Abdominal Palpation for the Diagnosis of Abdominal Aortic Aneurysm

EBEM Commentator

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SYSTEMATIC REVIEW SOURCE

This is a rational clinical examination abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each features an abstract of a rational clinical examination review from the *Journal of the American Medical Association* and a commentary by an emergency physician knowledgeable in the subject area.

The source for this rational clinical examination review abstract is: Lederle F, Simel D. The rational clinical examination: does this patient have abdominal aortic aneurysm? *JAMA.* 1999;281:77-82.

The *Annals'* EBEM editors assisted in the preparation of the abstract of this rational clinical examination review as well as selection of the Evidence-Based Medicine Teaching Points.

OBJECTIVE

To review and summarize the value of abdominal palpation for ruptured or asymptomatic abdominal aortic aneurysm.

DATA SOURCES

The authors report a MEDLINE search from 1966 through 1998 using a search strategy that combined 10 exploded MeSH headings with 2 text word categories. The resulting set was intersected with "aortic aneurysm." Other sources included articles in the review authors' files, references cited by articles and textbooks, and unpublished information from the authors of some studies.

STUDY SELECTION

The only exclusion criteria were series of fewer than 10 patients and those published before 1966. Each study was assigned a level of evidence ranging from a high of 1 to a low of 5 using a previously described scale dependent on the number of patients studied, whether patients were consecutive, whether signs and symptoms were assessed in a blinded fashion, and whether the reference standard was a criterion standard or of uncertain validity.[1]

DATA EXTRACTION AND ANALYSIS

Abdominal aortic aneurysm was defined as an abdominal aortic diameter of 3.0 cm or greater. Intermediate findings on palpation were considered negative when the aorta was not palpable and positive when the findings were considered suggestive (but not necessarily definitive) for an abdominal aortic aneurysm. In the 9 series of ruptured abdominal aortic aneurysms, the sensitivity of palpation in each series was reported. In the 15 series of abdominal palpation in populations screened for asymptomatic abdominal aortic aneurysm, a random-effects measure was used for pooling study results and reporting sensitivity and likelihood ratios with confidence intervals for abdominal aortic aneurysm ranging in size from 3 to 3.9 cm, 4 to 4.9 cm, and greater than 5 cm.

MAIN RESULTS

In patients with ruptured abdominal aortic aneurysm, the sensitivity of palpation ranged from 45% to 97%; however, given the retrospective nature of the research, it was not clear how often the physical findings suggested the diagnosis of abdominal aortic aneurysm as opposed to being documented or elicited after the diagnosis was otherwise established. In contrast, prospective study of abdominal palpation in 2,955 higher-risk patients not previously suspected of having abdominal aortic aneurysm detected 148 cases of asymptomatic abdominal aortic aneurysm with pooled sensitivity ranging from 29% for abdominal aortic aneurysm measuring 3 to 3.9 cm, to 50% for abdominal aortic aneurysm measuring 4 to 4.9 cm, to 76% for abdominal aortic aneurysm measuring more than 5 cm. Positive and negative likelihood ratios for abdominal aortic aneurysm larger than 3 cm were 12.0 and 0.72, respectively, whereas for abdominal aortic aneurysm larger than 4 cm they improved to 15.6 and 0.51 in the pooled results.

The authors emphasize that these pooled results apply only to abdominal palpation directed at abdominal aortic aneurysm detection and not to routine abdominal palpation, because each of the referenced studies was screening specifically for abdominal aortic aneurysm. Furthermore, the authors suggest that obesity diminishes the reliability of abdominal palpation for the detection of abdominal aortic aneurysm, as demonstrated by one study in which all misdiagnosed abdominal aortic aneurysm were in those with abdominal girths exceeding 100 centimeters.

CONCLUSION

The only physical examination technique of demonstrated value for the detection of abdominal aortic aneurysm is

abdominal palpation focused on detecting a widened aorta. Although positive findings on physical examination greatly increase the likelihood that a large abdominal aortic aneurysm is present, less than half of all high-risk patients suspected of having an enlarged aorta will be found to have an abdominal aortic aneurysm, and only one quarter of those at high risk for rupture (>5 cm). Therefore, when a ruptured abdominal aortic aneurysm is suspected, imaging studies should be performed regardless of physical examination findings. Both obesity and abdominal examination not specifically directed at measuring aortic width appear to reduce the sensitivity of abdominal palpation in detecting abdominal aortic aneurysm.[2]

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COMMENTARY: CLINICAL IMPLICATION

Elderly patients comprise an ever growing proportion of emergency department (ED) patients and up to 10% present with a chief complaint of abdominal pain.[3] With evidence suggesting an increase in the incidence of abdominal aortic aneurysm,[4,5] anything emergency physicians can do to promptly recognize ruptured or asymptomatic abdominal aortic aneurysm should reduce overall mortality.

