International Surgery Journal
Bhardwaj S et al. Int Surg J. 2021 Feb;8(2):692-695
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20210386

Short Communication

Outcome of pregnancy with acute appendicitis–a retrospective study

Suraj Bhardwaj[1]*, Shuchi Sharma[2], Vatika Bhardwaj[3], Roshan Lal[4]

[1]Department of General Surgery, [2]Department of Obstetrics and Gynecology, [3]Department of Anesthesia, [4]Department of Medicine, Shri Lal Bahadur Shastri Government Hospital Nerchowk, Mandi, Himachal Pradesh, India

Received: 17 August 2020
Revised: 08 October 2020
Accepted: 15 January 2021

***Correspondence:**
Dr. Suraj Bhardwaj,
E-mail: drsurajbhardwaj@yahoo.com

ABSTRACT

Acute appendicitis is the most common surgical non-gynaecological pathology during pregnancy. In this study, pregnant patients admitted with diagnosis of acute appendicitis in the last two years were evaluated retrospectively. Aim was to study the outcome of pregnancy with acute appendicitis. This was a retrospective study done on pregnant patients with acute appendicitis admitted between october 2017 and September 2019 in SLBS Government Medical College and Hospital, Mandi, HP. 7 pregnant patients were admitted for acute appendicitis. Patients were evaluated regarding age, gestational age, clinical and laboratory examinations, imaging studies, operative findings, mean hospital stay and outcome. In 4 out of 7 patients, acute appendicitis was confirmed and appendicectomy was performed. All of them were operated with open technique. There was no fetal or maternal morbidity or mortality in any patient. All patients delivered healthy babies during the postoperative course. Early surgical intervention is indicated if acute appendicitis is suspected. Pregnancy is not a reason to delay surgery.

Keywords: Acute appendicitis, Appendicectomy, Pregnancy

INTRODUCTION

Acute appendicitis is the most common non-gynaecological surgical emergency during pregnancy.[1] Its incidence is about 1 in 2000 pregnancies, with 50% of cases occurring in the second trimester.[2,3] Nausea, vomiting and abdominal pain in the normal obstetric patient can be incorrectly attributed to the hyperemesis gravidarum that is more common in first trimester and lead to delayed surgical intervention. Appendicitis must be suspected in any pregnant patient with right sided abdominal pain.

The gravid uterus displaces the appendix superiorly and laterally, thereby complicating diagnosis.[4] Delay in treatment is common because of uncertainty in making the diagnosis and hesitancy to proceed with surgery.[5] Leucocytosis is common in normal pregnancy. Diagnosis is often confused with ectopic pregnancy, pyelonephritis, twisted ovarian cyst, abruption placenta and red degeneration of a fibroid. Ultrasonography should be used to assess for the presence of such obstetrical pathologies. Delay in diagnosis and treatment also results in increased risk of developing perforation which can lead to poor postoperative outcomes.

Acute appendicitis can lead to abortion, premature delivery, increased perinatal mortality and maternal mortality. Operation is indicated in a pregnant patient as soon as diagnosis of acute appendicitis is made. A negative laparotomy carries a risk of foetal loss of upto 3% but foetal death rates reach 35% when perforation and peritonitis occurs. Incidence of perforation is highest in 3rd trimester.

Aim and objectives

Aim and objectives were to study the outcome of pregnancy with acute appendicitis

METHODS

This was a retrospective study done on pregnant patients admitted with acute appendicitis in SLBS Govt. Medical College and Hospital, Mandi, HP, between October 2017 to September 2019. 7 pregnant women who were referred to general surgery OPD for acute abdominal pain were included in this study. Clinical data collected retrospectively included presenting symptoms, physical examination findings, age of the patient, period of gestation, ultrasonographic confirmation, leukocyte count, postoperative complications and hospital stay. Abnormal WBC was considered less than 4000/mm3 (leukopenia) or more than 11000/mm3 (leukocytosis). However mild to moderate leukocytosis are features common to both normal pregnancy and acute appendicitis. Temperature above 37.8°C was considered as fever. The gestational period was categorized as the first (0-12 weeks), second (13-28 weeks), and third trimester (29 weeks and beyond). The reproductive age has been defined between 15 and 49 years according to World Health Organization (WHO). All patients were assessed by a gynaecologist and a general surgeon before and after surgery. Each patient was evaluated by the Alvarado scoring system. The period between surgical consultation and surgery was evaluated. Written consent was taken by all patients regarding post-operative outcome and complications following surgery. Appendicectomies were performed by an open approach. Incision was made at the point where maximum tenderness was noticed. General inhalational anesthesia was employed routinely during the operation. Urinary catheters were used routinely.

