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REVIEW

Oncologic Emergencies in Patients with Advanced Malignancies: A Narrative Review

Gen-he Long[1], Li-jun Qiao[2], Cheng-feng Fu[3]

[1]Department of School of Medicine, Tongren Polytechnic College, Tongren City, Guizhou Province, China. [2]Department of Basic Medical Sciences, Guzhou College of Health Prodessions, Tongren City, Guizhou Province, China. [3]Department of Oncology, Tongren People's Hospital,Tongren City, Guizhou Province, China.

Abstract

Background: Oncological emergencies are potentially life-threatening complications of malignancy or its treatment that require prompt recognition and appropriate management. As advances in cancer diagnosis and treatment have improved survival, the number of patients living with cancer-related complications has increased. Older adults are particularly vulnerable because of multimorbidity, frailty, polypharmacy, and treatment-related toxicities, which may complicate the recognition and management of acute oncological conditions. **Objective:** This narrative review summarizes the epidemiology, clinical manifestations, diagnostic considerations, management strategies, and prognosis of major oncological emergencies and urgent conditions encountered in clinical practice, with particular consideration of their relevance to older adults. **Content:** The review discusses several commonly encountered oncological emergencies, including superior vena cava syndrome (SVCS), tumor-related epilepsy (TRE), malignant spinal cord compression (MSCC), pathological fractures, malignant bowel obstruction (MBO), febrile neutropenia (FN), malignant pleural effusion (MPE), and breakthrough cancer pain (BTcP). For each condition, key clinical features, diagnostic approaches, treatment options, and prognostic considerations are reviewed. Particular attention is given to the challenges of early recognition and individualized management in older patients with cancer and coexisting medical conditions. **Conclusion:** Prompt recognition and multidisciplinary management of oncological emergencies are essential to reduce morbidity, prevent irreversible complications, and improve patient outcomes. A structured understanding of their clinical presentation and evidence-based management may support timely decision-making across emergency, oncology, inpatient, and supportive-care settings.

Keywords: Oncology; oncological emergencies; cancer complications; febrile neutropenia

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Superior Vena Cava Syndrome

Superior vena cava syndrome (SVCS) is a clinical syndrome caused by partial or complete obstruction of blood flow through the superior vena cava (SVC), resulting in impaired venous drainage from the head, neck, and upper extremities. Common clinical manifestations include facial and neck edema, dilatation of superficial veins of the neck and chest, dyspnea, cough, headache, dizziness, and visual symptoms (Table 1). Symptoms may become more pronounced in the supine position or with activities that increase venous pressure, such as bending forward (Table 2) [1].

Malignancy is an important cause of SVCS, accounting for a substantial proportion of cases, although benign causes, including catheter- or device-associated thrombosis, have become increasingly relevant with the widespread use of intravascular devices [2, 3]. Among malignant causes, lung cancer and lymphoma are frequently implicated, while metastatic malignancies can also produce SVC obstruction [2, 3]. The clinical presentation depends on the degree and rate of obstruction and the development of collateral venous circulation.

SVCS severity can be assessed using clinical classification systems that consider the extent of venous obstruction and the presence of respiratory or neurological compromise [3, 4]. These classifications may assist clinicians in determining the urgency of intervention and

Corresponding Author:
Dr. Cheng-feng Fu
Department of Oncology, Tongren People's Hospital,Tongren City, Guizhou Province, China.
Email: fcf930128@163.com

selecting an appropriate management strategy (Table 3).

Management should be individualized according to the severity of symptoms, underlying malignancy, expected survival, thrombotic involvement, and treatment goals. In patients with severe symptomatic or life-threatening SVCS, endovascular stent placement can provide rapid restoration of venous flow and relief of symptoms and is an important treatment option [3, 5]. Radiotherapy may be considered for radiosensitive tumors or when local tumor control is required, whereas systemic anticancer therapy is particularly relevant for malignancies that are sensitive to chemotherapy, immunotherapy, targeted therapy, or other systemic treatments [6, 7].

The choice and dose-fractionation schedule for radiotherapy depend on the underlying malignancy, treatment intent, previous irradiation, prognosis, and overall clinical condition. Although hypofractionated regimens may be appropriate for patients requiring rapid palliation, there is no single radiotherapy regimen that is suitable for all cases [8, 9].

For patients with non-small-cell lung cancer, molecularly targeted therapy may provide substantial clinical benefit when an actionable driver alteration is identified. In newly diagnosed patients with severe SVCS, however, waiting for comprehensive molecular profiling may not always be appropriate when immediate symptom control is required. The decision should therefore be individualized according to clinical severity, tumor characteristics, expected time to obtain molecular results, and available alternative interventions [3].

In patients with advanced disease and limited life expectancy, endovascular stenting may be particularly appropriate when rapid symptom relief is the primary treatment goal. Compared with radiotherapy, stenting can provide more immediate improvement in venous obstruction and may therefore be preferred in selected patients with severe symptoms or a need for rapid palliation [3, 5]. Multidisciplinary assessment involving oncology, interventional radiology, radiation oncology, and palliative-care specialists is often appropriate.

