

# The Pinch-An-Inch Test Is More Comfortable Than Rebound Tenderness

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## Citation

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## Abstract

### Background:

Rebound tenderness (RBT) can be uncomfortable for patients with acute abdominal pain. We evaluated whether a new technique for detecting peritonitis (the "pinch-an-inch" test) is more comfortable than RBT in patients with acute abdominal pain.

### Methods:

We prospectively compared examination comfort using a crossover study design in patients with suspected appendicitis. Patient comfort was measured using a 10 cm VAS.

### Results:

For the primary outcome, we found that the pinch-an-inch was significantly more comfortable than RBT (25.2 cm vs. 50.8 cm,  $p < 0.001$ , 95% confidence interval of the difference of the mean = 15.0 - 36.4 cm). Sensitivity, specificity, positive predictive value, and negative predictive value of the pinch-an-inch did not statistically differ from that of RBT or the other peritoneal signs.

### Conclusions:

Pinch-an-inch is a simple examination technique that appears to be more comfortable for the patient than RBT.

## INTRODUCTION

Skilled physical examination remains the cornerstone for clinical evaluation of the acute abdomen.<sup>1</sup> Classic rebound tenderness (RBT) has long been a standard technique for examining patients with suspected appendicitis.<sup>2,3,4</sup>

However, many experts now believe it to be too uncomfortable to perform on patients with acute abdominal pain.<sup>1, 5, 6</sup> Medicine's renewed emphasis on preventing and alleviating acute pain make this issue particularly imperative.<sup>7, 8</sup> In an effort to improve patient comfort during the abdominal exam, we developed an alternate technique for detecting peritonitis. We term this the "pinch-an-inch" test.<sup>9, 10</sup> We hypothesize that pinch-an-inch results in less pain than RBT, while not compromising effectiveness.

## MATERIAL AND METHODS

This was a prospective comparative assessment of two physical exam techniques for evaluating patients with suspected appendicitis. The primary outcome of interest was patient comfort during the exam as measured by a 10-centimeter visual analog scale. Patients served as their own

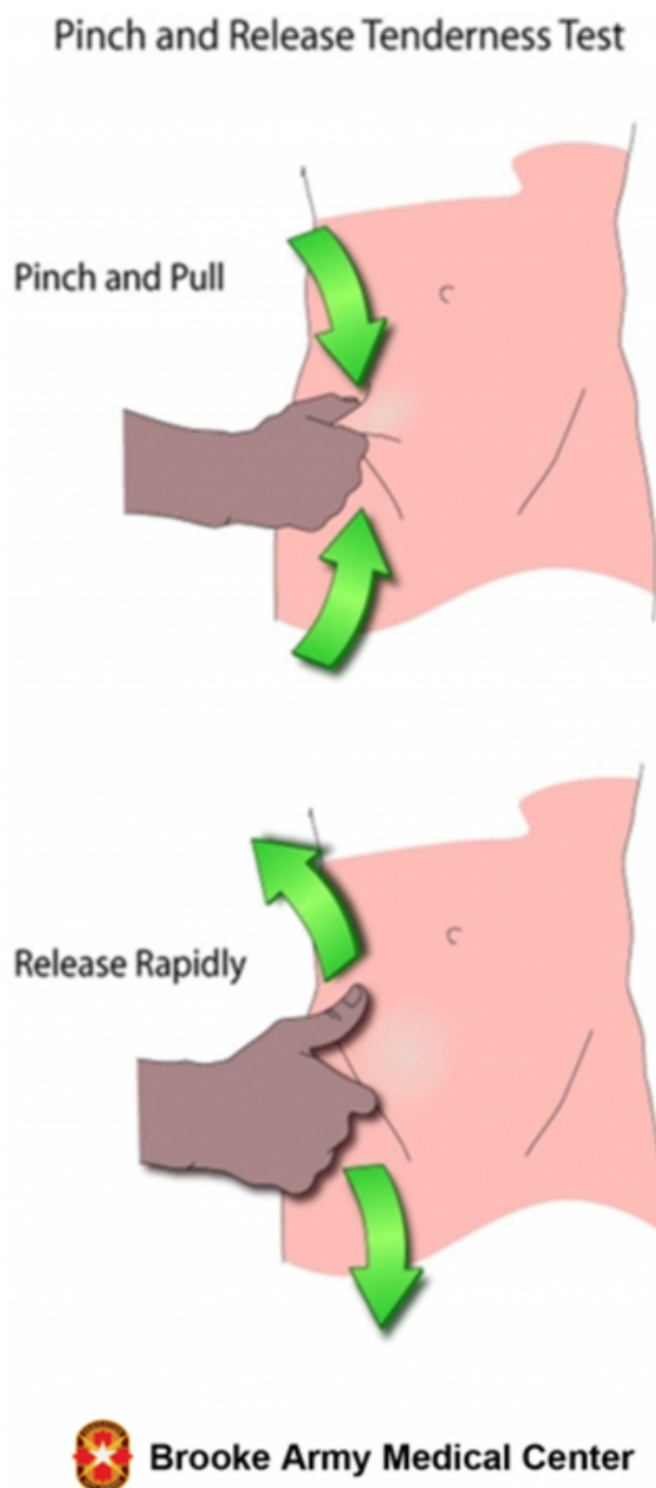
control in this crossover design. The setting was an academic emergency department with an annual census of 50,000 patients. A convenience sample of emergency department patients with acute abdominal pain gave informed consent. Exclusion criteria were: age <14 or a history of appendectomy. Exam sequence was randomized to first order to prevent either recency or learning biases. Sample size calculation for an  $\alpha$  value of 0.05 and  $\beta$  value of 0.80 with a two tailed hypothesis indicated a minimum of 31 patients to detect a 33% treatment effect in patient comfort.<sup>11</sup> The study was approved by the Institutional Review Board.