Time to surgery was defined as the period from onset of symptoms till surgery. For patients in earlier weeks of pregnancy, we followed them up till 30th postoperative day after appendectomy. Surgical outcomes were recorded during that period. After that the patients were followed up on pregnancy outcome in obstetric department. Coordination with the obstetric team made us easy for follow-up of these patients during post-operative period. Records were maintained. The patient's preoperative, operative details, postoperative outcomes, and pregnancy related outcomes were analyzed.

RESULTS

The mean age of the patients was 24.8 (22-27) years. The mean gestational age at the time of presentation was 21.2 weeks (11-33 weeks). 4 patients were in the second trimester, 2 were in the first trimester and 1 was in the third trimester of pregnancy. The mean Alvarado score was 7.6 (7-8). The mean leukocyte count was 12400 (10600-16100), and mean neutrophil% was 81.42% (72-90%). All 7 patients were admitted with complaints of abdominal pain. 5 patients had additional nausea and vomiting. Abdominal ultrasonography was performed in all patients. Ultrasonography revealed acute appendicitis in 5 patients. In the remaining 2 patients, in whom ultrasonography could not visualize the appendix, acute appendicitis was confirmed by clinical assessment and laboratory findings. Emergency appendicectomy was done in 4 patients by an open approach and 3 were managed conservatively. The median time between consultation and operation was 6 hours (3-10). The mean operation time was 54.1 minutes.

Table 1: Demographic data of the patients.

Age (yrs)	Gestational age (wks)	Alvarado score	Leucocyte count	Neutrophil count(%)	Usg (appendicitis)	Type of Surgery	Hospital stay (days)
27	18	8	11500	84	Seen	Open	2
27	21	7	12700	72	Seen	Open	2
22	17	7	11300	79	Seen	Open	2
26	32	8	10600	81	not seen	Not done	3
25	11	8	16100	90	Seen	Open	2
22	33	8	13200	88	not seen	Not done	4
25	17	7	11400	76	Seen	Not done	4

DISCUSSION

Certain anatomic and physiologic changes specific to pregnancy may make the cause of the abdominal pain difficult to ascertain in pregnant patients.[1-3] The uterus becomes an abdominal organ at around 12 weeks gestation and compresses the underlying abdominal viscera. This enlargement may make it difficult to localize the pain and may also mask or delay peritoneal signs. The laxity of the anterior abdominal wall may also mask or delay peritoneal signs. The ureters become dilated as early as the first trimester and remain dilated into the postpartum period. This distension may lead to urinary stasis, increasing not only the risk of urolithiasis, but also infection.[4,5] Increasing progesterone increases respiratory drive. Functional residual capacity decreases. Hemostatic changes also add to the challenge of evaluating and caring for pregnant women. Pregnancy produces a thrombogenic state, with two-to-three-fold increase in fibrinogen levels. In pregnancy, physiologic

