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Primary Cardiac Tumors: A Case Series and Review of Literature

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ABSTRACT

Inrtoduction: Cardiac tumors are exceedingly rare. Majority of tumors are metastatic secondaries rather than that of primary cardiac origin. Even if most of the tumors are benign, the cardiac location itself can be fatal. Advanced imaging modalities have enabled early detection of cardiac tumors. In the present study we analysed a series of 7 primary cardiac tumors over a period of 3 years, with reference to clinical, radiological, morphological and immunohistochemical findings at the Department of Pathology, Government medical college, Thiruvananthapuram**.**

Method: Institutional records were reviewed for all the diagnosed primary cardiac tumors.

Results: We reviewed 7 cases of primary cardiac tumors .All cases were adults with equal gender distribution. The majority of cases were benign primary cardiac myxomas, exclusively in left atrium. One case each of epithelioid hemangiendothelioma involving both right and left atria and cardiac angiosarcoma involving the interatrial septum were diagnosed.

Conclusion: Although cardiac tumors are rare entity, its prompt diagnosis has significant role in reducing patient mortality and morbidity.

KEYWORDS: Cardiac myxoma, Angiosarcoma, Epithelioid Hemangioendothelioma

ARTICLE DETAILS

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INTRODUCTION

Primary cardiac tumors are exceedingly rare with an incidence of less than 0.33%.[13]These are categorised as primary and secondary on the the basis of origin of these tumors. Majority of tumors of heart are metastatic secondaries rather than of primary cardiac origin. Primary cardiac tumors represent 5% of all cardiac tumors originating from heart. Around 75% of these are benign and 75% of these are cardiac myxomas [13,14.] Primary malignant sarcomas are rare and broadly divided into - sarcoma, malignant lymphoma and pericardial mesothelioma.[10] Among sarcomas angiosarcoma is the commonest. Most tumors are asymptomatic and are incidentally detected .When symptomatic, the presentation varies depending upon the location of the tumor. With the improvement in imaging modalities the cardiac tumors are increasingly being detected early.[16]Surgical excision is usually curative in primary cardiac tumors and is a mainstay of treatment.The objective of our study is to review the clinical ,pathological and immunohistochemical features of primary cardiac tumors identified over a period of 3 years.

METHODS

We performed a retrospective, record based review of all the consecutive histopathologically diagnosed cases of primary cardiac tumors between the period of 2018 – 2021. The cases were identified from our pathology database. Demographic parameters including age, gender along with clinical presentation, echocardiographic findings, location of tumor and the treatment modality were collected from record forms and computer database. Follow up data was collected from clinical records. Inclusion and exclusion criteria - All cases diagnosed as primary cardiac tumors were included and secondaries to heart were excluded.

We received a total of 7 cases of primary cardiac neoplasms between the period of 2018- 2021. The age ranged from 17 – 73 years, with a mean age of 46.1 and the distribution was equal among both sexes. Of the total cases reviewed 6 were symptomatic while one case was incidentally detected. Dyspnea was the most frequent symptoms comprising 48% . The distribution of various clinical presentation is shown in figure 1.One case of myxoma presented with acute thromboembolic episode , acute onset dizziness and weakness of limbs. (case 6, Table 1).Six of the cases underwent surgical resection of the tumor with one being under palliative treatment. The patient clinical characteristics are summarised in Table 1.

Table 1: Clinical characteristics

Case no	Age	Sex	Symptom	Site	Diagnosis	Surgery	Follow up
1.	48	F	Dyspnea	LA	Myxoma	Complete resection	Lost to follow up
2.	73	M	Palpitation	LA	Myxoma	Complete resection	Lost to follow up
3.	47	F	Chest pain	LA	Myxoma	Complete resection	Symptom free
4.	60	M	Incidental detection	IAS	Myxoma	Complete resection	Lost to follow up
5.	17	F	Dyspnea	LA	Angiosarcoma	Resection with ASD patch repair	Expired on post op day 2
6.	25	M	Acute CVA	LA	Myxoma	Complete resection	Symptom free
7.	53	F	Dyspnea	Biatrial	EHE	Palliative therapy	No clinical improvement

LA indicate, Left atrium; IAS- Interatrial septum; EHE- Epithelioid hemangioendothelioma

