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Original research article

INCIDENCE OF CONVERSION TO OPEN APPENDECTOMY FROM LAPAROSCOPIC APPENDECTOMY IN PREGNANT FEMALES

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Abstract: *Acute appendicitis is a common non-obstetric indication for surgery in pregnant women, and the choice between laparoscopic and open appendectomy remains a subject of debate. While the benefits of laparoscopic appendectomy over open surgery are well-established in the non-pregnant population, consensus is lacking in the pregnant cohort. This study aims to contribute insights into the optimal surgical approach for acute appendicitis in pregnant women. The study, conducted from January 2020 to December 2022 at Nishtar Hospital, Multan, focused on 45 pregnant women presenting with abdominal pain and diagnosed with acute appendicitis. Two patients were discharged after magnetic resonance imaging (MRI) revealed a normal appendix. Of the remaining 43 cases, 27 were in the first trimester, 8 in the second trimester, and 8 in the third trimester. All patients underwent successful laparoscopic appendectomy without any conversion to open surgery. The laparoscopic procedure duration ranged from 50 to 80 minutes, with an average postoperative hospital stay of 1.5-3 days. Postoperative wound infection occurred in three patients (6.66%), and two patients (4.44%) experienced preterm labor. Fetal outcomes, assessed through Apgar grading, size, and weight, showed no notable abnormalities after birth. Laparoscopic appendectomy, regardless of gestational age, proves generally safe and suitable for pregnant women with acute appendicitis. The procedure has minimal complications, making it a viable and preferred option during pregnancy. These findings advocate for the continued consideration of laparoscopic appendectomy as a standard approach for managing acute appendicitis in pregnant patients.*

Keywords: Appendix, Acute appendicitis, Laparoscopic, Pregnancy

Introduction

Acute appendicitis is the leading cause of pain in the abdomen, with a 7-9% incidence (Obsa et al., 2020). Acute appendicitis is one of the most prevalent non-obstetric reasons for pain in the abdomen, occurring in 1 in 1500 pregnancies, similar to what happens in the non-pregnant community.(Corneille et al., 2010; Cox et al., 2016)

Appendectomy is a routinely performed surgical operation. McBurney first characterized the open procedure as an appendectomy. (Vigneswaran, 2020). Laparoscopic appendectomy is currently the usual treatment for acute appendicitis in non-pregnant women. However, there are concerns regarding the safety of the procedure for pregnant women and the fetus.(Eom et al., 2012; Lemieux et al., 2009). Laparoscopy has been a popular method for appendicectomy due to its less invasive nature.(Ietto et al., 2021). Although laparoscopic appendicectomy (LA) has increased in popularity, some surgeons still prefer open appendicectomy (OA).

Laparoscopic appendectomy while expecting a child is advised during both the 1st and 2nd trimesters. There are currently no established protocols for conducting laparoscopic appendectomy during the third trimester.(Samardzic et al., 2011)

Laparoscopic appendectomy has several advantages over open appendectomy, such as less discomfort following the procedure, quicker discharge, lower risk of infections in the wound, and the ability to perform laparoscopic abdominal exploration. (Sathish Prabhu, 2016; Talha et al., 2020). Approximately 23% of appendectomies conducted throughout pregnancy are associated with normal appendices. (Lee et al., 2019)

There is insufficient evidence to support the superiority of laparoscopic versus open appendectomy for pregnant women. Previous research has shown that laparoscopic surgery is not as risky for pregnant women as open surgery. Research on the best surgical technique for treating acute appendicitis among pregnant women has shown inconsistent findings. (ŞENOCAK et al., 2020). This study intends to give knowledge about the best surgical technique for treating acute appendicitis among pregnant women.

Methodology

From January 2020 to December 2022, this retrospective study consisted of pregnant women with potential acute appendicitis reported to the Surgery Department or referred from the Obstetrics and Gynecology Department at Nishtar Hospital, Multan. The standard sampling approach was employed for sampling. Acute appendicitis was diagnosed following a thorough evaluation, including a complete history, physical checkup, laboratory tests (CBC, LFTs, urea, Creatinine), Alvarado scoring, and abdominal ultrasound.

All pregnant females, irrespective of gestational age, who fulfilled the Alvarado scoring criteria for diagnosis of acute appendicitis were included in the research study. Exclusion criteria had liver illnesses such as cirrhosis and coagulation disorders, widespread peritonitis, significant abdominal wall issues, prior small bowel laparotomies, fluid retention, and severe cardiovascular and pulmonary problems.

Initially, 45 pregnant females were enrolled in the study, which fulfilled our criteria. Later, two patients were discharged after magnetic resonance imaging (MRI) revealed a normal appendix.

Ethical committee permission and written consent were obtained before performing the study. All patients underwent successful laparoscopic appendectomy. Antibiotic prophylaxis was administered during general anesthetic induction before the surgical operation began. A laparoscopic appendectomy was done under general anesthesia. All patients received urinary catheters and pneumatic compressive instruments.

