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# Renal cell carcinoma, part 3

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**Abstract:** Renal cell carcinoma (RCC) accounts for most renal malignancies. This article, the last in a three-part series, presents treatment options for RCC using the American Joint Committee on Cancer Tumor, Node, and Metastasis staging system as a framework, as well as nursing-care options for patients undergoing partial or radical nephrectomy.

**Keywords:** active surveillance, cytoreductive nephrectomy, partial nephrectomy, radical nephrectomy, RCC, renal artery embolization, renal cell carcinoma, TNM staging, Von Hippel Lindau syndrome

TREATMENT FOR renal cell carcinoma (RCC) often requires surgical management with a partial nephrectomy (PN) or radical nephrectomy (RN).<sup>1,2</sup> In addition, immunotherapy and targeted molecular therapies have improved survival time for patients with metastatic RCC.<sup>3</sup> This article, the last in a three-part series, presents treatment options for RCC using the American Joint Committee on Cancer (AJCC) Tumor, Node, and Metastasis (TNM) staging system as a framework.<sup>4</sup> Nursing care for patients undergoing RN and PN and for those receiving systemic therapies is also discussed. For a comprehensive review of RCC, this article is intended to be used in conjunction with parts 1 and 2 of the series.<sup>5,6</sup>

The pathologic stage is the most reliable prognostic indicator for RCC and provides a direction in treatment options. The AJCC TNM is a standardized classification system for staging RCC (see *TNM classification system*).<sup>4</sup>

- Stage I malignancies are 7 cm or less.
- Stage II malignancies are greater than 7 cm. Stage I and Stage II malignancies are contained in the kidney.

- Stage III malignancies are locally invasive and/or have nearby lymph node involvement.

- Stage IV malignancies extend beyond the kidney, possibly to other organs or to distant lymph nodes.

Treatment approaches should be implemented based on the stage of malignancy and the patient's clinical status.

## Stage I and Stage II treatment

Active surveillance (AS) may be explored as an initial option for patients who have Stage I small renal masses (SRMs), particularly malignancies that are no larger than 2 to 3 cm.<sup>2,7-9</sup> Because the growth rate of RCC is generally slow, adults age 75 and older may elect AS over aggressive treatment because they are more likely to die from other causes. AS may also be considered in patients who have significant comorbidities and limited life expectancy. Close surveillance is crucial because in approximately 20% of patients, SRMs are high-grade malignancies that have a propensity to metastasize (see *Grading tumors*).<sup>2,7-9</sup>

Grade 3 and Grade 4 are considered high-grade aggressive malignancies, according to the World Health

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Organization (WHO)/International Society of Urological Pathology (ISUP) grading classification system.<sup>2,7-9</sup> If a surgical approach is chosen, a nephron-sparing approach with a PN to preserve renal function should be explored for Stage I SRMs. PN is the standard treatment for Stage I RCC and it is considered curative, with a 5-year survival rate of 94%.<sup>2,7-9</sup>

To perform a PN, the surgeon excises the mass and surrounding tissue, but leaves the rest of the kidney, including the nephron, intact. PN may be performed via an open, laparoscopic, or robotic-assisted laparoscopic approach for patients with a solitary mass in one kidney, multiple masses in one kidney, or bilateral masses. It may also be indicated for patients with inherited syndromes, such as Von Hippel Lindau syndrome in which subsequent malignancies may occur, and in those with impaired kidney function.<sup>1,2,7-9</sup>

In **open PN**, the surgeon accesses the affected kidney through a retroperitoneal or transperitoneal incision.

In contrast, a **laparoscopic PN** is a less invasive approach that involves several small abdominal incisions.<sup>1,2,7-9</sup> A PN is a more complicated procedure than an RN because it requires the surgeon to carefully manipulate and maneuver vessels and other tissues within the kidney while excising the tumor and its borders. An open or laparoscopic RN should be performed only when a PN is not possible because of the anatomical location and complexities of masses.<sup>1,2,7-9</sup>

RN involves the removal of the entire kidney, fatty tissue surrounding the kidney, and connective tissue that encloses and supports the kidney (known as Gerota's fascia) and adrenal gland. Rarely, the surgeon may elect to remove only the kidney and leave the adrenal gland in place (simple nephrectomy).<sup>1,2,7-9</sup>

