APPENDICITIS IN PREGNANCY; DOES MODIFIED ALVARADO SCORE HAVE A PREDICTIVE VALUE

MOHAMMAD SADDIQUE, PERVEZ IQBAL, ASIFA GHAZI*
Department of Surgery, Unit V, Dow University of Health Sciences & Civil Hospital, Karachi
*Department of Obstetrics & Gynaecology, Unit III, Dow University of Health Sciences & Civil Hospital, Karachi**

ABSTRACT
Objective: *To assess the predictive value of Modified Alvarado score for pregnant patients for early diagnosis of acute appendicitis in pregnancy.*
Study Design: *Case series.*
Setting & Duration: *Department of Gynaecology and Obstetric Unit III, Surgical Unit IV of Civil Hospital and a local private hospital at Karachi from February 2005 to December 2006.*
Methodology: *Twenty eight patients with right lower quadrant abdominal pain during pregnancy and operated for acute appendicitis were included in the study. Patients with other causes of acute abdomen were excluded. Modified Alvarado score for pregnant patients was designed and proforma was filled for all patients. This being new study management was planned on clinical ground and not affected by the recorded score. Open or laparoscopic appendectomy was done according to patient preference and subject to availability of facility. Maternal and foetal morbidity and mortality were evaluated till parturition.*
Results: *Among twenty eight pregnant patients that underwent appendectomy youngest was 18 year and oldest 38 year of age. Maximum number of patients 12(42.9%) were in second trimester. Positive predictive value of Modified Alvarado score for pregnant patients was 60% in score range of 5-7 and 100% in score range of 7-9. Three patients in 1st trimester and two in 2nd trimester opted for laparoscopic appendicectomy and remaining 23 had open appendicectomy. Two patients developed wound infection. One patient in laparoscopic group and other in open appendicectomy group developed preterm labour, capsule Nifedipine was used as tocolytic agent. No maternal or foetal mortality occurred in the study.*
Conclusion: *Alvarado score increases the diagnostic yield of clinical examination in cases of acute appendicitis.*

KEY WORDS: *Pregnancy, Appendicitis, Alvarado Score*

INTRODUCTION

Acute appendicitis is the most common extra-uterine surgical emergency requiring immediate surgical intervention during pregnancy.[1] Diagnosis of appendicitis is complicated by the physiologic and anatomic changes that occur during pregnancy.[2] Nausea, vomiting, constipation, increased frequency of urination, and pelvic or abdominal discomfort are frequently experienced in normal pregnancy. This can result in delayed diagnosis, increased risk of morbidity for mother and fetus, and even fetal loss.[3] In 1908 it was first reported that the mortality of appendicitis complicating pregnancy is the mortality of delay.[4]

The case-to-delivery ratio ranges from 1:2000 to 1:6000.[5,6] Pregnancy does not affect the overall incidence of appendicitis, but the severity may be increased in pregnancy. Appendicitis seems to be more common in the second trimester.[7] The Alvarado score for diagnosis of appendicitis was described in1986[8] and has been validated in adult surgical practice. This scoring system was modified keeping in mind the symptoms of normal pregnancy and named as Modified Alvarado Score for pregnant patients Table I. This study was aimed to observe the predictive value of this simple, inexpensive, non-invasive scoring system.

Correspondence:
Dr. Muhammad Saddique, Assistant Professor,
Dow University of Health Sciences &
Civil Hospital, Karachi.
Phones: 021-4575896, 0300-9209027.
E-mail: dsarain@hotmail.com

METHODOLOGY

This study was conducted at Gynae and Obstetric Unit III, Surgical Unit IV of Civil Hospital and a private hospital at Karachi from February 2005 to December 2006. Patients with pregnancy and right lower quadrant pain were admitted from Emergency and outpatient departments. Detailed history regarding the time of onset, duration, intensity, and character of the pain was recorded. Physical examination was carried out in supine and left decubitus position. Gestational age was determined by history, obstetrical examination and ultrasound. Viability of foetus was assessed by presence of foetal heart sounds on ultrasound and Doppler. Routine laboratory tests including White Cell count and ultrasound were carried out, histopathological examination was done on removed appendix. Twenty eight pregnant patients who were operated for acute appendicitis were included in the study and patients with other causes of acute abdomen were excluded from study. Proforma of Modified Alvarado Score for pregnant patients was filled in these cases. Scoring however did not affect the management of these patients who were treated on clinical assessment. Surgical intervention was done promptly when diagnosis of appendicitis was confirmed. Surgery was performed under general anaesthesia and 1 gm of 3rd generation cephalosporin was administered at the time of induction of anaesthesia. The same antibiotic was continued in twice daily dose for 3 days. Patients in the first and second trimester where given the choice of open or laparoscopic appendectomy when facility of laparoscopic surgery was available. Incision centered over McBurney's point was used in open surgery. Open technique for creation of pneumoperitoneum was employed in laparoscopic procedure. Maternal and foetal monitoring was continued in postoperative period. Two patients who went into preterm labour were treated by capsule Nifedipine 10mg 1/2 hourly till contraction stopped, both patients settled on two doses, so treatment continued 10 mg BD for 48 hours, then these and other patients were followed up after discharge in antenatal clinic till delivery of baby to record the outcome of surgery, foetal and maternal morbidity and mortality.