Histopathologically 5 of the total 7 cases were diagnosed as benign primary cardiac tumors and 2 as sarcomas .Benign cardiac tumors comprised of cardiac myxomas (72%) and malignant cases comprised of one case each of angiosarcoma and epithelioid hemangioendotheliona accounting for 14% each. (figure 2).The left atria was the predominant location comprising 71.4% with 14.2% each of biatrial and interatrial septal involvement.(Figure 3). Echocardiography remained the corner stone of diagnosis .For malignant tumors, magnetic resonance imaging was more useful to detect the extent and infiltrative nature of the tumors. MRI findings of the two malignant cardiac tumors are shown in figure 4 and 5,emphasising the infiltrative nature. Standard surgical resection of the tumors were done in six cases and one case was kept under palliative care considering the patient morbidity and metastastic status. All of the myxoma cases had uneventful postop period with two of the patients doing well and three lost to follow up. The young female diagnosed with angiosarcoma expired on postoperative day 2 due to complications and the case of hemangioendothelioma was under palliative treatment with the dismal prognosis.

.Histopathologic characteristics: On microscopy cardiac myxomas showed neoplastic stellate cells arranged in cords and nests in a myxoid background. (figure 6) and around blood vessels.(figure 7). On immunohistochemical examination the cells were calretinin positive.(figure 8).Angiosarcoma is a high grade infiltrating neoplasm, arranged in anastomosing vascular channels and sheets ,composed of spindle cells with marked nuclear atypia and with areas of necrosis.(Case 5 Table 1 ,figure 9). The cells were positive for immunohistochemical marker CD 31. (figure 10). Epithelioid hemangioendothelioma, on microscopy showed large endothelial cells arranged in cords and strands with moderate eosinophilic cytoplasm, oval vesicular nuclei seen in a chondromyxoid background. (Case 7 table 1, Figure11). The cells showed the characteristic cytoplasmic vacoulation blistering the cells. (Figure 12) . Immunohistochemistry showed membrane positivity for CD31.(Figure 13).