**Robot-assisted laparoscopic PN and RN** have made it substantially easier for the surgeon to remove a mass or entire kidney and suture the wound(s). Evidence indicates that there is equivalent control of disease processes and achievement of posi-

tive outcomes when open PN or RN and laparoscopic PN or RN are compared.<sup>1,2,7-9</sup>

During laparoscopic surgery, carbon dioxide is inserted into the abdominal cavity to help displace internal organs and give the surgeon easier access to the surgical site. Conversion from a laparoscopic PN to an open PN may be necessary if the surgeon determines that a mass is in a difficult location to excise.<sup>1,2,7</sup>

A laparoscopic or open RN is the standard surgical intervention for Stage II malignancies. Surgical excision of Stage II masses has a 5-year survival rate of 79%.<sup>1,2,7-9</sup>

Thermal ablation is a less invasive nephron-sparing option than PN for patients with SRMs (Stage I or Stage II).<sup>1,2,7</sup> Patients who are at high risk for poor surgical outcomes may be candidates for this procedure because it can be performed with a percutaneous approach using local anesthesia. An advantage of thermal ablation is its highly effective preservation of renal function. The 5-year survival rate is 90%.<sup>1,2,7</sup>

## TNM classification system<sup>4,28,29</sup>

Stage	Tumor (T)	Node (N)*	Metastasis (M)*	Explanation
I	T1	N0	M0	Tumor is ≤7 cm. No regional lymph node involvement or distant metastasis.
II	T2	N0	M0	Tumor is >7 cm. No regional lymph node involvement or distant metastasis.
III	T3	N0	M0	Tumor is regionally invasive. No regional lymph node involvement or distant metastasis.
	T3	N1	M0	Tumor is regionally invasive. Regional lymph node involvement is present, but no distant metastasis.
	T1 or T2	N1	M0	Meets T1 or T2 criteria for tumor size. Regional lymph node involvement is present but no distant metastasis.
IV	T4	N0-N1	M0	Tumor invades beyond the renal fascia and ipsilateral adrenal gland. Regional lymph node involvement may or may not be present. No distant metastasis.
	T1, T2, T3, T4	N0-N1	M1	Meets criteria for any tumor. Regional lymph node involvement may or may not be present. Distant metastasis is present.

\***N0**: no regional lymph node involvement. **N1**: regional lymph node involvement is present.  
**M0**: no metastasis to distant lymph nodes/organs. **M1**: metastasis to distant lymph nodes/organs is present.

Radiofrequency ablation is a type of thermal ablation that utilizes computed tomography (CT) or ultrasound technology to guide high-frequency radio waves to heat and ultimately destroy the malignancy. Similarly, cryotherapy uses extreme cold to destroy the malignancy, also with CT or ultrasound guidance.<sup>1,2,7</sup>

### Stage I and Stage II treatment: Nursing considerations

When caring for a patient scheduled for PN or RN, the nurse should perform a health history interview and evaluate for signs and symptoms of and risk factors for RCC, identify the presence of any comorbidities, and document the patient's current medications.<sup>7</sup> The nurse should perform a head-to-toe assessment with an emphasis on cardiopulmonary status to evaluate for optimal oxygenation and to identify risks for postoperative atelectasis and pneumonia.

Preoperative pulmonary function tests may be performed in some patients, especially those with a history of pulmonary disease and/or smoking, and in patients over age 60.<sup>7</sup>

A complete metabolic panel and complete blood cell count are integral to preoperative assessment. The nurse should assess serum creatinine and estimated glomerular filtration rate to evaluate kidney function. The surgeon must ensure that the unaffected kidney is functioning properly if the patient is undergoing RN.<sup>7</sup> Additionally, partial thromboplastin time should be assessed because bleeding is possible during surgery and postoperatively.<sup>7</sup>

Routine postoperative nursing care includes monitoring wound dressings, vital signs, lab values, and the patient's clinical status to assess for potential complications such as bleeding.<sup>1,2,7</sup>

The renal hilum is a point of entry and exit for renal vessels within the kidney. Renal hilum vascular injury in PN may occur intraoperatively and

## Grading tumors<sup>6</sup>

The grading of tumor cells by physical appearance is a helpful prognostic indicator. The Fuhrman grading system, which evaluates nuclear characteristics of cancer cells, has been a widely used system for grading RCC. The WHO and ISUP developed a standardized system to grade RCC that complements the Fuhrman grading system and includes a more definitive measure of nuclear characteristics of RCC. Each criterion in the WHO/ISUP classification system provides a prognostic indicator of the tumor. For example, Grades 1 and 2 are considered the least aggressive tumors, and Grades 3 and 4 are considered high-grade aggressive tumors. Tumor grade should be correlated with tumor stage and the patient's clinical status.