Tumor-Related Epilepsy

Tumor-related epilepsy (TRE) is epilepsy attributable to a primary or metastatic brain tumor and may be the presenting manifestation of intracranial malignancy. According to the International League Against Epilepsy (ILAE), seizures associated with brain tumors are classified according to the underlying structural etiology and seizure type. Most tumor-related seizures are focal in onset and may occur with preserved awareness, impaired awareness, or progression to bilateral tonic-clonic seizures [10, 11].

The frequency of seizures varies substantially according to tumor histology, anatomical location, grade, and growth characteristics. Seizures are particularly common in patients with low-grade gliomas, in whom they may represent the initial manifestation of disease. Reported seizure frequencies are also substantial among patients with glioblastoma, meningioma, and brain metastases, although estimates vary considerably across studies and patient populations [12– 14].

The occurrence of seizures in a patient with a known brain tumor may reflect tumor progression, treatment-related changes, metabolic disturbances, or other structural or systemic factors. New-onset or worsening seizures therefore require clinical assessment and, when appropriate, neuroimaging to identify potentially reversible causes or evidence of disease progression.

Status epilepticus represents a neurological emergency requiring immediate treatment. In patients with brain tumors, status epilepticus may be associated with advanced disease and poor prognosis. Cavaliere et al. reported a 30-day mortality rate of 23% among patients with brain tumors who developed status epilepticus [15]. The occurrence of status epilepticus close to the end of life has also been associated with poor outcomes [16]. However, prognosis depends on multiple factors, including tumor type and grade, neurological status, systemic disease burden, and response to treatment.

Acute management of tumor-related seizures follows the principles of emergency seizure management, with particular attention to the identification and correction of reversible precipitating factors. Benzodiazepines are commonly used for the initial management of prolonged seizures or status epilepticus, followed by an appropriate antiseizure medication when indicated. In patients with brain tumors, antiseizure medications should be selected with consideration of drug interactions, particularly interactions with systemic anticancer therapies and corticosteroids. Levetiracetam is frequently used because of its relatively limited potential for clinically relevant drug interactions.

Long-term seizure management should also address the underlying tumor. Depending on tumor type and clinical circumstances, treatment may include surgery, radiotherapy, systemic anticancer therapy, or a combination of these approaches. The management plan should be individualized according to seizure characteristics, tumor pathology and location, neurological status, overall prognosis, and the patient's goals of care.

Management of tumor-related epilepsy (TRE) requires both control of seizures and treatment of the underlying intracranial tumor. Depending on tumor type, location, resectability, disease extent, and the patient's overall condition, treatment may include surgery, radiotherapy, systemic anticancer therapy, and antiseizure medication (ASM) [17- 21].

For patients with surgically resectable tumors, tumor-directed surgery may reduce seizure frequency by removing or reducing the epileptogenic lesion [17]. However, postoperative seizures may persist in some patients, particularly when complete tumor resection is not feasible or when residual epileptogenic tissue remains [18]. Radiotherapy and systemic anticancer therapy may contribute to seizure control through treatment of the underlying tumor, although their effects on seizure frequency vary according to tumor type, treatment response, and disease status [19].

Antiseizure medications are central to the management

Table 1. Common Oncological Emergencies: Key Symptoms and Clinical Signs.

Oncological emergency	Common symptoms	Common clinical signs
Superior vena cava syndrome	Dyspnea; facial or neck discomfort; hoarseness; dizziness	Facial and neck edema; distended neck and chest veins; upper-extremity edema; venous congestion
Pathological fracture	Acute or worsening localized bone pain; pain with movement or weight-bearing	Deformity; localized swelling or mass; abnormal mobility; crepitus; functional impairment
Tumor-related epilepsy	Seizures; altered or impaired consciousness; focal neurological symptoms	Fixed gaze; myoclonic movements; tonic or clonic limb or facial movements; muscle rigidity; postictal neurological changes
Malignant spinal cord compression	Back or radicular pain; limb weakness; sensory disturbances; gait difficulty; bladder or bowel dysfunction	Muscle weakness; sensory loss or paresthesia; gait abnormalities; neurological deficits; paraplegia or, less commonly, hemiparesis
Malignant bowel obstruction	Colicky abdominal pain; nausea; vomiting; constipation or obstipation; abdominal distension	Abdominal tenderness or distension; palpable mass in some patients; altered, hyperactive, or absent bowel sounds; dehydration
Breakthrough cancer pain	Sudden, transient exacerbation of pain despite adequately controlled background pain	Guarding or protective posture; facial expression of acute pain; agitation or behavioral changes
Malignant pleural effusion	Dyspnea; cough; chest pain; reduced exercise tolerance; orthopnea	Dullness to percussion; decreased or absent breath sounds; reduced chest expansion; hypoxemia in severe cases
Febrile neutropenia	Fever; chills; malaise; weakness; symptoms related to the site of infection may be absent or subtle	Temperature ≥38.3°C (100.9°F) once or ≥38.0°C (100.4°F) sustained for ≥1 hour, with neutropenia; signs of infection may be minimal or absent

Note: Clinical manifestations may vary according to the underlying malignancy, severity of the emergency, comorbidities, and treatment status. In patients with febrile neutropenia, signs of infection may be subtle because neutropenia can attenuate the inflammatory response.

of patients with recurrent seizures and are particularly important in patients with advanced or unresectable disease. In patients receiving systemic anticancer therapy, drug selection should take potential pharmacokinetic interactions into account. Enzyme-inducing antiseizure medications, particularly phenytoin, carbamazepine, and phenobarbital, can induce hepatic cytochrome P450 enzymes and may alter the metabolism of several anticancer agents and other supportive medications [20, 21]. Consequently, non-enzyme-inducing agents are generally preferred when clinically appropriate. Levetiracetam and lacosamide are commonly used because of their relatively limited potential for clinically relevant drug interactions. Other agents may be considered according to seizure type, comorbidities, renal and hepatic function, adverse-effect profiles, and concurrent cancer treatment.