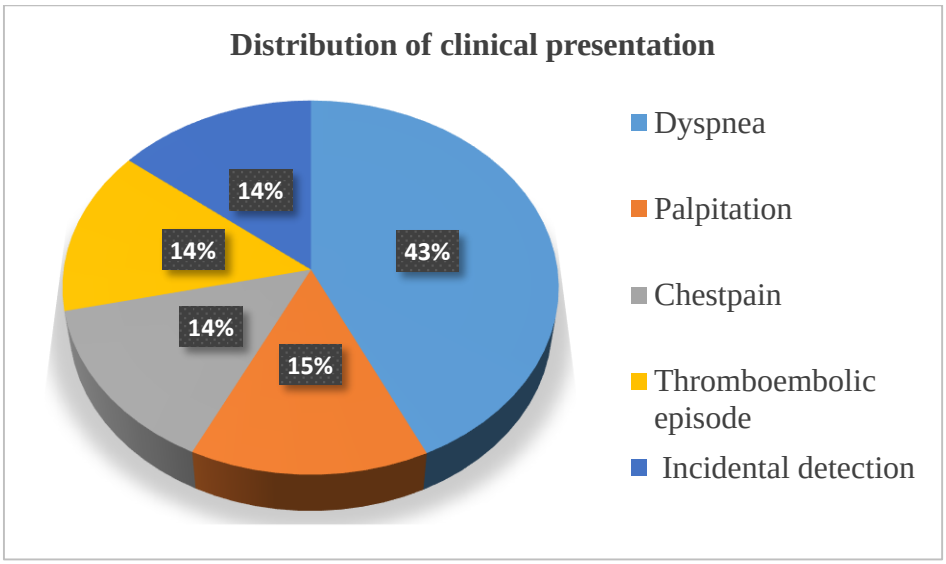

Figure1: Distribution of clinical presentation

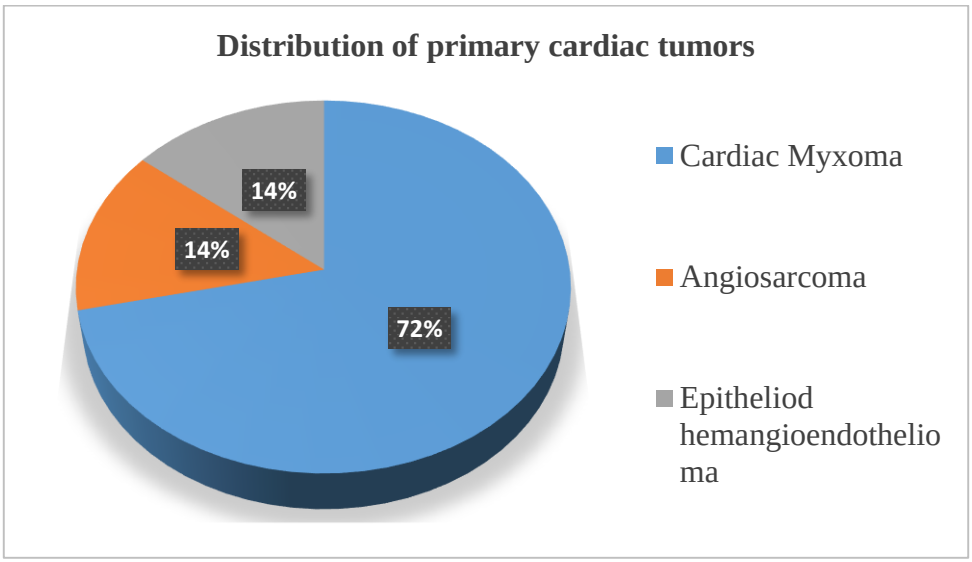

Figure 2: Distribution according to histopathological diagnosis

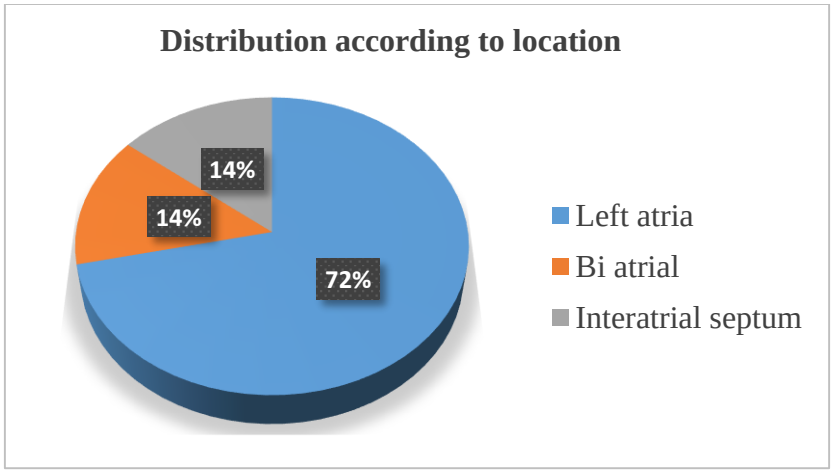

Figure 3: Distribution according location

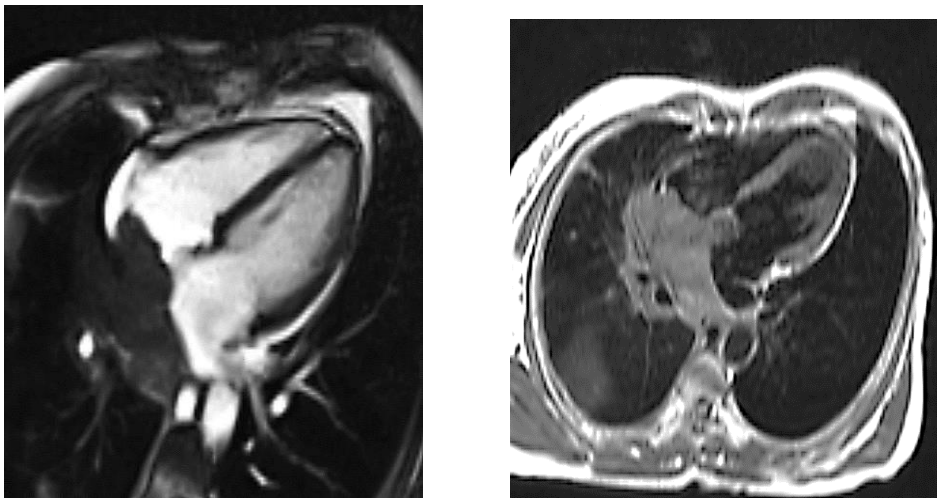

Figure 4: MRI shows case of epithelioid hemangioendothelioma infiltrating the posterior walls of RA and LA across the interatrial septum and pericardium