is typically managed with hemostatic medications and specific suturing techniques by the surgeon. The manipulation of the intra-abdominal organs may also cause trauma to the bowel, liver, spleen, pancreas, and diaphragm.<sup>1,2,7</sup>

Large malignancies may require an intentional entry into the collecting duct system in the kidney.<sup>1,2,7</sup> The surgeon must ensure that the incision is sufficiently sutured in the collecting duct system to avoid urine leakage. The surgeon may insert an abdominal drain, which enables the nurse to assess for urine leakage and bleeding in the postoperative period. Increasing amounts of serous drainage may be a sign of urine leakage.<sup>1,2,7</sup>

If urine leakage is present, the patient may exhibit postoperative abdominal pain, flank pain, diminished or absent bowel sounds, abdominal distension, and rising serum creatinine level. The nurse must be able to differentiate these signs and symptoms from the expected PN incisional pain that patients normally experience postoperatively.<sup>1,2,7</sup>

Treatment of a urine leak includes the placement of a ureteral stent and urinary bladder catheter. A percutaneous nephrostomy tube may be required on rare occasions.<sup>1,2,7</sup>

Patients who undergo minimally invasive thermal ablation may experience myalgia, fever, and temporary hematuria. They may also have a self-limiting hematoma at the surgical site. Those who undergo cryotherapy may

feel very cold after the procedure, so keeping them warm is important.

### Stage III treatment

Stage III RCC occurs when the malignancy grows into major veins or nearby tissues or has invaded regional lymph nodes but has not metastasized to other body organs.<sup>4</sup> Invasion of the inferior vena cava may require a thrombectomy.<sup>2,4,7-9</sup> The 5-year survival rate for patients with Stage III RCC is 53%.<sup>4</sup>

RN is the standard surgical approach for Stage III RCC and may be curative in some cases.<sup>2,7-9</sup> Regional lymph node invasion is not common.<sup>2,8</sup> However, lymph node dissection (LND) should be performed when imaging studies reveal lymph node abnormalities or when lymph node enlargement is noted upon palpation.<sup>2,10</sup>

LND plays an important role in determining the pathologic stage.<sup>2,10</sup> Most patients with isolated lymph node involvement will develop systemic progression within 1 year of any surgical interventions, although some patients will experience long-term, recurrence-free survival.<sup>2,10</sup>

The incidence of adrenal gland invasion is low in Stage III RCC, but ipsilateral adrenalectomy should be performed during RN when preoperative imaging studies indicate adrenal gland involvement.<sup>2,10</sup>

Renal artery embolization (RAE) is an effective technique to manage large malignancies with thrombus

