Handbook of Palliative Radiation Therapy
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To our patients and their families who inspire us with their grace.
To our families and friends who nourish us as we care for others.
To our mentors who taught us to excel.
To our trainees who will carry the torch forward.
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When people think about death and dying, they sometimes fear uncontrolled symptoms more than death itself. One common sentiment expressed in our practices is that people do not want to die in pain. Yet, many of our patients resist palliative care referrals with thoughts that “it means I am going to die” or that “I’ll have to stop treatment.” In the media, palliative care is often inaccurately associated with “death panels” and withholding care, something most people understandably want to avoid.

Palliative care does not accelerate death, and, in fact, seeks to enhance quality of life by relieving the physical symptoms and existential suffering associated with advanced illnesses such as cancer. Radiation therapy (RT) plays a key role in the palliation of physical symptoms due to advanced cancer.

This Work arose from a deep commitment to palliative care and in particular, palliative radiation therapy. During my tenure at my first faculty position, which was in a rural area, patients often traveled 1–2 hours to our center for radiation therapy. The need to optimize convenience for patients with severe symptoms led me to evaluate the data supporting hypofractionated or single fraction radiation therapy in a new light. Palliative RT patients need the shortest, most effective regimen to minimize travel time spent with pain, nausea, or exhaustion.

Twenty-five randomized trials have demonstrated equal pain relief between the delivery of a single fraction and multiple fractions of radiation therapy. Equivalence has been demonstrated in duration of palliative effect, time to onset of relief, complete response rates and partial response rates. Retreatment can be undertaken safely in patients who do not respond to single fraction RT. Exceptions to the absolute equivalence of single fraction radiation may include spinal cord compression or treatment of oligometastatic disease. Single fraction RT is more cost-effective and convenient for patients, yet it remains underutilized, accounting for ~ 5–7% of radiation regimens for painful bone metastasis in the United States.

During that time, I was fortunate to have found a mentor equally passionate about hypofractionated radiation in the treatment of patients with advanced cancer—my coeditor, Steve Lutz. Steve has been part of a core group of radiation oncologists promulgating hypofractionated radiation therapy for decades. He has helped formulate and promulgate guidelines for the appropriate treatment of bone metastases, locally advanced lung cancer, and glioblastoma multiforme. Steve has inspired innumerable radiation oncologists
Preface

by his tireless advocacy and mentorship. His efforts led to the foundation of the Society for Palliative Radiation Oncology (SPRO) dedicated to advocacy, education, and research.

Undoubtedly, the financing of medicine in the United States, and specifically the way in which RT is reimbursed, has contributed to the use of longer courses. Yet, we also truly believe that most people, having been trained to prescribe longer courses of radiation, have trouble leaving their comfort zone and using techniques that they haven’t learned about in as much detail. That is where this Work comes in—it is meant to be an extremely practical guide for physicians who want to implement shorter courses of radiation, where appropriate, into their clinical practice.

It comes at a time when the Centers for Medicare and Medicaid Services (CMS) have pledged to tie an increasing proportion of payments to value and quality. Recently, CMS launched the Oncology Care Model, a pilot program targeting increasing quality and reducing costs in the care of cancer patients receiving chemotherapy. Given the equivalent palliation and cost effectiveness, single fraction radiation regimens for the treatment of uncomplicated bone metastasis and hypofractionated palliative radiation regimens for other indications will likely play a key role in these settings.

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Handbook of Palliative Radiation Therapy
INTRODUCTION

Radiation oncologists have long understood the potential benefit of radiation therapy (RT) in palliating the distressing symptoms of advanced abdominal and pelvic cancers. Often, the role of external beam radiation therapy (EBRT) or brachytherapy in controlling bleeding or obstructive symptoms finds only a passing reference and most palliative medicine texts are silent on this important topic. Apprehension of radiation-induced toxicities may be one reason for this omission. This argument is not entirely valid, as various short course palliative radiation schedules are planned such that treatment-related acute toxicity is minimal. Because the majority of patients treated with palliative intent have limited life expectancies, treatment-related late toxicity is seldom a major concern; moreover, it is important to weigh the potential toxicity against the efficacy and improvement in a patient’s quality of life (QoL).

