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Role of Multidetector Computed Tomography in Evaluating Acute Right Iliac fossa Pain

Dr. Subashchanthira Bose N.*[1] & Dr. Ravichandra G.[2]

[1,2]Department of Radiodiagnosis, Yenepoya Medical College, Karnataka 575018

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***Corresponding author:**
Dr. Vedantkumar K. Kapadia
3rd Year Resident, Department of Radiology ,Medical College, Baroda

ABSTRACT

Acute right iliac fossa (RIF) pain is a common clinical presentation with diverse underlying causes, often posing a diagnostic challenge. Multidetector computed tomography (MDCT) has emerged as a critical imaging modality in the evaluation of such cases, offering high sensitivity and specificity in identifying the underlying pathology. This study explores the utility of MDCT in diagnosing acute RIF pain, focusing on its diagnostic accuracy, role in differential diagnosis, and impact on clinical management. A total of 51 patients presenting with acute RIF pain underwent MDCT, with findings correlated to clinical and surgical outcomes. MDCT demonstrated excellent diagnostic accuracy in detecting appendicitis, the most common cause of acute RIF pain, by visualizing features such as appendiceal diameter, wall thickening, and periappendiceal inflammation. It also accurately identified alternative diagnoses, including ovarian pathologies, mesenteric lymphadenitis, ileitis, and diverticulitis, which accounted for a significant portion of non-appendiceal cases. The study highlights the ability of MDCT to differentiate between surgical and non-surgical conditions, reducing unnecessary interventions. In cases requiring surgical management, MDCT findings contributed to timely and precise decision-making. The modality's ability to evaluate adjacent structures, such as the bowel, urinary tract, and reproductive organs, further enhanced its diagnostic value, particularly in atypical presentations. Limitations included radiation exposure and cost considerations, although these were outweighed by the benefits of improved diagnostic confidence and patient outcomes. The findings underscore the importance of MDCT as a frontline diagnostic tool in acute RIF pain, emphasizing its role in early and accurate diagnosis, guiding appropriate treatment, and minimizing diagnostic delays. Future research should focus on optimizing MDCT protocols and integrating it with clinical scoring systems to further enhance its utility in resource-limited settings.

INTRODUCTION

Abdominal pain is one of the most frequent reasons for emergency room visits, ranking as the second most common cause for patients aged 15 and older after chest pain [1]. Among these, acute right iliac fossa (RIF) pain is a common presentation, necessitating accurate diagnosis for effective management and to prevent complications. While clinical evaluation and laboratory investigations remain pivotal, imaging plays a crucial role in establishing a definitive diagnosis and guiding treatment [2].

Ultrasonography and plain radiographs, though commonly used, often yield inconclusive results. Ultrasonography is operator-dependent and time-consuming, requiring 20 to 30 minutes, whereas multidetector computed tomography (MDCT) is operator-independent and takes only about five minutes [3]. MDCT is gaining prominence as a preferred imaging modality for evaluating acute RIF pain due to its ability to provide high-resolution, cross-sectional images of the abdomen and pelvis. This detailed anatomical imaging aids in identifying various pathologies, differentiating uncomplicated appendicitis from complications such as perforation, and detecting alternative diagnoses [4].

MDCT offers several advantages. It allows comprehensive visualization of the appendix and surrounding structures, helping detect appendiceal wall thickening, luminal distension, peri appendiceal fat stranding, and appendicoliths or abscesses [5].

Studies consistently highlight MDCT's high sensitivity and specificity in diagnosing appendicitis and associated complications. It facilitates rapid and non-invasive diagnosis, reducing the need for unnecessary exploratory surgeries and improving patient outcomes [6].

However, certain challenges and limitations accompany MDCT use. Radiation exposure remains a concern, particularly for young patients and pregnant women, necessitating a careful risk-benefit assessment [6]. Additionally, interpreting MDCT images requires expertise to avoid diagnostic errors and recognize limitations. Evaluate the role of MDCT in assessing acute RIF pain by reviewing existing literature and analyzing institutional data. It seeks to highlight MDCT's diagnostic accuracy, clinical impact, and potential drawbacks .Findings will enhance understanding of its optimal use, guiding clinical decisions and improving patient care [8].