Regrettably, the majority of patients with ruptured abdominal aortic aneurysm die before reaching the ED, while even those who survive to hospital arrival suffer 50% mortality.[6] Although prompt diagnosis of ruptured abdominal aortic aneurysm decreases mortality,[7] less than 20% of patients will present with the classic triad (abdominal or back pain, pulsatile abdominal mass, hypotension), and more than 80% of abdominal aortic aneurysms that rupture have not been previously diagnosed.[8,9] Therefore, while the rapid diagnosis of abdominal aortic aneurysm may be lifesaving, it is often difficult. Moreover, alternative diagnoses are commonly entertained (eg, gastrointestinal pathology, renal colic), which further delays the diagnosis.

The data presented in this rational clinical examination installment are valuable in helping emergency physicians to diagnose an abdominal aortic aneurysm. Most important, this rational clinical examination abstract highlights the fact that physical examination is the only nonradiologic diagnostic technique that is important in the detection of an abdominal aneurysm. The technique is simple, well described (Figure), and useful. The presented data are appropriately stratified by aneurysmal size (Table). In the setting of a possible ruptured abdominal aortic aneurysm, larger aneurysms appear to be easier to detect, and positive likelihood ratios indicate that in a patient with moderate or high pretest probability of disease, identification of a palpable widened aorta may be valuable in substantially raising clinical suspicion. This may lead to an immediate decision to perform confirmatory imaging such as ultrasonography or, in circumstances where this is unavailable, may contribute significantly to a decision to consider immediate operative management, although the consequences of a false positive in this setting must be considered. Unfortunately, although positive likelihood ratios were high, negative likelihood ratios indicate the technique to be only moderately helpful in ruling out the disease, and therefore clearly inadequate to preclude imaging techniques such as ultrasonography.

- Place patient supine, knees flexed.
- With both hands palm-down on abdomen, each index finger on either side of the pulsation (each systole should move fingers apart), begin cephalad and left of umbilicus.
- Measure width.
- Aortas >2.5 cm merit radiologic evaluation.

Figure. Palpation technique for detecting abdominal aortic aneurysm.

The diagnosis of asymptomatic abdominal aortic aneurysm, although of less immediate concern to emergency physicians than the ruptured abdominal aortic aneurysm, represents a significant opportunity to prevent future morbidity and mortality. Recognizing the presence of abdominal aortic aneurysm before rupture reduces overall surgical mortality from 50% to 5%.[10]

TAKE HOME MESSAGE

Palpation to detect a widened aorta in the proper clinical setting appears likely to be quite valuable in raising the clinical suspicion for abdominal aortic aneurysm and may be considered diagnostic when positive in the setting of high pretest probability. Emergency physicians should perform a directed physical examination to detect a widened aorta when assessing all patients with abdominal pain who demonstrate risk factors for abdominal aortic aneurysm (eg, age older than 50 years, hypertension, vasculopathy) or whose clinical presentation suggests the possibility of ruptured abdominal aortic aneurysm. When ruptured abdominal aortic aneurysm is a diagnostic consideration, confirmation by diagnostic imaging should be rapidly sought.

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Table. Pooled sensitivities and likelihood ratios for asymptomatic abdominal aortic aneurysm.

	>3 cm	>4 cm	>5 cm
Sensitivity, %	39	—	76
Positive likelihood ratio (CI)	12 (7.4–9.5)	15.6 (8.6–28.5)	—
Negative likelihood ratio (CI)	0.72 (0.65–0.81)	0.51 (0.38–0.67)	—

CI, Confidence interval.

EBEM TEACHING POINT

Spectrum bias. Spectrums of age, sex ratio, and severity of disease may affect the validity or applicability of results in studies of diagnostic tests. Aortic aneurysm is a disease with a broad clinical spectrum. Although the term "aneurysm" is generally defined as localized dilation in a blood vessel, this can mean quantitatively (size) and qualitatively (eg, morphology, ruptured versus intact) varying entities. The size and location of the aneurysm will affect the ability of an examiner to identify its presence by palpation. Variations in these factors will affect sensitivity and specificity but may be unaccounted for or poorly accounted for in results reporting. Similarly, in retrospective studies using case-control designs, the only patients enrolled are those known to have the disease (cases) and those known not to have the disease (controls). This study sample poorly represents the true clinical spectrum of patients seen in clinical practice. This type of spectrum bias has also been shown to significantly and falsely increase sensitivity and specificity estimates of diagnostic tests and limit the generalizability of results to other settings.[11,12]

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