

Interventional Radiology Management of Nonresectable Neoplasia

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KEYWORDS

- Locoregional therapy • Intra-arterial chemotherapy • Embolization
- Chemoembolization • Stent

KEY POINTS

- Image-guidance allows for the performance of alternative techniques in the treatment of nonresectable neoplasia.
- Locoregional therapies can be considered for the treatment of a myriad of tumors; however, extensive understanding of anatomy and available techniques is required.
- Early outcomes associated with the interventional radiology management of nonresectable neoplasia are promising, although further evaluation of long-term outcomes is necessary.

INTRODUCTION

As medical and technological advances occur, it is inevitable that options for the treatment of neoplastic disease will increase. With the availability of evolving, innovative options, it is essential for treating clinicians and owners to work closely together to determine the best diagnostic and therapeutic course of action for a particular patient. It is always important to consider that while “something” can be done, it may not always be in that patient’s best interest. With that fact in mind, advances in instrumentation and other technologies using interventional radiology (IR) or more specifically interventional oncology (IO), techniques provide owners with treatment options, especially for the many cases that had no options only a short time ago. Most of these options are considered palliative in nature but have the potential to provide an improved quality of life.

TREATMENT OPTIONS

The major treatment option categories for oncologic disease have not changed much in the last several decades. In general, surgery should be considered whenever

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possible. Depending on tumor type, location, and biological behavior, chemotherapy and radiation therapy may be used in a neoadjuvant or adjuvant setting or as primary treatment modalities. The concept of “nonresectability” is a controversial topic because it is often clinician-dependent. As an example, some surgeons may feel that certain prostatic tumors can be removed with an aggressive prostatectomy approach, whereas others would be reluctant to consider this procedure due to the potential complications or the chance of recurrence. When surgery may be considered a poor option due to tumor location or severity of organ involvement, IO treatment options such as locoregional therapies or stenting can be considered.

ASSESSMENT OF TUMOR RESECTABILITY AND GOALS OF THERAPY

Although patient history, physical examination, and blood work are extremely important in the global assessment of a patient, these do not likely provide significant information about a particular tumor’s resectability. Advanced imaging (often beyond ultrasonography) is often needed, and in the author’s clinic, this is generally performed with computed tomography (CT) and magnetic resonance imaging (MRI). Although these modalities may not provide a total understanding of a tumor’s resectability, and surgery may be required to manipulate the tumor, CT and MRI have several properties that make them useful for preprocedural tumor assessment. First, a general sense of a tumor’s location and what adjacent structures/organs are involved can be obtained due to the cross-sectional imaging capacity of these modalities. Second, the vascular supply to tumors can be assessed and mapped, which can be useful for resection or for locoregional vascular therapies. Lastly, CT and MRI are commonly used to determine response to treatment through assessment of tumor size and characteristics before and after treatment.

Luminal patency, or lack thereof, is often best depicted using a real-time imaging modality such as fluoroscopy. Injection of contrast medium while recording fluoroscopic images allows a clinician to determine the location of an obstruction, severity of obstruction (ie, alteration of luminal diameter), and normal luminal size. In addition, it is possible to assess the efficacy of the opening of a malignant luminal obstruction after placement of a stent. In companion animals, malignant luminal obstructions in the urethra, ureter, esophagus, colon, and nasopharynx are often assessed using fluoroscopic imaging combined with the injection of contrast medium.

Although a tumor may be able to be resected in some patients from a surgical prowess standpoint, the removal of a tumor may otherwise compromise an organ and subsequently the patient. An example of this is large liver resections in human patients. In humans, the calculation of functional liver remnant is commonplace and is often performed before a large tumor resection.^{1,2} This remnant is measured before a resection to determine whether a patient can tolerate the proposed amount of tissue to be resected in an effort to prevent liver failure secondary to loss of liver tissue. If the remaining liver tissue does not seem to be sufficient for a particular patient, an alternative therapy such as portal vein embolization may be considered before resection in an attempt to generate more functional liver tissue.^{1,2} There is a scarcity of clinical data related to this topic in companion animals.

When considering an IO procedure in a case that has a tumor that is considered nonresectable, the goals of treatment should be well defined. Some possible questions to consider are as follows:

- Is the IO procedure being used as a primary or adjuvant therapy?
- Is the objective to downstage the tumor?
- Is the procedure being performed to make the tumor resectable?

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