Table I. Modified Alvarado score for pregnant patients

Variable	Score
Symptoms	
Right lower quadrant pain	2
Anorexia	1
Nausea / Vomiting	1
Signs	
Tenderness right lower quadrant	2
Rebound tenderness right iliac fossa	1
Pyrexia greater than or equal of 37.5	1
Investigations	
Leucocytosis	1
Total Score	9

RESULTS

Among twenty eight pregnant patients that underwent appendicectomy youngest was 18 year and oldest 38 year of age Table II. Maximum number of patients 12 (42.9%) were in second trimester. Marked leucocytosis was seen in 20(71.4%) patients. Ultrasound examination confirmed of acute appendicitis diagnosis in 22(78.6%) cases. MRI was done in one patient with equivocal signs and it confirmed inflammation of appendix. Three patients in 1st trimester and two in 2nd trimester opted for laparoscopic appendicectomy and remaining 23 had open appendicectomy Table III. Open appendicectomies were performed with incision centered at McBurney's point and no difficulty was encountered in locating appendix. One patient in 1st trimester presented with perforated appendix and laparotomy through lower midline incision was performed. One patient in each 1st and 2nd trimester with an Alvarado score range of 5-6 had normal appendix.

All patients with Alvarado score range of 7 to 9 had inflamed appendix. Positive predictive value was 60% in Alvarado score range of 5-7 and 100% in score range of 7 to 9. Two (7.1%) patients developed wound infection and another 2(7.1%) went into preterm labor were treated by capsule Nifedipine 10mg 1/2 hourly till contractions stopped, both patients settled on two doses, treatment was continued as 10mg BD for 48 hours. Patients were followed up after discharge in antenatal clinic till the delivery of baby to record the outcome of surgery, foetal and maternal morbidity. No maternal or foetal mortality occurred in this study.

DISCUSSION

Appendicitis in pregnancy is the most common non-obstetric cause of an acute abdomen requiring surgical

Table II. Age distribution

Age in years	No. of Patients
18-24	14 (50%)
25-30	8 (28.6%)
31-38	6 (21.4%)

Trimester	No. of cases	Surgery Open/Lap	Score		
			1-4	5-6	7-9
1st Trimester	6 (21.4%)	3/3	0	2	4
2nd Trimester	12 (42.9%)	10/2	0	2	10
3rd Trimester	10 (35.7%)	10/0	0	1	9
Total	28	23/5	0	5 (17.9%)	23 (82.1%)

Table III. Type of surgery and modified alvarado score for pregnant patients

intervention. Diagnostic difficulties arising from gestational symptoms compound the risk of foetal loss after negative appendicectomy and exponentially increase the risk to mother and foetus with delay in genuine cases.[9] Early diagnosis of acute appendicitis is possible only by the combined efforts of the obstetrician and the surgeon.[10] It has been stated that abdominal pain and vomiting with poorly localized right-sided tenderness and low-grade pyrexia in late pregnancy means appendicitis unless proved otherwise.[11] Pregnancy alone can produce white blood cell counts ranging from 6000-16,000/mm^3 in the second and third trimesters and from 20,000-30,000/mm^3 in early labor.[12]

Analysis of Alvarado score in diagnosis of acute appendicitis in women[13] has been carried out with sensitivity of 100% for score of 7 and above. Extensive literature search did not retrieve application of Alvarado scoring for diagnosis of acute appendicitis in pregnant women. This study of 28 pregnant patients who were operated for appendicitis showed a positive predictive value of 60% for Modified Alvarado score for pregnant patient, with score range of 5-6 and 100% for score range of 7-9. Ultrasound is an important tool for diagnosis of appendicitis in pregnancy with a reported sensitivity of 67-100% in different series.[14] In this study the sensitivity of ultrasound was 78.6%. Abdominal MRI has proved to be both safe and valuable in evaluating pregnant patients suspected of having appendicitis on the basis of clinical findings. This approach avoided unnecessary surgeries but identified patients who required interventions,[15] MRI was done in only one patient where it confirmed the diagnosis of acute appendicitis and patient underwent appendicectomy.

