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The association between body mass index and the results of appendectomy in children suspected to acute appendicitis

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Abstract

Background and Objective: In the present study, the diagnostic agreement between surgical and pathological findings of appendicitis in children was tested. The aim was to assess the association between patient body mass index (BMI) and this diagnostic agreement.

Methods: This cross-sectional study was carried out on 121 consecutive children aged less than 15 years suspected to acute appendicitis that were candidate for appendectomy in surgery ward of Ali-Asghar Children's Hospital between 2006 and 2011. The patients' characteristics were collected from hospital recorded files.

Results: Assessment of surgical and pathological findings showed a good agreement between the two procedures with an agreement value of 0.69. The overall prevalence of obesity in those with and without pathological appendicitis was 8.7% and 21.5% with a significant difference between them (p= 0.012). Also, the mean BMI in patients with surgical appendicitis was 19.6 ± 4.9 kg/m^2 and in those with normal appendix was 20.9 ± 4.8 kg/m^2 that was significantly lower in former group (p= 0.041).Thus, the mean BMI in patients with appendicitis diagnosed surgically or pathologically was lower than those with normal appendix.

Conclusion: Obesity is more common in children with normal appendix surgically and/or pathologically. Thus, the over diagnosis of appendicitis is higher in obese children.

Keywords: BMI, Appendectomy, Acute appendicitis, Ali-Asghar Children's Hospital

Introduction

Acute appendicitis is the most common abdominal emergency and also the most frequent reason for abdominal surgery within childhood (1). The early diagnosis of this phenomenon is mostly challenging and delay in timely diagnosis of this emergent event or in referring emergency wards may result in perforation in up to 50% of affected cases leading considerable morbidity and even mortality (2,3). Development and availability of novel diagnostic techniques led to lower diagnostic pitfall and thus create new opportunities for clinicians for diagnosing the event more accurately (4-6).

Nowadays, the overall prevalence of obesity within childhood has a considerably upward trend. The diagnosis of acute appendicitis in obese children and young adolescents may be more difficult and conflicting because of difficulty in clinical assessment of appendicitis in these age subgroups. In fact, the presence of obesity may potentially affect accuracy of diagnostic tools to diagnose appendicitis in these patients (7). In this regard, suspected appendicitis in obese children may be associated with increased incidence of normal appendectomy (9). On the other hand, active observation in hospital in very obese children may reduce the rate of normal appendectomy without increasing the incidence of complicated appendicitis. Thus, assessing relationship between the presence of childhood obesity and findings in appendectomy is essential. The aim of present was to assess the diagnostic agreement between surgical and pathological assessment of appendicitis in children based on the amount of body mass index.

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Methods

This cross-sectional study was carried out on 121 consecutive children aged less than 15 years suspected to acute appendicitis that were candidate for appendectomy in surgery ward of Ali-Asghar hospital between 2006 and 2011. Baseline characteristics including gender, age, surgical and pathological findings were collected from hospital recorded files. In this regard, the files with biased data were all excluded. In this study, body mass index (BMI) was calculated as weight in kilograms divided by height in square meters and was categorized as less than 15 kg/m^2, 15 to 20 kg/m^2, 20-25 kg/m^2 and higher than 25 kg/m^2. In this study the relation between BMI and results of appendectomy was assessed.

***Statistical analysis*:** Results were presented as mean ± SD for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. Continuous variables were compared using t test, or non-parametric Mann-Whitney U test, whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the groups. Categorical variables were, on the other hand, compared using Chi-square test or Fisher's exact test when more than 20% of cells with expected count of less than 5 were observed. The multivariate logistic regression analysis was used for assessing the risk for perforation of appendix after employing different baseline variables with the presence of these confounders. For the statistical analysis, the statistical software SPSS version 20.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

Results

Overall, 73.6% of participants were male and 26.4% were female with a mean (SD) age 11.6 ± 2.7 years ranged 5 to 15 years. The mean (SD) BMI was 19.6±4.9 kg/m^2. The most prevalent manifestation was abdominal pain (100%) followed by local tenderness (86.8%), vomiting (78.5%), anorexia (74.4%), and fever (61.2%). Regarding BMI, 14% had BMI less than 15 kg/m^2, 51% 15 to 20 kg/m^2, 23% 20 to 25 kg/m^2, and 12% higher than 25 kg/m^2.

Normal appendix in both surgical and pathological reports was shown in 20.6%, while 70.2% of patients were diagnosed to have appendicitis in both procedures. Also, 2.4% of patients with appendicitis in surgery had normal condition in pathological report. Besides, 6.6% of patients with normal appendix in surgical report had appendicitis in pathological report. The assessment of surgical and pathological findings showed a good agreement between the two procedures with an agreement value of 0.69. The mean (SD) BMI in patients with pathological appendicitis was 19.1 ± 4.7 kg/m^2 and in those with normal appendix was 21.5 ± 5.1 kg/m^2 that was significantly lower in former group (p= 0.008). As shown in Table 1, the overall prevalence of obesity in those with and without pathological appendicitis was 8.7% and 21.5% with a significant difference between them (p= 0.012). Also, The mean BMI in patients with surgical appendicitis was 19.6 ± 4.9 kg/m^2 and in those with normal appendix was 20.9 ± 4.8 kg/m^2 that was significantly lower in former group (p= 0.041). In this regard, the prevalence of obesity in patients with and without surgical appendicitis was 10.2% and 15.1% with a significant difference (p = 0.038) (Table 2).

Table 1. Body mass index according to pathological findings of appendicitis

BMI	Appendicitis (N = 93)	Normal (N = 28)	P value
< 15	15 (16.1)	2 (7.1)	0.012
15 – 20	51 (54.8)	11 (39.3)	
20 – 25	19 (20.4)	9 (32.1)	
> 25	8 (8.7)	6 (21.5)	

Table 2. Body mass index according to surgical findings of appendicitis

BMI	Appendicitis (N = 88)	Normal (N = 33)	P value
< 15	15 (17.0)	2 (6.1)	0.038
15 – 20	46 (52.3)	16 (48.5)	
20 – 25	18 (20.5)	10 (30.3)	
> 25	9 (10.2)	5 (15.1)	

Discussion

The present study had some important points on assessing relationship between BMI and acute appendicitis diagnosis in children. It has been well suggested that body habitus characterized by BMI can affect the validity of diagnostic findings to discriminate appendicitis from normal status in children who referred with evidences of appendicitis. Most studies show less accuracy of ultrasonography in obese children to diagnose appendicitis [9-11]. However as a new approach, we attempted to evaluate association between obesity in children and findings related to appendicitis in both pathology and surgery. In this regard, we could show first an acceptable diagnostic agree-

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ment between pathological assessment and surgical findings. In fact, by cross-tabulation of the positive and negative results of both diagnostic modalities, we found that a few numbers of patients had contradictory findings with regard to the occurrence of acute appendicitis, regardless to the measure of BMI. As another point, the diagnosis of acute appendicitis in suspected children with clinical manifestations was more finalized in non-obese children than in obese ones and diagnosis of appendicitis was more predicted in children with lower BMI.

Conclusion

In summary, we found that clinical diagnosis of appendicitis in obese children may lead to normal appendix in both surgical and pathological findings. Over diagnosis of appendicitis can be an important point in obese children.

Conflicts of interest: None declared.

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