The management of TRE should therefore be individualized and coordinated between neurology, neuro-oncology, radiation oncology, neurosurgery, and palliative-care teams when appropriate. In older adults, treatment selection should additionally consider frailty, cognitive function, functional status, polypharmacy, and the patient's goals of care.

Malignant Spinal Cord Compression

Malignant spinal cord compression (MSCC) is a potentially devastating oncological emergency caused by metastatic or locally invasive malignancy affecting the spinal cord or cauda equina. Without timely diagnosis and treatment, MSCC can result in irreversible neurological dysfunction, including motor weakness, sensory impairment, bladder or bowel dysfunction, and paraplegia [22- 24].

The clinical presentation commonly includes new or progressive back pain, radicular pain, sensory changes, motor weakness, gait disturbance, and autonomic dysfunction. Pain is often an early symptom and may precede neurological deficits. The thoracic spine is the most frequently affected region, followed by the lumbar and cervical regions, although the distribution varies across studies and according to the definition used [25].

MSCC requires urgent clinical assessment and diagnostic imaging. Magnetic resonance imaging of the spine is the preferred imaging modality because it can identify the level and extent of epidural disease, spinal cord compression, and associated vertebral involvement. Early recognition is particularly important because neurological function at the time of treatment is an important determinant of subsequent recovery.

Management depends on neurological status, degree of spinal cord compression, spinal stability, tumor histology and radiosensitivity, extent of disease, expected survival, surgical fitness, and patient preferences. Corticosteroids are commonly administered in patients with suspected or confirmed MSCC with neurological symptoms to reduce edema and potentially preserve neurological function while definitive treatment is arranged.

Surgery and radiotherapy are the principal tumor-directed treatment modalities. Surgical decompression and stabilization may be appropriate for selected patients with spinal instability, significant mechanical compression, rapidly progressive neurological deficits, or tumors that are relatively radioresistant, particularly when the patient has sufficient functional reserve and an expected survival that justifies an invasive intervention [26, 27]. The potential benefits of surgery must be balanced against perioperative morbidity, postoperative recovery, and the possibility that complications may delay subsequent radiotherapy.

Radiotherapy remains an important treatment for patients who are not suitable surgical candidates and for tumors that are responsive to radiation. Depending on the clinical situation, conventional external-beam radiotherapy or more specialized techniques may be considered. Evidence comparing surgery plus radiotherapy with radiotherapy alone suggests that selected patients may benefit from surgical decompression and stabilization; however, these findings should not be extrapolated to all patients with MSCC [26- 29].

Prognostic assessment is therefore essential when selecting treatment. Patients with very limited life expectancy, extensive metastatic disease, poor performance status, or substantial comorbidity may derive greater benefit from palliative radiotherapy and symptom-directed care than from major surgery. Conversely, patients with preserved neurological function, mechanical instability, a favorable performance status, and an expected survival sufficient to benefit from intervention may be candidates for surgical treatment followed by postoperative radiotherapy [28- 30].

Overall, MSCC should be managed as a multidisciplinary emergency, with rapid coordination among oncology, radiation oncology, neurosurgery or spinal surgery, radiology, rehabilitation, and palliative-care services. In older adults, treatment decisions should additionally incorporate frailty, baseline functional status, comorbidities, cognitive status, anticipated treatment tolerance, and individual goals of care.

Several conventional external-beam radiotherapy fractionation schedules have been used for MSCC, including single-fraction treatment (8 Gy), short-course regimens such as 5 × 4 Gy, and longer-course regimens such as 10 × 3 Gy or 20 × 2 Gy [31- 33]. The choice of fractionation should be individualized according to expected survival, performance status, extent of disease, tumor radiosensitivity, previous irradiation, treatment goals, and the need for durable local control. Shorter regimens may be particularly appropriate for patients with limited life expectancy or poor functional status because they reduce treatment burden, whereas longer courses may be considered for patients with a more favorable prognosis when durable local control is an important treatment goal [31- 33].

Radiotherapy can provide effective palliation and local tumor control in appropriately selected patients with MSCC. However, local progression may occur, particularly in patients with radioresistant tumors, extensive epidural disease, or limited treatment response. Reported rates of local failure vary substantially across studies because of differences in tumor type, radiation dose and fractionation, disease extent, and duration of follow-up [34].

Systemic anticancer therapy is generally not the immediate treatment for symptomatic MSCC because neurological compromise requires urgent local management. Depending on tumor type and treatment sensitivity, systemic therapy may subsequently be administered as part of the overall cancer treatment plan [26].

