

Colorectal cancer in older adults: Challenges in radiological diagnosis for therapeutic decision-making

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Abstract

Colorectal cancer in older adults presents significant clinical and diagnostic challenges due to its atypical presentation and the frequent coexistence of comorbidities such as cardiovascular disease, diabetes, and cognitive impairment. These factors directly influence treatment selection and prognosis, highlighting the importance of comprehensive geriatric assessments, including frailty evaluation using tools like the FI-CGA-10. Frailty is highly prevalent in this population and affects both treatment tolerance and follow-up planning. Ethical considerations, including respect for autonomy and quality of life, are central when defining individualized therapeutic goals.

Radiological imaging plays a crucial role in the diagnosis, staging, and therapeutic planning of colorectal cancer. Modalities such as contrast-enhanced computed tomography, virtual colonoscopy, magnetic resonance imaging, and endorectal ultrasound provide critical information, although their application in older adults is often limited by anatomical constraints, functional limitations, and contrast intolerance. Alternative techniques like video capsule endoscopy offer less invasive options with high diagnostic yield.

Interpretation of imaging must consider age-related physiological changes and potential artifacts from prosthetic devices. Therapeutic decision-making should integrate radiological findings with functional assessments and comorbidity profiles, adopting a multidisciplinary approach that prioritizes patient safety and preferences.

To enhance diagnostic accuracy, adapted imaging protocols, specialized training in geriatric radiology, and artificial intelligence tools are recommended. AI supports early frailty detection and personalized care planning. Interdisciplinary coordination among radiologists, oncologists, and geriatricians promotes a patient-centered care model that delivers tailored, clinically relevant interventions for older adults with colorectal cancer.

Keywords: Colorectal Cancer; Older Adults; Frailty; Diagnostic Imaging; Comorbidities; Therapeutic Planning

1. Introduction

Colorectal cancer represents one of the leading causes of cancer-related morbidity and mortality worldwide. In the United States, it accounts for approximately 10% of all cancer cases and deaths, highlighting its significant burden on

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the healthcare system (1). Globally, colorectal cancer ranks third in incidence and second in mortality among all malignancies, underscoring its relevance as a global public health concern (2).

While recent trends show a rising incidence of colorectal cancer among younger adults, the highest proportion of cases continues to occur in individuals over 65 years of age (1; 3). This pattern is closely linked to the aging of the global population a demographic shift that has contributed to the increasing prevalence of chronic diseases, including colorectal cancer. Older adults thus represent a particularly vulnerable group, not only due to the higher incidence of disease but also because of the complex diagnostic and therapeutic challenges they present (3).

In regions with higher sociodemographic indices, the burden of colorectal cancer is even more pronounced. This underscores the need for early detection, diagnostic, and treatment strategies tailored to the needs of older populations (4).

Within this context, radiological imaging plays a pivotal role in the management of colorectal cancer. Imaging is essential for disease staging, which directly informs the therapeutic approach, especially in older patients whose comorbidities and frailty may significantly influence clinical outcomes (2).

Techniques such as computed tomography, magnetic resonance imaging, and positron emission tomography are critical for assessing the extent of the primary tumor, regional lymph node involvement, and distant metastases. These modalities not only establish the clinical stage but also support multidisciplinary decision-making processes, helping to determine whether surgical, oncological, or palliative interventions are most appropriate based on the patient's overall health and functional status (2).

To analyze the specific challenges associated with radiological diagnosis of colorectal cancer in older adults and to examine how imaging findings influence therapeutic decision-making in this population. The article aims to highlight the clinical, functional, and technical factors that affect diagnostic accuracy and treatment planning, emphasizing the need for age-adapted strategies in a multidisciplinary care context.

The aim of this article is to examine the specific challenges involved in the radiological diagnosis of colorectal cancer in older adults and to explore how imaging findings influence therapeutic decision-making in this population.

