Sarcouncil journal of Medical sciences

ISSN(Online): 2945-3526

Volume- 01| Issue- 09| 2022

Research Article

Received: 15-10-2022 | Accepted: 25-10-2022 | Published: 04-11-2022

Laparoscopic Versus Open Appendectomy in Pediatric Age Group: A Randomized Controlled Trial Study

***Dr. Rifaat Hasan Ali*[1] *and Dr. Hawkar A. Khayyat*[2]**

[1]*M.B.Ch.B. Hawler Medical University*

[2]*Assist proof., Consultant Pediatric Surgeon, Hawler Medical University, 2021-2022 A.D*

Abstract: This study, which could be the first study in Iraq and Kurdistan region, aims to evaluate the outcome of laparoscopic appendectomy (LA) versus open appendectomy (OA) in the management of acute appendicitis regarding the use of analgesia, the time to get positive bowel sounds, the length of hospital stays, and the return to daily activity, in pediatric age group. A prospective randomized controlled trial was conducted in the period from December 2020 to March 2022 were collected 104 Paediatric patients from Raparin Paediatric Teaching Hospital/Erbil city, Kurdistan Region, Iraq. And Results which found A total of 104 patients were operated on in-group Laparoscopic 52 patients and 52 patients in group OA. The study showed Mean age of the patients was 9.1±2.2 years, and the use of less Narcotic analgesic to patients who underwent removal of appendicitis OA, Time to get +ve bowel sound (hours) To patients who underwent LA It ranged between 4-8 hours This led to the length of hospital stay (hours) and speeds up the return to daily activities. In the LA group, and These advantages in morbidity define a shorter hospital stay and less hospitalization, which has led to a reduced need for analgesics and the introduction of reusable instruments, thus reducing the overall cost of care. Laparoscopic appendectomy allows for an excellent recovery for children, enabling them to complete antibiotic treatment plans and reducing hospital stays. This method has become a priority, and there have been reports of the use of laparoscopic appendectomy for the treatment of acute appendicitis complicated by peritonitis or appendicular abscess.

Keywords: OA, LA, appendicitis, pediatric, appendectomy, Laparoscopic.

INTRODUCTION

Acute appendicitis is a common source of acute abdominal pain with a lifelong prevalence of 7% to 9%.

Acute appendicitis is the most common condition that leads to emergency surgery in a child.

Open appendectomy (OA) performed via the right lower quadrant (Grid-Iron) incision in the 19th century, initially identified by McBurney, remained primarily unchanged for 100 years until the advent of laparoscopic appendectomy (LA) in 1983.

It can develop in children at any age, starting from a few months of age. At the same time, the symptoms of the disease may vary, especially in children [Assefa, Z. *et al*., 2014; Misauno, M.A. *et al*., 2012]. According to statistics, in only 30% of cases, patients have a classic progression of the disease, and in the remaining 70%, An atypical course of appendicitis is diagnosed [Varlet, F. *et al*., 1994].

In the first hours of acute appendicitis, the body temperature is normal or slightly elevated. A fever of more than 38 ° C usually indicates the appearance of purulent and destructive forms of appendicitis, immediate recourse to a paediatric surgeon is required, and delay can threaten the development of infectious toxic shock and the risk of perforation of the appendix [Stringel, G. *et al*., 1997; Svensson, J.F. *et al*., 2016].

One of the first symptoms of appendicitis is localized pain in the navel or stomach a little later, which can move to the lower right corner of the abdomen, lower back, right hypochondrium, or suprapubic region. The localization of pain depends on the location of the appendix.

Appendicitis occurs when the inner part of the appendix becomes full, causing it to swell, such as mucus, feces, and parasites [Meguerditchian, A.N. *et al*., 2002; Esposito, C. *et al*., 2007; Masoomi, H. *et al*., 2012]. Properly, and when this supply is cut off, this organ wilts and dies. With the development of the condition, the appendix ruptures, and then stool, mucus, and other harmful substances come out and leak into the body, which may cause greater harm and infection to the child, so one must pay close attention to the symptoms of abdominal pain in the child before it develops [Faiz, O. *et al*., 2008; Pogorelic, Z. *et al*., 2015; Wei, B. *et al*., 2011].

