Comparing Presentation and Diagnostic Accuracy for Conscripts and Nonconscripts Who Have Already Been Selected for Appendectomy

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Background: The evaluation of acute appendicitis (AA), the most common cause of acute abdomen, in conscripts is important, specifically when it seems that the probability of malingering for secondary gains (such as exemption) is high, and surgeons may lose some cases of AA through this assumption. Methods: In this analytic cross-sectional study, 455 male conscripts with suspected AA were compared with 142 male individuals between 14 and 26 years of age who had already been selected for appendectomy. Results: The mean age (±SE) was 20.4 ± 0.08 years. There were no statistically significant differences between the case and control groups in terms of age, rates of different symptoms and signs, quality and duration of pain, vital signs, and laboratory findings. Conclusions: There was no significant difference between conscripts and others in terms of the presentation of AA and its accurate diagnosis. Therefore, it is recommended that military physicians approach conscripts with suspected AA like other patients.

Introduction

The most common surgical disease and the most common cause of acute abdominal findings,[1] acute appendicitis (AA), occurs more commonly among men during their second and third decades of life.[2] Despite the high prevalence of the disease, diagnosis proves difficult in some cases. The evaluation of AA in different cases is important because there are indefinite diagnoses made on the basis of clinical presentations and laboratory findings.

Constant preparedness of military personnel is of the essence in armies. Because such individuals undergo psychological and somatic stress, malingering is always a possibility.[3] In Iran, men >18 years of age are liable for 20-month conscriptions with low salaries; therefore, there is a higher probability of malingering among these individuals, in the hope of being granted exemption. What worries military medical personnel is that conscripts live together and exchange experiences, making it possible for them to fake or to exaggerate the symptoms of a disease. On the other hand, it seems that the incidence of AA among conscripts is high because of their gender and age group. Consequently, accurate diagnosis and differentiation of AA from other diseases, and indeed malingering, is one of the medical problems in armies for which no solution has yet been offered.

The aims of this study were to evaluate the conscripts sent to our referral hospital with a primary clinical diagnosis of AA (case group) and to compare them with other patients who matched them in terms of age and gender (control group), with respect to presentation and rate of AA. It should show whether surgeons have any forethought about selecting conscripts for appendectomy. It is of note that our literature review showed that there were very few data on appendectomy in conscripts.

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Methods

Study Design

This analytic cross-sectional study was performed by reviewing data for all patients who had undergone open appendectomy in Baqiyatallah Hospital between July 1997 and June 1999. The control group was selected from 14- to 26-year-old male individuals who had undergone open appendectomy during the same time period. The protocol of this study (see below) was approved by the scientific committee of the research department of Baqiyatallah University of Medical Science (code 75/015-Un-M).

Instruments and Measurements

Our checklist consisted of 48 questions, investigating demographic information (age), symptoms (chief complaint, abdominal pain, nausea, vomiting, anorexia, frequency, urgency, and dysuria), signs (temperature, tenderness, rebound tenderness, cough tenderness, and psoas, obturator, and rowsing signs), pain characteristics (quality, duration, and primary and final location), laboratory (leukocytosis, neutrophilia, leukocyturia, hematuria, and bacteriuria) and pathological findings, and preoperative and postoperative diagnoses. The primary checklist was evaluated by expert methodologists in surgery and surgeons for its face and content validity. A pilot study was then performed to find conflicting, ambiguous, and vague cases during data collection.

Recruitment and Baseline Survey

Six trained medical students of the surgical ward gathered information. All chart abstractors followed a unit pattern to complete the forms. The supervisor of the study trained chart abstractors. Clinical signs and symptoms and laboratory findings were recorded upon admission of the patients to the emergency department. Those with a primary diagnosis of AA were operated on if at least two groups of positive data from the following three groups were present: symptoms (anorexia, nausea, vomiting, and shifting abdominal pain), signs (right lower quadrant tenderness and rebound tenderness), and laboratory findings (leukocytosis and polynucleosis, in particular). The duration of hospitalization was recorded according to the discharge notes, and perforation of the appendix (if it occurred) was determined by using the operative report sheet. All appendix samples were evaluated by expert pathologists for the final diagnosis. In pathological diagnoses, acutely inflamed, suppurative, gangrenous, perforated, and tumoral appendices were considered as accurate diagnoses, whereas other features of the appendix, such as congestion, were regarded as false diagnoses (negative appendectomy [NA]). In this study, the presence of urinary symptoms means the presence of at least one of these symptoms: dysuria, frequency, and urgency. Questionable rebound means that, according to the examiner (senior resident or surgeon), there was neither a positive rebound sign nor a negative one.