Acute appendicitis can occur in any trimester of gestation but is most common in the first and second trimesters.[16] According to a study conducted in Saudi Arabia[17], there were 10(19%) patients who presented in the first trimester, 31(60%) second trimester, 8(15%) third trimester and 3(6%) patients in the puerperium. In this study 6(21.4%) presented in first trimester, 12(42.9%) in second trimester and 10(35.7%) in the last trimester. Some studies have reported a higher incidence in third trimester.[10]

Laparoscopic appendicectomy during pregnancy is as effective and safe as the conventional approach and has all the benefits of minimally invasive operation.[18] Some other series of Laparoscopic appendicectomy during pregnancy reported a significantly higher rate of foetal loss compared to open appendicectomy.[19] In this study 3 patients in first and 2 patients in 2nd trimester had laparoscopic appendicectomy and no maternal or foetal complication was seen. Incision for the removal of the appendix in pregnant patients in all trimesters can be successfully made over McBurney's point.[20] In the present study same approach and there was no difficulty in appendicectomy. One patient in first trimester presented with perforated appendix and laparotomy through lower midline incision was carried out. This patient and another patient developed wound infection which responded to conventional treatment. One patient in laparoscopic group and other in open appendicectomy group developed preterm labor was treated by capsule Nifedipine orally. No maternal or foetal mortality occurred in the study.

CONCLUSION

Alvarado score increases the diagnostic yield of clinical examination in cases of acute appendicitis.

REFERENCES

1. Horowitz M D, Gomej G A. Santiesteban R, Burkett G. Acute appendicitis during pregnancy. Arch Surg 1985; 120: 1362-8.

2. Tracey M, Fletcher H S. Appendicitis in pregnancy. Am Journ Surg 2000; 66: 555-9.

3. Tamir I L, Bongard F S, Klein S R. Acute appendicitis in the pregnant patient. Am Journ Surg 1990; 160: 571-5.

4. Bable E A. Perforated appendicitis complicating

pregnancy. JAMA 1908; 51: 1310.

5. Gomez A, Wood M. Acute appendicitis during pregnancy. Am Journ Surg 1979; 137(2): 1803.

6. Sivanesaratnam V. The acute abdomen and the obstetrician. Baillieres Best Pract Res Clin Obstet Gynaecol 2000; 14(1): 89-102.

7. Cunningham F G, McCubbin J H. Appendicitis complicating pregnancy. Obstet Gynaecol 1975; 45(4): 415-20.

8. Alvarado A. A practical score for the early diagnosis of acute appendicitis Ann Emerg Med 1986; 15: 557-564.

9. Brown J J, Wilson C, Coleman S, Joypaul B V. Appendicitis in pregnancy: an ongoing diagnostic dilemma. Colorectal Dis 2009; 11(2): 116-22.

10. Raja K S, Janjua N B, Iqbal J. Appendicitis in pregnancy. RMJ 2003; 28: 52-55.

11. Tamir I L. Acute Appendicitis in the pregnant patient. Am Journ Surg 1991; 76: 1246-61.

12. Pritchard J A, Baldwin R M, Dickey J C. 1. Blood volume changes in pregnancy and the puerperium, 2. Red blood cell loss and changes in apparent blood volume during and following vaginal delivery, cesarean section, and cesarean section plus total hysterectomy. Am Journ Obstet Gynecol 1962; 84(10): 1271-82.

13. Horzic M, Salamon A, Kopljar M. Analysis of scores in diagnosis of acute appendicitis in women. Coll Antropol 2005; 29: 133-8.

14. Robert W, Janathan S. Ultrasound scanning in diagnosis of acute appendicitis in pregnancy. Emerg Med Journ 2007; 24: 359-60.

15. Cobben L P, Groot I, Haans L. MRI for clinically suspected appendicitis during pregnancy. AJR 2004; 183: 671-75.

16. Fallon W F, Newman J S, Fallon G L. Malangoni MA The surgical management of intra abdominal inflammatory conditions during pregnancy: Surg Clin North Am 1995; 75: 15-31

17. Mahmoodian S. Appendicitis complicating pregnancy: South Med J 1992; 85: 19-24.

18. Carlos M S, Ana P P, Joaquin S, Jose B. Laparos copic appendicectomy during pregnancy: Between personal experiences and scientific evidence. JACS 2007; 205: 37-42.

19. Colin A W, Tang T, Stewart R W. Laparoscopic versus open appendectomy in pregnancy: a systemic review. International Journal of Surgery 2008; 6: 339-44.

20. Popkin C A, Lopez P P, Cohn S M. The incision of choice for pregnant women with appendicitis is through McBurney's point. Am Journ Surg 2002; 183: 20-2.