leukocytosis occurs, and in our study, all patients had leukocytosis.[5] Anatomical changes related to the gravid uterus, gestational symptoms, the physiological inflammatory response, and a wider differential diagnosis in pregnant women result in poor diagnostic accuracy, reported to range from 36 to 86%.[6] Acute appendicitis has a peak incidence in the second and third decades coinciding with the childbearing years, and the incidence in pregnancy appears broadly the same as in the nonpregnant, whereas the rate of perforation and subsequent complications are greater.[7] Fetal mortality is given as 5% after appendicitis, whereas this rate increases to approximately 20% in a perforated appendicitis.[7,8] Similarly, maternal mortality also increases in perforated cases. Given the lack of sensitivity of the preoperative evaluation, it is not surprising that the pathologic diagnosis of appendicitis is confirmed in 36-50% of cases. 5 of 7 patients were diagnosed as appendicitis, and pathologic investigation of 4 specimens confirmed our diagnosis. The accuracy of the diagnosis is greater in the first trimester, but more than 40% of patients who undergo appendectomy in the second and third trimester have a normal appendix. The negative laparotomy rate for suspected appendicitis in obstetric cases is 25-50%, compared with 15-35% in general surgical cases in non-obstetric patients.[6-8] In our study, 4 of 7 patients were second trimester. It has been nearly 100 years since Balber stated that 'the mortality of appendicitis complicating pregnancy is the mortality of delay'. The wisdom of this statement has been repeatedly demonstrated. Delay in the diagnosis of appendicitis is associated with significant complications. Delay to surgery is equally risky, with rates of fetal loss reported to be 1.5-4% in uncomplicated appendicitis compared with 21-35% in the presence of ruptured appendicitis.[7,8] The risk of preterm labor is greatest during the first week after surgery, but preterm delivery is rare.[4-8] Furthermore, increasing gestational age reduces diagnostic accuracy and is associated with increased rates of appendiceal perforation and hence complications.[8,9]

We operated the patients in our series within 12 hours. Contrary to the literature, in our study, there was no fetal loss or appendiceal perforation. The reason for this difference was the short time period between consultation and operation in our study. The authors suggest that none of the clinical parameters investigated is useful in predicting appendicitis in pregnancy. US and magnetic resonance imaging (MRI) are not associated with ionizing radiation, have not been shown to have any deleterious effects on pregnancy, and should be used when feasible.[4,9,10] Retrospective studies have suggested that MRI of the appendix is useful in delineating the presence of appendicitis in pregnant women, but the small number of patients in these studies limits the inference that can be drawn.[11,12] There are also studies using computed tomography (CT) for the diagnosis of acute appendicitis in pregnancy; however, due to the deleterious effects of ionizing radiation on the fetus, it is suggested to be used only in severe trauma patients with pregnancy.[13,14] Wallace et al reported an overall negative appendectomy rate of 37% for pregnant patients with presumed acute appendicitis.[15] In our series, no adverse effects on the fetus or the pregnancy were observed after surgery. We operated our patients within 12 hours with open technique. We discharged patients on second post-operative day. The symptom/sign complex does not sufficiently diverge from other causes of abdominal pain during pregnancy.[16-19] There is no current possibility of developing a sufficiently accurate scoring system as in the non-pregnant patients.

In view of the facts of rare occurrence but increased incidence of perforation in the third trimester and increased fetal mortality in perforated cases, early surgery should be done in all patients suspected of having acute appendicitis.[20-22] The type of surgery, whether open or laparoscopic approach, depends on the experience and preference of the surgeon.[21,22]

CONCLUSION

Acute appendicitis is a challenging diagnosis in the pregnant patient. However, early surgical intervention should be performed if acute appendicitis is suspected. The type of surgery depends on the surgeon's preference and experience. Pregnancy is not a reason to delay surgery.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Upadhyay A, Stanten S, Kazantsev G, Horoupian R, Stanten A. Laparoscopic management of a nonobstetric emergency in the third trimester of pregnancy. Surg Endosc. 2007;21:1344- 8.
2. Brown JJ, Wilson C, Coleman S, Joypaul BV. Appendicitis in pregnancy: an ongoing diagnostic dilemma. Colorectal Dis 2009;11:116-22.
3. Turhan AN, Kapan S. Apandisit A. In: Ertekin C, Güloğlu R, Taviloğlu K, editors. Acil cerrahi. İstanbul: Nobel Tıp Kitabevleri. 2009:301-16.
4. Kilpatrick CC, Monga M. Approach to the acute abdomen in pregnancy. Obstet Gynecol Clin North Am 2007;34:389-402.
5. Stone K. Acute abdominal emergencies associated with pregnancy. Clin Obstet Gynecol 2002;45:553-61.
6. Coleman MT, Trianfo VA, Rund DA. Nonobstetric emergencies in pregnancy: trauma and surgical conditions. Am J Obstet Gynecol 1997;177:497-502.
7. Butala P, Greenstein AJ, Sur MD, Mehta N, Sadot E, Divino CM. Surgical management of acute right lower-quadrant pain in pregnancy: a prospective cohort study. J Am Coll Surg. 2010;211:490-4.