Hasson's open method of pneumoperitonium was done via a supraumbilical transversal cut in the first trimester and 3-4 cm above the readily apparent uterine fundus at the end of pregnancy. The abdomen's wall strata and peritoneum were opened, and a 10 mm port was introduced. To facilitate the procedure and avoid inferior vena cava compression, the individual was tilted 30 degrees towards the left side of the body.

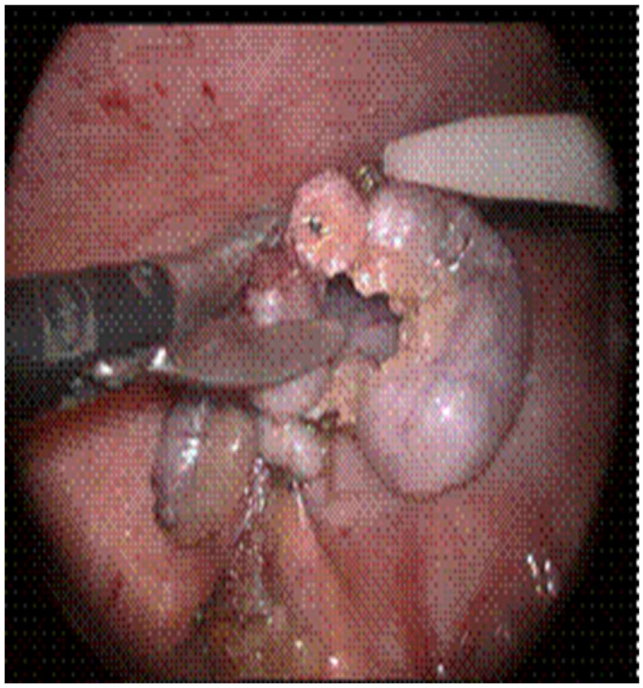

Fig 1: The grasper holds the appendix and places it in the specimen bagP

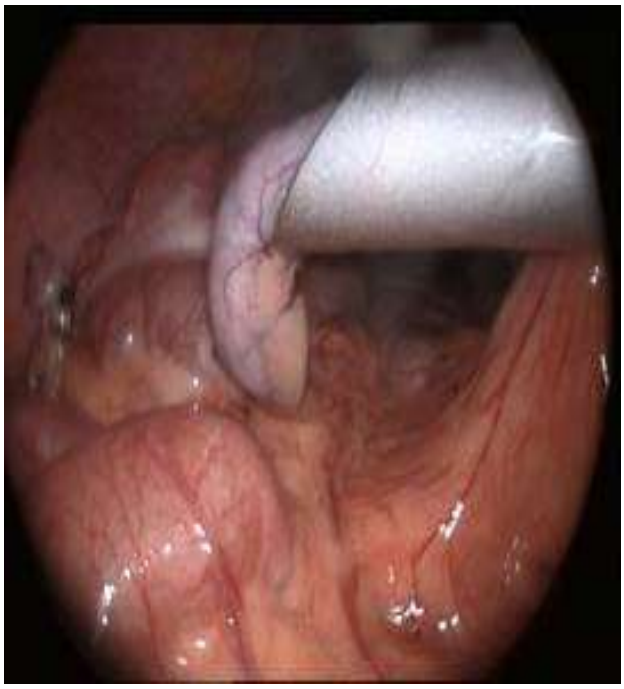

Fig 2: Detached appendix within cannula.

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To prevent fetal hypercapnia, the level of carbon dioxide flow was regulated below 12 mmHg. The same surgical team performed LA using conventional ports and placed the telescope at the umbilicus. Two ports were identified in both bottom quadrants. An inflamed appendix was seen in the cavity of the abdomen. The mesoappendix was charred with a harmonic scalpel, and the base was secured with two vicryl loops. The appendix was removed using a laparoscopic bag.A conduit for drainage was left in situ for complex appendicitis cases. The people we treated did not receive prophylactic tocolysis. The appendix was submitted for histopathological investigation. We evaluated all patients regarding fetal loss, operating time, hospital stay, premature birth, conversion to open appendectomy, and other surgical problems. The data was analyzed with SPSS-21. Quantitative data was measured using mean and SD, whereas qualitative data was represented by numbers and percentages (%)..

Results

Our study included 43 pregnant individuals who went to the ER with abdominal discomfort during pregnancy, regardless of whether they had a fever or not. Patients were categorized based on their gestational age: first, second, and third trimester. The mean age of the participants was 24.5 ± 5.2 years. Table 1 presents the overall number of patients admitted during each trimester. Table 2 shows that 27 patients came in the first trimester, not requiring open appendectomy, and all undergoing successful laparoscopic appendectomy. Similarly, all patients in the 2nd and 3rd trimesters underwent successful laparoscopic appendectomy (Table 2). Table 3 shows that the laparoscopic appendectomy took an average of 59.7 minutes. The average duration of stay following a laparoscopic operation was 1.9 days. Three patients (6.66%) had postoperative wound infections following laparoscopic appendectomy. Table 4 shows two cases of premature labor. The fetal outcome was assessed using Apgar grading, fetal length, and weight following birth, with no notable abnormalities found. Postoperative histopathology was categorized as usual, suppurated, and complicated appendix. Table 5 displays the postoperative pathological analysis and incidence of wound infections.

