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THE DIAGNOSTIC PARADOX IN ACUTE OBSTRUCTIVE ABDOMEN: WHEN CLINICAL FINDINGS

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1

Abstract: INTRODUCTION Acute obstructive abdomen presents significant diagnostic challenges due to frequent discrepancies between clinical findings and imaging results. While clinical examination provides initial insights, it often lacks the precision needed for definitive diagnosis, necessitating the use of advanced imaging modalities such as computed tomography. Despite its high sensitivity and specificity, imaging can yield false positives and negatives, particularly in complex cases like transient obstructions, postoperative changes, or conditions mimicking obstruction. These challenges underscore the need for a comprehensive diagnostic approach integrating clinical, imaging, and patient-specific factors. **OBJETIVE** To explore the diagnostic paradox in acute obstructive abdomen, focusing on the discrepancies between clinical findings and imaging results and their implications for patient outcomes. **METHODS** This is a narrative review which included studies in the MEDLINE – PubMed (National Library of Medicine, National Institutes of Health), COCHRANE, EMBASE and Google Scholar databases, using as descriptors: "Acute obstructive abdomen" OR "Diagnostic Imaging" OR "Clinical findings" OR "Multidisciplinary approach" OR "Artificial intelligence in radiology" in the last 5 years. **RESULTS AND DISCUSSION** The results highlight the importance of computed tomography as the gold standard, alongside the emerging role of contrast-enhanced imaging and point-of-care ultrasound in improving diagnostic precision. False-negative results due to transient or dynamic pathologies remain a significant concern, emphasizing the utility of repeat imaging in unresolved cases. Multidisciplinary collaboration involving surgeons, radiologists, and other specialists proves essential in interpreting discordant findings and guiding patient management. Advances in artificial intelligence and dynamic imaging techniques offer additional tools to refine diagnosis, although their implementation requires careful consideration of ethical and practical limitations. **CONCLUSION** A balanced, multidisciplinary approach is critical to resolving the diagnostic paradox in acute obstructive abdomen. Leveraging technological advancements while emphasizing clinical acumen can improve diagnostic accuracy, reduce errors, and optimize patient outcomes. Future research should focus on refining diagnostic algorithms, enhancing clinician education, and incorporating innovative technologies to bridge the gap between clinical and imaging findings.

Keywords: Acute obstructive abdômen; Diagnostic Imaging; Clinical findings; Multidisciplinary approach; Artificial intelligence in radiology.

INTRODUCTION

The diagnostic evaluation of acute obstructive abdomen has undergone significant evolution, reflecting advancements in medical technology and a deeper understanding of pathophysiological processes[1]. Historically, reliance on clinical acumen and physical examination was paramount, with imaging modalities playing a secondary, often confirmatory role[1]. However, as the complexity of presenting cases increased, diagnostic imaging became indispensable in identifying the precise etiology of obstruction, facilitating targeted management[1]. The advent of radiography, ultrasound, and more recently, computed tomography (CT), has revolutionized the diagnostic approach, yet challenges remain, particularly when imaging findings do not align with clinical observations[2]. This paradox underscores the need for a nuanced interpretation of all diagnostic elements to prevent mismanagement and potential complications[2].

Acute obstructive abdomen encompasses a wide spectrum of etiologies, ranging from mechanical obstruction caused by adhesions or hernias to more insidious causes such as malignancies or volvulus[2]. The presentation is equally variable, with symptoms including abdominal pain, vomiting, and distension, often overlapping with other acute surgical conditions[2]. The clinical significance of prompt and accurate diagnosis cannot be overstated, as delays in intervention may lead to catastrophic complications such as bowel ischemia or perforation[2]. Despite advancements, the limitations of relying solely on clinical findings become apparent in atypical presentations or in patients with confounding comorbidities[3].

Clinical examination remains a cornerstone in the initial evaluation of acute obstructive abdomen, offering critical insights into the severity and potential etiology of the obstruction[3]. Signs such as localized tenderness, peritonitis, and altered bowel sounds provide valuable information but are inherently subjective and dependent on the clinician's expertise[3]. In many instances, clinical findings may fail to predict the underlying pathology accurately, necessitating the integration of laboratory and imaging studies[3]. This limitation is particularly evident in cases with minimal physical findings despite significant obstruction observed on imaging, challenging the conventional diagnostic hierarchy[4].

