Role of Radiation Therapy in Retroperitoneal Sarcomas

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Soft-tissue sarcomas arising in the retroperitoneum represent an uncommon diagnosis, with approximately 600 new cases per year in the United States. Due to this small database, an assessment of the relative merits of different treatment strategies is not available. It is known that patients with retroperitoneal sarcomas fare worse in terms of local control and disease-free survival than do patients with soft-tissue sarcoma of an extremity. The reasons for this are unclear but may be due, in part, to the large size of these tumors at diagnosis and the difficulty in obtaining adequate surgical margins.

Core Needle vs Incisional Biopsy

The diagnosis of retroperitoneal sarcoma often is not made until the lesion is quite large. Furthermore, such tumors may be encountered at transperitoneal exploration. In this situation, there is often an attempt at excisional biopsy or subtotal excision that has not been planned with appropriate preoperative assessment. Such procedures may increase the likelihood of seeding the surgical wound and peritoneal surfaces.

For this reason, at the Massachusetts General Hospital, the preferred method of biopsy is a CT-guided core needle biopsy through a retroperitoneal approach, rather than an incisional biopsy. A core needle biopsy has the advantage of allowing sampling of areas that appear solid on cross-sectional imaging. Also, atypical lipomas (referred to as low-grade liposarcomas by many pathologists) can contain areas of high-grade dedifferentiated tumor, and such regions can be selectively biopsied under CT guidance.

Whether core needle or incisional biopsy is chosen, the approach should always be retroperitoneal. The radiologist performing the needle biopsy should discuss the preferred approach with the surgeon. If an incisional biopsy is performed, it should be done by the surgeon who will perform the tumor resection.

Preoperative Radiation

For retroperitoneal sarcoma patients who are diagnosed preoperatively, there is an opportunity for evaluation of the best treatment strategy by a multispecialty sarcoma team. Consideration can be given to the use of preoperative radiation and chemotherapy.

Preoperative radiation has a number of important advantages, as discussed in the comprehensive review by Clark and Tepper. The tumor acts as a tissue expander, allowing the radiation oncologist to minimize hepatic and bowel irradiation. The entire tumor mass can therefore be included in the radiation treatment volume. Furthermore, there is the option of planning for intraoperative radiation, utilizing electron-beam or brachytherapy procedures. In addition, if preoperative radiation is delivered, tumor cells exfoliated at the time of surgery are less likely to implant the wound and peritoneal surfaces. Whether the phenomenon of sarcomatosis occurs spontaneously or is hastened by surgery is unknown. Our own bias is that it is related to surgery (or transperitoneal biopsy) since sarcomatosis rarely, if ever, occurs in the setting of primary disease, even in those with very massive tumors.

Radiation is judged to increase the probability of tumor control if it is delivered in the preoperative setting following a needle or incisional biopsy through a retroperitoneal approach. It is therefore not surprising that extremely high local control rates have been documented for preoperative radiation.[1]
The indications for preoperative radiation therapy include grade I-III lesions at initial presentation or recurrence. We do not treat atypical lipomas unless they contain high-grade dedifferentiated elements. Doses in the range of 45 Gy are utilized and appear to be well-tolerated.

**Postoperative Radiation Therapy**

The indications for radiation therapy in the postoperative setting are not well-established. The planning of the radiation fields is complicated by the fact that normal tissues fall into the space previously occupied by the tumor mass, which undoubtedly increases the toxicity of radiation. Our practice has been to reserve radiation for salvage in patients with negative margins who have undergone resection for primary disease. Patients with microscopically positive surgical margins should be evaluated by a radiation oncologist and offered postoperative radiation therapy if functional status is adequate.

Controversy exists over whether postoperative radiation fields should cover the entire preoperative tumor volume in patients with positive margins. Our bias has been to direct attention to the site of margin positivity. Doses in the range of 66 Gy are used, assuming that the tolerance of critical normal tissues is respected. If feasible, special boost techniques, including proton radiation, should be employed. Whole-abdominal radiation therapy remains experimental, and should not be used in the preoperative or postoperative setting outside of the confines of a clinical study.

**Chemotherapy**

The role of chemotherapy in the treatment of retroperitoneal sarcomas remains experimental. Given the high rates of regional and distant failure, a strong emphasis should be placed on treating patients on clinical protocols. Given the rarity of this disease, phase III protocols are not realistic unless conducted by intergroups. Also, protocols that utilize preoperative chemotherapy should not gauge response solely on the basis of volume reduction. For example, extremity sarcomas frequently show high pathologic response rates (ie, more than 95%) with little or no change in volume. Therefore, protocols that tailor the intensity of chemotherapy to volume changes may undertreat patients who have good pathologic response rates. Moreover, such trials are inherently biased, in that responding patients are treated more intensively. Thus, it will be difficult to determine whether favorable responders do better because of their response or because of the more intensive treatment that they receive.

**Summary**

In summary, patients with primary and recurrent retroperitoneal sarcoma should be treated at institutions with multispecialty groups that have an interest and expertise in this disease. Whenever possible, the highest priority should be given to treating patients on clinical protocols designed to answer relevant scientific questions. Every effort should be made to spare patients inappropriate biopsy and treatment, since the best and most realistic chance of cure lies with proper treatment of the primary disease.

**References:**


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