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## Original Research

### Efficacy of Computed Tomography in detecting cases of Acute Appendicitis

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#### ABSTRACT

**Background:** Routine contrast-enhanced computed tomography (CECT) has been described as an accurate diagnostic imaging modality in patients with acute appendicitis. The present study was conducted to assess the efficacy of CT scan in diagnosing cases of acute appendicitis. **Materials & Methods:** The present study was conducted on 518 cases of suspected acute appendicitis. All abdominal CT scans were performed from diaphragm to the symphysis pubis using multi-detector helical CT scanners (MDCT) with intravenous contrast medium. **Results:** Out of 518 patients, males were 310 and females were 208. CT diagnosed 498 correctly. Sensitivity found to be 97.6%, specificity 82%, positive predictive value (PPV) of 75% and negative predictive value (NPV) of 94%. **Conclusion:** The role of CT scan in diagnosing cases of acute appendicitis is increasing. Authors found high sensitivity and specificity of CT scan.

**Key words:** Acute appendicitis, Computed tomography, Multi-detector

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## INTRODUCTION

Appendicitis should be considered in any person with undiagnosed abdominal pain. The incidence peaks between the ages 15 and 24. The concept that right lower quadrant pain in women of childbearing age is more complex clinical problem than in men and they historically had higher rates of negative laparotomy. Anderson<sup>1</sup> reported decreased diagnostic accuracy for appendicitis among women, particularly in the third decade of life. Clinical diagnosis of appendicitis is usually made on the basis of history, physical examination and laboratory studies but a variety of approaches have been used for diagnosis including ultrasound, helical computerized tomography (CT), clinical scoring systems, and neural network.

It is observed that due to risk-benefit ratio of the surgery, physicians generally accept that about 15 percent of appendectomies will reveal a normal appendix, although this rate varies with the population being considered.<sup>2</sup> In a healthy young man with right lower quadrant pain, this "negative appendectomy" rate is less than 10 percent, whereas it may reach 20 percent in a young woman due to other pelvic processes that obscure the diagnosis and alter the risk-benefit ratio. Young children and

patients over the age of 65 historically have higher rates of both perforated appendix and negative appendectomy.<sup>3</sup>

Routine contrast-enhanced computed tomography (CECT) has been described as an accurate diagnostic imaging modality in patients with acute appendicitis. However, most patients with acute appendicitis can be diagnosed by clinical findings and physical exam alone.<sup>4</sup> The present study was conducted to assess the efficacy of CT scan in diagnosing cases of acute appendicitis.

#### MATERIALS & METHODS

The present study was conducted in the department of Radiodiagnosis. It comprised of 518 cases of suspected acute appendicitis. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study. General information such as name, age, gender etc. was recorded. All abdominal CT scans were performed from diaphragm to the symphysis pubis using multi-detector helical CT scanners (MDCT) with intravenous contrast medium. A number of different CT scanners were used and axial section thickness evolved from 0.625 to 2.5 mm. Two radiologists evaluated the images to overcome bias. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

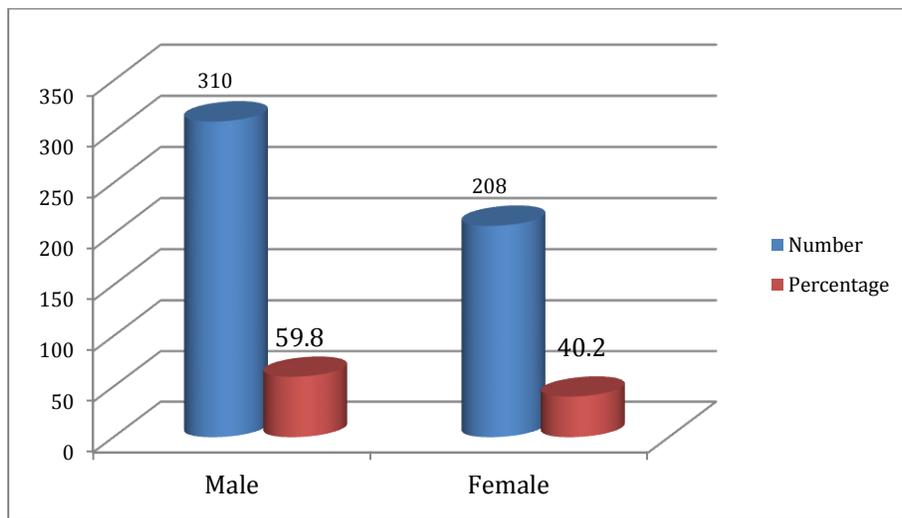
**RESULTS**

**Table I Distribution of patients**

Gender	Number	Percentage
Male	310	59.8
Female	208	40.2

Table I shows that out of 518 patients, males were 310 and females were 208.