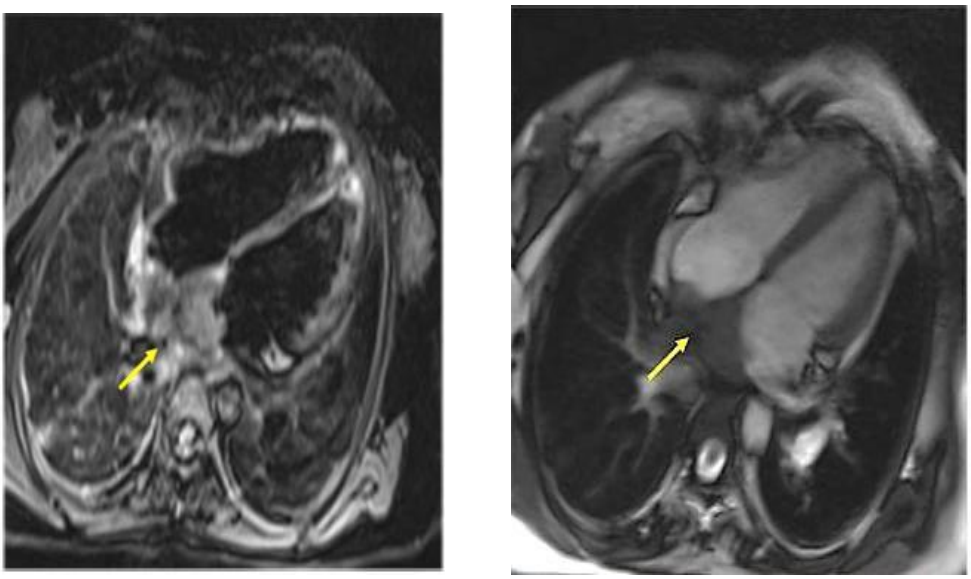

Figure 5: MRI of case of angiosarcoma showing Hypointense mass centred at interatrial septae extending to right & left atria

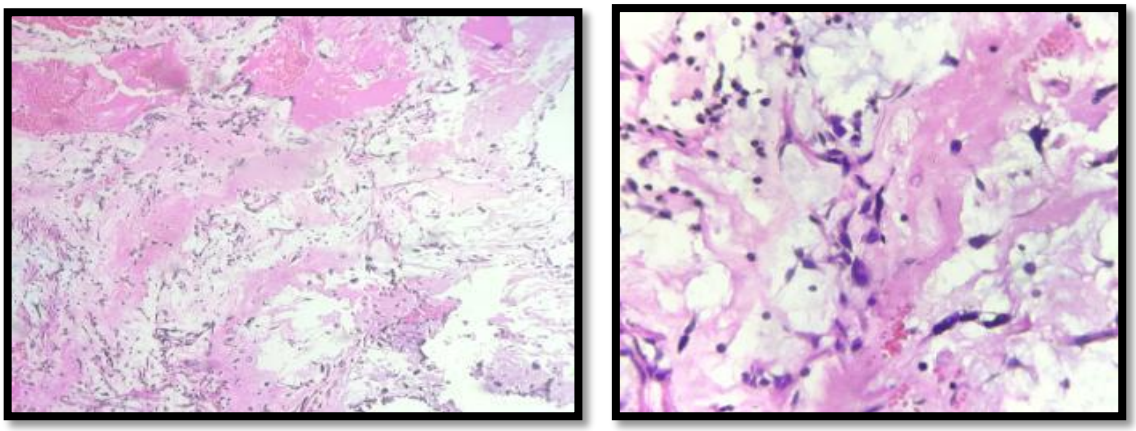

Figure 6: A: (40x) & B (100x): Histological features of cardiac myxoma : myxoma cells in myxoid background

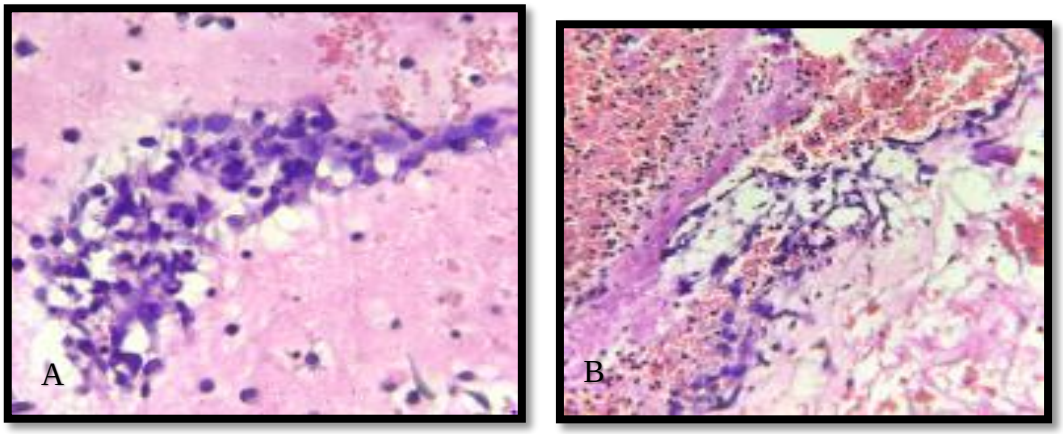

Figure 7: A (400x) Myxoma cells in nests. B : cells clustered around blood vessels