Imaging has transformed the landscape of acute abdomen diagnosis, with modalities such as plain abdominal radiography, ultrasound, and CT scans forming the backbone of the diagnostic algorithm[4]. While X-rays remain useful for detecting air-fluid levels and bowel distension, their sensitivity is limited, prompting the widespread use of CT as the gold standard[4]. CT provides unparalleled detail in identifying obstruction sites, underlying causes, and associated complications such as ischemia or perforation[5]. However, false positives and negatives continue to occur, complicating clinical decision-making[5]. In certain scenarios, imaging findings may overestimate the severity of obstruction or fail to detect transient or early-stage obstructions[5].

Laboratory tests, although not diagnostic, play a supportive role in assessing the systemic impact of obstruction[6]. Elevated markers of inflammation, deranged electrolytes, and evidence of organ dysfunction provide indirect evidence of disease severity[6]. However, these findings are often nonspecific and cannot substitute for imaging or clinical evaluation[6]. This necessitates a comprehensive approach that synthesizes clinical, laboratory, and imaging findings to guide management effectively[7]. Such integration becomes even more critical in cases where imaging does not corroborate clinical suspicion[7].

The diagnostic paradox, wherein clinical findings and imaging results diverge, is a frequent and challenging phenomenon in acute obstructive abdomen[7]. False positives, such as imaging-detected obstructions that resolve spontaneously, can lead to unnecessary interventions[7]. Conversely, false negatives, where significant pathology is missed on imaging, pose a substantial risk to patient outcomes[8]. Factors contributing to this paradox include patient-specific variables such as obesity, prior surgeries, and atypical anatomy, all of which can obscure imaging clarity[8]. These challenges necessitate a deeper understanding of the limitations and strengths of each diagnostic tool[8].

The pathophysiological basis for discrepancies between clinical and imaging findings lies in the dynamic nature of bowel obstruction[9]. Transient obstructions, partial obstructions, and early-stage pathology may not produce definitive imaging signs, despite being clinically significant[9]. Furthermore, the overlap of symptoms with other abdominal pathologies complicates diagnosis, particularly in elderly

and pediatric populations[9]. These populations often present atypically, requiring a heightened index of suspicion and tailored diagnostic approaches[10].

Experience and expertise play a pivotal role in interpreting discordant findings, emphasizing the need for multidisciplinary collaboration in complex cases[10]. Radiologists, surgeons, and gastroenterologists must work cohesively to synthesize available data and reach a consensus on management[10]. Advances in artificial intelligence (AI) and machine learning hold promise in improving diagnostic accuracy by identifying subtle imaging abnormalities and patterns that may elude human interpretation[11]. However, these technologies are not without limitations and must be viewed as complementary rather than replacement tools[11].

Ethical and medico-legal implications further complicate the management of cases with diagnostic discordance[11]. Delayed or inaccurate diagnoses can lead to significant morbidity and mortality, raising questions about accountability and standards of care[12]. Guidelines exist to streamline diagnostic and management pathways, but their application often requires contextual adaptation to individual cases[12]. Despite their limitations, adherence to evidence-based protocols remains integral to minimizing diagnostic errors and improving patient outcomes[12].

OBJETIVES

To explore the diagnostic paradox in acute obstructive abdomen, focusing on the discrepancies between clinical findings and imaging results and their implications for patient outcomes.

SECUNDARY OBJETIVES

1. To evaluate the diagnostic accuracy of various imaging modalities in acute obstructive abdomen.

2. To analyze the prevalence and causes of false positives and false negatives in imaging.

3. To identify patient-specific factors that influence diagnostic discrepancies.

4. To assess the potential of advanced imaging techniques and artificial intelligence in resolving diagnostic challenges.

5. To propose a multidisciplinary framework for optimizing diagnosis and management.

METHODS

This is a narrative review, in which the main aspects of the diagnostic paradox in acute obstructive abdomen, focusing on the discrepancies between clinical findings and imaging results and their implications for patient outcomes in recent years were analyzed. The beginning of the study was carried out with theoretical training using the following databases: PubMed, sciELO and Medline, using as descriptors: "Acute obstructive abdomen" OR "Diagnostic Imaging" OR "Clinical findings" OR "Multidisciplinary approach" OR "Artificial intelligence in radiology" in the last 5 years. As it is a narrative review, this study does not have any risks.