Carcinomas arising in intra-abdominal organs are generally not treated with curative intent with RT alone due to a lack of therapeutic benefit. However, patients with advanced, inoperable disease may obtain symptom relief when treated by a short course of radiation. Intraluminal brachytherapy has been used for palliating obstructive symptoms of biliary tract cancers and is a safe procedure with minimal morbidity. Palliative RT achieves hemostasis in patients with unresectable gastric carcinoma not fit for systemic chemotherapy and is associated with a statistically significant rise in their hemoglobin levels. Several other studies have confirmed this benefit though the doses of radiation varied from a single fraction of 8 to 50 Gy in 25 fractions. All dose schemes have benefits in symptom control, with no statistically significant differences between patients who received a biologically effective dose (BED) less or more than 39 Gy, assuming the alpha-beta ratio to be 10.
EBRT is an integral part of multimodality treatment for carcinoma of the rectum and anal canal and provides relief to patients with locally advanced or recurrent disease not amenable to surgical excision. Pelvis masses can cause pain, obstruction, tenesmus, bleeding, and discharge. Though most studies are retrospective without patient-reported QoL, they consistently demonstrate symptom relief and improved QoL with palliative pelvic RT. No statistically significant dose–response relationship has been established. James et al. reported a similar median duration of response in patients receiving <15 Gy or more. In the systematic review of palliative RT by Cameron et al in incurable primary and recurrent rectal cancer by palliative EBRT, all of the 27 studies reported good relief of pain, bleeding, and mass effect with acceptable toxicities. None of these studies had patient reported outcomes and various dose-fractionations were used. Most of these studies were retrospective chart reviews of patients treated more than two decades ago, with incomplete follow up. Despite these inherent shortcomings, the pooled response to palliative pelvic EBRT ranged from 71% to 81%. It was not possible to calculate the BED for comparison of different dose schedules. There is a need for prospective studies using modern RT techniques and uniform endpoints, to provide robust evidence about the risk–benefit ratio of palliative pelvic RT in advanced rectal carcinoma. In patients with locally advanced and metastatic rectal cancer, a hypofractionated radiation therapy course can limit the need for palliative colostomy to 33%. This regimen was associated with an 82% local control rate with less than 10% mild acute toxicity and no late toxicity.

Patients with locally advanced or metastatic bladder cancer may benefit from palliative RT to the pelvis. Fossa and Hosbach reported on their experience treating all symptomatic patients above age 80 and younger patients with distant metastasis with palliative pelvic RT. Using a moderate dose of 30 Gy in 10 fractions over 2 weeks, patients experienced a significant reduction in hematuria. In a retrospective review of 94 patients, Salminen reported complete and partial relief of symptoms, 43% and 29% respectively, with 30 Gy in 6 fractions over 3 weeks. Eight out of 17 patients did not need the indwelling catheter after radiation. The estimated median survival was 9.6 months. There was a local control rate of 40% which was associated with longer survival. In a systematic overview article, Widmark et al. reported that it is possible to decrease tumor-induced bladder symptoms rapidly and effectively with palliative EBRT. Also, a hypofractionated 1-week regimen was as effective as a 2-week daily treatment in doing this.
RT has been used for symptom relief in gynecological malignancies for many years. Both brachytherapy and EBRT have been used successfully to obtain hemostasis in carcinoma cervix. Boulware et al., from the MD Anderson Cancer Center, published their experience using hypofractionated radiation 10 Gy once a month for 3 months. After 3 fractions, vaginal bleeding was controlled in all patients. However, care must be taken not to use very high doses per fraction radiation for patients with potentially curable disease and long anticipated survival. In addition to bleeding, radiation palliates pain, obstructive symptoms, and vaginal discharge. Skirenko and Barnes reported overall symptom response rates of 45% to 100% for bleeding, 0% to 83% for pain, 39% to 49% for discharge, and 19% to 100% for obstructive symptoms. The RTOG 7905 trial was based on the MD Anderson experience and added concurrent Misonidazole, a hypoxic cell sensitizer, to the radiation. This trial closed prematurely due to excessive gastrointestinal complications and a different hypofractionated regimen was designed. RTOG 8502, used twice a day radiation for 2 days, 3.7 Gy/fraction, a regimen now known as the QUAD shot. The cycle was repeated monthly up to a maximum of three times or maximum dose of 44.4 Gy. This led to a significant decrease in early and late toxicities. At Princess Margaret Hospital (PMH), 7 Gy/fraction is delivered on a weekly basis for 3 weeks. In their 10-year experience, vaginal bleeding was controlled in 92% patients and the regimen was comparable to the other hypofractionated regimens in terms of efficacy and toxicity.

