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Original Article

Does the Appendix Location Change During Pregnancy?

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Abstract

Background: Early diagnosis of appendicitis is important during pregnancy. Unlike omentom, cecum and appendix are not likely to be displaced by the growing uterus, so the concept of position change of the appendix during pregnancy is questionable.

Objective: To determine the anatomical location of appendix during pregnancy.

Methods: In a prospective study from October 1995 to March 1999, 291 women of reproductive age were evaluated for the location of appendix. They were divided into 3 groups, A: 165 pregnant women (37-40 weeks of gestation) who underwent elective cesarean section, B: 26 pregnant women (19-39 weeks of gestation) with acute appendicitis, who underwent appendectomy, and C: 100 non-pregnant women with acute appendicitis who underwent appendectomy serving as the comparison group. The location of appendix was considered as normal if it fell within ± 2 cm variation from McBurney's point, otherwise, it was considered as a position change.

Results: In group A, 26 out of 165 (15%) and in group B, 6 out of 26 (23%) women had change in the position of appendix. In the control group, 17% had change in position. There were no significant differences between group A and B as compared with the control group (group C). In group B, there was no relation between the height of the fundus and the point of tenderness.

Conclusion: The location of appendix does not change significantly during the pregnancy in most women.
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Keywords • Pregnancy • appendix • appendicitis

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Introduction

During pregnancy, appendicitis is the most frequently encountered extrauterine disease requiring surgical intervention. In 1849, the first case of appendicitis during pregnancy was reported in the medical literature.[1] Acute appendicitis can cause premature labor pain specially if the appendix is perforated (33-80%).[2,3] The rate of spontaneous abortion is also higher in these cases (8.5-33%) and with perforation it increases up to 35.7%.[4,5]

Therefore, this study was conducted to determine the localization of appendix in pregnancy for early diagnosis and management.

Patients and Methods

In a prospective study, from October 1995 to March 1999, 291 women aged 17-45 years, who were referred to the clinics, emergency rooms and operation rooms of hospitals affiliated with the Shiraz University of Medical Sciences, were evaluated for the location of the appendix.

These patients were divided into 3 groups as follows: Group A consisted of 165 pregnant women (gestational age 37-40 weeks) who underwent elective cesarean section due to an obstetric cause, group B was comprised of 26 pregnant women (19-39 weeks of gestation) admitted to the emergency rooms with abdominal pain and underwent operation with a diagnosis of acute appendicitis, and group C which was the comparison group with 100 non-pregnant women in reproductive age, underwent appendectomy due to acute appendicitis. The location of appendix was considered as changed if it was not within ± 2 cm of McBurney's point. In the study groups A and B, the relation between gestational age and location of appendix was also evaluated.

Statistical analysis

The data were analyzed using SPSS software. Chi-square test was used for comparison between groups and finding relationship between variables and p-values less than or equal to 0.05 were considered as statistically significant.

Results

In group A, 26 out of 165 pregnant women (15.7%) who underwent cesarean section had change in the position of appendix (Table 1). This was not statistically significant as compared with the control group (p=0.57). In group B, 6 out of 26 (23%) pregnant women with acute appendicitis had a change in the location of the appendix. This figure also was not statistically significant in comparison with the control group (Table 1). In group C (the control), 17 cases out of 100 (17%) patients, had a change in the location of appendix (Table 1). As shown in Table 1, these changes were not statistically significant when the study groups A and B were compared to the control group (p=0.96). In group B (with acute appendicitis), on physical examination, no relation between the height of the fundus and the point of tenderness was seen (p=0.55), but there were statistically significant relationship between the point of tenderness and location of appendix (p=0.002). On the other hand, maximum point of tenderness changed with change in the position of appendix. The change in the location of appendix in pregnant women of group A (26 out of 165 women) had occurred in the gestational age of 40 weeks or more (25%) (Table 2).

Table 1: Number (%) of patients with change in location of their appendices in all groups

	Number (%) of patients in		
Change (cm)	**Group A**	**Group B**	**Group C**
3-4	15 (57.7)	3 (50)	9 (52.9)
5-6	7 (26.9)	2 (33.4)	8 (47.1)
7-8	4 (15.4)	1 (16.6)	0 (0.0)
Total	26 (100)	6 (100)	17 (100)

p>0.05 comparing groups A and B with the control group (group C)

Discussion

There is urgency in making the diagnosis of appendicitis since it is a life-threatening process for the mother and may affect the fetus as well with preterm labor and delivery. A wide range of fetal mortality rates (2-43%) as a result of delayed diagnosis and management of acute appendicitis have been reported.[6-12] In this study, we evaluated the location of appendix by direct vision, and we found different results from other studies. Since 1932, several different methods have been used to determine the location of appendix. Baer *et al.* in 1932, showed upward displacement of appendix and cecum during pregnancy by repeated barium enema That procedure was limited because of the potentially hazardous effect of radiation. Several reports have suggested that high-resolution sonography is fairly accurate in making the diagnosis of acute appendicitis.[4,13-15] In 1992 Lim *et al.* reported that the accuracy of sonography was 98%.[16] Although the accuracy of the sonography for the diagnosis of appendicitis is very high, it is difficult during the second and third trimesters of pregnancy due to the size of gravid uterus.[16] On the other hand, typical diagnostic criteria for appendicitis in non-pregnant individuals are often confusing in the setting of the anatomy and physiologic characteristics of pregnant women. Signs and symptoms common to both normal early pregnancy and appendicitis include anorexia, nausea and vomiting.[17] In addition, during pregnancy the

Table 2: Relation between gestational age and the location of the appendix in patients of group A

	Number (%) of women with	
Gestational age (wks)	**Cesarean section**	**Position change of appendix**
37	80 (48.5)	13 (16.2)
38	40 (24.2)	5 (12.5)
39	25 (15.2)	3 (12)
40	20 (12.1)	5 (25)

appendix moves away from the abdominal wall and there is muscle laxity, so it may cause delay in diagnosis due to the reduced severity of symptoms (tenderness and rebound tenderness).[16,18] Therefore, as in other reports,[17] we were unable to find any reliable sign or symptom that could be used as a guide for diagnosing acute appendicitis in pregnancy. It must be mentioned that our data support the concept that the majority of patients with acute appendicitis have pain in the right lower quadrant at any gestational age. The previous concept about the right upper quadrant location of appendix in pregnancy[2] can cause inappropriate delay in making the correct diagnosis, leading to maternal and fetal mortality. It can be concluded that a high clinical suspicion is necessary to make the diagnosis. And, because of the overlap with normal pregnancy symptoms, a higher false-positive rate is not only acceptable but also necessary to avoid delay in diagnosis. Though larger studies must be conducted to confirm our findings, this study shows that the observed change in the location of appendix in pregnant women corresponds to that in non-pregnant women of reproductive age and simply it does not move up as the fetus grows and it remains in the right lower quadrant.

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