2. Methodology

To develop this narrative review on colorectal cancer in older adults, with a focus on the challenges of radiological diagnosis and its implications for therapeutic decision-making, a comprehensive literature search was conducted. The objective was to examine diagnostic limitations specific to this population, analyze how age-related physiological and functional factors affect imaging accuracy, and explore how radiological findings guide or hinder treatment selection. Special emphasis was placed on the role of imaging in clinical staging, surgical planning, and the evaluation of operability in elderly patients with comorbidities and functional decline.

The literature review was based on a structured search of well-established scientific databases, including PubMed, Scopus, and Web of Science, chosen for their relevance in radiology, oncology, geriatrics, and surgical decision-making. Rigorous inclusion and exclusion criteria were applied to ensure scientific validity and clinical applicability. Only peer-reviewed articles published between 2019 and 2025, in English or Spanish, were considered. Eligible studies addressed topics such as the use of diagnostic imaging in colorectal cancer staging, the impact of frailty and comorbidity on radiological evaluation, geriatric-specific considerations in imaging protocols, and how radiological findings influence treatment planning. Editorials, case reports, and articles lacking methodological rigor or full text were excluded. Keywords used in the search included: colorectal cancer, older adults, frailty, diagnostic imaging, comorbidities, therapeutic planning.

A total of 29 relevant sources were selected, including original research articles, systematic reviews, clinical guidelines, and expert consensus statements. A qualitative and thematic analysis was conducted to synthesize current evidence, identify diagnostic and therapeutic challenges in the elderly population, and highlight areas requiring further research to improve individualized and multidisciplinary management.

3. Clinical and geriatric aspects of colorectal cancer

In older adults with colorectal cancer, the clinical presentation is often nonspecific and atypical, which significantly complicates early and accurate diagnosis. Unlike younger patients, who may exhibit classic symptoms such as rectal bleeding or changes in bowel habits, older individuals frequently present with vague complaints like fatigue, weight loss, or mild abdominal discomfort symptoms that are easily misattributed to normal aging or pre-existing chronic conditions (5).

This population is also commonly affected by multiple comorbidities, including cardiovascular disease, diabetes mellitus, and cognitive decline, all of which influence diagnostic choices, treatment options, and overall clinical outcomes. Comorbid conditions have been independently associated with decreased overall survival, underscoring the importance of a comprehensive assessment that goes beyond oncologic staging to incorporate general medical and functional status (6).

In this context, frailty and functional assessment have become essential tools in guiding clinical decision-making. Frailty is highly prevalent among older patients with colorectal cancer, with a substantial proportion categorized as pre-frail or frail conditions that directly impact treatment selection and follow-up planning (5; 7). The FI-CGA-10 is one validated tool for assessing frailty in this population, as it integrates multiple domains including cognition, mobility, and ability to perform activities of daily living. Strong correlations have been observed between frailty levels and impairments in these functional areas, reinforcing the value of routine geriatric assessments (7).

Ethical considerations also play a central role in the oncologic care of older adults. Respect for patient autonomy and preservation of quality of life are core principles in treatment planning, particularly when prognosis is limited or interventions carry substantial risks. These discussions often require clear and compassionate communication with both the patient and their family to align therapeutic goals with individual values (5).

Furthermore, prognostic evaluations must account for both the severity and number of comorbidities, as these are key predictors of survival outcomes (6). The complexity of managing colorectal cancer in the elderly highlights the urgent need for more inclusive clinical trials that actively enroll older adults with diverse functional profiles, thereby generating robust evidence applicable to this growing patient population (3).

4. Imaging modalities in the diagnosis of colorectal cancer

Radiological imaging plays a central role in the diagnosis and staging of colorectal cancer, offering critical information for treatment planning particularly in older adults, where comorbidities and functional limitations may influence the feasibility of invasive procedures. Among the available modalities, computed tomography colonography, also known as virtual colonoscopy, has emerged as a valuable screening tool, especially for individuals at increased risk for complications from traditional optical colonoscopy. This technique is less invasive and better tolerated by patients, contributing to higher acceptance rates and potentially improving screening adherence (8; 9). However, despite its advantages, virtual colonoscopy has limitations. Its sensitivity diminishes for lesions smaller than 6 mm and it may inadequately visualize abnormalities located near the anal canal, particularly in the anterior wall (10). Moreover, incidental extracolonic findings can complicate interpretation and lead to unnecessary follow-up investigations (11).