Rehabilitation is an important component of MSCC management, particularly in patients with neurological deficits or functional limitations. Early, individualized rehabilitation aims to preserve or improve mobility and independence, prevent complications associated with immobility, and optimize quality of life. Interventions may include positioning, mobility and strengthening exercises, bladder and bowel management, occupational therapy, and appropriate assistive devices [35, 36]. Rehabilitation planning should be coordinated with the patient's neurological status, spinal stability, treatment plan, and overall prognosis.

Pathological Fractures

Pathological fractures are important complications of metastatic bone disease and may result in substantial pain, functional impairment, loss of independence, and reduced quality of life. They most commonly occur in patients with metastatic cancers of the breast, prostate, lung, kidney, and thyroid, although virtually any malignancy can produce destructive bone lesions [37- 40]. The risk of fracture varies according to the primary tumor, location and extent of bone involvement, degree of cortical destruction, lesion size, and mechanical loading.

Pathological fractures are associated with substantial morbidity and may also be associated with poor short- and long-term outcomes. Reported mortality rates vary considerably among studies and populations, reflecting differences in tumor type, disease burden, age, comorbidity, functional status, and treatment received [41]. Therefore, mortality estimates should be interpreted in the context of the characteristics of the underlying patient population.

Management depends on the anatomical site, extent of bone destruction, presence or absence of an established fracture, mechanical instability, neurological involvement, tumor characteristics, expected survival, performance status, and patient preferences. Pathological fractures involving major weight-bearing long bones frequently require surgical stabilization, particularly when mechanical instability, severe pain, or functional impairment is present [42]. However, surgery may not be appropriate for all patients, particularly those with very limited life expectancy, severe comorbidity, poor functional status, or an unfavorable risk–benefit profile.

For spinal metastatic disease, treatment planning requires assessment of both neurological compromise and mechanical instability. The Bilsky epidural spinal

Table 2. Signs and Symptoms of Superior Vena Cava Syndrome.

Category	Sign/Symptom	Incidence (%)
Hemodynamic	Facial edema	82
	Upper-extremity edema	46
	Distended neck veins	63
	Distended chest veins	53
	Facial plethora	20
	Visual symptoms	2
Respiratory	Dyspnea	54
	Cough	54
	Hoarseness	17
	Stridor	4
Neurological	Syncope	19
	Headache	9
	Dizziness	6
	Confusion	4
	Obtundation or coma	2

Note: Data adapted from Kristin et al. [8]. Incidence values are presented as reported in the original source.

cord compression scale can be used to characterize the degree of epidural disease, while the Spinal Instability Neoplastic Score (SINS) assists in evaluating mechanical instability [43]. These tools should be used as components of a broader multidisciplinary assessment rather than as independent determinants of treatment.

Prophylactic stabilization may be considered when the risk of an impending pathological fracture is substantial. The Mirels scoring system incorporates lesion site, pain, lesion type, and the proportion of cortical involvement to estimate fracture risk in long bones. A Mirels score of ≥9 is generally associated with a high risk of fracture and may support consideration of prophylactic fixation, although the score should not be regarded as an automatic indication for surgery [44]. Clinical judgment and multidisciplinary orthopedic assessment remain essential.

For spinal lesions, SINS incorporates location, pain, spinal alignment, vertebral body collapse, and radiographic characteristics of the lesion. Scores of 0–6 generally indicate stability, scores of 7–12 indicate potentially unstable disease, and scores of 13–18 indicate instability [45]. Patients with potentially unstable or unstable lesions should be evaluated by an appropriate spine specialist. Importantly, a high SINS does not independently mandate surgery; the decision should incorporate neurological status, epidural disease, overall prognosis, performance status, comorbidities, and treatment goals.

Preventive strategies for skeletal complications may also include radiotherapy and bone-modifying agents, such as bisphosphonates or denosumab, when clinically appropriate. These treatments may reduce skeletal-related events in selected patients with metastatic bone disease but do not replace mechanical stabilization when structural instability or an established pathological fracture is present.

Overall, management of pathological fractures should be individualized and multidisciplinary. In addition to orthopedic or spinal surgical assessment, treatment may involve radiation oncology, medical oncology, rehabilitation, pain management, and palliative care. In older adults, particular attention should be paid to frailty, baseline mobility, fall risk, comorbidities, cognitive status, and the expected impact of treatment on independence and quality of life.

Malignant Bowel Obstruction

Malignant bowel obstruction (MBO) is a common complication of advanced cancer, occurring in approximately 3%–15% of patients with advanced malignancy [46]. It is particularly common in patients with ovarian and colorectal cancers, which account for a substantial proportion of cases [46– 48]. MBO has a multifactorial pathophysiology and may result from intraluminal tumor growth, bowel-wall infiltration, mesenteric or omental disease, extrinsic compression, peritoneal carcinomatosis, or tumor-related neural involvement. Nonmalignant contributing factors include constipation or fecal impaction, opioid use, postoperative adhesions, fibrosis, and treatment-related changes following radiotherapy or intraperitoneal chemotherapy [47, 48].