## Immunotherapy: Selected cytokines for treating RCC<sup>13,14,22,23,30,31</sup>

	Side effects and adverse reactions	Priority nursing considerations	Priority patient education
<b>Interferon alpha</b>	<p><i>Side effects:</i> anorexia, nausea, vomiting, decreased weight, diarrhea, alopecia, dry skin, arthralgia, headache, fatigue, flulike syndrome.</p> <p><i>Adverse reactions:</i> neutropenia, infection, fever, hypotension, cardiac dysrhythmias, cardiomyopathy, vasculitis, neuropathy, abdominal pain, increased liver enzymes, gastrointestinal bleeding, anemia, thrombocytopenia, pancreatitis, liver failure, visual disturbances, depression, suicidal ideation, thyroid dysfunction, pneumonia, pulmonary hypertension, pulmonary edema, and sarcoidosis.</p>	<ul style="list-style-type: none"> <li>• Assess cardiopulmonary status, including breath sounds, oxygen saturation, and amplitude of pulses.</li> <li>• Assess vital signs, especially heart rate and rhythm, BP, and body temperature for the presence of fever.</li> <li>• Assess for bleeding.</li> <li>• Assess for infection.</li> <li>• Assess complete blood cell count, liver enzymes, and thyroid function studies.</li> <li>• Assess mental status and ask patients if they are depressed or having suicidal thoughts.</li> <li>• Assess visual acuity.</li> <li>• Assess skin.</li> </ul>	<p><i>Teach patients to:</i></p> <ul style="list-style-type: none"> <li>• report chest pain, dyspnea, dizziness, or weight gain.</li> <li>• report orthostatic hypotension. Rise slowly from a seated position and ambulate with caution to prevent falls.</li> <li>• report a fever, chills, cough, sore throat, or any other signs or symptoms of infection.</li> <li>• report bleeding, easy bruising, blood in the stool, bleeding gums.</li> <li>• use a soft toothbrush and electric razor to prevent bleeding.</li> <li>• report increasing fatigue.</li> <li>• report increasing anxiety and depression or thoughts of suicide.</li> <li>• report any changes in vision.</li> <li>• report any changes in sensation, such as numbness and tingling.</li> <li>• Maintain good nutrition and get plenty of rest.</li> </ul>
<b>Interleukin-2</b>	<p><i>Side effects:</i> fatigue, arthralgia, rash, pruritus, anorexia, nausea, vomiting.</p> <p><i>Adverse reactions:</i> respiratory failure, tachycardia, anemia, abdominal pain, hypotension, myocardial infarction, renal failure, peripheral edema, sepsis, thrombocytopenia, infection, fever, sepsis, confusion, increased bilirubin, increased serum creatinine, abnormal liver function tests, and capillary leak syndrome. The manifestations of capillary leak syndrome include pulmonary edema, respiratory distress, hypotension, cardiac insufficiency, hypovolemia, cerebral edema, neuro-psychiatric manifestations, and decrease in perfusion to the kidneys.</p>	<ul style="list-style-type: none"> <li>• Assess cardiopulmonary status including breath sounds, oxygen saturation, and amplitude of pulses.</li> <li>• Assess vital signs, especially the heart rate and rhythm, BP, and the presence of fever.</li> <li>• Assess for infection.</li> <li>• Assess complete blood cell count, liver enzymes, and serum creatinine.</li> <li>• Assess for bleeding.</li> <li>• Assess for changes in urine output and correlate with serum creatinine.</li> <li>• Assess mental status.</li> <li>• Assess for erythematous rash and pruritus. This rash can lead to desquamation of skin and can be very uncomfortable.</li> <li>• Assess for abdominal pain and characteristics of bowel sounds and stool pattern. Bowel ischemia and perforation may occur.</li> </ul>	<p><i>Teach the patient to:</i></p> <ul style="list-style-type: none"> <li>• report chest pain, dyspnea, dizziness, edema, or weight gain.</li> <li>• report orthostatic hypotension. Rise slowly from a seated position and ambulate with assistance.</li> <li>• report a fever, chills, cough, sore throat, or any other signs of infection.</li> <li>• report bleeding, including easy bruising, blood in the stool, or bleeding gums.</li> <li>• use a soft toothbrush and electric razor to prevent bleeding.</li> <li>• report increasing fatigue and onset of a rash or pruritus.</li> <li>• discuss contraceptive use with healthcare provider.</li> <li>• Use sunscreen with a sun protection factor of at least 15 to prevent skin injury from photosensitivity.</li> <li>• report changes in mood or the onset of confusion.</li> <li>• report changes in bowel habits.</li> <li>• maintain good nutrition and get plenty of rest.</li> </ul>

formation.<sup>11</sup> RAE is performed 2 to 4 weeks prior to RN to reduce the bulk of the mass, facilitate excision of the mass, and reduce the incidence of bleeding in the perioperative period. RAE may also be performed as a palliative measure to increase survival time in patients who are poor surgical candidates.<sup>11</sup>

Immunotherapy may be administered to prime the patient's immune system to recognize, attack, and destroy cancer cells. **Cytokines** are proteins and one type of adjuvant immunotherapy (see *Immunotherapy: Selected cytokines for treating RCC*).<sup>12-15</sup>

- Interferon-alpha is a glycoprotein

with immune system modulating properties that has an antiproliferative effect on renal malignancies. Patients generally tolerate the medication well with flulike symptoms being the most common adverse reaction.<sup>12-15</sup>

- Interleukin-2 stimulates lymphocytes to destroy cancer cells and is associated with more serious adverse reactions when compared with interferon-alpha, such as bleeding and cardiopulmonary complications.<sup>12-15</sup>

#### **Immune checkpoint inhibitors (ICIs)**

are another type of immunotherapy (see *Immunotherapy: A selected ICI for treating RCC*).<sup>12-15</sup>

