

## Review Article

DOI: 10.22114/ajem.v0i0.272

## Approach to Acute Abdominal Pain: Practical Algorithms

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Published online: 2019-11-08

### Abstract

**Context:** Acute abdominal pain is one of the most common complaints of patients admitted to emergency units. This study aimed to propose a new approach to abdominal pain by designing a more structured diagnostic workup for physicians.

**Evidence acquisition:** A comprehensive review of relevant articles and algorithms presented in books and websites was conducted. Approaches which were relevant to the study concept, were selected.

**Results:** Seven algorithms were introduced with respect to the site of abdominal tenderness. The mainstay of these algorithms was differential diagnosis of the tenderness site.

**Conclusion:** Based on the findings, the designed approach can prevent confusion among physicians and reduce requests for many unnecessary paraclinical tests, which delay the final diagnosis and impose unacceptable costs on patients and healthcare systems.

**Key words:** Abdominal Pain; Algorithms; Diagnosis; Disease Management

**Cite this article as:** Vaghef-Davari F, Ahmadi-Amoli H, Sharifi A, Teymouri F, Paprouski N. Approach to Acute Abdominal Pain: Practical Algorithms. Adv J Emerg Med. 2020;4(\*):e\*.

### CONTEXT

Abdominal pain is one of the most common complaints of patients admitted to emergency units, accounting for approximately 4-5% of emergency department visits (1-3). Recent studies show that self-referrals due to abdominal pain, as well as primary care physician referrals to emergency departments, have increased, imposing heavy burdens on emergency surgical care providers (4). Generally, suggesting a rational differential diagnosis and planning a suitable diagnostic and management approach have always been challenging for primary care physicians when treating patients with abdominal pain. One challenging aspect of abdominal pain treatment is the request for appropriate paraclinical diagnostic tests (5). In fact, performing many unnecessary laboratory tests and radiological imaging procedures not only delays the final diagnosis, but also imposes significant costs. Among different body parts, the abdomen and abdominal problems have always intrigued researchers (2). Overlaps in the initial presentations of benign and life-threatening pathologies, nonabdominal source of pain, and presentation of atypical signs and symptoms rather than the classic ones, which may also vary with age, sex, and comorbidities, are among confounding factors for timely and accurate

diagnosis of abdominal pain (1, 6). Therefore, examination and management of abdominal pain should start with precise history-taking and complete physical examination, followed by the selection of proper diagnostic laboratory tests and imaging modalities to establish a diagnosis. With this background in mind, the purpose of the present study was to design a stepwise approach for first-line physicians treating patients with abdominal pain.

### EVIDENCE ACQUISITION

An extensive search of Medline, PubMed, EMBASE, databases was conducted to identify relevant studies published during 1950-2017 (December 2017), using the following keywords: "abdominal pain", "diagnostic approach", "algorithm", and "management". In addition, we searched for images of algorithms using Google search. All articles were screened by two independent authors for relevance to the study goals. The selected studies were reviewed, and those including stepwise diagnostic algorithms were included in our algorithm.

### RESULTS

Finally, 10 management algorithms were selected for acute abdominal pain; some were used for

specific age or disease groups, while some were based on the site of pain (1). The algorithms used some common points in history-taking and physical examination for a systematic approach. The differences were mainly related to the point of start, target age, and type of complaint. Overall, the most common factors, which should be considered when selecting the best line of management, include age, sex, ethnicity, occupation, social habits, onset of pain, location of pain, duration of pain, pain variations, quality of pain, radiation, concomitant symptoms, aggravating factors, and relieving factors (1-3, 7-14).

One common approach among all abdominal pain algorithms was that they all considered pain as a subjective symptom in their approach. The main problem of this approach is that the location of pain is sometimes different from the main pathology site, and it seems that physical examination can play a more important role. Therefore, in this approach, the site of abdominal tenderness is suggested as the main indicator. This approach provides more accurate information about the exact location of intra-abdominal pathology and suggests a more targeted diagnostic line.