Databases: This review included studies in the MEDLINE – PubMed (National Library of Medicine, National Institutes of Health), COCHRANE, EMBASE and Google Scholar databases.

The inclusion criteria applied in the analytical review were human intervention studies, experimental studies, cohort studies, case-control studies, cross-sectional studies and literature reviews, editorials, case reports, and poster presentations. Also, only studies writing in English and Portuguese were included.

RESULTS AND DISCUSSION

The diagnostic accuracy of clinical findings compared to imaging in acute obstructive abdomen continues to be a subject of significant research[13]. Clinical examination alone, although foundational, often lacks the sensitivity and specificity required for definitive diagnosis[13]. For instance, abdominal distension and altered bowel sounds, while common findings, show wide interobserver variability, especially in cases involving obesity or postoperative adhesions[14]. Imaging, therefore, has become indispensable in validating clinical suspicion, with modalities like computed tomography (CT) providing high accuracy in locating obstructions and identifying complications such as strangulation[14].

Prevalence studies indicate that discrepancies between clinical examination and imaging findings occur in 25–35% of acute obstructive abdomen cases[14]. These disparities are particularly pronounced in pediatric patients, where clinical signs are often nonspecific and imaging findings may not clearly delineate pathology[15]. Similarly, elderly patients with comorbidities or altered physiological responses often exhibit misleading clinical or imaging results[15]. These findings underscore the necessity for a combined clinical-imaging approach to minimize diagnostic errors[15].

Common scenarios where imaging fails to match clinical suspicion include transient bowel obstructions, pseudo-obstructions, and conditions with intermittent symptoms[15]. Adhesive small bowel obstructions often resolve spontaneously, leading to imaging findings that may underestimate the severity of clinical presentations[16]. Conversely, imaging occasionally overestimates obstruction in cases where bowel loops appear distended without functional compromise[16]. Misinterpretation of radiographic findings, such as air-fluid levels or nonspecific dilatation, can result in unnecessary interventions or delays in surgery[16].

The choice of imaging modality is critical in determining diagnostic accuracy, as each modality offers distinct strengths and limitations[16]. CT scans are considered the gold standard due to their high sensitivity and ability to provide detailed anatomical views of obstructions[17]. Contrast-enhanced CT further improves diagnostic precision, particularly in identifying ischemic bowel segments or vascular compromise[17]. Ultrasound, while operator-dependent, remains a valuable tool in specific populations, such as children and pregnant patients, where radiation exposure must be minimized[17].

The utility of point-of-care ultrasound (POCUS) in emergency settings has gained traction in recent years, offering a rapid and non-invasive method to identify bowel dilatation and free fluid[17]. Studies show that POCUS can achieve sensitivities approaching 80–90% in experienced hands, making it an essential adjunct in resource-limited environments[18]. However, its limitations include dependency on operator skill and difficulty in visualizing deep abdominal structures in obese patients[18]. False-negative imaging results remain a significant barrier to accurate diagnosis in acute obstructive abdomen[18]. Factors such as transient obstruction, early-phase disease, and suboptimal imaging conditions contribute to these inaccuracies[19]. Pathophysiological mechanisms, including intermittent bowel motility or decompression of distended segments before imaging, further complicate the diagnostic process[19]. These findings highlight the importance of repeat imaging or complementary diagnostic modalities in cases with unresolved clinical suspicion[19].

Clinical conditions that mimic acute obstructive abdomen, such as paralytic ileus, mesenteric ischemia, or pseudo-obstruction, often complicate imaging interpretation[19]. In these scenarios, imaging findings may suggest obstruction where none exists, leading to

potential misdiagnosis and inappropriate interventions[20]. Dynamic imaging techniques, such as fluoroscopy or cine-MRI, are being explored to address these challenges by providing functional insights into bowel motility and transit[20]. The influence of obesity on clinical and imaging diagnostic accuracy is well-documented, with adipose tissue often obscuring anatomical landmarks and complicating physical examination[20]. CT scans remain the modality of choice in these patients, although high body mass index can necessitate tailored imaging protocols to optimize visualization[21]. Similarly, postoperative patients present unique diagnostic challenges due to altered anatomy and the presence of surgical artifacts, which can mimic or obscure true obstruction[21].