Two centers in India who routinely use monthly palliative pelvic radiation for advanced carcinoma cervix published their experience of using parallel opposed megavoltage radiation. Mishra et al. used 10 Gy/fraction with additional brachytherapy in five patients while Rai et al. used 8 Gy/fraction. Both studies reported good control of symptoms like vaginal bleeding, discharge, and pain. Carcinoma of the cervix is a common disease within developing countries, where many patients report late to the hospital with incurable disease. A short course of hypofractionated radiation can control their distressing symptoms, improve QoL, and reduce hospitalization with minimal treatment-related toxicity.

It is unlikely that prolonged fractionation can produce more effective or durable palliation as compared to short, hypofractionated ones. Since higher radiation doses per fraction have a higher potential for late toxicity, which generally occurs 9 months after completion of treatment. Therefore, it is important to carefully select patients for hypofractionation. In patients with limited life expectancies, a short but effective dose of palliative pelvic radiation will produce adequate symptom relief without increasing the burden for patients and caregivers.
TREATMENT PLANNING BY SITE

The aim of palliative RT is to improve the QoL of patients with incurable disease, by providing maximum symptom relief, while minimizing treatment-related acute toxicities and durations of hospital stays. This can be achieved by minimizing the field sizes and number of fractions while maintaining the therapeutic index.

With proper patient selection, delayed toxicities are seldom of concern while planning palliative RT, thereby allowing a wider freedom in choosing the field sizes and target volumes for various sites. Hence, it becomes impractical to have stringent practice guidelines for planning palliative RT. Treatment planning recommendations for typical case scenarios encountered in clinical practice are given in the following section. However, treatment volumes and field sizes should be selected appropriately on a patient-by-patient basis, considering various factors like life expectancy, performance status, disease burden, severity of symptoms, comorbidities, goals of therapy, and departmental logistics.

Most often, conventional planning based on bony landmarks is adequate for treatment planning, especially in developing countries with limited resources. In centers where conventional simulators have been superseded by CT simulators, virtual simulation is used for treatment planning.

The following cases illustrate the role of palliative-radiation therapy in the treatment of bladder cancer, vaginal bleeding, rectal cancer, vulvar cancer, and liver metastasis. Further discussion of the role of palliative radiation therapy for liver tumors can be found in Chapter 9.

Case 8.1: Palliative Treatment of the Bladder

A 75-year-old patient of carcinoma of the urinary bladder, with widespread bone and lung metastases, presents with dysuria and pelvic pain. He had coronary artery disease and a poor performance status. Being unsuitable for systemic chemotherapy, he was planned for palliative pelvic RT.

Simulation for such patients is done in the supine position, preferably with an empty bladder. Parallel opposed antero-posterior fields are generally used. The upper border is placed at L5–S1 interface; lower border at the level of ischial tuberosities; lateral borders are placed 2-cm lateral to the widest part of the pelvic brim (Figure 8.1).
If virtual simulation is planned, a noncontrast CT scan is taken in supine position with empty bladder. Gross tumor along with the entire urinary bladder and prostatic urethra is delineated and a margin (2–2.5 cm) is given to account for internal motion and set up uncertainties. Conformal radiation with two or three fields is delivered using multileaf collimation (Figure 8.2).

**FIGURE 8.1** Palliative RT portal for antero-posterior fields, urinary bladder cancer.

**FIGURE 8.2** Conformal radiation plan for urinary bladder cancer.
Case 8.2: Palliative Radiation for Vaginal Bleeding

A 68-year-old female presented with foul smelling discharge and bleeding *per vaginum*; examination revealed a large ulceroproliferative growth replacing the entire cervix and extending to the lateral pelvic walls, with a frozen pelvis. After further evaluation she was diagnosed with poorly differentiated squamous cell cancer of the cervix, with extensive para-aortic and supraclavicular nodal metastases, and bilateral gross hydro-uretero-nephrosis and deranged renal function. She was planned for palliative pelvic radiation.