The clinical presentation of MBO varies according to the location and degree of obstruction. Common symptoms include nausea, vomiting, abdominal pain, abdominal distension, and reduced or absent passage of stool and flatus [49]. Symptoms may initially be intermittent, particularly in partial obstruction, and may progressively become more persistent as the obstruction worsens. A detailed clinical assessment should therefore consider the duration and progression of symptoms, bowel function, previous abdominal surgery, tumor burden, medication use, nutritional status, and overall prognosis.

Contrast-enhanced computed tomography (CT) is an

Table 3. Grading of Superior Vena Cava Syndrome.

Grade	Clinical findings
0	Asymptomatic: Superior vena cava obstruction identified on imaging without clinical symptoms
1	Mild: Edema of the head or neck
2	Moderate: Head or neck edema associated with functional impairment
3	Severe: Mild-to-moderate cerebral or laryngeal edema, or reduced cardiac reserve
4	Life-threatening: Significant cerebral or laryngeal edema or hemodynamic compromise
5	Fatal: Death

Note: Adapted from Yu et al. [9].

important imaging modality for suspected MBO because it can help identify the site and cause of obstruction, distinguish malignant from nonmalignant causes, assess disease extent, and identify complications such as bowel ischemia or perforation [50]. Laboratory assessment should also include evaluation of hydration status and electrolyte abnormalities, particularly in patients with prolonged vomiting or gastrointestinal losses.

Management of MBO should be individualized according to the site and severity of obstruction, tumor burden, performance status, nutritional status, expected survival, comorbidities, and patient preferences. In selected patients with a potentially reversible obstruction, good functional status, limited disease burden, and an acceptable operative risk, palliative surgery may provide symptom relief and restore intestinal function. However, surgery is associated with substantial morbidity and mortality in patients with advanced malignancy. Sotirianakou et al. reported a 30-day postoperative mortality rate of 18.6% following surgery for MBO, with outcomes influenced by factors including age, recurrent metastatic disease, and ostomy-related complications [51].

Endoscopic stent placement may be an alternative to surgery in selected patients, particularly those with a technically suitable single-site obstruction and an appropriate anatomical location. The choice between surgery, stenting, and conservative management should be based on multidisciplinary assessment and the goals of care (Table 4) [48].

For patients who are not suitable candidates for surgery or stenting, or who decline invasive treatment, medical management is directed primarily toward symptom control. Treatment may include intravenous or subcutaneous fluids when appropriate, analgesics, antiemetics, antisecretory agents, corticosteroids in selected patients, and correction of electrolyte abnormalities. Octreotide can reduce gastrointestinal secretions and may improve nausea, vomiting, and other symptoms associated with inoperable MBO [52]. Opioids may be required for pain control, while antiemetic therapy should be selected according to the clinical presentation and degree of obstruction (Table 5).

Gastrointestinal decompression may provide rapid relief of nausea, vomiting, and abdominal distension in selected patients. Nasogastric tube decompression can be used for acute symptom control, while longer-term decompression procedures may be considered in selected patients with persistent or recurrent obstruction when consistent with the goals of care. Nutritional support should be individualized according to prognosis, functional status, symptom burden, and patient preferences rather than routinely administered to all patients with advanced MBO.

In older adults, management should additionally consider frailty, baseline functional status, cognitive impairment, comorbidities, polypharmacy, nutritional status, and the anticipated burden of invasive interventions. Early involvement of palliative-care services can facilitate symptom control and shared decision-making, particularly when definitive surgical treatment is unlikely to provide meaningful benefit.

Febrile Neutropenia

Febrile neutropenia (FN) is a potentially life-threatening complication of cytotoxic anticancer therapy and requires prompt clinical assessment and treatment. Its incidence varies substantially according to the type and intensity of chemotherapy, underlying malignancy, patient characteristics, and use of prophylactic measures. FN occurs in approximately 10%–50% of patients receiving chemotherapy for solid tumors and may occur more frequently among patients with hematological malignancies [53, 54].

FN is generally defined as a single oral temperature of ≥38.3°C (101°F) or a temperature of ≥38.0°C (100.4°F) sustained for at least 1 hour, in the presence of an absolute neutrophil count (ANC) of <0.5 × 10^9/L or an ANC expected to decline below this threshold within the following 48 hours [55]. Definitions may vary slightly among international guidelines; therefore, the diagnostic criteria used should be clearly specified when reporting the incidence of FN.

The clinical presentation of FN may be subtle because neutropenia can attenuate the inflammatory response. Fever may be the only manifestation of a serious infection. Patients should therefore undergo prompt clinical assessment, including a detailed history, physical examination, complete blood count with differential, renal and hepatic function tests, and appropriate microbiological investigations. Blood cultures should generally be obtained before antimicrobial therapy when this does not cause a clinically significant delay. Additional cultures and imaging should be guided by symptoms and clinical findings.

The risk of complications and mortality varies according to the underlying malignancy, degree and

Table 4. Recommendations for the Management of Malignant Bowel Obstruction.