Contrast-enhanced computed tomography is widely used for detecting colorectal lesions and for staging the disease. It provides detailed anatomical images that are essential for assessing tumor size, location, and potential invasion into adjacent structures. This modality is particularly useful for staging advanced colorectal cancer and supports clinicians in selecting appropriate therapeutic strategies (12).

In cases of rectal cancer, magnetic resonance imaging is considered the modality of choice due to its superior soft tissue resolution. MRI enables precise assessment of the tumor's relationship with surrounding pelvic organs and is indispensable in planning for surgical resection or radiotherapy (13; 14). Accurate local staging through MRI also guides the decision between neoadjuvant therapy and primary surgical intervention (14).

Endorectal ultrasound is another imaging technique with high precision in evaluating early-stage rectal cancer. It allows for detailed visualization of the depth of tumor invasion and involvement of perirectal tissues. However, its use is limited by its operator-dependent nature and technical challenges, which reduce its applicability in general clinical settings (12).

Lastly, positron emission tomography combined with computed tomography (PET-CT) has specific indications in colorectal cancer, particularly for detecting local recurrence and distant metastases. In older adults, its utility must be carefully considered, as comorbid conditions, reduced functional reserve, and age-related physiological changes may affect both the feasibility of the procedure and the interpretation of findings (12).

5. Radiological challenges in older adults

Diagnosing colorectal cancer in older adults presents several anatomical and functional challenges that may compromise the accuracy and safety of radiological and endoscopic procedures. One of the most frequent issues is colonic distension, often accompanied by reduced mobility, which can complicate the execution of conventional diagnostic techniques such as colonoscopy. These limitations are particularly relevant in frail individuals or those with neurocognitive impairment. For instance, patients with dementia are not only less likely to tolerate these procedures but also face a higher risk of non-colonoscopy-related complications, including renal and pulmonary events (15).

Another major concern in this population is intolerance to contrast agents, which can pose a barrier to procedures such as computed tomography colonography. Nevertheless, recent studies suggest that adequate bowel preparation can be achieved without imposing strict dietary restrictions, which may increase patient compliance and reduce discomfort during the preparatory phase (16).

Procedural challenges extend to both the physical and physiological demands of bowel preparation and sedation, which are frequently poorly tolerated by older adults. These difficulties limit the feasibility of standard colonoscopy and call for less invasive alternatives. One such method is video capsule endoscopy, which has demonstrated both safety and high diagnostic yield in geriatric populations, offering a valuable tool for patients who are unfit for traditional procedures (17).

In addition, imaging artifacts caused by prosthetic devices and degenerative joint conditions such as osteoarthritis can impair image clarity, particularly in computed tomography colonography. These artifacts can obscure colonic segments, complicating the detection of lesions or polyps (18).

Interpretation of imaging findings is further complicated by age-related physiological changes, which may alter tissue characteristics and anatomical landmarks. These variations increase the risk of misdiagnosis, either by underestimating malignant lesions or by overinterpreting benign findings as suspicious. Furthermore, high-risk colorectal surgeries in older adults have been associated with a greater likelihood of long-term functional decline, reinforcing the importance of diagnostic accuracy and patient-centered decision-making that weighs both oncologic benefit and quality of life (19).

6. Impact of radiological diagnosis on therapeutic decision-making

Radiological imaging plays a pivotal role in guiding therapeutic decisions in older adults diagnosed with colorectal cancer. Beyond its function in detecting tumors, imaging is critical for accurately staging the disease and determining the operability of lesions, both of which have a direct impact on the selection of appropriate treatments. In this population, where comorbidities and physiological vulnerability are common, precise radiological assessment becomes essential to ensure that therapeutic strategies are aligned with the patient's overall health status and prognosis (21; 22).