For such patients, a four-field box technique or a simpler two-field technique is adequate for palliation. Simulation is done in supine position with an empty bladder. Simple positioning devices like knee wedges may be used. The upper margin of the field is generally placed at L4–L5 interface; however, it can be brought down to L5–S1 interface in certain cases if field size is too large. Lateral margins are placed 2-cm lateral to the widest part of the pelvic brim. Lower margin should be placed at least 2 cm beyond the lower extent of the disease, and inferior margin of the obturator foramen is an adequate bony landmark for most cases (Figure 8.3). However, if there is extension of growth into the lower vagina, the patient should be simulated in a frog-leg position with antero-posterior fields, and lower border placed to cover the introitus. For patients without lower vaginal extension, two lateral fields can be added by placing the anterior border at the anterior

**FIGURE 8.3** Antero-posterior portals for palliative RT of cervical cancer.
cortex of pubic symphysis and posterior border to cover the sacral hollow (Figure 8.4). Virtual simulation and conformal planning may be used in selected cases and fields with differential weightage can be used for improved dose distribution.

**FIGURE 8.4** Lateral fields for palliative RT of cervical cancer.

### Case 8.3: Palliative Radiation Therapy for Rectal Cancer

A 65-year-old patient with adenocarcinoma of the rectum underwent abdomino-perineal resection and adjuvant chemotherapy 7 years ago. Now he presented with multiple liver metastases, along with local recurrence, causing pelvic pain. He did not respond to second-line chemotherapy, and was offered palliative pelvic RT.

Simulation for patients of rectal cancer is generally done in the prone position for better reproducibility, unless patients have an existing colostomy. Antero-posterior fields or four-field box technique is generally used, similar to patients of cervical cancer; however, the upper margins are usually placed
at L5–S1 interface. For lateral fields, the anterior margins are placed at the posterior cortex of symphysis pubis, and posterior border is generally placed 1.5 cm behind the anterior sacral margin (Figure 8.5). For conformal radiation, gross primary tumor along with adequate margins on either side is delineated and a margin is given for set up errors. Generally, uninvolved nodal regions are not included in palliative radiation.

**FIGURE 8.5** Lateral portals for four-field box technique, rectal cancer.

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**Case 8.4: Palliative Radiation Therapy for Vulvar Cancer**

A 73-year-old female presented with a large ulceroproliferative growth over her external genitalia, and was diagnosed as a case of vulval cancer, extending into the lower third of vagina and urethra. Due to multiple comorbidities and poor performance status, she was considered for palliative RT.

Simulation for such patients of vulval cancer is preferably done in frog-leg position, and antero-posterior fields are adequate. Tissue equivalent bolus material is generally placed during treatment to increase the superficial dose. Upper border is placed at midsacroiliac joint and lower border should flash the entire perineum and the gross disease with adequate margin. Lateral borders are placed 2-cm lateral to the pelvic inlet. If there is gross inguinal nodal
enlargement, fields may be extended laterally. Alternatively, a single incident field may be used by rotating the couch and gantry for treating the gross disease in appropriately selected patients (Figure 8.6).

![Figure 8.6](image)

**FIGURE 8.6** Single-field technique with couch and gantry rotation for palliation of vulval cancer.

### Case 8.5: Palliative Radiation Therapy to the Liver

A 56-year-old male patient was diagnosed as a case of pancreatic cancer with multiple liver metastases. Response to systemic chemotherapy was suboptimal; a biliary stent was placed to relieve obstructive symptoms but the patient had persistent pain in the upper abdomen radiating to the back. He was planned for palliative RT.

