survival versus 8 months for surgery alone; median overall survival was 11 months. Surgical mortality was 22% to 29% at 90 days.

The results presented reflect the challenge of selecting patients who may benefit most from resection and/or systemic therapies. Still, some clinical processes could be considered to facilitate care in these complicated patients:

1. Multidisciplinary discussion of treatment options (cardiothoracic surgery, medical oncology). Surgeon, institutional expertise, and clinical infrastructure should be carefully considered to optimize the best course of care.
2. Extent of disease should be carefully defined. If an operation is considered, the surgeon should be confident to achieve complete resection. A debulking operation may not sufficiently improve quality of life or survival. Local control of PCS may be considered to prevent “sudden death” from outflow obstruction or to provide additional time for systemic therapy. Patients with metastatic disease will have limited survival. Neoadjuvant therapy could be used to assess biological response

before surgery, in anticipation of continuing that treatment after surgery.

3. With limited survival the norm, advanced care planning would be helpful to guide family and physicians in major future decisions.

Regrettably, the treatment of PCS has not advanced significantly over 40 years. Patients who present with locally advanced and metastatic disease have limited options, and the local and systemic management tools we have available are helpful but generally ill-equipped to manage the complexity of this disease process. Genomic analysis^{3,4} could provide predictive, prognostic, and therapeutic guidance.

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Commentary: Cardiac sarcoma—Can we win this battle?

Michael Magarakis, MD, and Tomas A. Salerno, MD

There are about 5144 articles listed in PubMed on cardiac sarcoma, with 1668 written in the last 10 years. This underscores the view that we have not developed an effective treatment modality for this dreadful disease. Mean survival for these unfortunate patients remains in the range of 7 to 12 months, despite early diagnosis and aggressive surgical treatment.¹

Michael Magarakis, MD (left), and Tomas A. Salerno, MD (right)

CENTRAL MESSAGE

Median survival for patients with cardiac sarcoma remains poor, in the range of 7 months to 1 year, indicating the need to search for new and innovative therapies to treat this dreadful cancer.

From the Division of Cardiothoracic Surgery, University of Miami Miller School of Medicine, and the Miami Veterans Administration Medical Center, Miami, Fla.

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Address for reprints: Tomas A. Salerno, MD, 1611 NW 12th Ave, Miami, FL 33136 (E-mail: tsalerno@med.miami.edu).

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An excellent commentary by Ravi and Reardon² on an article by Hendriksen and colleagues³ and a large experience in the treatment of these tumors by Yin and associates,¹ who report 442 patients with primary cardiac sarcoma, indicates that median survival remains in the range of 7 to 12 months, reporting no real change in outcome from a 1973 to 2005 series of patients to the recent decade of 2006 to 2015. This experience comes from a center with very experienced surgeons, who have aggressively pursued surgical treatment, including autotransplantation, aimed at achieving complete resection of the tumor.³ They showed that surgery and chemotherapy were protective factors, with increasing age having a negative impact in survival.

Recently, improved survival, in the range of 46% at 1 year and 28% at 2 years, has been reported with aggressive surgical resection of the tumor, which may include autotransplantation.⁴ Surgical mortality in this series was 15%. With neoadjuvant therapy and radical surgery, a median 1-year survival of 54% has been reported.⁵

Understanding the nature of this disease is of paramount importance. One needs to realize that most of these tumors remain silent, and by the time the tumor is discovered, it is already a systemic disease with dismal prognosis. As very well pointed out by Ravi and Reardon,² “Systemic disease requires systemic treatment.” Their recent report suggests that these patients should be referred to high-volume centers, where multidisciplinary teams participate in the planning of treatment. But keeping an open mind and detecting these tumors before systemic disease ensues is another solution. As with many fatal cancers, perhaps screening should be implemented. An echocardiogram is a relatively simple, inexpensive test that can aid in identifying these patients. In fact, screening echocardiography

can aid in identifying other treatable heart conditions before they become advanced.

Will our surgical societies recommend implementing screening echocardiograms in the community? Will this have an impact? Is surgical therapy alone ever going to be adequate, or should we consider this an intravascular hematogenous metastatic cancer by definition? Will a tumor marker ever be developed so that cardiac sarcoma can be diagnosed with a simple screening blood test?

It is obvious that new approaches are needed to treat sarcomas of the heart. Efforts in new areas of research involving gene mapping in patients with this condition, potential gene manipulation, immunotherapy and other target therapy utilizing nanotechnology should be explored. It is likely that a breakthrough in treatment or perhaps early diagnosis will have to occur, if we are ever going to have an effective treatment/cure for cardiac sarcoma.

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