In the children's age group (up to 3-4 years), the disease begins with seemingly normal symptoms of anxiety, lack of sleep, vomiting, high temperature, and often loose stools with mucus. Complaints of pain in the right iliac region, which is characteristic of acute appendicitis in adults, almost never occur at this age [Xiao, Y. *et al*., 2015; Pogorelić, Z. *et al*., 2017].

***Corresponding Author:** Dr. Rifaat Hasan Ali

DOI-https://doi.org/10.5281/zenodo.7293075

Second, nausea and vomiting may also be symptoms of appendicitis in addition to the loss of appetite, constipation, or severe diarrhea.

Difficulty passing gases, which is a sign of a partial or complete blockage in the intestine and is associated with appendicitis.

Mild fever Appendicitis usually causes a fever between 37.2 °C (and 38 °C), which may be accompanied by chills. Meanwhile, a high temperature (38.8 °C) and an increased heart rate may mean that the appendix has burst [Rakić, M. *et al*., 2014]

Surgical intervention is performed laparoscopically. This option is the gold standard for the surgical treatment of acute appendicitis—laparoscopic appendectomy results in a good aesthetic outcome, rapid recovery, and minimal tissue trauma. However, for laparoscopic appendectomy, there must be necessary conditions, in particular, the absence of total peritonitis. Therefore, it is very important to seek medical help in the first hours after the development of the disease. [Družijanić, N. *et al*., 2012]

The duration of the operation in the absence of complications ranges from 10 to 50 minutes; in the case of an atypical anatomical location of the appendix, it can be increased up to 2 hours [Liu, Y. *et al*., 2017].

AIM OF STUDY

The aim of this study is to evaluate the outcome of laparoscopic appendectomy (LA) versus open appendectomy (OA) in the management of acute appendicitis regarding the use of analgesia, the time to get positive bowel sounds, the length of hospital stays, and the return to daily activity, in pediatric age group.

PATIENTS AND METHODS

A prospective randomized controlled trial was conducted in the period from December 2020 to March 2022 were collected 104 Paediatric patients from Raparin Paediatric Teaching Hospital / Erbil city, Kurdistan Region, Iraq.

Patients were distributed according to the type of technique used in Appendectomy in children, as 52 patients who underwent Laparoscopic and 52 patients who underwent open appendectomy were collected.

STUDY DESIGN

This study was designed to compare the techniques used in Appendectomy in children aged between 5 to 12 years in Raparin Pediatric Teaching Hospital / Erbil city, Kurdistan Region, Iraq.

And Inclusion criteria were Patients with the diagnosis of acute appendicitis, based on clinical findings and investigations, who were randomly assigned to Group A: Laparoscopic appendectomy (LA) and Group B: Open appendectomy (OA). Age and sex of patients, signs, and symptoms were noted. Duration of surgery, length of hospital stays (LOS), starting oral intake, postoperative pain, and postoperative wound infection were recorded, with a follow-up period between (1-15) months.

Exclusion criteria: Patients with another disease or differential diagnosis, patients present with appendicular mass, or patients with radiological findings that may indicate the presence of appendicular mass or abscess

The preoperative data, including the signs and symptoms, and duration, with the investigation findings.

Intraoperative findings include the type of incision, number of ports, the intraoperative finding (perforated, inflamed, gangrenous), other visible pathologies, and duration of surgery from the skin incision to the last stich applied.

Postoperative data include the duration of hospital stay, which is the number of nights the patient stay in the hospital, the type of drugs used for pain control, whether mild analgesia or narcotic analgesics and their duration of use, postoperative vomiting, duration to get positive bowel sounds and starting oral intake, duration of hospital stay and return to daily activity, patient or parent satisfaction with the surgical wound, surgical wound site hernia, and wound infection.

In the postoperative period, the patient receives intravenous fluid, antibiotics, and analgesia according to the patient's response to pain. Mobility is encouraged as soon as the patient has the ability to go with it. Oral intake is established after getting evidence of the presence of positive bowel sounds either by passing gases or positive bowel sounds by abdominal auscultation. Paralytic ileus is defined as failure to have positive bowel sounds after 12 hours postoperatively. The length of hospital stay is calculated by counting the nights that the patient had spent it in the surgical ward after having surgery.