Imaging not only informs oncologic staging but also provides valuable insight into tumor characteristics, including size, location, depth of invasion, and presence of regional or distant metastases. These parameters, when interpreted in conjunction with patient-specific factors such as functional reserve and medical comorbidities, can lead to significant modifications in treatment planning (23).

Radiological findings are particularly important in determining whether a patient is a candidate for surgical resection, chemotherapy, radiation therapy, or palliative interventions. By evaluating the anatomical extent of disease and potential complications, imaging allows clinicians to balance treatment efficacy against the risks of adverse events in vulnerable older adults (24). Lessons from other oncologic contexts, such as head and neck cancer, illustrate how imaging often guides the decision between surgical and nonsurgical modalities, taking into account the patient's ability to tolerate aggressive treatment protocols (22).

Moreover, radiological imaging is integral to evaluating operability, particularly in patients with multiple comorbidities or borderline functional capacity. Combined with comprehensive geriatric assessments, imaging helps predict treatment outcomes and individualizes care plans that minimize risks while maximizing potential benefit (23).

The effective use of imaging in therapeutic decision-making requires the integration of multidisciplinary teams, which include radiologists, oncologists, geriatricians, and surgeons. Such collaboration ensures that radiological findings are interpreted within the broader context of the patient's medical, functional, and social situation (21). This team-based approach facilitates shared decision-making, where patient preferences and goals are incorporated into the treatment plan, ultimately leading to improved outcomes and a higher quality of care (24).

7. Proposals to optimize radiological diagnosis in older adults

Improving diagnostic accuracy and treatment planning in older adults with colorectal cancer requires the implementation of adapted imaging protocols and supportive innovations. Among these, the adoption of less invasive therapeutic techniques is especially relevant. For example, stereotactic body radiotherapy has been proposed as an effective alternative for older patients with oligometastatic disease. Due to its lower toxicity profile compared to conventional chemotherapy, this approach is particularly suitable for individuals with frailty or comorbidities, allowing for tumor control while minimizing treatment-related complications (25).

In parallel, advanced imaging modalities such as computed tomography, magnetic resonance imaging, and ultrasound have proven indispensable in evaluating age-associated conditions like muscle steatosis and fibrosis, which may influence prognosis and functional outcomes. These methods can be optimized to reduce physiological stress and improve diagnostic tolerance in older patients (26).

To fully address the complexities of geriatric oncology, specialized training in geriatric radiology is essential. Radiologists should be equipped with the knowledge to identify and interpret age-related anatomical and physiological changes, as well as to understand the clinical implications of frailty and functional decline (27).

In this context, artificial intelligence (AI) is emerging as a valuable tool. Machine learning applications can enhance early identification and management of frailty, thereby supporting more precise diagnostic interpretation and tailored treatment planning (28). Furthermore, digital platforms such as the SURGE-Ahead project demonstrate how AI can support geriatric co-management through decision-support tools that promote continuity of care and individualized treatment strategies (29).

Interdisciplinary coordination is fundamental to achieving optimal outcomes. Incorporating comprehensive geriatric assessments into shared decision-making processes ensures that oncologic interventions align with the patient's overall health status, personal goals, and risk profile (27). Collaborative care models, involving oncologists, radiologists, and geriatricians, promote holistic management that integrates both medical and supportive needs, thus enhancing the quality and relevance of care delivered to older adults with colorectal cancer (25).

8. Conclusion

The management of colorectal cancer in older adults requires comprehensive geriatric assessments, as frailty and comorbidities significantly influence clinical presentation, diagnosis, and treatment decisions.

Diagnostic imaging is fundamental for staging and treatment planning, but its use must be adapted to the functional and physiological limitations associated with aging, favoring less invasive alternatives when necessary.

The integration of multidisciplinary teams, specialized training in geriatric radiology, and artificial intelligence tools enables personalized, patient-centered care that optimizes clinical outcomes and respects individual treatment goals.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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