We designed our algorithms based on the site of abdominal tenderness: right upper quadrant; left upper quadrant; epigastric; right lower quadrant; left lower quadrant; suprapubic; and generalized tenderness (Figures 1-7). We also established some rules for constructing our algorithms:

The request for all para-clinical tests should be based on the primary differential diagnosis, following history-taking and physical examination. It is not rational to blindly request different laboratory and imaging tests. In fact, it is necessary to request for tests based on the differential diagnosis.

There is no need to request for all the planned para-clinical tests at the same time, as some may become unnecessary during the diagnostic process.

The algorithms are designed for first-line physicians, who plan the primary approach for patients.

The results of each step of the diagnostic process determines the next step.

## REFERENCES

1. Cartwright SL, Knudson MP. Evaluation of acute abdominal pain in adults. *Am Fam Physician*. 2008;77(7):971-8.
2. Martin RF, Rossi RL. The acute abdomen: an overview and algorithms. *Surg Clin North Am*. 1997;77(6):1227-43.
3. Falch C, Vicente D, Häberle H, Kirschniak A, Müller S, Nissan A, et al. Treatment of acute abdominal pain in the emergency room: a systematic review of the literature. *Eur J Pain*. 2014;18(7):902-13.

The algorithms are only designed for primary diagnostic management in emergency units to be used by emergency medical specialists, family physicians, or general physicians.

## DISCUSSION

This type of approach to abdominal tenderness seems to have many advantages for physicians, who have the first contact with patients in emergency units. First, the algorithms are based on a common differential diagnosis of the abdominal tenderness site; therefore, they are more targeted and prevent waste of resources due to unpurposeful imaging and laboratory test requests. Second, they help physicians devise a logical and cost-effective approach in the clinical decision-making process by requesting for paraclinical data based on the available data to establish the final diagnosis. This type of approach prevents confusion among physicians and reduces requests for unnecessary paraclinical tests, which can delay the final diagnosis and impose unacceptable costs.

## CONCLUSIONS

Based on the findings, the designed approach can prevent confusion among physicians and reduce requests for many unnecessary paraclinical tests, which delay the final diagnosis and impose unacceptable costs on patients and healthcare systems.

## ACKNOWLEDGEMENTS

None.