For abdominal malignancies, bony landmarks are less reliable for treatment planning, as compared to pelvic malignancies. For such patients, virtual simulation on a plain or contrast-enhanced CT scan is preferable to ensure adequate coverage. Gross primary disease responsible for the symptoms is delineated and a margin is given for uncertainties. Elective nodal irradiation is not generally indicated (Figure 8.7). If CT simulation is not available, wide antero-posterior fields extending between D11 and L2 vertebral bodies are used, and lateral margins are placed according to the location and extent of the disease, with renal shielding in appropriate cases.
Radiation-induced toxicities can be subdivided into acute, which occurs during or immediately after therapy, and late, which occurs several months after completion of treatment. Acute reactions depend on the total dose, dose per fraction, and overall treatment time while late reactions primarily depend on dose per fraction. A more modest total dose of RT and the limited life expectancy of the patient typically balance risk associated with the higher dose per fraction. Careful patient selection also minimizes the risk; hypofractionated RT with large RT dose per fraction should be used sparingly in frail patients with potentially curative disease who may live long enough to be at risk for late toxicity. Much of the available literature on palliative EBRT is retrospective with inadequate follow-up and toxicity data. In addition, it may be difficult to distinguish some of the late toxicities like fistula formation from disease progression. With the advent of modern radiation techniques delivering conformal therapy, normal tissues can be saved from unwanted radiation, which should reduce both acute and late toxicities.

The acute side effects of radiation include nausea, vomiting, anorexia, and fatigue. When the pelvis is irradiated, patients also complain of bowel and bladder symptoms. Salminen et al. reported that 62% of the bladder cancer patients experienced diarrhea. Sixteen percent of patients had severe acute
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Toxicity\textsuperscript{10} which resulted in treatment termination (5\%) or interruption (7\%). Urinary frequency or incontinence was found in 20\% of patients. The use of two anterior-posterior fields was associated with more severe toxicities than three or four field RT. Late effects, such as urethral stricture, proctitis, cystitis, small bowel injury, and urinary incontinence, were noted in 29\% of patients more than 3 months after completion of treatment. The incidence of late effects was significantly higher in patients with longer field size. There were no treatment-related deaths in the group of patients studied.

Skliarenko and Barnes evaluated the role of pelvic RT for gynecological cancers and reported an overall late toxicity rate of 6\% to 12\% occurring 9 to 10 months after treatment.\textsuperscript{13} To reduce the risk of severe late toxicities, the third fraction of 10 Gy could be omitted if adequate symptom relief was achieved by two fractions. The RTOG 7905 reported excessively high late GI toxicities because of the radiation sensitizer Misonidazole.\textsuperscript{14} Their subsequent trial 8502 showed a marked reduction in late toxicity—only 6\% late complications were noted.\textsuperscript{15,16} Among the 51 patients treated by the PMH group,\textsuperscript{17} only two complained of severe late toxicities.

Kim et al.\textsuperscript{20} used short course palliative radiation for cancers of the uterine cervix. Using three-dimensional conformal radiation, they delivered 20 to 25 Gy with 5 Gy/fraction. Only 7 of 17 patients had minor gastrointestinal toxicity and one patient had grade three diarrhea 1 week after treatment. Late complications were seen in four patients but none had grade three or higher severity. Hypofractionated, conformal pelvic radiation is likely to be effective and less toxic but more randomized, prospective trials are required to establish these facts. The life expectancy of the patient should always be considered when selecting appropriate fractionation schedules.

\textbf{SYMPTOM MANAGEMENT}

Recurrent and advanced abdominal and pelvic malignancies can cause severely distressing symptoms resulting in a poor QoL. Effective palliation of these symptoms can often be achieved using uncomplicated treatment practices with minimal morbidity and treatment decisions should be based on improving the QoL. Depending on the site and patterns of spread, the symptoms may vary from patient to patient. The most common symptoms include bleeding, pain, discharge, urinary/bowel fistulas, obstruction, lower extremity edema, deep vein thrombosis, fungating wounds, and ascites.