Checkpoints are a series of inhibitory

and stimulatory pathways in a person's immune system that regulate the identification and elimination of cancer cells. ICIs block proteins that modulate the immune system to prevent T-lymphocytes from recognizing and destroying cancer cells. This blocking process allows T-lymphocytes to be released and stimulate an immune response against cancer cells. Common ICIs that are effective in treating advanced and metastatic RCC include, but are not limited to, antiprogrammed cell death protein 1 (PD-1, known as nivolumab) and cytotoxic T-lymphocyte antigen (CTLA-4, known as ipilimumab).<sup>12-15</sup>

### **Immunotherapy: A selected ICI for treating RCC<sup>14,30,31</sup>**

	<b>Side effects and adverse reactions</b>	<b>Priority nursing implications</b>	<b>Priority patient education</b>
<b>Nivolumab</b>  Monoclonal antibody: may cause an immune-mediated infusion reaction with chills, fever, and pruritus. The reaction may take place during the infusion or 24 to 72 hours after the infusion. It is managed with diphenhydramine and antipyretics.	<i>Side effects:</i> arthralgia, anorexia, diarrhea, constipation, headache, fatigue, dry skin, insomnia.  <i>Adverse reactions:</i> pneumonitis, myocarditis, ventricular dysrhythmias, thrombocytopenia, anemia, neuropathy, hepatitis, hypophysitis, adrenal insufficiency, type 1 diabetes mellitus, nephritis, Stevens-Johnson Syndrome or toxic epidermal necrolysis, encephalitis, abdominal pain, small bowel obstruction, iridocyclitis, hypercalcemia, hypocalcemia, hyperkalemia, hypomagnesemia, hyponatremia, hyperglycemia, increased liver enzymes, increased cholesterol, and increased triglycerides.	<ul style="list-style-type: none"> <li>• Assess vital signs, including heart rate and rhythm.</li> <li>• Assess for bleeding and infection and monitor electrolytes.</li> <li>• Assess for signs and symptoms of immune-mediated pneumonitis, such as cough and shortness of breath.</li> <li>• Monitor patient for signs and symptoms of immune-mediated colitis such as abdominal pain, diarrhea, and mucus or blood in the stool.</li> <li>• Monitor patient for signs and symptoms of hepatitis such as jaundice and an increase in liver enzymes and bilirubin.</li> <li>• Assess skin for rashes or blistering.</li> <li>• Assess for signs and symptoms of hypophysitis such as headache, weight changes, excessive thirst and urination, and mental status changes.</li> <li>• Assess for signs and symptoms of encephalitis such as headache, fever, and changes in mental status.</li> <li>• Monitor for signs and symptoms of renal dysfunction, such as an increase in serum creatinine, decrease in urine output, hematuria, and edema.</li> <li>• Monitor thyroid function studies.</li> <li>• Monitor bowel function.</li> </ul>	<i>Teach patients to:</i> <ul style="list-style-type: none"> <li>• use meticulous skin care and to report onset of a new lesion or rash.</li> <li>• stay hydrated to minimize dry skin and pruritus.</li> <li>• report coughing, shortness of breath, and/or chest pain.</li> <li>• report bleeding, changes in bowel pattern, and signs or symptoms of infection such as fever.</li> <li>• report signs and symptoms of hepatitis including anorexia, nausea, abdominal discomfort, and jaundice.</li> <li>• report changes in urinary patterns and the onset of peripheral edema indicating renal dysfunction.</li> <li>• report any changes in mood and the onset of confusion or changes in weight.</li> <li>• report numbness or tingling of the hands or feet.</li> <li>• use contraception to avoid fetal harm (females with reproductive potential).</li> </ul>