## AUTHORS' CONTRIBUTION

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

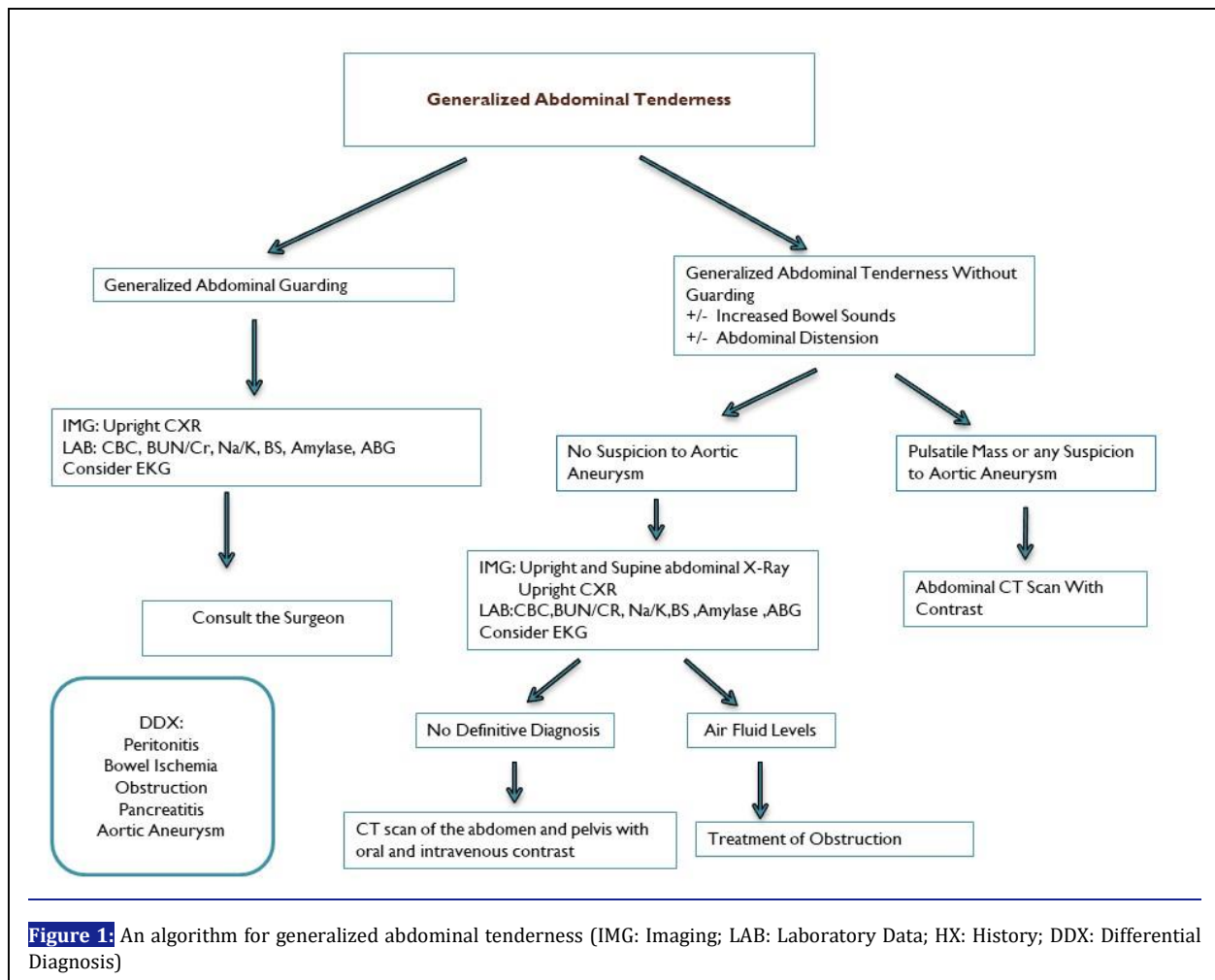
## CONFLICT OF INTEREST

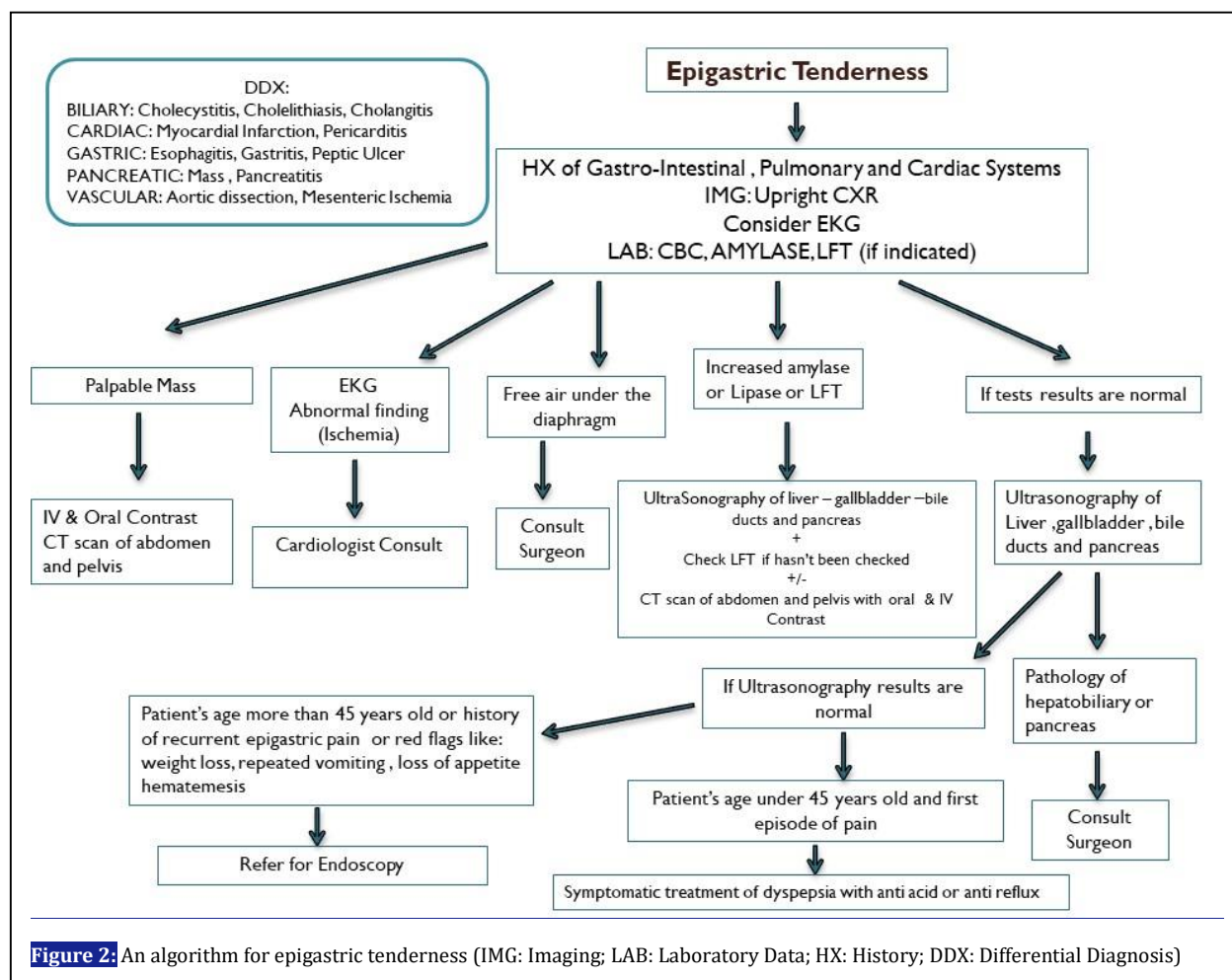