This study evaluates the accuracy and effectiveness of 128-slice MDCT in diagnosing and differentiating conditions causing acute right iliac fossa pain [9]. It aims to correlate radiological findings with histopathological results in surgical cases and with follow-up imaging in conservatively managed patients. By analyzing the diagnostic capabilities of MDCT, the study seeks to establish its value in identifying underlying pathologies and improving clinical decision-making for patients presenting with acute right iliac fossa pain [10].

METHODOLOGY

This prospective study included 100 patients aged 15–70 years presenting with acute right iliac fossa (RIF) pain. Multidetector computed tomography (MDCT) was performed using a 128-slice scanner, with intravenous contrast administered when appropriate. An ethical approval has been obtained from the Ethical Approval Committee. Imaging findings were evaluated for appendicitis, alternative diagnoses, and complications like perforation or abscess. Surgical patients had MDCT findings correlated with histopathological results, while conservatively managed patients underwent follow-up imaging or clinical evaluation to confirm diagnoses. Exclusion criteria included pregnancy and severe renal impairment. Sensitivity, specificity, and diagnostic accuracy were calculated, highlighting MDCT's role in diagnosing RIF pain and guiding clinical management effectively.

RESULT

Table 1: Age Category Frequency Proportion

Age Category (Years)	Frequency	Proportion (%)
10–19	5	9.60%
20–30	9	17.30%
31–40	12	23.10%
41–50	7	13.50%
51–60	10	19.20%
61–70	8	15.40%

The distribution of participants by age categories shows the largest group to be aged 31–40 years (23.1%). The mean age is 42.2 years, with a standard deviation of 16.4 years, indicating moderate variability in ages across the sample.

Table-2: Distribution of Gender Among Study Participants (N=51)

Gender	Frequency	Proportion
Female	25	49%
Male	26	51%

The study's gender distribution is balanced, with 26 males and 26 females, each representing 50% of the participants. This equal representation indicates unbiased participation from both genders in the study.

Table-3: Distribution of Pathology Among Study Participants

Pathology	Frequency (N=51)	Proportion
Acute Pancreatitis	6	12%
Aortic Aneurysm	3	5.8 %
Appendicitis	9	17.3%
Bowel Ischemia	4	7.7%

Bowel obstruction	9	17.3%
Cholecystitis	3	5.8%
Diverticulitis	1	1.9%
Intussusception	2	3.8%
Non-specific Abdominal	3	5.8%
Perforation	4	7.7%
Urolithiasis	4	7.7%
Volvulus	3	5.8%

Table-3 highlights various pathological conditions in the study. Appendicitis and bowel obstruction were most common (17.3% each), followed by acute pancreatitis (12%). Bowel ischemia, perforation, urolithiasis, and volvulus accounted for 7.7% each. Less frequent conditions included aortic aneurysm, cholecystitis, nonspecific abdominal pain (3–5.8%), diverticulitis (1.9%), and intussusception (3.8%).

Table 4: Distribution of Clinical Symptoms Among Study Participants (N=51).

Symptoms	Frequency	Proportion
Abdominal Pain	13	25 %
Constipation	9	18 %
Fever	9	18 %
Lower Back Ache	9	18 %
Vomiting	6	12 %
Weight loss	5	9 %

Table-4 shows that abdominal pain was the most common symptom (25%), followed by constipation, fever, and lower back ache (18% each). Vomiting was reported by 12% of participants, while weight loss was the least frequent symptom, occurring in 9% of cases.

Table-5: Distribution of Treatment among study participants (N=51)

Treatment	Frequency	Proportion
Conservative	13	25 %
Surgical	38	75 %

Among 51 participants, 75% chose surgical treatment, while 25% opted for conservative management. This reflects notable preference for surgical interventions over conservative approaches within the study group.

