Iranian Heart Journal; 2019; 20 (3)

Case Report

Transthoracic Biopsy of the Cardiac Mass Obviating Open Surgery

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ABSTRACT

We describe a 1-year-old boy who underwent a percutaneous transthoracic biopsy of an incidentally detected cardiac tumor. The procedure was performed under ultrasound guidance to obviate the need for surgery. The benign nature of the mass precluded subsequent curative surgery. Ultrasound is a valuable modality in guiding percutaneous biopsy of thoracic lesions. ***(Iranian Heart Journal 2019; 20(3): 91-94)***

KEYWORDS: Heart neoplasms, Pulmonary lesion, Fine needle aspiration biopsy, Image-guided biopsy

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Received: Ocotober 31, 2018 **Accepted:** January 25, 2019

Pathologic examinations are necessary for the definitive diagnosis and management of patients with cardiac tumors. Biopsies are usually taken via diagnostic surgery, which may prove curative in some cases as well. However, this approach carries a high risk of morbidity. An alternative to the usual surgical technique may be an ultrasound-guided transthoracic core-needle biopsy.

Here, we present a case in which percutaneous biopsy of a cardiac mass not only precluded open surgery for diagnostic purposes but also, due to the benign nature of the pathology of the tumor, obviated the need for subsequent curative surgery.

Case Report

An asymptomatic 1-year-old boy was incidentally found to have a heart murmur and normal sinus rhythm with infrequent premature ventricular contractions when his mother requested a routine checkup for him at out center. The mother herself had a history of rheumatic valvular disease and surgery and was under periodic follow-up evaluations.

Transthoracic echocardiography (TTE) revealed a poorly-defined left ventricular (LV) mass of considerable size, abnormal LV regional wall motions, a proper global LV function, no inflow or outflow obstruction, normal pulmonary pressure, and mild mitral regurgitation. Further assessment with cardiac magnetic resonance (CMR) was, therefore, recommended. An abdominopelvic ultrasound examination was performed and proved unremarkable for abnormal findings.

The CMR revealed a large heterogeneous infiltrative LV mass, mostly confined to the apical and posterior parts of the ventricle (Fig. 1), as well as the extension of the lesion to the

mitral annulus and the left atrium. There was no concomitant pericardial effusion or thickening, and the biventricular ejection fraction and all the cardiac valvular functions were normal. The only exception was, however, a mild aortic regurgitation. The mass showed heterogeneous low-to-iso T1- and iso-to-high T2-weighted image intensities with heterogeneous early and late gadolinium enhancements. No sign of mediastinal or hilar lymphadenopathy or mass was detected.

The primary differential diagnoses were in support of rhabdomyosarcoma, rhabdomyoma, and less probably fibroma.

Given the exophytic component of the lesion and accessibility through the anterior chest wall, an ultrasound-guided percutaneous transthoracic biopsy was performed in the open-heart surgery room under general anesthesia.