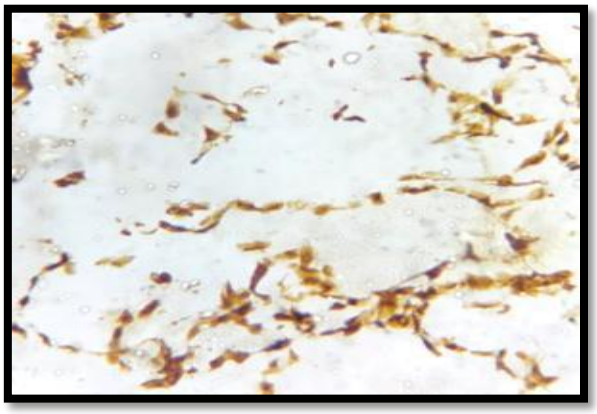

Figure 8:Positive immunostaining for calretinin

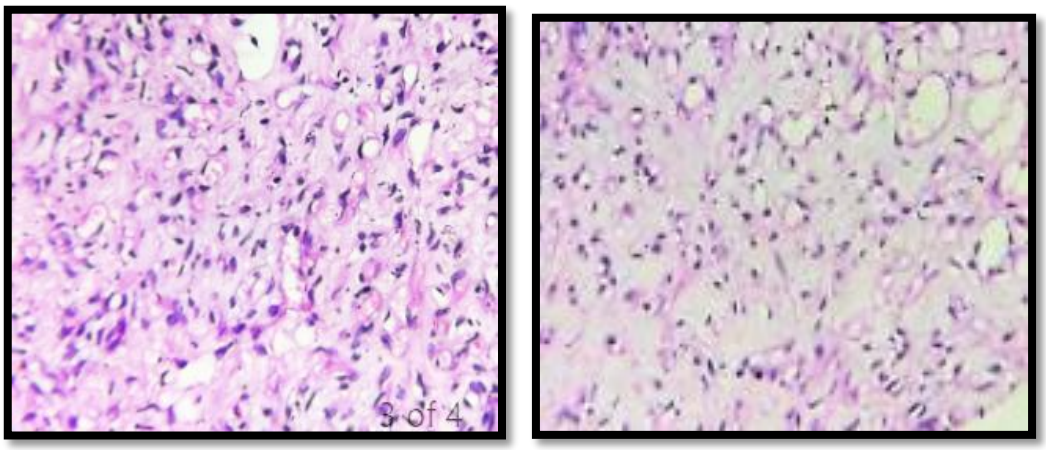

Figure 11: (100x) Microscopy of epithelioid hemangioendothelioma , showing cells in chondromyxoid background

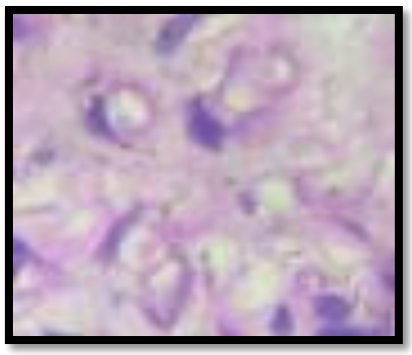

Figure 12: Microscopy showing cytoplasmic vacuoles blistering the cells in epithelioid hemagioendothelioma

