Avoiding bowel toxicity in the treatment of the renal surgical bed

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Renal cell carcinoma (RCC) is the most common cancer associated with the kidney. RCC accounts for approximately 3% of all adult malignancies with the incidence increasing by almost 2% per year.1,2 Radical nephrectomy is the standard of treatment for patients with localized disease; however, approximately 30% of patients present with metastasis.2

The use of radiotherapy is most often limited to post-operative cases when residual tumor is identified or for symptomatic relief of metastatic disease. Definitive radiotherapy treatment is not commonly indicated due to the low tolerance to radiation of surrounding abdominal structures such as the small bowel, ipsilateral kidney, and spinal cord. For patients diagnosed with left-sided RCC, the main dose limiting structure is the small bowel. The following case study will focus on avoiding bowel toxicity with the use of post-operative radiotherapy for the treatment of a Stage III left-sided renal cell carcinoma.

**Bowel Toxicity**

Normal tissue tolerance doses to radiation often limit the curability of a malignancy. A tumor lethal dose of radiation cannot be delivered when a critical structure, such as the small bowel, is included in the treatment field.

Small bowel radiation toxicity is characterized by mucosal inflammation and breakdown. Chronic injury includes the development of progressive vascular stenosis and intestinal wall fibrosis.3 Acute and chronic toxicities associated with irradiation of the small bowel are identified in terms of TD5/5. This represents the tissue field. Complication rates for critical structures are of radiation received and the volume of bowel in the radiation toxicity to the small bowel are the total dose and treatment volume, complication rates are considerably lower than 5-10% in daily practice and comparable to major abdominal surgery alone.3

The two most important factors influencing radiation toxicity to the small bowel are the total dose of radiation received and the volume of bowel in the field. Complication rates for critical structures are identified in terms of TD5/5. This represents the tissue dose associated with a 5% injury rate within 5 years of radiation treatment. The TD5/5 doses for the small bowel are 4500cGy for approximately 400cm² of bowel and 5000cGy when 100cm² of bowel is included in the treatment field.4 This correlation shows the importance of conformal radiation techniques.

### Table 1

<table>
<thead>
<tr>
<th>Acute Effects (6-18 months post RT)</th>
<th>Chronic Effects (9-18 months- 5 years post RT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>Bowl Obstruction</td>
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<tr>
<td>Colicky Abdominal Pain</td>
<td>Fistula Formation</td>
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<tr>
<td>Nausea</td>
<td>Perforation</td>
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<tr>
<td>Vomiting</td>
<td>Hemorrhage</td>
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**References**