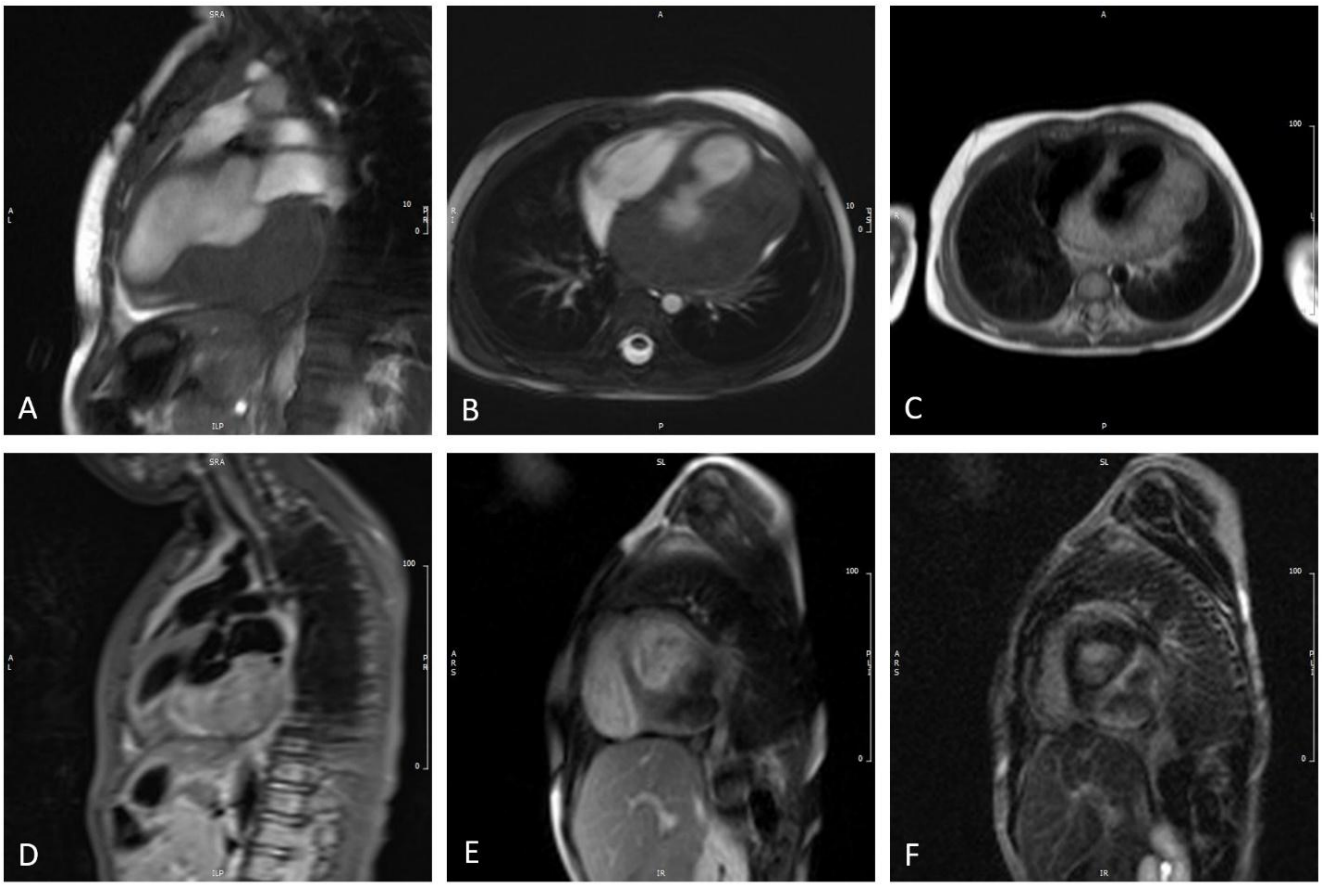

Figure 1. Cardiovascular magnetic resonance imaging of the patient: A) two-chamber true FISP view, depicting an iso-intensity tumoral lesion confined to the left ventricular inferior wall and extended to the mitral valve; B) the transversal true FISP section, representing the lesion's adhesion to the left ventricular lateral wall; C) hyper-signal intensity on the T2-weighted HASTE transverse image; D) short tau inversion recovery (STIR) sequence, depicting the tumor's hyper-signal intensity on a 2-chamber view; E) peripheral enhancement characteristic on the short-axis early enhancement imaging; and D) delayed gadolinium enhancement (DGE) images, depicting a hyper-enhancement rim around the tumoral mass with a slight increase in signal intensity in the core of the mass

An 18-gauge semiautomatic core biopsy needle (Stericut; TSK Laboratory, Tochigi, Japan) was inserted into the lesion (Fig. 2). (Please refer to the additional video in the electronic version.)

Two samples were taken from the lesion without any significant complications, except for a minimal and loculated pericardial effusion adjacent to the mass.

Follow-up TTE confirmed no adverse events, and the patient had a desirable recovery course in the intensive care unit.

The histopathologic examination of the biopsy specimen revealed a storiform growth pattern of hypercellular spindle cells, favoring fibroma as the primary diagnosis (Fig. 3). Given that the patient had no clinical symptoms and the tumor did not affect his cardiac function, the watch-and-wait approach was adopted for the benign cardiac mass.

At one year's post-biopsy follow-up by ECG, Holter monitoring, and TTE, no progression of the tumor was observed. In addition, the patient's health status had remained stable and he showed preserved LV function and normal sinus rhythm with a few premature atrial contractions and unifocal premature ventricular contractions.