## Targeted molecular therapy: Sorafenib<sup>15,21,24,30,31</sup>

Side effects and adverse reactions	Priority nursing considerations	Priority patient education
<p><i>Side effects:</i> fatigue, anorexia, nausea, vomiting, alopecia, dry skin, pruritus, weight loss.</p> <p><i>Adverse reactions:</i> myocardial ischemia, prolonged QT interval, myocardial infarction, hypertension, bleeding, cutaneous toxicities including hand-foot syndrome, gastrointestinal perforation, hepatitis, thyroid dysfunction, infection, neuropathy</p>	<ul style="list-style-type: none"> <li>• Assess cardiopulmonary status, including breath sounds and heart rate and rhythm, and ECG results.</li> <li>• Assess complete blood cell count, liver function tests, and thyroid studies.</li> <li>• Monitor vital signs, including noting hypertension and signs and symptoms of infection including fever.</li> <li>• Assess for easy bruising or bleeding including blood in the stool.</li> <li>• Assess the abdomen for pain and distension. Correlate findings with bowel sounds, bowel patterns, and lab results, such as an increase in liver enzymes. The presence of jaundice indicates hepatitis.</li> <li>• Assess for dry skin, itching, alopecia, flaking, and redness of the eyes and scalp.</li> <li>• Assess for hand-foot reactions such as tenderness and thickening of soles and palms, which may be accompanied by blisters.</li> <li>• Note that sorafenib may increase the effects of warfarin.</li> <li>• Counsel women and men of reproductive potential about using contraception for at least 2 weeks following therapy, or as directed by the healthcare provider.</li> </ul>	<p><i>Teach the patient to:</i></p> <ul style="list-style-type: none"> <li>• report signs of infection such as fever, sore throat, or increasing fatigue; chest pain, pressure, or discomfort; bleeding; and abdominal pain and changes in bowel patterns, including constipation.</li> <li>• maintain meticulous skin care and stay hydrated, which will minimize dry skin and pruritus.</li> <li>• use an electric razor and soft toothbrush to prevent bleeding.</li> <li>• take a daily BP measurement, as hypertension can be an adverse reaction of therapy.</li> <li>• minimize sun exposure and use a sunscreen with a sun protection factor of 15 or more.</li> <li>• get plenty of rest, maintain good nutrition, and avoid alcohol.</li> </ul>

ICIs are monoclonal antibodies (biologics) that may increase autoimmune activity, causing a systemic inflammatory response. Immunosuppression with low-dose corticosteroids and corticosteroid-sparing agents such as mycophenolate mofetil will minimize or prevent this response.<sup>12-15</sup> Cytokines and ICIs may be combined with targeted therapies to treat Stage IV metastatic disease.<sup>2,16</sup>

### Stage IV treatment

In Stage IV RCC, a malignancy invades tissue outside of the kidney and may metastasize to other organs or distant lymph nodes. The 5-year survival rate for patients with Stage IV RCC is 12%.<sup>2,7-9</sup> The following discussion examines treatment options for patients who have metastatic RCC on initial presentation as well as for those who have metastatic disease after a disease-free period.

Cytoreductive nephrectomy, metastasectomy, immunotherapy with ICIs and cytokines, and targeted molecular therapy with tyrosine kinase inhibitors (TKIs) are among the options for these patients.<sup>2,7-9</sup>

- **Cytoreductive nephrectomy**, which refers to removing the diseased kidney as well as any additional surrounding tissues or organs that are affected, may be performed in a patient with Stage IV RCC.<sup>2,16</sup> The goal of a cytoreductive nephrectomy is to remove as many cancer cells as possible. RCC is highly immunogenic, and the removal of the malignant tissue reduces disease burden and the development of biological clones that may lead to additional metastasis.<sup>2,16</sup>
- Patients may also undergo **metastasectomy**, which is the surgical removal of metastatic lesions.<sup>2,17</sup> Metastasectomy can reduce pain,

increase survival time, and, on rare occasion, be curative. RCC can metastasize to distant lymph nodes and to organs such as the lungs (most common), bone, liver, brain, pancreas, and thyroid gland.<sup>2,17</sup>

For patients with Stage IV RCC, systemic therapies should be considered to complement surgical treatments.<sup>2,17</sup>

- **Systemic drug therapy** includes TKIs which are the first-line drug therapy for treating metastatic RCC. Implicated in the development of cancer, tyrosine kinases are enzymes that have a role in cell proliferation, metabolism, and apoptosis. TKIs block enzyme activity to reduce tumor growth. Because these drugs target vascular endothelial growth factor (VEGF) receptors to reduce the vasculature and blood supply to tumors, they are also known as VEGF inhibitors.<sup>2,3,16,18,19</sup>



Multikinase inhibitors approved by the FDA for the treatment of metastatic RCC include sorafenib and sunitinib.<sup>2,3,16,18,19</sup> Sorafenib was the first multikinase inhibitor approved by the FDA for the first-line treatment of metastatic RCC (see *Targeted molecular therapy: Sorafenib*).<sup>15,16,20,21</sup> TKIs may be used alone or in combination with ICIs and cytokines.<sup>2,3,16,18,19</sup> Bevacizumab is a monoclonal antibody that is a VEGF receptor inhibitor.<sup>15,16</sup>