Quality Assurance and Quality Control

There were no conflicting data because information was gathered only from the emergency ward and not from different sources, such as the operating room or medical/surgical ward. We explained the differences between negative, ambiguous, uncertain, and missing variables to our chart abstractors, to prevent missing-value bias. Missing-data analysis showed no difference between cases with missing data and others. There were follow-up sessions only to solve chart abstractors' problems and not for monitoring. To determine the accuracy of the data, an expert general practitioner reviewed 60 case files randomly. There were minor mistakes, which were corrected. The title of this study was hidden from the data abstractors, because it was part of a larger research study on the description of all patients hospitalized in our center between July 1997 and June 1999 and being a conscript or not was one of the accessory variables. Therefore, data abstractors were blinded regarding the group of patients (conscripts or not). During the data entry process, we verified the accuracy of data fields by rechecking a fraction of entered checklists for each operator. Means and percentages of different variables did not differ according to the data abstractors, except for the presence of bacteriuria.

For data analysis, descriptive indices such as frequency, mean, and SE were determined and statistical tests (including the χ^2 test and Student's *t* test) were performed with SPSS 11.5 software (SPSS, Chicago, Illinois). The significance level was set at $p < 0.05$. The study protocol was in conformity with the ethical guidelines of the 1975 Declaration of Helsinki.[4]

Results

The study evaluated 455 male conscripts (case group) and 142 ordinary male patients (control group) over a 2-year period. The mean age (±SE) was 20.5 ± 0.07 years in the case group and 20.2 ± 0.27 years in the control group, which was not a statistically significant difference.

The chief complaint was abdominal pain for 449 patients (99.3%) and 140 patients (98.6%) in the case and control groups, respectively, without any statistically significant difference. The percentages of different signs and symptoms in the case and control groups are compared in Table I. There was no statistically significant difference.

The characteristics of pain in the case and control groups are listed in Table II. These characteristics were the same for the two groups. The duration of pain from the onset until hospitalization was 26.2 ± 1.5 hours in the case group and 32.2 ± 3.8 hours in the control group, which was not a statistically significant difference. Oral temperatures were also the same for the case (37.3 ± 0.03°C) and control (37.2 ± 0.04°C) groups.

TABLE I

SYMPTOMS AND SIGNS IN CASE AND CONTROL GROUPS

Symptoms and Signs	No. (%) Case (n = 445)	Control (n = 142)
Symptoms		
Nausea	264 (80.2)	94 (84.7)
Anorexia	329 (87.5)	99 (83.2)
Vomiting	190 (59.2)	64 (57.7)
Urinary symptoms	33 (15.3)	10 (13.5)
Signs		
RLQ tenderness	386 (93.2)	118 (87.4)
Rebound tenderness	349 (86.6)	107 (84.9)
Cough tenderness	211 (90.2)	58 (84.1)
Psoas sign	57 (69.5)	26 (68.4)
Obturator sign	46 (63)	19 (61.3)
Rowsing sign	84 (71.8)	20 (58.8)

RLQ, right lower quadrant of abdomen.

TABLE II

PAIN CHARACTERISTICS IN CASE AND CONTROL GROUPS

	No. (%) Case (n = 445)	Control (n = 142)
Quality of pain		
Persistent	364 (89.4)	118 (89.4)
Intermittent or colic type	43 (10.6)	14 (10.6)
Primary location of pain		
RLQ	139 (33.9)	32 (23.7)
Other	248 (66.1)	93 (76.3)
Final location of pain		
RLQ	368 (92)	121 (92.4)
Other	24 (8)	10 (7.6)

RLQ, right lower quadrant.

Leukocytosis was found for 287 conscripts (64.2%) and 92 members of the control group (66.6%). The mean (±SE) percentages of polymorphonuclear leukocytes were 76.4 ± 0.7% and 74.7 ± 1.7% for the case and control groups, respectively.