STUDY PERIOD

Cooperation was made with the specialized committees responsible for providing permits for

Publisher: SARC Publisher

the purpose of collecting data and demographic information on patients, and the study period was from December 2020 to March 2022.

Results

Table 1: Distribution of patients according to age * method Cross tabulation

Age * Method Cross Tabulation				
Count				
		Method		Total
		LA	OA	
Age	5.00	6	7	13
	6.00	0	5	5
	7.00	1	3	4
	8.00	2	4	6
	9.00	15	16	31
	10.00	5	8	13
	11.00	10	4	14
	12.00	13	5	18
Total		52	52	104

Table 2: Distribution of patients according to age * method * sex Cross tabulation

Age * Method * Sex Cross Tabulation					
Count					
Sex			Method		Total
			LA	OA	
boys	age	5.00	1	1	2
		6.00	0	2	2
		8.00	0	2	2
		9.00	6	9	15
		10.00	2	4	6
		11.00	9	2	11
		12.00	11	3	14
	Total		29	23	52
girls	age	5.00	5	6	11
		6.00	0	3	3
		7.00	1	3	4
		8.00	2	2	4
		9.00	9	7	16
		10.00	3	4	7
		11.00	1	2	3
		12.00	2	2	4
	Total		23	29	52
Total	age	5.00	6	7	13
		6.00	0	5	5
		7.00	1	3	4
		8.00	2	4	6
		9.00	15	16	31
		10.00	5	8	13
		11.00	10	4	14
		12.00	13	5	18
	Total		52	52	104

Publisher: SARC Publisher

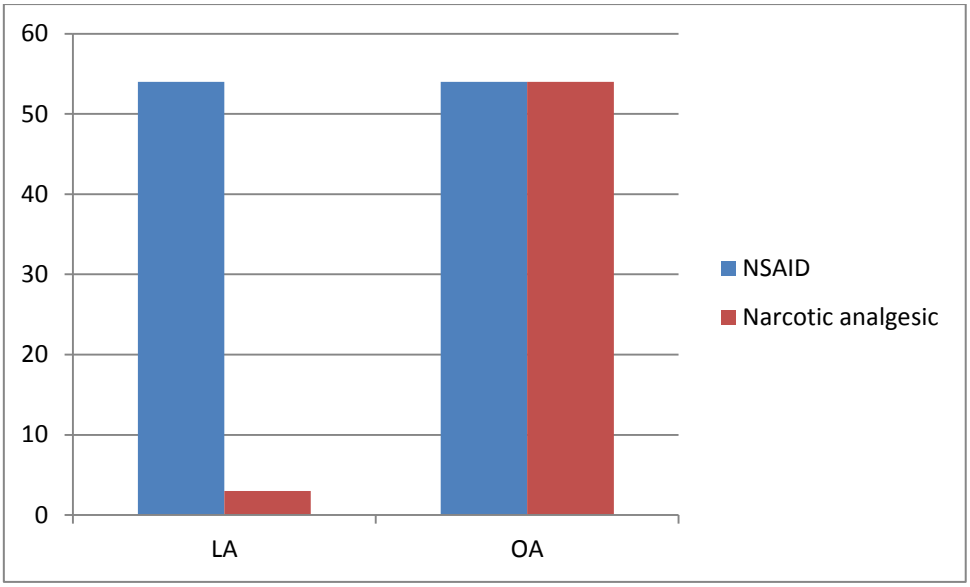

Figure 1: Distribution of patients according to Pain control

Table 3: Results according to Time to get + ve bowel sound (hours)

Time * Method Cross Tabulation				
Count				
		Method		Total
		LA	OA	
time	4.00	10	0	10
	5.00	15	0	15
	6.00	15	0	15
	7.00	6	0	6
	8.00	5	1	6
	9.00	0	8	8
	10.00	1	2	3
	11.00	0	3	3
	12.00	0	7	7
	13.00	0	5	5
	14.00	0	7	7
	15.00	0	4	4
	16.00	0	5	5
	17.00	0	1	1
	18.00	0	4	4
	19.00	0	2	2
	20.00	0	2	2
	21.00	0	1	1
Total		52	52	104

