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Appendicitis in Elderly - Not a Usual Form of Appendicitis

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Abstract: ***Acute appendicitis tends to have a more complicated course in advanced age, being associated with higher risk of complications. In the elderly population, however, the presentation may be atypical and cause a diagnostic delay, this can be explained by physiological changes in the elderly, such as decreased immune response, bowel function and pain perception. A misdiagnosis occurs in about half of the patients and almost 25% of the patients requires more than 24 hours to receive the correct diagnosis, increasing the risk for perforation which rises to 70% in these subjects. The acute appendicitis must be considered in the differential diagnosis evaluation for abdominal pain in elderly, in order to reduce morbidity and mortality.***

1. Introduction

The first appendectomy was executed in 1735 by Claudius Amyand on an 11-year-old boy, while the first description arrived in 1886 by Reginald Fitz[1, 2]. It is a commonly treated condition in emergency abdominal surgery and is often considered as a disease of the youth age, with a peak incidence in the second and third decades of life[3].However, acute appendicitis can affect all age groups. The lifetime risk of acute appendicitis in the global population is 7% and particularly about 10% of cases occurs in the elderly population (older than 65 years)[4]. Nearly half of these patients present to the emergency department for abdominal pain[5]and acute appendicitis is the third most common cause of acute abdomen in this setting after intestinal obstruction and biliary disease[6].Acute appendicitis tends to have a more complicated course in advanced age[7], being associated with higher risk of perforation and infective complications[8, 9].

2. Material and Methods

A review of the literaturepublished in the years 1990-2019 hasbeencarried out on PubMed database, using the words: appendicitis AND elderly OR geriatricpatients OR oldpatients. Weperformed aselectionbased on the titles, abstracts, and eventuallywholearticles.

3. Discussion

Morphologic and functional changes in elderly subjects

In young adults, the diagnosis is not usually a challenging issue and the outcomes of surgical management are generally excellent[10]. In the elderly population, however, the presentation may be atypical and cause a diagnostic delay[11,12]: this can be explained by physiological changes in the elderly, such as decreased immune response, bowel function and pain perception[13,14,15].

It has been demonstrated that elderly subjects need a prolonged time to perceive a painful stimulus[16]: if this is particularly true for precordial pain related to cardiac ischemia, it has been described also for intra-abdominal diseases[17,18].

The appendix is frequently atrophic with and a narrowed or obliterated lumen andpresents a reduced lymphatic tissue and vascular supply. Moreover, aged appendix often presents fatty infiltration, mucosal thinning and fibrosis of the wall. These morphological and functional abnormalities lead to a more rapid progression of and an increased incidence of subsequent perforation[19].

A post-operative finding of hidden appendiceal neoplasm is a rare but not negligible event related to appendectomy procedure[20,21].

Clinical presentation and diagnostic scores

Despite the acute onset of disease less than one third of elderly patients presents fever, anorexia, right lower quadrant pain or leukocytosis. Moreover, half of these subjects shows no rebound or involuntary guarding at abdominal palpation[22,23].

A misdiagnosis occurs in about half of the patients and almost 25% of the patients requires more than 24 hours to receive the correct diagnosis, increasing the risk for perforation which rises to 70% in these subjects[22,24].

To increase the diagnostic accuracy in acute appendicitis, several scores have been developed, even though they have never been validated in elderly population.

Described in 1986, the Alvarado score is used widely in the diagnosis of acute appendicitis, especially because it is based on symptoms, physical findings and laboratory data only. It has been validated in several cohorts of adult patients with right lower quadrant pain and is found to be reliable, reproducible and cheap[25].

The Lintula score was originally developed for the pediatric age group and consists of data taken from patient's history associated to physical examination[26]. The addition of anamnestic data seems to increase diagnostic accuracy when compared to clinical approach only[27].

Some investigators evaluated scoring systems for the diagnosis of appendicitis in the elderly and found both

Alvarado and Lintula scores to present high sensitivity and specificity[28].

However, they are not sufficient alone to certainly predict a diagnosis of appendicitis. Their usefulness basically lies in determining the need for further radiologic studies or acting as a guide for dictating clinical management[29,30,31].

Risk factors predictive for perforation

Several works that aimed to predict appendiceal rupture did not draw a consistent conclusion. In contrast, Sheu et al. have recorded retrospectively 601 patients >60 years of age with acute appendicitis and showed that elderly patients with appendix perforation present differently than patients without perforation. It was found that major risk factors associated with perforation were fever > 38°C, leucocyte shift to the left, anorexia, male sex and retrocaecal appendix. They also found delayed surgical management and duration of pain as correlated factors[32], in agreement with other findings from literature.

Abdelkarim H et al. studied 214 patients over the age of 60 years with a pathologically confirmed diagnosis of acute appendicitis, comparing two group of patients with perforated and non-perforated appendicitis,obtaining similar outcomes. They also consideredother related risk factors likecomorbidities at presentation, delayed hospital access, lower abdominal tenderness and guarding.These features were seen more often in the perforated rather than in the non-perforated group[33].