Clinical situation	Recommendation
Single-level large-bowel obstruction	Self-expanding metallic stent placement is preferred when technically feasible and when colonic perforation is absent (level of evidence: II; grade: B). Palliative surgery may be considered as an alternative in selected patients.
Multi-level obstruction	Palliative surgery may be considered in a highly selected patient population (level of evidence: IV; grade: B).
Advanced cancer requiring palliative surgery	Patients undergoing palliative surgery for MBO have a high risk of postoperative complications. Less-invasive surgical approaches should therefore be considered whenever appropriate (level of evidence: IV; grade: B).

Note: Adapted from Madariaga et al. [54]. MBO, malignant bowel obstruction.

duration of neutropenia, hemodynamic status, organ dysfunction, presence of documented infection, and other patient-specific risk factors. Bloodstream infections occur in a proportion of patients with FN and are associated with increased morbidity and mortality [56, 57]. Reported mortality rates also vary substantially among studies and according to the causative organism and patient population [58].

Prompt initiation of empiric broad-spectrum antibacterial therapy is the cornerstone of FN management, particularly in patients with high-risk clinical features. The initial antimicrobial regimen should be selected according to the severity of illness, suspected source of infection, previous antimicrobial exposure, local resistance patterns, allergy history, and institutional guidelines. Patients with hemodynamic instability, organ dysfunction, pneumonia, or other high-risk features generally require inpatient management and intravenous antimicrobial therapy.

Risk stratification can help identify selected patients with low-risk FN who may be candidates for outpatient treatment when appropriate infrastructure, reliable follow-up, and rapid access to medical care are available. Tools such as the Multinational Association for Supportive Care in Cancer (MASCC) risk index may assist in this assessment, although clinical judgment remains essential.

Granulocyte colony-stimulating factors (G-CSFs) are not routinely required as treatment for every episode of established FN but may be considered in selected high-risk patients according to clinical circumstances and guideline recommendations. Primary prophylaxis with G-CSF is also an important strategy for preventing FN in patients receiving chemotherapy regimens associated with a substantial risk of neutropenia.

Older adults require particular attention because age-related physiological changes, comorbidities, frailty, and reduced physiological reserve may increase the risk of severe infection and treatment-related complications. Management should therefore incorporate functional status, comorbidity burden, concomitant medications, previous chemotherapy exposure, and the patient's goals of care when determining the appropriate treatment setting and intensity.

The treatment of FN primarily involves prompt antimicrobial therapy, supportive care, and, when appropriate, measures to prevent or shorten neutropenia. Although an infectious cause is not identified in all patients, the absence of an immediately identifiable pathogen does not exclude a clinically significant infection. Bachlitzanaki et al. identified an etiological cause in only 55.6% of patients with FN [59]. Nevertheless, major international guidelines, including those of the American Society of Clinical Oncology (ASCO) and the European Society for Medical Oncology (ESMO), recommend prompt administration of empiric broad-spectrum antibacterial therapy in patients with suspected high-risk FN, without waiting for microbiological results [60– 62]. The initial antimicrobial regimen should be selected according to the patient's clinical status, suspected source of infection, previous antimicrobial exposure, local epidemiology, and institutional resistance patterns. Blood cultures and other appropriate microbiological investigations should be obtained as early as possible, preferably before antibiotic administration when this does not cause a clinically meaningful delay. Antimicrobial therapy should subsequently be modified or de-escalated according to microbiological findings, clinical response, and antimicrobial susceptibility results. This approach is important for balancing the need for timely treatment against the increasing problem of antimicrobial resistance.

Prevention of FN is also an important component of supportive cancer care because FN can result in hospitalization, treatment delays or dose reductions, increased healthcare costs, and potentially poorer cancer outcomes [55]. Prophylactic administration of granulocyte colony-stimulating factor (G-CSF) can reduce the duration and severity of chemotherapy-induced neutropenia and decrease the risk of FN, thereby helping patients maintain planned chemotherapy schedules [63, 64]. Current ASCO, ESMO, and NCCN recommendations support primary G-CSF prophylaxis when the anticipated risk of FN associated with a chemotherapy regimen is sufficiently high, generally around 20% or higher, and may also support prophylaxis at lower levels of regimen-related risk when additional patient-specific risk factors are present [65- 67]. The decision should therefore consider both the chemotherapy regimen and individual patient characteristics, including advanced age, comorbidities, previous chemotherapy or radiotherapy, poor nutritional status, and reduced functional reserve.

Malignant Pleural Effusion

Malignant pleural effusion (MPE) is a common

Table 5. Drug Categories and Representative Agents Used in the Management of Malignant Bowel Obstruction.