Table 4: Mean±SD of Time to get +ve bowel sound (hours)

Descriptive					
	Method			Statistic	Std. Error
time	LA	Mean		5.7115	.18693
		95% Confidence Interval for Mean	Lower Bound	5.3363	
			Upper Bound	6.0868	
		5% Trimmed Mean		5.6368	
		Median		6.0000	
		Variance		1.817	
		Std. Deviation		1.34801	

Publisher: SARC Publisher

		Minimum		4.00	
		Maximum		10.00	
		Range		6.00	
		Interquartile Range		1.00	
		Skewness		.803	.330
		Kurtosis		.701	.650
	OA	Mean		13.6154	.47099
		95% Confidence Interval for Mean	Lower Bound	12.6698	
			Upper Bound	14.5609	
		5% Trimmed Mean		13.5171	
		Median		13.5000	
		Variance		11.535	
		Std. Deviation		3.39639	
		Minimum		8.00	
		Maximum		21.00	
		Range		13.00	
		Interquartile Range		5.00	
		Skewness		.285	.330
		Kurtosis		-.712	.650

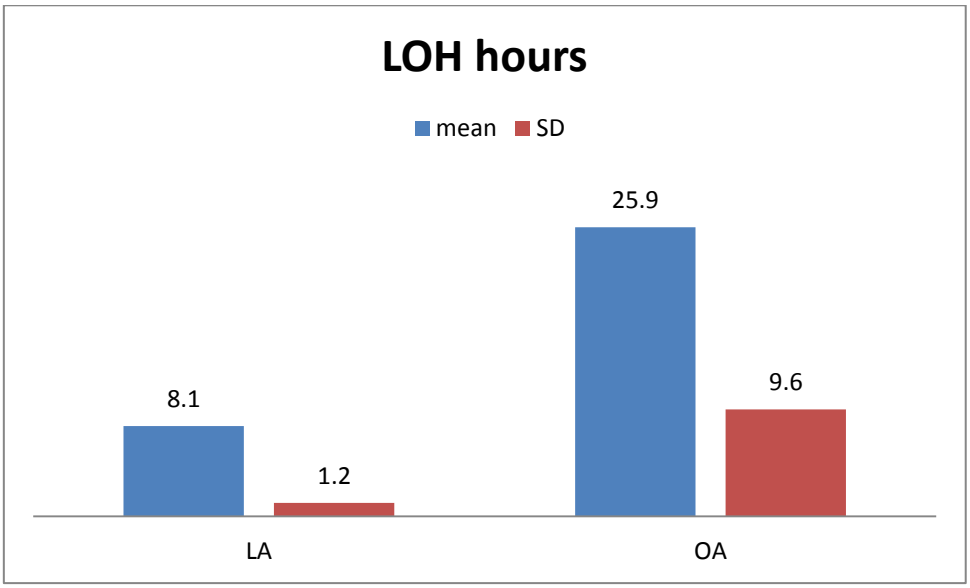

Figure 2: Histogram Mean ±SD for Length of hospital stay (hours)