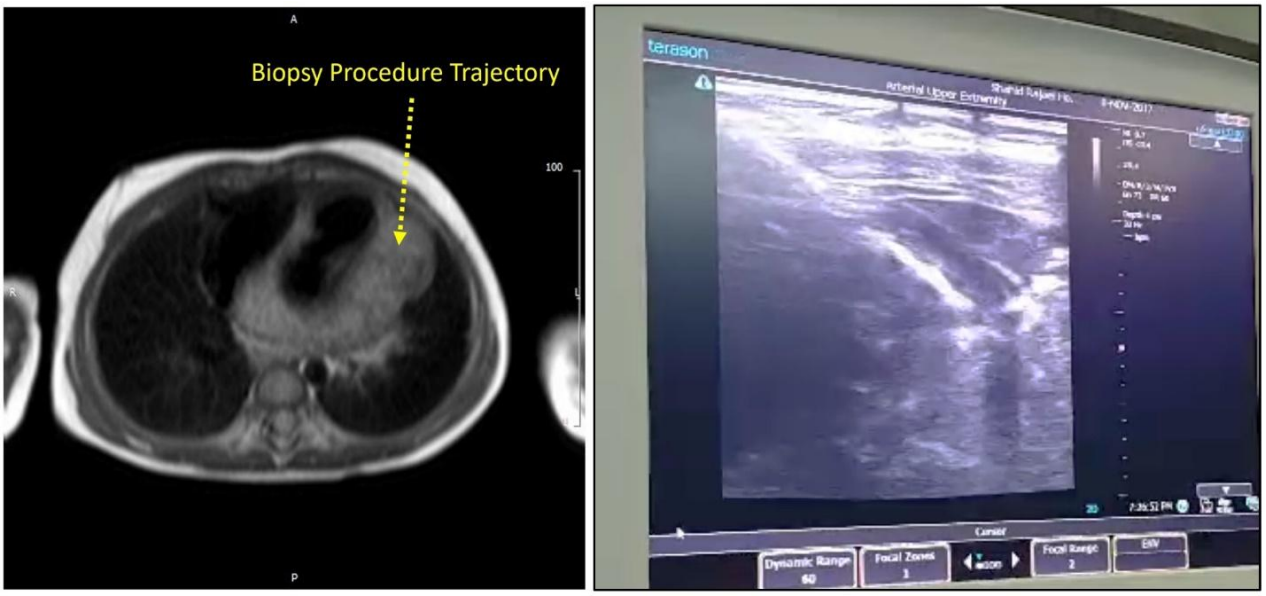

Figure 2. Core-needle biopsy from the tumoral mass of the same patient: right) the linear hyper-echo signal, depicting the biopsy needle tip through the suspected lesion; and left) the trajectory pathway of the needle biopsy through the patient's chest wall

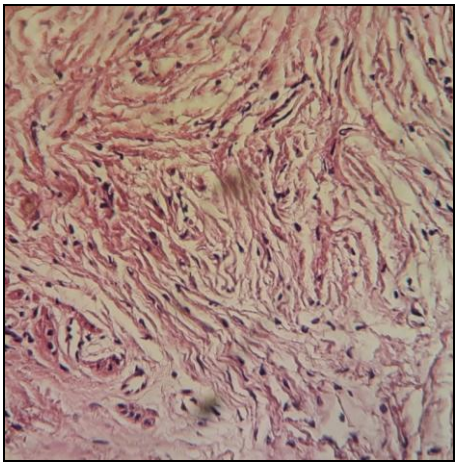

Figure 3. Pathological assessment, revealing that the specimen mostly consists of hypercellular spindle cells, mostly in favor of fibroma

DISCUSSION

Primary cardiac tumors are rare and overwhelmingly benign. A robust prognosis and meticulous planning of the treatment course are strongly contingent upon reliable diagnostic methods, amongst which image-guided percutaneous biopsy is less invasive than a surgical biopsy.

Formerly, there were a few reports of biopsies obtained under the guidance of computed tomography or fluoroscopy. [1-3] Not only does ultrasound guidance confer real-time visualization, which is vital in approaching a beating heart, but also it is a safe low-cost user-

friendly and widely available guide that does not expose the patient to radiation. [4-6]

The procedure was performed in a dedicated cardiac operating room and under general anesthesia with the attendance of an expert cardiac anesthesiologist and a cardiac surgeon as a backup. Ultrasound-guided percutaneous transthoracic biopsy, albeit a seemingly safe procedure, is not entirely devoid of risks. There is potential for wall perforation and hemopericardium, especially after the replacement of the normal myocardium with disorganized neoplastic cells. In our case, the mass had a sizable exophytic component, making it a proper target for the percutaneous approach with a view to sparing the more centrally positioned cardiac parts susceptible to perforation. Furthermore, the tumor exhibited a heterogeneous enhancement with no significant central vascularity in the first-pass perfusion and the early post-gadolinium images, which demonstrated its suitability for sampling and the resultant diminished risk of postprocedural hemopericardium.

CONCLUSIONS

Percutaneous ultrasound-guided core-needle biopsy could be a rational alternative to the diagnostic open surgical approach, not least for non-avidly vascular exophytic cardiac masses abutting the thoracic cage.

Acknowledgments:
The authors would like to thank Dr Kourosh Tirgar Fakheri.

Conflict of Interest: None

REFERENCES

1. Tao TY, Yahyavi-Firouz-Abadi N, Singh GK, Bhalla S: Pediatric cardiac tumors: clinical and imaging features. Radiographics 2014, 34(4):1031-1046.

2. Yamagami T, Kato T, Tanaka O, Hirota T, Ito K, Nishimura M, Shimada J, Nishiyama K, Nishimura T: Percutaneous needle biopsy under CT fluoroscopic guidance for cardiac tumor during continuous intravenous injection of contrast material. Journal of vascular and interventional radiology: JVIR 2005, 16(4):559-561.

3. Daliri A, Oehring K, Moosdorf RG, Franke FE, Kalinowski M, Zahedi F, Froelich JJ: Percutaneous left atrial cardiac biopsy with CT fluoroscopy guidance. Journal of Vascular and Interventional Radiology 2007, 18(7):909-913.

4. Yanada M, Shimada J, Ito K, Terauchi K, Shimomura M: Cardiac angiosarcoma with diagnostic difficulty. Kyobu geka The Japanese journal of thoracic surgery 2007, 60(13):1148-1151.

5. Rubens D, Strang J, Fultz P, Gottlieb R: Sonographic guidance of mediastinal biopsy: and effective alternative to CT guidance. Revista da Imagem 1998, 20(1):14.

6. Dodd 3rd G, Esola CC, Memel DS, Ghiatas AA, Chintapalli KN, Paulson EK, Nelson RC, Ferris JV, Baron RL: Sonography: the undiscovered jewel of interventional radiology. Radiographics 1996, 16(6):1271-1288.