For a patient presenting with bleeding, it is important to first identify the cause. Bleeding may occur due to tumor infiltration of the blood vessels, systemic complications such as thrombocytopenia and underlying coagulopathy, use of drugs such as nonsteroidal anti-inflammatory drugs (NSAIDs) and anticoagulants, and concurrent illness including infection.
The patient presenting with acute hemorrhage should be put on bed rest and hemodynamic support along with administration of anxiolytics and/or sedatives. Rapid acting sedatives such as intravenous or subcutaneous midazolam 2.5 or 5 mg should be administered and may be repeated if necessary. Drugs like oral tranexamic acid have been found to be helpful in patients with mild bleeds but need to be used cautiously in cases of bleeding from the bladder due to risk of clot retention. For patients with vaginal bleeding, tight vaginal packing is very useful in cases of acute hemorrhage. Depending on the institutional practice, the pack may be soaked in povidone-iodine, acriflavin, or thrombostatic agents. The vaginal pack is usually left in situ for 24 to 48 hours, during which the patient can be hemodynamically stabilized and planned for palliative external RT or brachytherapy.\textsuperscript{21,22} Repeated vaginal packing should be done if required. Large doses of hypofractionated RT have been found to be extremely effective in controlling vaginal and rectal bleeds, bleeds from fungating ulcers, and hematuria. The cessation of bleeding usually occurs in 12 to 48 hours after treatment. Although a number of fractionation schedules have been used, there is at present no evidence that protracted radiation results in more effectual palliation.\textsuperscript{23,24} Dose per fraction of 8 to 10 Gy as a single fraction or 2 to 3 fractions repeated at monthly intervals have not only resulted in effective symptom control, but are also cost-effective and logistically suitable to the already distressed patient and the care givers.\textsuperscript{25}

Transcutaneous arterial embolization (TAE) may be considered in selected patients in whom noninvasive measures and radiation fail to control bleeding. Occasionally, it may also be used upfront in cases of massive hemorrhage. The procedure involves embolization of the iliac vessels using coils, gel foam, and so on. The evidence regarding its use in the palliative setting is largely based on case reports and short series. Thus, arterial embolization should be attempted only in a suitable patient where the facilities for the same are available.

Symptoms such as pain, pressure symptoms due to soft-tissue masses, and bony invasion by tumor are managed with analgesics and adjuvant drugs according to the World Health Organization (WHO) step ladder pattern, depending on the type and severity of the symptoms. RT has been found to be very effective in providing a relatively sustained relief of these symptoms. While the majority of studies in this regard are limited to cervical cancer, the results of the same may be extrapolated to other sites in the pelvis. Relief of pain has been reported in 40\% and 100\% of patients in various studies with stabilization of pain reported in nearly 50\% of patients.\textsuperscript{8,18,19} Similarly, relief of obstructive symptoms in patients with advanced rectal cancers has been reported in nearly two-thirds of patients receiving palliative pelvic RT with 1/3rd reporting symptom control at 1 year after treatment.\textsuperscript{8,26} Vaginal discharge or discharge
from the rectum can be a very distressing symptom. The few studies evaluating the role of RT have reported in a wide variation in response ranging from 15% to 100%. In addition, significant relief dysuria, obstipation, and tenesmus have been observed with RT.

Although palliative RT along with appropriate medical management plays a pivotal role in symptom management of advanced incurable cancers, it needs to be cautiously administered in patients with disease-related fistulas as it may lead to exacerbation of symptoms and a deterioration in QoL. Terminally ill patients presenting with uremia and obstructive uropathy should be managed with best supportive care. The decision to perform an invasive percutaneous nephrostomy should be individualized and its role in very advanced/recurrent/residual disease seems controversial. Though the procedure may transiently improved renal function, it typically only prolongs the patient’s pain and suffering. In such cases, prolonging survival by preventing death from uremia may come with the price of reduced QoL because of pain, fatigue, recurrent infections, or other sequel of advanced metastatic disease.

