulut S, Bahçe ZS, Öztaş T, Gümüş S, Söğütçü N, Sakarya H, et al. Assessment of demographic, clinical and histopathological features of patients who underwent appendectomy due to a presumed diagnosis of acute appendicitis. Ulus Travma Acil Cerrahi Derg 2021; 27(3): 315–24.
8. de Wijkerslooth EML, van den Boom AL, Wijnhoven BPL. Variation in classification and postoperative management of complex appendicitis: A European survey. World J Surg 2019; 43(2): 439–46. [CrossRef]
9. Chisum M, May A, Wang M, Hagen E, Weinsheimer R. Post operative pediatric appendicitis nurse-driven discharge: Patient outcomes and nursing perspectives. Am J Surg 2021; 221(4): 850–5. [CrossRef]
10. Pennell C, Meckmongkol T, Arthur LG, Ciullo S, Prasad R, Lindholm E, et al. A standardized protocol for the management of appendicitis in children reduces resource utilization. Pediatr Qual Saf 2020; 5(6): e357. [CrossRef]
11. Rothman K, Garvan C, Neu M. The impact of early ambulation in the pediatric postoperative appendectomy patient. J Pediatric Surg Nurs 2016; 5(3): 70–5. [CrossRef]
12. Cheng O, Cheng L, Burjonrappa S. Facilitating factors in same-day discharge after pediatric laparoscopic appendectomy. J Surg Res 2018; 229: 145–9. [CrossRef]
13. Knaapen M, van Amstel P, van Amstel T, The SML, Bakx R, van Heurn ELWE, et al. Outcomes after appendectomy in children with acute appendicitis treated at a tertiary paediatric centre: results from a retrospective cohort study. Langenbecks Arch Surg 2021; 406(1): 163–9. [CrossRef]
14. Manworren RCB, Cooper J, Mishra T, Kaduwela N. Children's pain at home after laparoscopic appendectomy. Pain Manag Nurs 2021; 22(5): 623–30. [CrossRef]
15. Dahal GR. Acute appendicitis in children: How is it different than in adults? Grande Med J(GMJ) 2019; 1(1): 35–40.
16. Oyetunji TA, Gonzalez DO, Aguayo P, Nwomeh BC. Variability in same-day discharge for pediatric appendicitis. J Surg Res 2015; 199(1): 159–63. [CrossRef]
17. Rahman MAM, Chowdhury TK, Chowdhury MZ. Early appendectomy for appendicular mass: operative findings and outcome in 220 children-a developing country perspective. Annals of Pediatric Surg 2020; 16(39): 1–5. [CrossRef]
18. Schoel L, Maizlin II, Koppelmann T, Onwubiko C, Shroyer M, Douglas A, et al. Improving imaging strategies in pediatric appendicitis: a quality improvement initiative. J Surg Res 2018; 230: 131–6. [CrossRef]
19. Cameron DB, Anandalwar SP, Graham DA. Development and implications of an evidence-based and public health-relevant definition of complicated appendicitis in children. Annals of Surg 2020; 271(5): 962–8. [CrossRef]
20. Gürünlüoğlu K, Zararsız G, Aslan M, Akbaş S, Tekin M, Gürünlüoğlu S, et al. Investigation of serum interleukin 6, high-sensitivity C-reactive protein and white blood cell levels during the diagnosis and treatment of paediatric appendicitis patients before and during the COVID-19 pandemic. Afr J Paediatr Surg 2023; 20(2): 130–7. [CrossRef]
21. Childers CP, Dworsky JQ, Massoumi RL, Shenoy R, Maggard-Gibbons M, Lee SL, et al. The contemporary appendectomy for acute uncomplicated appendicitis in children. Surgery 2019; 165(5): 1027–34. [CrossRef]

22. Akbulut S, Koc C, Kocaaslan H, Gonultas F, Samdanci E, Yologlu S, et al. Comparison of clinical and histopathological features of patients who underwent incidental or emergency appendectomy. World J Gastrointest Surg 2019; 11(1): 19–26. [CrossRef]
23. Rentea RM, St Peter SD. Pediatric appendicitis. Surg Clin North Am 2017; 97(1): 93–112. [CrossRef]
24. Rızalar S, Özbaş A. Effect of early postoperative feeding on the recovery of children post appendectomy. Gastroenterol Nurs 2018; 41(2): 131–40. [CrossRef]
25. Ingram MC, Harris CJ, Studer A, Martin S, Berman L, Alder A, et al. Distilling the key elements of pediatric appendicitis clinical practice guidelines. J Surg Res 2021; 258: 105–12.
26. Brunet-Wood K, Simons M, Evasiuk A, Mazurak V, Dicken B, Ridley D, et al. Surgical fasting guidelines in children: Are we putting them into practice? J Pediatr Surg 2016; 51(8): 1298–302. [CrossRef]
27. Oparin Y, Zeraatkar D, Shanthanna H, Motaghi S, Couban R, Kattail D, et al. Preoperative fasting for prevention of perioperative complications in children. Cochrane Database Syst Rev 2021; 2021(2): CD013809. [CrossRef]
28. American Society of Anesthesiologists Committee. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: an updated report by the American Society of Anesthesiologists Committee on Standards and Practice Parameters. Anesthesiology 2011; 114(3): 495–511. [CrossRef]
29. Cundy TP, Sierakowski K, Manna A, Cooper CM, Burgoyne LL, Khurana S. Fast-track surgery for uncomplicated appendicitis in children: a matched case-control study. ANZ J Surg 2017; 87(4): 271–6. [CrossRef]