After performing the pinch-an-inch and RBT, patient comfort was serially measured using a 10 cm visual analog scale (with 0 = no discomfort and 10 = severe discomfort). Pinch-an-inch,<sup>9, 10</sup> (see figure 1) is performed by "pinching" a fold of abdominal skin at McBurney's point and elevating it away from the peritoneum. While holding the skin away from the peritoneum, the examiner asks the patient if it hurts. Since the skin is not then in contact with the peritoneum, it should not hurt if there is peritonitis. Then the examiner lets

the skin recoil back with its intrinsic elasticity. If the patient experiences increased discomfort when the skin fold strikes the peritoneum this constitutes a positive finding. RBT was performed in the classic manner (see figure 1) by pressing the examiner's fingers gently but deeply over the right lower quadrant of the abdomen for 15-30 seconds and then suddenly releasing the pressure.<sup>3, 12</sup> If the patient experienced increased discomfort during the “rebound”, this constitutes a positive test. Participating physicians underwent a brief training session and were given pocket cards with the exam techniques (see figure 1).

**Figure 1**

Figure 1: Demonstration of the Pinch-an-Inch Test



The examiners also conducted bedside tests for heel tap, Rovsing's, psoas, and obturator signs.<sup>1, 12</sup> If the patient was discharged to home from the emergency department, a follow-up call was placed within seven days. The phone interviewer assessed whether the patient's pain had resolved or if they underwent an appendectomy at another hospital

subsequent to the initial evaluation. Histopathologic examination of the specimen confirmed diagnoses of appendicitis.

For the primary outcome of patient comfort, we measured statistical significance with the student t-test. We defined a priori a clinically significant difference in comfort as a difference of the mean VAS score  $> 1.5$  cm (at  $p$  value  $< 0.05$ ).<sup>11</sup> In addition, we performed a sensitivity analysis with 95% confidence intervals of pinch-an-inch compared to RBT and other bedside techniques.

### **RESULTS**

We enrolled a total of 33 patients, of whom 30.3% ultimately were diagnosed with appendicitis. The average age of the cohort was 33.6 years (range = 15-75), 67% were female, and the admission rate was 51.5%. Follow-up was completed for 90.9% of the patients; three discharged patients could not be contacted telephonically to determine their ultimate outcome. Hospital records, however, confirmed that they did not undergo surgery at our institution.

For the primary outcome of patient comfort, we found that the pinch-an-inch was significantly more comfortable than RBT (25.2 cm vs. 50.8 cm,  $p < 0.001$ , 95% confidence interval of the difference of the mean = 15.0 - 36.4 cm). The sensitivity analysis of pinch-an-inch and the other bedside exam techniques are displayed in Table 1. Sensitivity, specificity, positive predictive value, and negative predictive value of the pinch-an-inch did not statistically differ from that of RBT or the other peritoneal signs.

### **DISCUSSION**

Pinch-an-inch is a simple technique which appears to be more comfortable for the patient undergoing evaluation for acute abdominal pain than RBT. RBT has been criticized frequently for creating excessive patient discomfort, but several studies have shown it to be quite accurate in the evaluation of appendicitis so its use should not be abandoned.<sup>4, 13</sup> Pinch-an-inch uses the same general principles as RBT. But rather than depressing the inflamed peritoneum to recoil up to the abdominal wall, it elevates the abdominal wall to allow recoil back down to the peritoneum. We believe this accounts for the demonstrated difference in patient discomfort. The technique potentially allows for a more objective and reproducible physical exam than RBT which requires the examiner to withdraw his hands rapidly enough to stay ahead of the natural recoil of the abdominal

wall.<sup>14</sup> RBT also requires that the physician does not further depress his hands in a form of “backswing”.<sup>9</sup> Pinch-an-inch in contrast allows for a more rapid and reproducible release of tension.

There were several important limitations in our study. The sample size was underpowered resulting in large confidence intervals for sensitivity and specificity. A minimum of 276 patients would be required to prove equivalent accuracy between pinch-an-inch and RBT. Interestingly, the sensitivity and specificity of all tests for peritonitis were all generally modest, a common if variable finding in the literature.<sup>12, 15</sup> However, exam findings must by necessity be placed in context of a complete history, physical and serial evaluation and should not be viewed out of context.<sup>1,2,3, 5, 12</sup> Finally, we had different examining physicians which may have reduced its accuracy. Future studies should look at the inter-observer reliability of this test.

Pinch-an-inch results in less discomfort for patients with acute abdominal pain. Any effort to alleviate suffering in these patients should be encouraged whenever possible.<sup>7, 8</sup> We plan a larger prospective study to better assess its accuracy in detecting peritonitis at the bedside.

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