Publisher: SARC Publisher

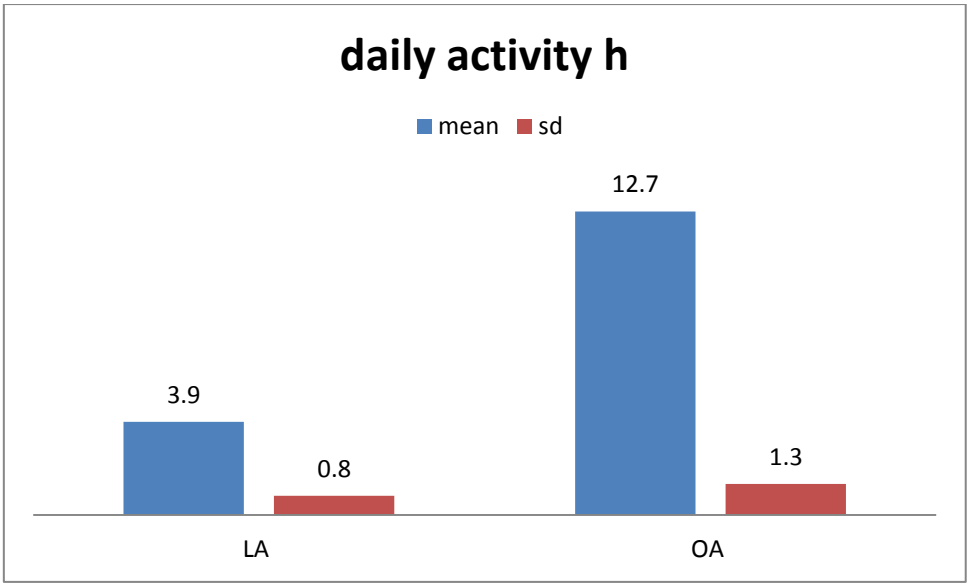

Figure 3: Evaluate the results through a comparison between LA and OA according to daily activity

DISCUSSION

Surgical intervention has evolved over time with regard to appendicitis from traditional surgical intervention to laparoscopic techniques. Our study aimed to conduct a comparative analysis between the techniques used to Appendectomy in children. In this study, 104 patients were collected and distributed according to the type of technique used to remove appendicitis, 52 patients underwent laparoscopic, and 52 patients underwent open appendectomy. The most common ages in this study were nine years for 31 patients and 12 years for 18 patients, as it is shown in Table 1. [Marzuillo, P. *et al*., 2015]

In Table 2, which shows the distribution of patients according to age * method * sex Cross tabulation (52 patients were boys and distributed (29 patients underwent Laparoscopic, 23 patients underwent Open Appendectomy) (and 52 female patients were distributed as follows: 29 patients OA and 23 LA patients). [Meguerditchian, A.N. *et al*., 2002; Addiss, D.G. *et al*., 1990]

In this study, NSAID were used for all patients participating in this study, and for narcotic analgesic it was used for 52 patients who underwent OA and three patients who underwent LA. [Meguerditchian, A.N. *et al*., 2002; Souter, A.J. *et al*., 1994]

Also, results were found to check patient satisfaction when knowing the results of Time to get +ve bowel sound (hours).

Where a noticeable decrease was observed in the number of hours for the time to get +ve bowel sound (hours), from 4 to 6 hours, the real value and the mean was 4.7 ±0.6. As for patients who underwent OA, the number of hours was significantly increased by more than 6 hours, and the real value was 14.4 ± 5.4

The average hospital stay was calculated for patients who underwent removal of appendicitis, and excellent results were found to achieve the patient's desire when using a technique called Laparoscopic Appendectomy (8.1 ± 1.2). As for the patients who underwent Open Appendectomy, the real value and the arithmetic mean of the average hospital stay was (25.9 ± 9.6) as shown in Figure 3. As for the return of daily activities to the patients, we notice a remarkable development in patients who underwent Laparoscopic at a rate ranging between 3-5 days. Therefore, Laparoscopic use of laparoscopic appendectomy in cases of acute appendicitis in emergency surgery improves treatment results and protects patients from the traumatic abdominal incision and associated complications [Misauno, M.A. *et al*., 2012; Adwan, H. *et al*., 2014-Guanà, R. *et al*., 2016]. In recent years, this method has become a priority, and there have been reports of the use of laparoscopic appendectomy for the treatment of acute appendicitis complicating due to peritonitis or appendicular abscess [Varlet, F. *et al*., 1994-Faiz, O. *et al*., 2008]. However, the possibility of expanding indications for the use of the laparoscopic technique in the treatment of acute and destructive appendicitis has not been fully established and needs further investigation.

Early rehabilitation of patients after surgical operations and a significant reduction in the number of wound complications contributed to a

Publisher: SARC Publisher

reduction in the treatment of patients, according to our data, by 1.6 times compared to this indicator for open interventions. It should be noted that a comparative analysis of laparoscopic and open appendectomy was performed when the frequency of use of both methods was almost the same. Over the course of the study, laparoscopic treatment became the dominant method of treatment, which, along with advanced training of surgeons and a decrease in the number of postoperative complications, led to a significant reduction in the duration of hospitalization, which did not exceed 3-4 days during the past two years. In another study conducted by -Li A. Sherif E in 2014 [Souter, A.J. *et al*., 1994], in which 400 patients ranging in age from 4 to 16 years were collected. Patients were distributed according to gender into 290 boys and 110 girls. Patients were distributed according to the type of method used for appendectomy to OA 180 patients and LA to 220 patients.