Category	Representative drugs	Main mechanism/action	Potential adverse effects
Antisecretory therapy	Anticholinergics: scopolamine butylbromide, scopolamine hydrobromide, glycopyrrolate, atropine	Reduce gastrointestinal smooth-muscle activity and secretions	Dry mouth, drowsiness, constipation, tachycardia, palpitations, confusion or hallucinations
	Somatostatin analogues: octreotide, somatostatin, lanreotide	Reduce gastrointestinal and pancreatic secretions, intestinal motility, and splanchnic blood flow; promote fluid and electrolyte reabsorption	Nausea, diarrhea, abdominal discomfort, injection-site reactions, bradycardia
	Gastric antisecretory agents: proton-pump inhibitors (e.g., omeprazole, lansoprazole); H_2-receptor antagonists (e.g., famotidine)	Reduce gastric acid secretion	Headache, dizziness, gastrointestinal symptoms; longer-term use may be associated with additional adverse effects
Control of nausea and vomiting	Prokinetic agents: metoclopramide	Enhances upper gastrointestinal motility and gastric emptying; may be useful in partial obstruction	Extrapyramidal symptoms, drowsiness, diarrhea; may worsen complete mechanical obstruction
	Antiemetics: haloperidol, chlorpromazine, ondansetron, aprepitant	Act on dopamine, serotonin, neurokinin-1, and other pathways involved in nausea and vomiting	Sedation, extrapyramidal symptoms, QT prolongation, dizziness, metabolic effects
Anti-inflammatory therapy	Glucocorticoids: dexamethasone, methylprednisolone	Reduce intestinal and tumor-associated edema and may improve obstructive symptoms	Hyperglycemia, fluid retention, infection risk, impaired wound healing, other corticosteroid-related effects
Pain control	Opioid analgesics: morphine, oxycodone, fentanyl, methadone	Activate opioid receptors to provide analgesia	Sedation, dizziness, nausea, vomiting, constipation, respiratory depression
	Anticholinergics: scopolamine, anisodamine	Reduce gastrointestinal smooth-muscle spasm and abdominal cramping	Anticholinergic adverse effects; see above
Promotion of bowel emptying	Oral water-soluble contrast agents (OWSC): Gastrografin (diatrizoate/ meglumine amidotrizoate preparations)	Hyperosmolar agents may draw fluid into the intestinal lumen and, in selected partial obstructions, facilitate intestinal transit	Nausea, vomiting, abdominal discomfort, fluid and electrolyte disturbances
	Hypertonic enemas: mannitol-based preparations and other appropriate agents	Increase luminal fluid and stimulate bowel evacuation	Abdominal cramping, diarrhea, rectal discomfort, burning, nausea
Infection management	Antibiotics: selected cephalosporins (e.g., cefotiam, cefoxitin) and nitroimidazoles (e.g., metronidazole)	Provide antimicrobial coverage when infection, bacterial translocation, or intra-abdominal infection is suspected	Allergic reactions, gastrointestinal effects, cytopenias, dizziness, confusion, other drug-specific adverse effects

Note: Adapted from Huang et al. [58]. Drug selection should be individualized according to the type and severity of obstruction, presence of complete versus partial obstruction, renal and hepatic function, comorbidities, concomitant medications, and treatment goals. Prokinetic agents should generally be avoided in complete mechanical obstruction because they may worsen colicky pain or other obstructive symptoms.

complication of advanced malignancy and is associated with substantial symptom burden and poor prognosis [68]. Lung and breast cancers account for a large proportion of MPE cases, although virtually any malignancy can involve the pleural space [69]. Common clinical manifestations include dyspnea, cough, chest discomfort or pain, and reduced exercise tolerance. The severity of symptoms depends not only on the volume of the effusion but also on the rate of accumulation, underlying lung disease, and overall cardiopulmonary function.

The diagnosis of MPE requires integration of clinical findings, imaging, and pleural fluid evaluation. Chest ultrasonography is particularly useful for detecting pleural fluid and guiding drainage procedures, while chest computed tomography can provide information about the underlying malignancy, pleural abnormalities, and other thoracic disease. Thoracentesis with cytological examination of pleural fluid is commonly used to establish a diagnosis when clinically appropriate.

Treatment of MPE is primarily palliative, with the goals of relieving symptoms, improving functional status, minimizing recurrent hospital visits, and preserving quality of life. Therapeutic thoracentesis can provide rapid symptomatic relief and may be appropriate for patients with a limited life expectancy or when the likelihood of recurrent effusion is uncertain [70]. However, repeated thoracentesis may be burdensome in patients with rapidly recurrent effusions.

For patients with symptomatic and recurrent MPE, definitive pleural interventions may be considered. These include chemical pleurodesis, commonly using talc, and placement of an indwelling pleural catheter (IPC). The choice between these approaches depends on lung re-expansion after drainage, the presence of a trapped lung, expected survival, performance status, local expertise, and patient preferences [70]. IPCs can be particularly useful in patients with recurrent effusion or non-expandable lung and may allow outpatient management while reducing the need for repeated therapeutic procedures.

Ultrasound-guided thoracentesis can improve procedural safety by facilitating identification of the effusion and reducing the risk of complications [71]. Similarly, image-guided or ultrasound-assisted placement of an IPC may be appropriate when available. Surgical approaches are generally reserved for selected patients in whom less invasive strategies are unsuitable or unsuccessful.

Management of the underlying malignancy should be considered whenever systemic anticancer therapy is likely to provide meaningful benefit. Although intrapleural

therapies and other local interventions have been investigated, their use should be guided by the available evidence and the specific clinical setting. Agents such as bevacizumab and fibrinolytic therapies have been studied in selected circumstances, but they should not be considered routine treatment for all patients with MPE [68, 72].

In older adults, treatment decisions should take into account frailty, baseline respiratory function, comorbidities, functional status, expected survival, treatment burden, and patient preferences. A palliative-care approach focused on symptom control and quality of life is particularly important in patients with advanced disease and limited therapeutic options.