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Table 1: Frequency of patients in each trimester.

Variable	Number of patients	Percentage
1st trimester	27	62.79
2nd trimester	8	18.60
3rd trimester	8	18.60

Table 2: Comparison of the total number of individuals treated in each trimester with the surgical technique used.

Variable	1st trimester	2nd trimester	3rd trimester	Total
Open appendectomy	0	0	0	0
Laparoscopic appendectomy	27	8	8	43

Table 3: Time duration, Length of hospital stay, and wound infection of Laparoscopic appendectomy.

Variable	Mean operation duration(minutes)	Mean hospital length of stay (days)	Wound infection (n,%)
Laparoscopic appendectomy	59.7	1.9	3(6.66)

Table 4 illustrates fetal outcomes after laparoscopic appendectomy.

Variable	Laparoscopic appendectomy	Percentage
Preterm labor	2	4.44%
Congenital anomalies	0	0
Intrauterine fetal death	0	0

Table 5: Postoperative histopathology and wound infection occurred in each trimester.

Trimester	Postoperative pathology	Number	Wound infection
1st			
	Normal appendix	1	0
	Suppurated appendix	18	0
	Complicated appendix	8	0
2nd			
	Normal appendix	0	0
	Suppurated appendix	5	0
	Complicated appendix	3	1
3rd			
	Normal appendix	0	0
	Suppurated appendix	4	0
	Complicated appendix	4	2

Discussion

Acute appendicitis is almost equally common in pregnant and non-pregnant ladies. (McGory et al., 2007). Acute appendicitis is the leading cause of pain in the abdomen in pregnant women. (Ml, 2007; Pearl et al., 2011). Kapan et al. found that whereas acute appendicitis can manifest in any trimester, half of cases occur in the second trimester (Schwartz, 1999). Still, in our study, the maximum number of patients presented to us were in the first trimester of their pregnancy. Proper utilization of diagnostic imaging reduced the adverse appendectomy incidence to 1-3%. (Garcia et al., 2018). According to Thomson et al., acute appendicitis tends to be accurately diagnosed within the first trimester. (Thomson et al., 2015).

On the other hand, Kazar et al. and Mazze et al. found that acute appendicitis was best diagnosed during the first trimester.(MAZZE and KÄLLÉN, 1992; Schwartz, 1999). In this investigation, only one first-trimester patient showed a normal appendix following postoperative pathology. Pregnant individuals with acute appendicitis can have open or laparoscopic surgery, similar to the rest of the population. Zhang et al. showed in research that laparoscopic appendectomy throughout pregnancy is successful in all trimesters. (Günaydin, 2012). Laparoscopic surgery in women who are pregnant provides virtually identical and equivalent results as those in non-pregnant patients. (Günaydin, 2012).

According to Walsh et al., 1% of laparoscopic appendectomy cases were converted to open surgery; in the present investigation, no patients underwent open appendectomy. (Walsh et al., 2008). Kazar et al. found that the risk of premature labor due to operational intervention while expecting is 10-15%, the same as following laparoscopic as well as open appendectomy. In this study, two patients experienced premature labor, accounting for 4.44%. (Schwartz, 1999)

Our investigation found maternal and fetal results similar to those described by Alkatary et al. and Pederson et al. (Alkatary and Bahgat, 2017). Eom et al. reported a 1% conversion rate from laparoscopic to open appendicectomy. (Eom et al., 2012). During our investigation, no cases were switched from laparoscopic appendectomy to open appendectomy. Our investigation found one instance of normal appendices in postoperative histopathology

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assessment. However, studies have documented negative appendices in 20-45% of incidences during pregnancy.(Bhandari et al., 2017) (Ueberrueck et al., 2004)**.** Bhandari et al. observed a 21.4% negative appendectomy rate in pregnant individuals.(Bhandari et al., 2017). In this investigation, just one patient appeared in the first trimester with a normal appendix.

Conclusion

Laparoscopic appendectomy is a surgical procedure that involves the removal of the appendix using a laparoscope, a thin tube with a camera and light. This procedure is generally considered safe for pregnant women suffering from acute appendicitis, regardless of the stage of pregnancy. It is a feasible and popular alternative due to its low complication rates. These findings support the continued use of laparoscopic appendectomy as a standard treatment for acute appendicitis in pregnant women.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

SYED SHAMS UL HASSAN (Assistant Professor)
Concept & Design of Study, Final Approval of version
TANIA MAHAR (Assistant Professor)
Drafting, Revision Critically,
BENISH ZAHRA (House Officer)
Drafting, Revision

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