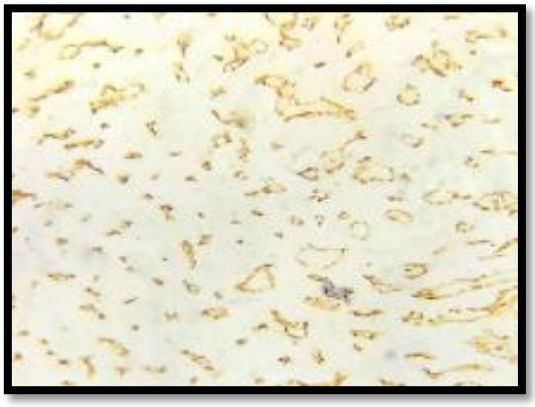

Figure 13:Positive staining for CD 31

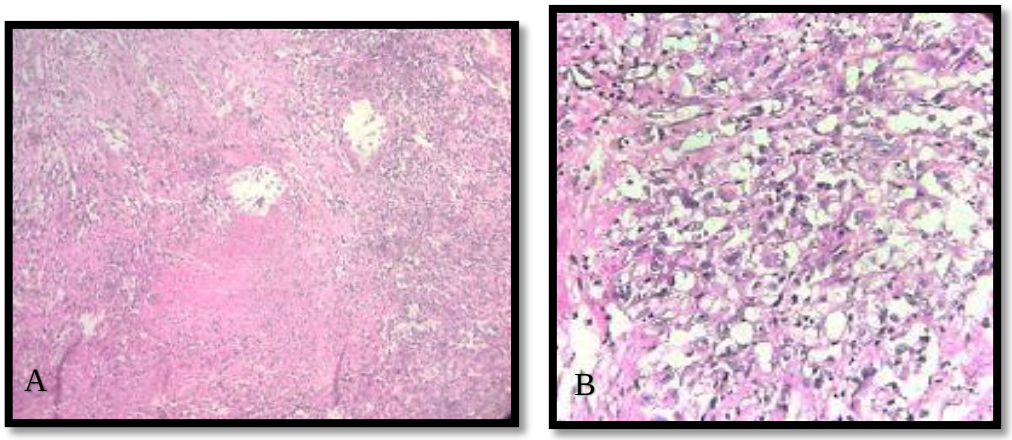

Figure 9: A (4ox) & B (100x) Microscopy of angiosarcoma, high grade neoplasm showing anastomosing vascular channels

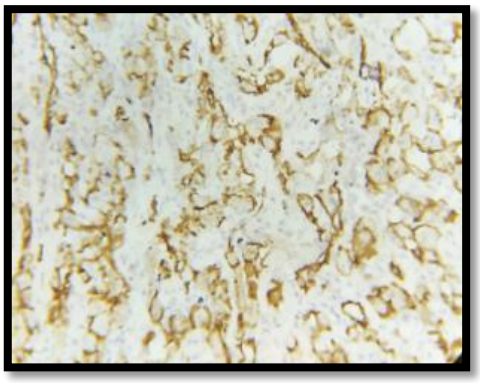

Figure 10: Positive immunostaining for CD 31

DISCUSSION

Cardiac primary tumors are a rare entity in comparison to metastatic secondaries to heart. [1] The incidence of primary cardiac tumors varies between 0.001 and 0.03%. [13 ,14] The majority of primary cardiac tumors are benign, with myxoma being the commonest.[11]25% of primary cardiac tumors are malignant ,with sarcoma accounting for the majority of cases. [17]Most of the primary cardiac tumors reported in our series are benign. Atrial myxomas were the commonest (72%) and two cases were of malignant cardiac tumors (28%). A study by Mohammad Sanad et reported 91% cardiac tumors as benign with myxoma comprising 89% of their benign cardiac tumors.[10]

Cardiac tumors have a wide age distribution. In both adults and infants vast majority of tumors are benign. [3] In adults > 90% of the tumors are cardiac myxomas, predominantly located in the left atria.[6] Malignant primary cardiac tumors are sarcomas ,most commonly angiosarcomas usually located in the right atrium.[5] In our study also 5 of the total cases were benign cardiac myxomas located in the left atrium and malignant ones included angiosarcoma and epithelioid hemagioendothelioma. The age group in our study ranged from 17 – 73 years, with a mean age of 49.1. Cardiac tumors

produce symptoms through any of the four mechanisms : obstruction of blood flow, local invasion or features of embolism and constitutional sypmtoms.[13,18] Embolisation has been reported in 30-43% of cases.[10] The symptom presentation in cardiac tumors are varied and it depends on the size and location of tumors rather than the histological characteristics One of the cases in our study presented with acute cerebrovascular accident with sudden onset dizziness and weakness of limbs. Rest of the cases had dyspnea ,palpitation and chest pain. Dyspnea was the most common symptom in our study which is similar to study conducted by Nomoto et al and kumar et al.[16,18]

Atrial myxomas are most common tumors that are usually encountered.They are frequently seen in the third to sixth decade.[1] 75% of myxomas are seen in left atria.[13] They are rare in ventricles with a reported incidence of about 3-4%. [15] Left ventricular myxoma usually arise from endocardial septum from pleuripotent mesenchymal cells associated with subendocardial residual embyronal cells.[1,10,13] Carney complex associated myxomas occur more frequently in left ventricle when compared to sporadic cases.[1,14] In our study myxomas accounted for about 72% of the total cases and all were exclusive to left atrium. In our study the age ranged from second to sixth decade .Nomoto et all reported prevalence of myxoma as 67% and left atrium was the most common site.(35%).[18]. Myxomas are pediculated in most cases and can extend into the chamber affected. Histologically they show cytologically bland myxoma cells in cords, nest or rings in a myxoid matrix . Rings frequently occur around the small vessels.The background shows variable inflammatory cells and multinucleated cells. Hemorrhages with hemosiderin laded macrophages and Gamna gandy bodies can be seen. Rare glandular elements and diffuse large B cell lymphomas have been described in myxoma background.[1] Myxoma cells show immunoreactivity for calretinin in almost all cases and show variable positivity for NSE, S100, SMA and desmin.[1]Clinically they can be mistaken for organising thrombus. Patients can present with systemic embolization (cerebral or peripheral) or with symptoms due to obstruction of the mitral valve.[6,13] In our study also one of the patient presented with acute CVA and his MRI showed acute cerebellar infarction. Thus the diagnosis of myxoma requires prompt resection as there is increased risk of embolization and sudden death . But surgical resection of these tumors have good prognosis.