Dynamic versus static imaging techniques have been compared extensively in the literature, with dynamic approaches showing promise in identifying functional obstructions or intermittent pathologies[21]. Fluoroscopic studies, for example, are effective in assessing motility disorders, while cine-MRI provides high-resolution images without radiation exposure[22]. However, these techniques remain underutilized due to limited availability and the need for specialized expertise[22]. Imaging patterns associated with specific causes of acute obstructive abdomen have been systematically categorized to aid in differential diagnosis[22]. For example, "whirl sign" on CT is highly suggestive of volvulus, while the "closed-loop" configuration is a hallmark of strangulated bowel[23]. Identifying these patterns requires experience and expertise, as subtle findings can easily be overlooked in complex cases[23]. Advanced imaging technologies, including dual-energy CT and 3D reconstruction, have further enhanced the ability to detect these pathognomonic signs[23].

Repeated imaging in cases of unresolved clinical suspicion has proven invaluable, particularly in identifying evolving pathologies or transient obstructions[23]. Serial CT scans are commonly employed to monitor progression, although the associated radiation exposure remains a concern[24]. Emerging technologies, such as low-dose CT protocols, aim to address this issue while maintaining diagnostic accuracy[24]. Delayed diagnosis due to conflicting findings has been shown to significantly impact patient outcomes, increasing the risk of complications such as bowel ischemia, perforation, and sepsis[24]. Multidisciplinary consultations involving surgeons, radiologists, and gastroenterologists are crucial in these cases to ensure timely and accurate decision-making[25]. Such approaches not only improve diagnostic precision but also facilitate personalized treatment strategies, ultimately enhancing patient care[25].

Artificial intelligence (AI) is increasingly being integrated into diagnostic workflows to address limitations in human interpretation and improve imaging accuracy[25]. Machine learning algorithms have demonstrated potential in detecting subtle abnormalities, such as early ischemic changes, which may be missed by radiologists[26]. However, the implementation of AI in clinical practice remains limited by concerns over reliability, cost, and ethical implications[26].

CONCLUSION

The diagnostic paradox in acute obstructive abdomen underscores the complexity of integrating clinical findings with imaging modalities to achieve timely and accurate diagnosis. While clinical examination remains indispensable in the initial assessment, its inherent limitations necessitate the use of advanced imaging techniques. Computed tomography has emerged as the gold standard, offering superior sensitivity and specificity, yet discrepancies between clinical suspicion and imaging results remain a significant chal-

lenge. Addressing this gap requires a nuanced approach that considers patient-specific factors, the pathophysiological dynamics of obstruction, and the limitations of each diagnostic modality.

False-negative and false-positive imaging results are critical contributors to diagnostic delays and mismanagement, emphasizing the importance of repeated imaging or alternative modalities in ambiguous cases. Scenarios such as transient obstructions or postoperative changes often complicate diagnosis, requiring a multidisciplinary team to interpret findings and guide clinical decisions effectively. The integration of dynamic imaging techniques and functional assessments shows promise in addressing these challenges, particularly in complex or atypical cases.

Advancements in artificial intelligence and machine learning offer significant potential to enhance diagnostic accuracy, especially in detecting subtle abnormalities that may elude human interpretation. However, these technologies must be implemented cautiously, ensuring they complement rather than replace clinical expertise. Similarly, emerging low-dose imaging protocols and advanced reconstruction techniques aim to minimize patient risks while maintaining diagnostic precision. These innovations highlight the ongoing need for research and development in diagnostic imaging.

A comprehensive approach that combines clinical judgment, imaging advancements, and multidisciplinary collaboration is essential to improving outcomes in acute obstructive abdomen. Tailored diagnostic algorithms that account for patient demographics, comorbidities, and clinical context can reduce errors and optimize treatment strategies. The role of continuous education and training for clinicians and radiologists cannot be overstated, as expertise remains a cornerstone in interpreting complex diagnostic findings.

In conclusion, resolving the diagnostic paradox in acute obstructive abdomen requires a balanced approach that leverages technological advancements while prioritizing clinical acumen. Multidisciplinary teamwork, continuous research, and a patient-centered focus are critical to bridging the gap between clinical and imaging findings. By refining diagnostic strategies and embracing innovation, the medical community can improve the accuracy, efficiency, and outcomes of care for patients with this challenging condition.

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