Leukocyturia, hematuria, and bacteriuria were detected in 26 (6.5%) versus 8 (6.1%), 34 (8.5%) versus 11 (8.4%), and 103 (36.8%) versus 48 (44.4%) patients in the case and control groups, respectively. There was no statistically significant difference between the two groups in terms of leukocytosis, percentages of polymorphonuclear leukocytes, leukocyturia, hematuria, and bacteriuria. The mean (±SE) duration of hospitalization was similar between the case (3.5 ± 0.06 days) and control (3.4 ± 0.12 days) groups.

A comparison of the primary and final (pathological) diagnoses revealed that an accurate diagnosis had been made for 351 (78.3%) of those in the case group, in comparison with 118 (83.7%) of those in the control group, which means that 97 (21.7%) patients in the case group and 23 (16.3%) members of the control group had NA. There was no statistically significant difference in NA rates between the case and control groups. The perforation rates were 1.5% in the case group and 4.2% in the control group (not significant).

Discussion

AA is usually diagnosed in light of clinical symptoms and signs and laboratory findings. We will continue to have some undefined "negative" rates, as well as some missed cases of AA, as long as we lack a specific diagnostic test for appendicitis.[5] We rely upon the clinical recognition of a pattern of disease, and we diagnose appendicitis as part of the art of clinical surgery.[6] Andersson et al.[7] found that inflammatory variables such as temperature, white blood cell count, and C-reactive protein levels were discriminators of appendicitis on par with clinical findings but no single variable had sufficient predictive power to be used as a diagnostic test. Similarly, we found that, although fever was not a common sign (63.8% of our patients with AA were afebrile at initial presentation), there was a common, albeit not universal, increase in the white blood cell count (71.1%). In fact, 20.2% of our patients had a normal temperature and a normal white blood cell count; as a result, the decision to perform surgery for our patients was based solely on physical examination results and the history and profile of a young, male, otherwise healthy individual with the onset of localized abdominal pain.

The mean duration of pain for the conscripts was less than that for the control group. Although this was not significant, it may indicate that conscripts have a lower threshold of pain endurance and that they refer to medical centers earlier when faced with a medical problem.

Martinez-De Jesus et al.[8] found a significant correlation between perforation rates and rates of self-medication in a Mexican population; however, we do not think that these factors apply to our population, which has access to cost-free medical care. We do think that this accessibility to medical care can explain the lower perforation rate (1.5%) and higher percentage of NA (21.7%) for our conscripts, in comparison with the same factors in similar studies.[5]

In this study, the percentage of NA among the conscripts was 21.7%. The acceptable percentage was up to 20% in previous years,[9] but this standard has been challenged in recent years.[5] There is a study demonstrating that the acceptable percentage of NA is 16%,[6] whereas some other studies have decreased the figure to 9%.[5] There is not enough information about appendectomy among conscripts but, given that the percentage of NA is higher for female subjects[1,2,5,6] and our conscripts were all male, the percentage of NA among conscripts should be far lower than 21.7%. However, a comparison with the control group showed no statistically significant difference (21.7% versus 16.3%).

In this study, only the files of patients who had undergone appendectomy were evaluated. Patients who were referred to the hospital with suspected malingering were either diagnosed by medical personnel at an early stage or refused unnecessary surgery, making a precise evaluation of malingering impossible. Further studies are required to fulfill this need.

Morrison et al.[10] retrospectively reviewed data on 37,000 patients with a working diagnosis of appendicitis. Sixty-seven of them were active duty military personnel. There was AA in 38 cases (57%), NA in 16 cases (24%), and perforated or gangrenous appendix in 13 cases (19%). The mean hospitalization time was 3 days for all patients; times were 6.3 days and 7.6 days in cases with NA and complicated appendectomy, respectively. There were not significant differences in the hospitalization times and NA rates for the conscripts in that study versus ours.

The present study and a similar one[10] maintain that clinical evaluation by a surgeon based on the medical history, physical examination findings, and condition of the patient in a medical center is the most accurate diagnostic test for AA. Consequently, it seems essential that medical personnel be better trained to be able to make more accurate diagnoses and to decrease the rates of NA and perforated and/or gangrenous appendicitis by using readily available diagnostic modalities such as sonography, computed tomography, and isotope scanning.[11]

There is no significant difference between conscripts and others in the presentation and diagnostic accuracy of AA. Therefore, because of the similarity of signs, symptoms, and laboratory findings for the case and control groups, it is recommended that military physicians approach conscripts with suspected AA like other patients.

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