The mammalian target of rapamycin (mTOR) promotes the development of two kinase complexes, mTOR-1 and mTOR-2. These complexes are signaling pathways in cell proliferation and growth that are hyperactive in cancer. Everolimus and temsirolimus are two mTOR inhibitors that are also options that may be used to treat metastatic RCC.<sup>2,3,16,18,20</sup>

The nurse should assess patients receiving an mTOR Inhibitor for fatigue, stomatitis, hyperglycemia, infection, and hypercholesterolemia.<sup>15,20</sup> The nurse should also closely monitor patients receiving temsirolimus for interstitial lung disease, proteinuria, bowel perforation, and intracerebral hemorrhage.<sup>14,19</sup>

• **Stereotactic body radiation (SBRT)** is another option to reduce tumor burden in patients with metastatic RCC.<sup>2,23</sup> SBRT delivers a high amount of radiation to a tumor and spares normal bodily tissues. The evidence indicates that the greatest benefit of radiation therapy is pain management; it does not significantly increase survival time.<sup>2,23</sup>

Bone is the second most common target of RCC metastasis, following the lungs.<sup>2,23</sup> Metastasis to the bone may cause bone pain, pathologic fractures, and spinal cord compression. Bone metastasis stimulates the production of osteoclasts, leading to bone resorption. Receptor activator of NFκB ligands is a pathway for bone resorption in response to tumor

## Educating patients about skin care<sup>24-27</sup>

Teach patients undergoing immunotherapy and targeted therapy these strategies to protect their skin and minimize adverse reactions such as pruritus.

- Drink 8 to 10 glasses of water or other nonalcoholic fluid daily to avoid dehydration, which exacerbates pruritus.
- Avoid alcohol intake and smoking.
- Apply emollient creams regularly. Use hypoallergenic, hydrating creams, and lotions but avoid creams that contain retinoid, which can dry the skin.
- Take medicated baths, such as a soothing oatmeal bath, as directed by the healthcare provider.
- Use mild soaps for sensitive skin. Avoid perfumes, deodorants, starch-based powder, and cosmetics.
- Shower with lukewarm water.
- Wear loose-fitting clothes.
- Maintain a cool and humid environment at home to help prevent pruritus.
- Avoid scratching rashes or lesions. A gentle massage or pressure to the skin using a soft cloth may be helpful.
- Remain physically active if able. Consider relaxation or distraction techniques, walking, and yoga.
- Minimize sun exposure. Wear a wide brimmed hat when outdoors and apply sunscreen with a sun protection factor of at least 15.
- Consult the healthcare provider for additional treatments if rashes or lesions worsen, persist, or interfere with sleep and daily activities.

growth factors. Evidence indicates that bisphosphonates such as zoledronic acid are effective in reducing or preventing skeletal-related events in metastatic RCC.<sup>2,23</sup> The inclusion of a multikinase inhibitor such as sunitinib with a bisphosphonate may promote the best therapeutic outcome.<sup>2,3,15</sup>

## Stage III and IV priority assessment, interventions, and patient teaching

To develop a plan of care for a patient undergoing treatment for Stage IV RCC, the nurse should conduct a thorough health history and a head-to-toe physical assessment and evaluate any imaging and lab study results. Besides the post-op considerations previously discussed, medication management is crucial. The sidebars provide detailed descriptions of patient assessment and education with selected medications.

The skin is a common source of discomfort for patients receiving immunotherapy and targeted therapy

with TKIs.<sup>24-27</sup> Dry skin and pruritus are common. Patients receiving targeted therapy may also experience various rashes and lesions, photosensitivity, and hand-foot syndrome, which involves painful lesions on the palms and soles of the feet.<sup>24-27</sup> The earliest symptom of hand-foot syndrome are paresthesias of the hands and feet. See *Educating patients about skin care* for strategies to promote skin comfort.<sup>24-27</sup>

Regardless of the stage of a patient's RCC, the nurse must integrate critical thinking with assessment data. In addition, providing the patient with emotional support should be integral to the plan of care in a patient's journey with RCC. Nurses should encourage the patient and his or her loved ones to verbalize fear, anxiety, and feelings of uncertainty with a diagnosis of RCC. These emotions will vary according to the stage of the disease and prognosis. Counselors, psychologists, and support groups are often helpful. ■



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