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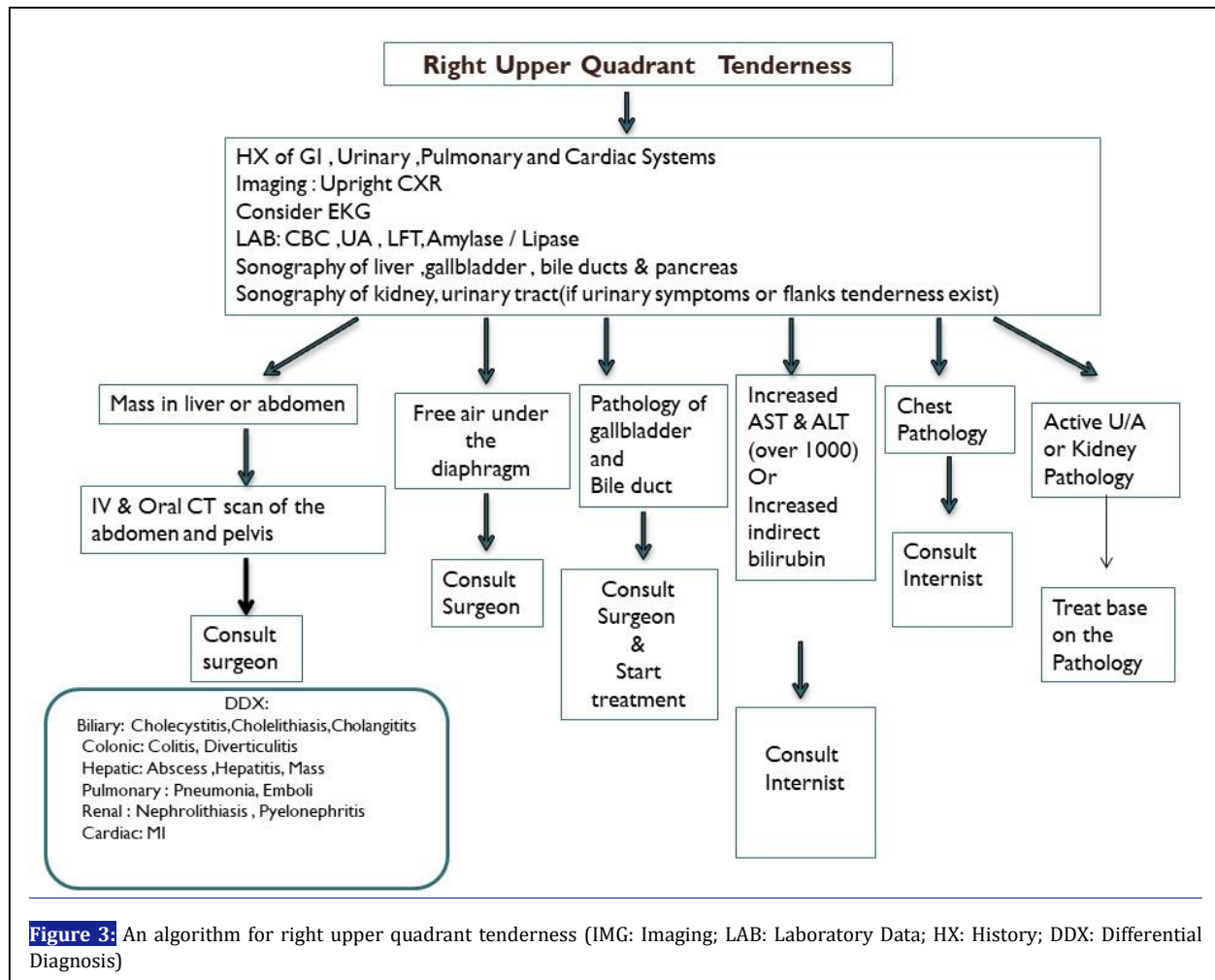
## FUNDING