Significant differences were found in the time of operation (p = 0.018, 95% CI) and hospital stay (p = 0.01, 95% CI). [Adwan, H. *et al*., 2014]

CONCLUSION

In this study, we conclude the main advantages of laparoscopic appendectomy over open appendectomy were reduced postoperative pain, reduced risk of wound infection, shorter hospital stays, and faster return to normal activities in adults. At the same time, laparoscopic appendectomy outperformed open appendectomy in terms of wound infections and shorter hospital stays in children. Two studies reported that adults who underwent laparoscopic appendectomy had a better quality of life when assessed at the study period.

As for the disadvantages of laparoscopic appendectomy, intra-abdominal abscesses are detected more often in children.

RECOMMENDATION

Surgical intervention time is longer for laparoscopic procedures compared to open appendectomies and tends to be longer when complicated appendicitis is encountered. However, this is not significant for the development of postoperative complications.

Laparoscopic appendectomy offers advantages in the treatment of acute appendicitis compared to open appendectomy.

REFERENCES

1. Assefa, Z. and Gyesuse, A. "Acute appendicitis in children admitted to zewditu memorial hospital." *Ethiopian Medical Journal* 52.4 (2014): 189-195.
2. Misauno, M.A., Ojo, E.O. and Uba, A.F. "Laparoscopic paediatric surgery: A potential for paradigm shift in developing countries." *African Journal of Paediatric Surgery* 9.2 (2012): 140–2.
3. Varlet, F., Tardieu, D., Limonne, B., Metafiot, H. and Chavrier, Y. "Laparoscopic versus open appendectomy in children-comparative study of 403 cases." *European journal of pediatric surgery* 4.06 (1994): 333-337.
4. Stringel, G., Zitsman, J.L., Shehadi, I. and Kithir, S. "Laparoscopic appendectomy in children." *JSLS: Journal of the Society of Laparoendoscopic Surgeons* 1.1 (1997): 37–9.
5. Svensson, J.F., Patkova, B., Almström, M., Eaton, S. and Wester, T. "Outcome after introduction of laparoscopic appendectomy in children: A cohort study." *Journal of pediatric surgery* 51.3 (2016): 449-453.
6. Meguerditchian, A.N., Prasil, P., Cloutier, R., Leclerc, S., Péloquin, J. and Roy, G. "Laparoscopic appendectomy in children: a favorable alternative in simple and complicated appendicitis." *Journal of pediatric surgery* 37.5 (2002): 695-698.
7. Esposito, C., Borzi, P. and Valla, J.S. *et al*. "Laparoscopic versus open appendectomy in children." *World J Surg*. 31.4 (2007): 750-755.
8. Masoomi, H., Mills, S., Dolich, M.O., Ketana, N., Carmichael, J.C., Nguyen, N.T. and Stamos, M.J. "Comparison of outcomes of laparoscopic versus open appendectomy in children: data from the Nationwide Inpatient Sample (NIS), 2006–2008." *World journal of surgery* 36.3 (2012): 573-578.
9. Faiz, O., Blackburn, S.C., Clark, J., Bottle, A., Curry, J. I., Farrands, P. and Aylin, P. "Laparoscopic and conventional appendicectomy in children: outcomes in English hospitals between 1996 and 2006." *Pediatric surgery international* 24.11 (2008): 1223-1227.
10. Pogorelic, Z., Rak, S., Mrklic, I. and Juric, I. "Prospective validation of Alvarado score and Pediatric Appendicitis Score for the diagnosis of acute appendicitis in children." *Pediatric emergency care* 31.3 (2015): 164-168.
11. Wei, B., Qi, C.L., Chen, T.F., Zheng, Z.H., Huang, J.L., Hu, B.G. and Wei, H.B. "Laparoscopic versus open appendectomy for