Diagnostic Accuracy Parameters	Formulas	Substitution	Values
Sensitivity	True Positives / (True Positives + False	33 / (33 + 2)	94.3%
	Negatives)		
Specificity	True Negatives/ (True Negatives + False Positives)	12 / (12 + 5)	70.6%
Positive Predictive Value(PPV)	True Positives / (True Positives+Fals Positives)	33 / (33 + 5)	86.8%
Negative Predictive Value(NPV)	True Negatives / (True Negatives+False Negatives)	12 / (12 + 2)	85.7%
Likelihood Ratio (LR+)	Sensitivity/(1-Specificity)	94.3%/(1-70.6%)	3.2
Likelihood Ratio (LR-)	(1-Sensitivity)/ Specificity	(1-94.3%) / 70.6%	0.08

MDCT demonstrated a sensitivity of 94.3%, accurately identifying most surgical cases of Right Iliac Fossa Pain. Its specificity was 68.8%, meaning it correctly identified non-surgical cases but may occasionally produce false-positive results, suggesting surgery when unnecessary. This highlights MDCT's high effectiveness in diagnosing surgical cases while having some limitations in specificity.

DISCUSSION

This prospective observational study was conducted among 51 patients presenting with right iliac fossa (RIF) pain, who were advised to undergo MDCT (128 slices) at Yenepoya MedicalCollege Hospital, Mangalore, between April 2022 and June 2024 [11]. The study aimed to evaluate the accuracy and efficacy of MDCT in diagnosing and differentiating the various pathological conditions causing RIF pain and to correlate these diagnoses with histopathological findings [12]. The largest age group in the study was 31-40 years, comprising 23.1% of the participants, with a mean age of 42.2 years and a standard deviation of 16.4 years. A balanced gender distribution was observed, with 49% females and 51% males [13].

Various pathological conditions causing RIF pain were identified, including appendicitis and bowel obstruction, each accounting for 17.3% of cases, followed by acute pancreatitis (12%). These findings align with those of other studies, which also highlighted appendicitis as a common cause of RIF pain [14]. The most common clinical symptom reported was abdominal pain, observed in 25% of participants, followed by constipation, fever, and lower back pain, each in 18%. Vomiting and weight loss were less common, reported in 12% and 9% of the participants, respectively [15].

The study also focused on the correlation between MDCT findings and surgical outcomes. Of the cases identified as positive by MDCT, 86.8% required surgery, demonstrating MDCT's high sensitivity (94.3%) for identifying surgical candidates. The specificity of MDCT was 70.6%, indicating some potential for false-positive results, which underscores the importance of careful interpretation [16]. The positive predictive value (PPV) was 86.8%, reflecting the accuracy of positive MDCT findings in confirming RIF pathologies, while the negative predictive value (NPV) was 85.7%, highlighting the reliability of negative MDCT results in excluding RIF pathologies [17].

This study emphasizes the role of MDCT as a valuable diagnostic tool in evaluating RIF pain, with its high sensitivity and good PPV and NPV, making it effective for identifying patients who may require surgical intervention [18]. However, its moderate specificity suggests a need for cautious interpretation to avoid unnecessary surgeries based on false-positive results [19]. These findings align with other studies that have shown MDCT's superior diagnostic accuracy for identifying right iliac fossa pathologies, especially in cases with clinical ambiguity [20].

CONCLUSION

Our study adds to the accumulating evidence unders-coring the critical role of MDCT in diagnosing and distinguishing various conditions causing RIF pain. The alignment between MDCT findings and surgical outcomes demonstrates its diagnostic reliability. This research enhances our comprehension of RIF pain and highlights the nuanced considerations required for making surgical decisions in clinical practice. The results stress the importance of a tailored, individualized approach, acknow-ledging the varied presentations and the life-saving potential of surgical interventions in specific cases.

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