**Graph I: Distribution of patients**

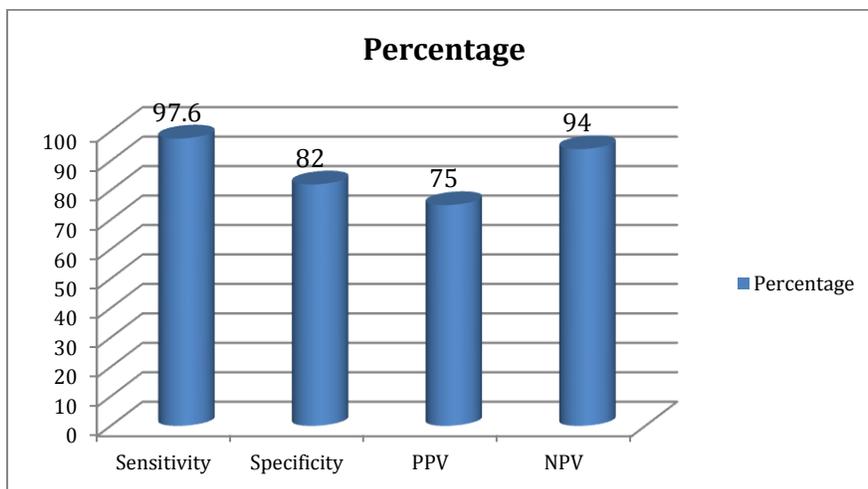


**Table II Efficacy of CT scan in diagnosis of acute appendicitis**

Total- 518	CT scan
Diagnosed by CT scan	498
Sensitivity	97.6
Specificity	82
PPV	75
NPV	94

Table II shows that out of 518 cases, CT diagnosed 498 correctly. Sensitivity found to be 97.6%, specificity 82%, positive predictive value (PPV) of 75% and negative predictive value (NPV) of 94%.

**Graph II: Efficacy of CT scan in diagnosis of acute appendicitis**



## DISCUSSION

The increased use of CT has been shown to decrease the negative appendectomy rate (NAR) without increase in delayed or false-positive diagnosis. Appendectomy has been the standard treatment for acute appendicitis for over a century. The treatment paradigm of uncomplicated acute appendicitis may be changing as operative treatment may be unnecessary for the majority of uncomplicated appendicitis patients. To optimize and tailor the treatment for acute appendicitis, precise and accurate diagnostic tools such as CT are required.<sup>5</sup>

When using CT to diagnose appendicitis, there are 2 main options: the standard abdominal and pelvic scan and the appendiceal scan with rectal contrast. The former displays classic patterns such as concentric, thickened appendiceal walls; an appendicolith, fat stranding, or other signs of inflammation. A phlegmon, abscess, or free air can also be suggestive of appendicitis. Contrast or air present within the lumen of the appendix virtually excludes the diagnosis of appendicitis. Based on a systematic review of patients with suspected appendicitis, the sensitivity and specificity of a pelvic and abdominal CT scan are 94 percent and 95 percent, respectively. The benefit of a complete abdominal scan is that alternative diagnoses are made in up to 15 percent of patients.<sup>6</sup> The present study was conducted to assess the efficacy of CT scan in diagnosing cases of acute appendicitis.

In present study, out of 518 patients, males were 310 and females were 208. Stroman et al<sup>7</sup> conducted a study with 107 patients consisting of 44 males (41%) and 63 females (59%) with a median age of 33 years (range 13 to 89 years) were imaged with CECT to evaluate suspected appendicitis. Of the 107 CECTs performed, 11 false-positive and 3 false-negative readings were identified, resulting in a sensitivity of 92%, specificity of 85%, PPV of 75%, NPV of 95%, and an overall accuracy of 90%. Forty-three patients were imaged with ultrasound and CECT, and CECT had significantly better sensitivity and accuracy (30% versus 92% and 69% versus 88%,  $P < 0.01$ ). With regard to clinical management, 100% (36/36) of patients with appendicitis, and 4.2% (3/71) of patients without appendicitis underwent appendectomy. Therefore, the overall negative appendectomy rate was 7.6% (3/39).

We found that CT diagnosed 498 correctly. Sensitivity found to be 97.6%, specificity 82%, positive predictive value (PPV) of 75% and negative predictive value (NPV) of 94%. Wagner et al<sup>8</sup> conducted a study in which eighty-eight of the 96 patients (91.6%) with acute appendicitis were correctly diagnosed by CT, 26 of the 28 patients (93%) without acute appendicitis were correctly diagnosed. Prospective interpretation of CT images yielded a sensitivity of 92 per cent and a specificity of 93 per cent for the diagnosis of acute appendicitis. There were eight false-negative scans. Of the total there were 88 true positives, 26 true negatives, 8 false negatives and no false positives.

Lietzen et al<sup>9</sup> found that out of the 1065 patients, 714 had acute appendicitis and 351 had other or no diagnosis on computed tomography. There were 700 true-positive, 327 true-negative, 14 false-positive, and 24 false-negative cases. The sensitivity and the specificity of computed tomography were 96.7% respectively. The rate of false computed tomography diagnosis was 4.2% for experienced consultant radiologists and 2.2% for inexperienced resident radiologists. Thus, the experience of the radiologist had no effect on the accuracy of computed tomography diagnosis.

## CONCLUSION

The role of CT scan in diagnosing cases of acute appendicitis is increasing. Authors found high sensitivity and specificity of CT scan.

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