In primary malignant tumors sarcomas predominate.[10,11] Angiosarcomas are the commonest among them. Sarcomas have variable clinical presentation depending on the tumor location. Epithelioid angiosarcomas should be distinguished from epitheloid hemangioendothelioma which is an another rare entity in the heart, According to literature only a few cases of cardiac epitheloid hemangioendothelioma have been reported [8]. The average age is 49 years with female predominance and a propensity to occur in right side of heart, especially the right atrium.[1]. The lesion may be large, replacing the atrial wall and extensively infiltrate into the chambers and adjacent structures.[10] They are frequently seen in fourth decade and in males. In our study the single case was seen in young female .The literature states that malignant sarcomas in the young are more lethal [5].Microscopically these tumors are composed of irregularly shaped anastomosing vascular channels lined by moderately pleomorphic hyperchromatic round to spindle cells, which are arranged in cords ,nests or papillae and shows area of haemorrhage and necrosis.[1,3] ERG is the most sensitive and specific marker confirming endothelial differentiation.[1] Other markers are CD31 and CD34. Hemangioendothelioma is a rare vascular tumor that has unpredictable behaviour [10,19] The number of reported cases are rare and does not exceed 20.[13, 8 ,19] According to WHO classification hemangioendotheliomas are classified into benign ,intermediate or malignant tumor .[11,20] They occur in all age groups and have no sex predilection [17.]They are reported in left atrium ,mitral valve and right atrium.[12,19] Invasion and metastasis have been reported in these cases.[21]. In our study also the case of epitheloid hemangioendothelioma showed biatrial infiltration and infiltration of adjacent lung parenchyma. Epithelioid hemangioendothelioma is distinctive and has epithelioid appearance and frequently angiocentric .[8] It is a rare entity in heart .It can be distinguished from epithelioid angiosarcoma morphologically by characteristic cytoplasmic vacuolation blistering the cells. (Figure 12), nuclear inclusion and chondromyxoid matrix. They harbour CAMTA1 –WWTR1 fusion[1].

Mutiple cardiovascular imaging modalities provide a comprehensive information on cardiac neoplasms.[22] Echocardiography remains the cornerstone in diagnosing cardiac tumors [10] However echo alone cannot fully evaluate invasion in cardiac tumors [10]. CT and MRI are better modalities for distinguishing malignant and benign lesions. The importance of imaging in identifying cardiac tumors is to identify the potential complication that it can cause and also help indecision regarding management. [22]

Surgical modality can vary according to the site and size of the tumor, Simple resection is the treatment of choice in benign tumors such as myxoma . In case of complex tumors, resection is possible if the lesion is limited to the heart and if malignant tumors is not infiltrating adjacent structures.[13].I n our study the outcomes were variable with benign cardiac tumors were completely resected and having good prognosis following surgery .For malignant tumors the literature reports poor prognosis .[13] Majority of patients die due to distant metastasis.The median survival is less than one year with chemotherapy and radiation therapy.Hence early diagnosis is of paradigm importance.

LIMITATIONS

Our study is a retrospective study based on record and computer databases available at a single institution. Since it is a small series, the association with clinical events is

indirect. A larger sample is needed to include more pathologies.

CONCLUSION.

Cardiac tumors are rare and are important disease related to heart. In our study primary cardiac tumor predominantly consisted of benign tumors namely myxomas. Malignant cardiac tumors were associated with poor prognosis. The diagnosis of cardiac tumors is challenging. Advancement of imaging modalities have lead to early detection of these tumors. Surgical resection results in good outcome in benign tumors but management of malignant tumors can be quite challenging and may need multimodal therapy.

REFERENCES

I. Lokuhetty ,D.,White ,V.A& Cree, Ian A.(2021) : Thoracic tumors.WHO classification of Tumors(5th ed.) .International Agency for Research on Cancer(IARC);2021

II. Sternberg, S. S., Mills, S. E., & Carter, D. (2010). Sternberg's diagnostic surgical pathology (5th ed.). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.