Publisher: SARC Publisher

acute appendicitis: a metaanalysis." *Surgical endoscopy* 25.4 (2011): 1199-1208.
12. Xiao, Y., Shi, G., Zhang, J., Cao, J.G., Liu, L.J., Chen, T.H., Li, Z.Z., Wang, H., Zhang, H., Lin, Z.F. and Lu, J.H. "Surgical site infection after laparoscopic and open appendectomy: a multicenter large consecutive cohort study." *Surgical Endoscopy* 29.6 (2015): 1384-1393.
13. Pogorelić, Z., Katić, J., Mrklić, I., Jerončić, A., Šušnjar, T., Jukić, M., Vilović, K. and Perko, Z. "Lateral thermal damage of mesoappendix and appendiceal base during laparoscopic appendectomy in children: comparison of the harmonic scalpel (Ultracision), bipolar coagulation (LigaSure), and thermal fusion technology (MiSeal)." *journal of surgical research* 212 (2017): 101-107.
14. Rakić, M., Jukić, M., Pogorelić, Z., Mrklić, I., Kliček, R., Družijanić, N., Perko, Z. and Patrlj, L. "Analysis of endoloops and endostaples for closing the appendiceal stump during laparoscopic appendectomy." *Surgery today* 44.9 (2014): 1716-1722.
15. Družijanić, N., Pogorelić, Z., Perko, Z., Mrklić, I. and Tomić, S. "Comparison of lateral thermal damage of the human peritoneum using monopolar diathermy, Harmonic scalpel and LigaSure." *Canadian journal of surgery* 55.5 (2012): 317–21
16. Liu, Y., Cui, Z. and Zhang, R. "Laparoscopic versus open appendectomy for acute appendicitis in children." *Indian pediatrics* 54.11 (2017): 938-941.
17. Marzuillo, P., Germani, C., Krauss, B.S. and Barbi, E. "Appendicitis in children less than five years old: A challenge for the general practitioner." *World journal of clinical pediatrics* 4.2 (2015):19-24
18. Addiss, D.G., Shaffer, N., Fowler, B.S. and Tauxe, R.V. "The epidemiology of appendicitis and appendectomy in the United States." *American journal of epidemiology* 132.5 (1990): 910-925.
19. Souter, A.J., Fredman, B. and White, P.F. "Controversies in the perioperative use of nonsterodial antiinflammatory drugs." *Anesthesia & Analgesia* 79.6 (1994): 1178-1190.
20. Adwan, H., Weerasuriya, C.K., Endleman, P., Barnes, A., Stewart, L. and Justin, T. "Laparoscopic versus open appendicectomy in children: a UK District General Hospital experience." *Journal of Pediatric Surgery* 49.2 (2014): 277-279.
21. Svensson, J.F., Patkova, B., Almström, M., Eaton, S. and Wester, T. "Outcome after introduction of laparoscopic appendectomy in children: A cohort study." *Journal of pediatric surgery* 51.3 (2016): 449-453.
22. Kapischke, M., Pries, A. and Caliebe, A. "Short term and long term results after open vs. laparoscopic appendectomy in childhood and adolescence: a subgroup analysis." *BMC pediatrics* 13.154 (2013).
23. Guanà, R., Lonati, L., Garofalo, S., Tommasoni, N., Ferrero, L., Cerrina, A., Lemini, R., Dallan, C. and Schleef, J. "Laparoscopic versus open surgery in complicated appendicitis in children less than 5 years old: a six-year single-centre experience." *Surgery research and practice* 2016 (2016).
24. Adwan, H., Weerasuriya, C.K., Endleman, P., Barnes, A., Stewart, L. and Justin, T. "Laparoscopic versus open appendicectomy in children: a UK District General Hospital experience." *Journal of Pediatric Surgery* 49.2 (2014): 277-279.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Ali, R.H. and Khayyat, H.A. "Laparoscopic Versus Open Appendectomy in Pediatric Age Group: A Randomized Controlled Trial Study." *Sarcouncil journal of Medical sciences* 1.9 (2022): pp 9-16.

Publisher: SARC Publisher