Breakthrough Cancer Pain

Breakthrough cancer pain (BTcP) is a transient exacerbation of pain that occurs in patients with relatively stable and adequately controlled baseline cancer pain [73]. Episodes may occur spontaneously or be precipitated by predictable or unpredictable factors. Clinically relevant characteristics include the frequency, duration, intensity, precipitating factors, time to peak intensity, and response to rescue analgesia [74]. Accurate characterization of these features is important for distinguishing BTcP from inadequately controlled background pain and for selecting an appropriate management strategy.

BTcP episodes typically have a rapid onset and relatively short duration. Many patients reach peak pain intensity within several minutes, with a substantial proportion reaching maximum intensity within approximately 10 minutes [75, 76]. Episodes may resolve spontaneously or following administration of rescue analgesia. Because of their rapid onset, treatment should be readily accessible and appropriately matched to the temporal characteristics of the pain episode.

Management of BTcP should begin with optimization of baseline analgesia and identification of potentially reversible causes. When rescue medication is required, short-acting opioid formulations may be used in appropriately selected opioid-tolerant patients. Rapid-onset fentanyl formulations have been developed specifically for breakthrough pain in opioid-tolerant patients, although their use should follow appropriate prescribing criteria and local regulatory guidance. The choice of rescue medication should consider the onset and duration of pain, route of administration, previous opioid exposure, renal and hepatic function, cognitive status, and risk of adverse effects.

The need for dose titration of rescue opioids should be individualized. Mercadante et al. reported that routine dose titration was not necessarily required for opioid-tolerant patients with BTcP, although patients receiving an initial non-titrated dose may require additional rescue medication during early episodes. These findings support an individualized approach based on previous opioid exposure, analgesic response, adverse effects, and clinical reassessment rather than the use of a uniform rescue dose for all patients.

In older adults, particular caution is required because age-related changes in drug metabolism and clearance, frailty, cognitive impairment, polypharmacy, and increased susceptibility to sedation and respiratory depression may increase the risk of opioid-related adverse effects. Regular reassessment of pain severity, functional status, treatment response, and adverse effects is therefore essential. Multidisciplinary management involving oncology, palliative-care, pain specialists, nursing staff, and caregivers can help optimize symptom control while minimizing treatment-related harm.

Summary and Outlook

Oncological emergencies and urgent cancer-related conditions represent an important clinical challenge as improvements in cancer detection and treatment allow patients to live longer with advanced or metastatic disease. These conditions can develop as a consequence of tumor progression, metastatic involvement, treatment-related complications, or the interaction between cancer and pre-existing comorbidities. Their clinical presentation and severity vary considerably, requiring rapid assessment and condition-specific management.

Effective management depends on early recognition, appropriate diagnostic evaluation, and timely intervention. A multidisciplinary approach involving emergency physicians, oncologists, surgeons, radiation oncologists, neurologists, radiologists, rehabilitation specialists, palliative-care professionals, nurses, and other healthcare providers is often necessary. Treatment decisions should be individualized according to disease characteristics, severity of the emergency, expected survival, performance status, comorbidities, treatment-related risks, and patient preferences.

Prevention and early identification are also important components of care. Appropriate cancer treatment planning, antimicrobial prophylaxis when indicated, monitoring for treatment-related complications, early recognition of neurological or respiratory symptoms, and patient and caregiver education may reduce the severity and consequences of some oncological emergencies. In patients with advanced disease, integration of palliative-care principles can help ensure that symptom control and quality of life remain central components of treatment.

Further prospective research is needed to improve risk stratification, establish evidence-based treatment pathways, and clarify the optimal management of oncological emergencies in older adults. Greater representation of older patients in clinical research is particularly important because frailty, multimorbidity, functional impairment, and treatment preferences may substantially influence both treatment selection and outcomes.

In conclusion, oncological emergencies are potentially life-threatening complications of cancer that require rapid recognition, timely intervention, and individualized management. This narrative review discussed several clinically important conditions, including superior vena cava syndrome, tumor-related epilepsy, malignant spinal cord compression, pathological fractures, malignant

bowel obstruction, febrile neutropenia, malignant pleural effusion, and breakthrough cancer pain.

Although these conditions differ substantially in their clinical presentation, pathophysiology, and treatment, early diagnosis and coordinated multidisciplinary management are fundamental to preventing irreversible complications and reducing morbidity and mortality. Treatment should be individualized according to tumor type and extent, severity of the acute condition, expected survival, performance status, comorbidities, treatment-related risks, available therapeutic options, and patient preferences.

In patients with advanced cancer, management should extend beyond emergency stabilization to include symptom control, preservation of function, quality of life, and alignment of treatment with the patient's goals and preferences. Particular attention is required in older adults because frailty, multimorbidity, polypharmacy, and reduced physiological reserve may influence both the presentation of oncological emergencies and tolerance of their treatment. Continued clinical research and improved integration of emergency, oncological, supportive, and palliative care are needed to strengthen the evidence base and optimize outcomes for patients experiencing oncological emergencies.

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Statement of Transparency and Principles

•The authors declare no conflict of interest.

•The study was approved by the Research Ethics Committee of the authors' affiliated institution.

•All authors contributed to the implementation of this research.

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