Patients with advanced abdominal malignancies usually present with upper gastro-intestinal bleeding, pain, biliary obstruction, and ascites. Although the medical management is essentially similar, RT has a relatively limited role in management of hemorrhage in these patients, especially with the evolution of advanced endoscopic techniques that can effectively control hemorrhage. For pain management, apart from the standard WHO step ladder, percutaneous celiac plexus blockage may benefit patients with poor response to or poor tolerance of opioid analgesics. Radiation can be considered as an alternative treatment in management of poorly controlled pain in advanced pancreatic cancers. Jaundice with associated pruritus, malaise, loss of appetite, and abdominal discomfort commonly occur in patients with advanced pancreatic cancers. Percutaneous transhepatic biliary drainage or endoscopic stent placement provides an excellent outcome in these patients. Those with malignant bowel obstruction are best managed conservatively with a combination of metoclopramide, octreotide, and steroids given in appropriate doses. In patients with advanced gastric cancers, symptoms like intractable vomiting due to gastric outlet obstruction can be relieved by proximal decompression using nasogastric tube insertion, percutaneous endoscopic gastrostomy (PEG), or gastric stenting. In addition, patients with advanced pelvic and abdominal cancers often present with symptoms of ascites and deep vein thrombosis. For ascites, a combination of repeated therapeutic paracentesis and diuretic therapy or peritoneo-venous shunts helps ameliorate the discomfort. Management of deep vein thrombosis can be challenging as these patients are also at a risk of bleeding. The recommended management includes the use of low-molecular-weight heparins. The aim of management in patients with
advanced incurable cancers should be enhancement of QoL, even though the survival is limited.

**CLINICAL PEARLS**

- RT is an effective modality for palliation of symptoms due to pelvic malignancies, like pain, bleeding, or discharge.
- Availability of alternative modalities using endoscopic techniques, along with inherent lack of favorable therapeutic benefit, limits the role of radiation therapy for palliation of abdominal malignancies.
- Optimal patient selection after considering various factors like severity of symptoms, disease burden, performance status, life expectancy, patient convenience, and departmental logistics, is paramount for deciding on the fractionation schedule.
- Single or limited fractions of higher doses of radiation are often preferred for patients with limited life expectancies.
- Various short course fractionated regimens have been developed for patients with longer life expectancies, to optimally balance the treatment duration and probability of radiation-induced late effects.
- Optimal utilization of available resources, along with appropriate supportive care by a multidisciplinary team, is necessary for improving the QoL of patients with pelvic and abdominal malignancies.

**SELF-ASSESSMENT**

**Questions**

1. The preferred modality for controlling hematemesis in a patient of metastatic gastric cancer is
   A. External RT
   B. Endoscopic hemostasis
   C. Chemotherapy
   D. Targeted therapy

2. Choose the false statement among the following, regarding biliary tract cancer.
   A. Percutaneous transhepatic biliary drainage is an accepted modality for relieving obstructive symptoms
   B. Brachytherapy is never used for palliation
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C. SBRT has a limited role in management of inoperable gall bladder cancer
D. Repeated paracentesis can be done to relieve malignant ascites

3. In a male patient with metastatic urinary bladder cancer, the treatment portals for palliative RT should include all of the following, except
   A. Dome of the bladder
   B. Neck of the bladder
   C. Prostatic urethra
   D. Inguinal lymph nodes

4. All of the following can be used for controlling vaginal bleeding in a palliative patient of cervical cancer, except
   A. Vaginal packing
   B. Tranexemic acid
   C. External radiation
   D. Radiofrequency ablation

5. The best modality for management of pelvic pain in a patient with inoperable metastatic rectal cancer is
   A. Chemotherapy
   B. Cetuximab
   C. External RT
   D. Trans arterial embolization

6. A relative contraindication for palliative RT in a patient with vulval cancer is
   A. Bleeding
   B. Discharge
   C. Ulceration
   D. Vescico-vaginal fistula

Answers

1. B. For an overtly bleeding vessel causing hematemesis, endoscopic treatment results in more immediate hemostasis. Radiation therapy is more useful in oozing in the absence of an identifiable vessel. Radiation therapy has been reported to control hematemesis and improve hemoglobin levels but the series are small.

2. B. Intraluminal brachytherapy palliates obstructive symptoms of biliary tract cancers. EBRT has also been used with minimal morbidity.
3. D. Inguinal lymph nodes are rarely the cause of symptoms in bladder cancer. To palliate bladder cancer, the entire bladder should be in the target volume.

4. D. Radiation therapy, vaginal packing, and administration of tranexamic acid are viable treatment options for vaginal bleeding. Radiofrequency ablation has not been used in this setting.

5. C. Radiation therapy effectively palliates pelvic pain due to locally advanced rectal cancer with response rates of 70% to 80%.

6. D. Bleeding, discharge, and ulceration can be effectively palliated with EBRT. A vesico-vaginal fistula cannot be palliated with radiation therapy.

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