However, although currently there are no certain predictive criteria to identify the risk of appendiceal rupture in elderly patients, thosepresenting with fever (>38° C) and increased leukocyte immature forms have to be considered for an immediate surgical treatment.Other minor risk factors are represented by male sex, anorexia, appendix in retrocaecal position, longer duration of pain before hospital admission.

Diagnostic imaging

Diagnostic imaging could represent an useful tool in the suspicion of appendicitis, especially through the use of abdominal ultrasonography and computed tomography (CT)[34,35,36]. Ultrasonographyis able to detect an inflamed appendix and free abdominal fluid with low costs, but this simple method is relatedtoboth operator experience and patients features (weight, abdominal morphology, compliance).The use of CT scan in this setting has been shown to improve diagnostic accuracy and decrease the negative laparotomy rates but of course protracting pre-surgical time and increasing the costs[7,22,37].Storm-Dickerson TL et al. reported that the incidence of perforation declined over the past 20 years from 72% to 51% in his patients due to the earlier use of CT scan[22]. Recent studies reported a sensitivity rate of 91-99% in elderly subjects[35]. However, it is not routinely performed in all cases due to high costs and possible surgical treatment delay.

Laparoscopy vs laparotomy

Laparoscopic appendectomy was first mentioned by Kurt Semm in 1983[38]and, since that, numerous studies tried to compare laparoscopy and conventional open appendectomy. Literature reports described the advantages of laparoscopic surgery over the open technique in terms of decreased post-surgical pain, time to recovery and wound complications, while others found that referring elderly patients with complicated appendicitis to laparoscopic surgery increasessurgical time, conversion rate and duration of hospital stay[39,40,41]. However, it seems that in cases of complicated appendicitis, the preferred surgical approach is the open one, probably due to more operating view of the abdominal adhesion and peritonitis[42].Moreover, is debated whether there might be an increased risk of postoperative intra-abdominal abscess after laparoscopic procedure, as reported in a recent Cochrane. On the other hand, a meta-analysis by Ukai et al. demonstrated that this risk disappeared in studies published after 2001[43,44,45].

In a recent study, Wray et al. concluded that is difficult to determine which surgical technique, among open or laparoscopic approach offersmore advantages, considering that both procedures determine a small incision, low incidence of complications, a short hospital stay and a rapid return to normal activity[29].However, some investigators found a significantly higher mortality in open surgery compared to laparoscopicappendectomy[46].

Outcomes

Outcomes of acute appendicitis in the elderly has been evaluated by few authors[47,48,49].

Uncomplicated appendicitis in both young and old age groups present a similar prognosis[50,51,52,53].

A retrospective report on 63 cases of elderly patients (meanage 65 years) reported a mortality of 6.3%, a perforation rate of 31.8% of cases and atotal complication rate of 34.9%. It is of interest to note thatonly2.3% and 16.2% of non-perforated subjects respectively died or presented a complication[50].

A retrospective, single-institution analysis was conducted on 257 patients, 195 young and 62 elderly (≥ 60 years old).Elderly patients presented a greater rate of gangrenous (24% vs 11.3%, p<.01) and perforated appendicitis (40% vs 14.4%, p< .01). Pulmonary, cardiac and renal diseases as well as diabetes and hypertension incidence were more than 2-fold greater in elderly patients. Complications and 30-day readmission rates were similar in both groups[54].

Cohen-Arazi et al. conducted a study on seventy-four patients with more than 65 years (mean age of 74.6 ± 7.4) comparing outcomes with a randomly selected group of young adult patients of 20-45 years. No deaths were reported. No differences were reported for time from onset of symptoms to surgery between the two groups. A CT scan was performed in all the elderly patients, while only in 55.6% of the younger subjects (p <.001). 77% of the younger patients underwent laparoscopic appendectomy compared to 43.2% of the elderly patients (p < 0.001). A greater number of complication was reported in elderly patients (21.6%) compared to younger patients (3.2%, p<.001). Pathological findings of severe appendicitis were almost4-fold more common in the elderly group (39.2 vs. 10.5%, p < 0.001). Hospitalization was longer for elderly

patients and even longer for those with complications (p <.001)[55].

Mortality rate for elderly patients following perforated appendicitis was reported between 2.3%-10%, and is often related to septic complications compounded by patients'comorbidities[7,51,52,56,57]

When compared to younger age groups, the length of hospital stay is usually longer for elderly patients. This is usually related to the higher rate of complications, prolonged need forantimicrobial treatment, management of other comorbidities and social weakness[51,34,58].

4. Conclusion

Acute appendicitis in the elderly population represents a diagnostic issue considering that clinical presentation might be atypical due to age-related features. For this reason, it needs to be always considered in the differential diagnosis evaluation for abdominal pain,in order to reduce morbidity and mortality.In fact, surgical outcome of non-complicated appendicitis seems to be similar to those of young adult patients. A diagnostic delay due to late presentation to the hospital and clinical underestimation is associated with higher rates of perforation and post-operative complications.The early use of imaging tools such as ultrasonography or CT scan can reduce the time to the appropriate treatment. It is still not clear which surgical approach, among open or laparoscopy, is associated to better outcome but it seems reasonable to state that, for patients with uncomplicated appendicitis and low comorbidities burden, the latter technique could be the safer.

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