None declared.

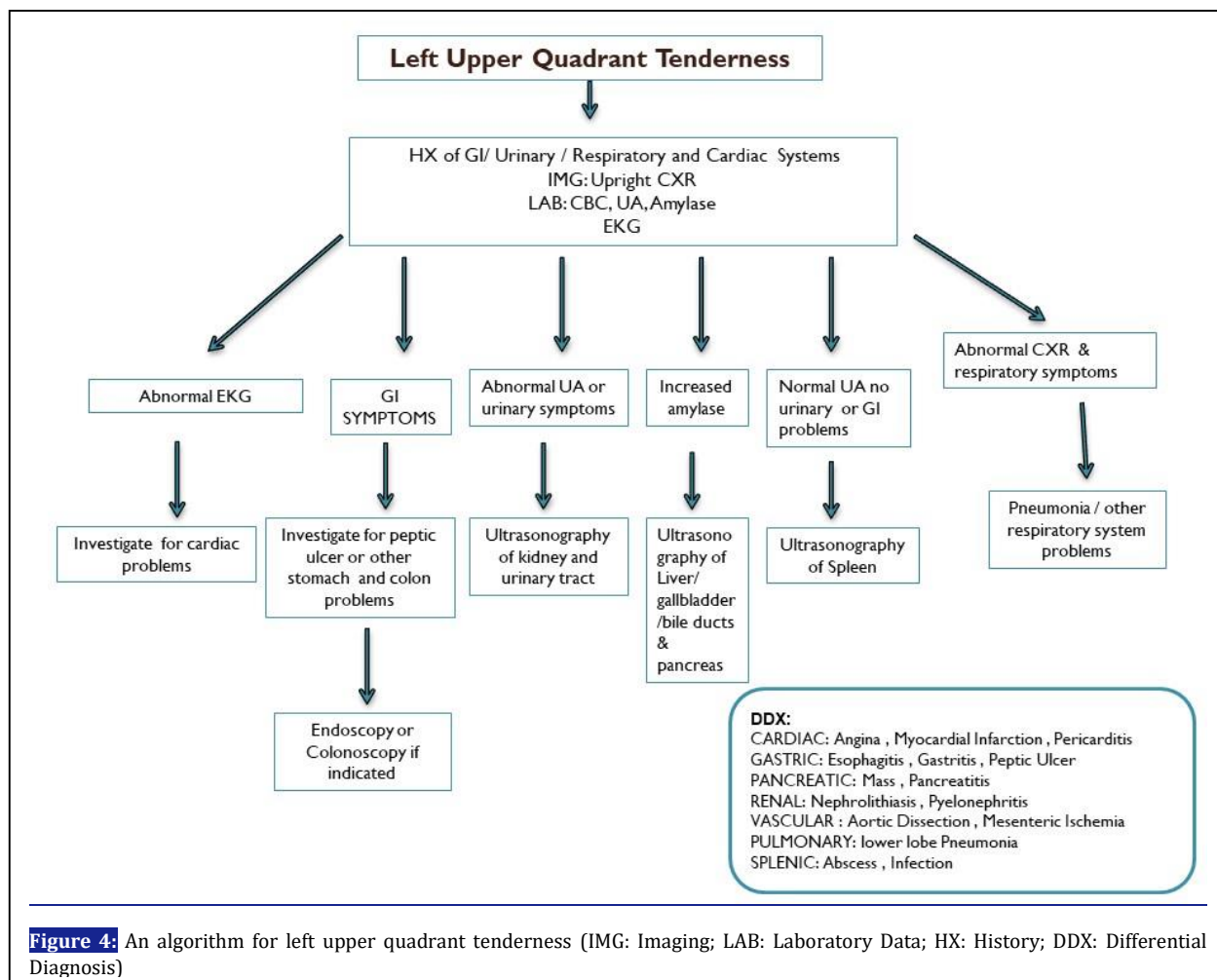
4. Kozomara D, Galić G, Brekalo Z, Kvesić A, Jonovska S. Abdominal pain patient referrals to emergency surgical service: appropriateness of diagnosis and attitudes of general practitioners. *Coll Antropol.* 2009;33(4):1239-43.
5. Toorenvliet BR, Bakker RFR, Flu HC, Merkus JWS, Hamming JF, Breslau PJ. Standard outpatient reevaluation for patients not admitted to the hospital after emergency department evaluation for acute abdominal pain. *World J Surg.* 2010;34(3):480-6.
6. Brown HF, Kelso L. Abdominal Pain An Approach to a Challenging Diagnosis. *AACN Adv Crit Care.* 2014;25(3):266-78.
7. Trentzsch H, Werner J, Jauch KW. Acute abdominal pain in the emergency department-a clinical algorithm for adult patients. *Zentralbl Chir.* 2011;136(2):118-28.
8. Sperber AD, Drossman DA. Functional abdominal pain syndrome: constant or frequently recurring abdominal pain. *Am J Gastroenterol.* 2010;105(4):770-4.
9. Năcul AP, Galbinski S, Antoni G, Jung L. Etiological Diagnosis of Chronic Pelvic Pain in Patients Submitted to Laparoscopic Surgery. *Bras J Video-Sur.* 2008;1(1):13-9.
10. Zhou H, Chen YC, Zhang JZ. Abdominal pain among children re-evaluation of a diagnostic algorithm. *World J Gastroenterol.* 2002;8(5):947-51.
11. Prystupa A, Kurys-Denis E, Krupski W, Mosiewicz J. Diagnostics of acute pain in abdominal right upper quadrant. *J of Pre-Clin Clin Res.* 2011;5(2):56-9.
12. Andersen DK, Billiar TR, Brunicki FC, Dunn DL, Hunter JG, Matthews JB, et al. *Schwartz's Principles of Surgery: McGraw-Hill Education; 2015.* 13. Squires RA, Postier RG. Acute abdomen. *Sabiston Textbook of Surgery 19th ed Philadelphia, PA: Elsevier Saunders.* 2012.
14. Mehta M, Taggart J, Darling III RC, Chang BB, Kreienberg PB, Paty PS, et al. Establishing a protocol for endovascular treatment of ruptured abdominal aortic aneurysms: outcomes of a prospective analysis. *J Vasc Surg.* 2006;44(1):1-8.











**Figure 4:** An algorithm for left upper quadrant tenderness (IMG: Imaging; LAB: Laboratory Data; HX: History; DDX: Differential Diagnosis)