III. Stiller B, Hetzer R, Meyer R, Dittrich S, Pees C, Alexi-Meskishvili V, Lange PE. Primary cardiac tumours: when is surgery necessary?. European journal of cardio-thoracic surgery. 2001 Nov 1;20(5):1002-6.

IV. Winther C, Timmermans-Wielenga V, Daugaard S, Mortensen SA, Sander K, Andersen CB. Primary cardiac tumors: a clinicopathologic evaluation of four cases. Cardiovascular Pathology. 2011 Jan 1;20(1):63-7.

V. Leja MJ, Shah DJ, Reardon MJ. Primary cardiac tumors. Texas heart institute journal. 2011;38(3):261.

VI. Maraj S, Pressman GS, Figueredo VM. Primary cardiac tumors. International journal of cardiology. 2009 Apr 3;133(2):152-6.

VII. Kim CH, Dancer JY, Coffey D, Zhai QJ, Reardon M, Ayala AG, Ro JY. Clinicopathologic study of 24 patients with primary cardiac sarcomas: a 10-year single institution experience. Human pathology. 2008 Jun 1;39(6):933-8.

VIII. Sugimoto T, Yamamoto K, Yoshii S. A primary epithelioid hemangioendothelioma of the right atrium: report of a case and literature review.

IX. Huang W, Li L, Gao J, Gao JB. Epithelioid hemangioendothelioma of the right atrium invaded the superior vena cava: case report and review of literature. The International Journal of Cardiovascular Imaging. 2021 Jan;37(1):285-90.

X. Isobe S, Murohara T. Cardiac tumors: Histopathological aspects and assessments with cardiac noninvasive imaging. Journal of Cardiology Cases. 2015 Aug 1;12(2):37-8.

XI. Shapiro LM. Cardiac tumours: diagnosis and management. Heart. 2001 Feb 1;85(2):218-22.

XII. Karaağaç E, Yeşilkaya N, Tellioğlu TM, Ünay FÇ, Beşir Y. A rare cardiac tumor presenting with myxoma: Primary cardiac hemangioendothelioma. Turkish Journal of Thoracic and Cardiovascular Surgery. 2021 Jan;29(1):110..

XIII. Sanad M, Arafa S, Hegazy MA, Abdel Hamid WA. Primary cardiac tumors: a spectrum of pathologies and scenarios. The Cardiothoracic Surgeon. 2020 Dec;28(1):1-1.

XIV. Ren DY, Fuller ND, Gilbert SA, Zhang Y. Cardiac tumors: clinical perspective and therapeutic considerations. Current Drug Targets. 2017 Dec 1;18(15):1805-9.

XV. He DK, Zhang YF, Liang Y, Ye SX, Wang C, Kang B, Wang ZN. Risk factors for embolism in cardiac myxoma: a retrospective analysis. Medical science monitor: International Medical Journal of Experimental and Clinical Research. 2015;21:1146.

XVI. Kumar N, Agarwal S, Ahuja A, Das P, Airon B, Ray R. Spectrum of cardiac tumors excluding myxoma: experience of a tertiary center with review of the literature. Pathology-Research and Practice. 2011 Dec 15;207(12):769-74.

XVII. Li S, Gao C. Surgical experience of primary cardiac tumor: single-institution 23-year report. Medical Science Monitor: International Medical Journal of Experimental and Clinical Research. 2017;23:2111.

XVIII. Nomoto N, Tani T, Konda T, Kim K, Kitai T, Ota M, Kaji S, Imai Y, Okada Y, Furukawa Y. Primary and metastatic cardiac tumors: echocardiographic diagnosis, treatment and prognosis in a 15-years single center study. Journal of Cardiothoracic Surgery. 2017 Dec;12(1):1-9

XIX. Arafa S, Sanad M. Primary cardiac hemangioendothelioma of the mitral valve. The Egyptian Heart Journal. 2018 Sep 1;70(3):229-32.

XX. Seo JW, SONG MK, Park SH, PARK HE, PARK SA. Primary cardiac hemangioendothelioma in an infant: a case report. Clinical Pediatric Hematology-Oncology. 2019:60-5.

XXI. Ishibashi H, Takasaki C, Akashi T, Okubo K. Successful excision of epithelioid hemangioendothelioma of the superior vena cava. The Annals of thoracic surgery. 2020 Apr 1;109(4):e271-3.

XXII. Guo GR, Wang X, Yang J, Chen L, Song JP, Wang LQ. Outcome and Pathological Characteristics of Primary Malignant Cardiac Tumors Insights from Single-Center Samples. International Heart Journal. 2019 Jul 30;60(4):938-43.