8. Mourad J, Elliott JP, Erickson L, Lisboa L. Appendicitis in pregnancy: new information that contradicts long-held clinical beliefs. Am J Obstet Gynecol. 2000;182:1027-9.
9. Terzi A, Yildiz F, Vural M, Coban S, Cece H, Kaya M. A case series of 46 appendectomies during pregnancy. Wien Klin Wochenschr. 2010;122:686-90.
10. Kilpatrick CC, Orejuela FJ. Management of the acute abdomen in pregnancy: a review. Curr Opin Obstet Gynecol. 2008;20:534-9.
11. Blumenfeld YJ, Wong AE, Jafari A, Barth RA, El-Sayed YY. MR imaging in cases of antenatal suspected appendicitis-a meta-analysis. J Matern Fetal Neonatal Med 2011;24:485-8.
12. Patel SJ, Reede DL, Katz DS, Subramaniam R, Amorosa JK. Imaging the pregnant patient for nonobstetric conditions: algorithms and radiation dose considerations. Radiographics 2007;27:1705-22.
13. Patel SJ, Reede DL, Katz DS, Subramaniam R, Amorosa JK. Imaging the pregnant patient for nonobstetric conditions: algorithms and radiation dose considerations. Radiographics 2007;27:1705-22.
14. Ames Castro M, Shipp TD, Castro EE, Ouzounian J, Rao P. The use of helical computed tomography in pregnancy for the diagnosis of acute appendicitis. Am J Obstet Gynecol 2001;184:954-7.
15. Wallace CA, Petrov MS, Soybel DI, Ferzoco SJ, Ashley SW, Tavakkolizadeh A. Influence of imaging on the negative appendectomy rate in pregnancy. J Gastrointest Surg. 2008;12:46-50.
16. Jeong JS, Ryu DH, Yun HY, Jeong EH, Choi JW, Jang LC. Laparoscopic appendectomy is a safe and beneficial procedure in pregnant women. Surg Laparosc Endosc Percutan Tech 2011;21:24-7.
17. Corneille MG, Gallup TM, Bening T, Wolf SE, Brougher C, Myers JG, et al. The use of laparoscopic surgery in pregnancy: evaluation of safety and efficacy. Am J Surg. 2010;200:363-7.
18. Bakker JK, Dijksman LM, Donkervoort SC. Safety and outcome of general surgical open and laparoscopic procedures during pregnancy. Surg Endosc. 2011;25:1574-8.
19. Kapan S, Kapan M. Gebelik ve akut karın. Türkiye Klinikleri Cerrahi Tıp Bilimleri Dergisi 2005;4:84-9.
20. Cohen-Kerem R, Railton C, Oren D, Lishner M, Koren G. Pregnancy outcome following non-obstetric surgical intervention. Am J Surg 2005;190:467-73.
21. Ortega AE, Hunter JG, Peters JH, Swanstrom LL, Schirmer B. A prospective, randomized comparison of laparoscopic appendectomy with open appendectomy. Laparoscopic Appendectomy Study Group. Am J Surg 1995;169:208-13.
22. Pedersen AG, Petersen OB, Wara P, Rønning H, Qvist N, Laurberg S. Randomized clinical trial of laparoscopic versus open appendicectomy. Br J Surg 2001;88:200-5.

Cite this article as: Bhardwaj S, Sharma S, Bhardwaj V, Lal R. Outcome of pregnancy with acute appendicitis–a retrospective study. Int Surg J 2021;8:692-5.