EJVES Vascular Forum (2024) 62, 35–40

REVIEW

Acute Lower Limb Ischaemia as a Presenting Sign of Atrial Myxoma: Case Report and Scoping Review of the Literature

Alberto M. Settembrini [a,*,‡], Leonardo Foresti [a,b,‡], Paolo Verlato [b], Gianluca Buongiovanni [a], Daniele Bissacco [a], Chiara Lomazzi [a], Marco Maggioni [c], Santi Trimarchi [a,d]

[a] Department of Cardio Thoracic and Vascular Diseases, Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, Milan, Italy
[b] Department of Vascular Surgery, University Medical Centre Utrecht, Utrecht, the Netherlands
[c] Division of Pathology, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy
[d] Clinical and Community Sciences Department, Università degli Studi di Milano, Milan, Italy

Objective: Cardiac myxomas (CMs) are the most common primary cardiac tumour in adults. They are a rare cause of peripheral embolisation and may present as acute lower limb ischaemia (ALI). A scoping review was undertaken and a case of ALI due to CM embolisation is presented in this paper.
Methods: MEDLINE, Scopus, and Embase were systematically searched for studies reporting data on ALI as a presentation of CM embolisation. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) was followed.
Results: A healthy 26 year old female presented to the emergency department with bilateral ALI. Urgent bilateral aorto-iliac embolectomy and distal embolectomy of the left femoropopliteal axis were performed. The retrieved embolic material exhibited a yellowish appearance and jelly like consistency, and histological analysis provided a diagnosis of a myxomatous embolus. Transoesophageal echocardiography confirmed the left atrial origin of a myxomatous tumour, but the residual mass was considered too small for further excision. At a two year clinical follow up, the patient was alive and well without recurrence. Between 1989 and 2023, 59 patients with ALI due to CM embolisation were identified in the literature. An in hospital mortality rate of 12.1% ($n = 7$) was reported, while the in hospital complication and re-intervention rates were 34.5% ($n = 20$) and 27.6% ($n = 16$), respectively. No post-discharge deaths, complications, or re-interventions were reported; fasciotomies were the most reported ($n = 10$). Post-discharge follow up was reported in 22 (37.3%) patients. Mean follow up was 18.0 $\pm$ 18.8 months (range 1–120), and 86.4% of patients ($n = 19$) were alive and well at last follow up.
Conclusion: This review and the associated case report underline that CM embolisation should be considered in healthy young patients presenting with cryptogenic ALI. Early transoesophageal echocardiography and histological analysis of the retrieved embolus are recommended to minimise misdiagnosis in these populations.

Article history: Received 19 March 2024, Revised 31 May 2024, Accepted 3 July 2024,
Keywords: Acute limb ischaemia, Atrial myxoma, Embolectomy, Peripheral embolism

INTRODUCTION

Cardiac myxomas (CMs) are the most common type of primary cardiac tumour in adults, originating from the left atrium in 75% of cases, with an estimated annual incidence of 0.5 per million population per year.[1] Embolic complications occur in 10–45% of CMs, where most myxomatous emboli migrate to the central nervous system or coronary arteries.[2] However, acute lower limb ischaemia (ALI) may be the initial presentation, and failure to recognise myxomatous emboli can lead to recurrent emboli affecting the prognosis of these patients. This paper reports a case of ALI due to embolisation of CM and a literature review was undertaken to summarise the current knowledge of this scenario. The patient consented to publication of the images.

MATERIALS AND METHODS

This scoping review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[3] The protocol was registered and made publicly accessible on the Open Science Framework (DOI 10.17605/OSF.IO/NHCZB). Two independent investigators systematically reviewed and analysed full text studies published in English within the MEDLINE,

‡ These two authors contributed equally to this work and co-share first authorship for the manuscript.
* Corresponding author. Department of Cardio Thoracic and Vascular Diseases, Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, Via Francesco Sforza 35, 20122 Milan, Italy.
E-mail address: alberto.settembrini@unimi.it (Alberto M. Settembrini).

https://doi.org/10.1016/j.ejvsvf.2024.07.036

Scopus, and Embase databases (last query on 30 August 2023). For discrepancies, a third author was consulted to provide consensus. Research questions and search strings were established prior to the systematic search and are detailed in Supplementary Table S1. The extracted data were analysed using Microsoft Excel and presented in text format, utilising numbers (*n*) and percentages (%), or mean, median ±standard deviation (SD), or range. In accordance with the PRISMA-ScR,[3] no quality assessment of the included papers was performed.

RESULTS

Case report

A healthy 26 year old Caucasian female presented to the emergency department with bilateral lower limb pain and progressive weakness, with worsening left calf pain, numbness, and cyanotic appearance of the ipsilateral foot after physical exercise. At the first clinical evaluation both femoral pulses were absent, and the patient was diagnosed with ALI, with Rutherford grade[4] IIa and IIb on the right and left lower limbs, respectively. Transthoracic echocardiography showed no appositions or masses within the cardiac chambers. Duplex ultrasound confirmed the diagnosis, showing absent flow along the left femoropopliteal arterial axis and tardus parvus waveforms in the common femoral arteries, bilaterally. Computed tomography angiography (CTA) showed an occlusion of the aortic bifurcation, with concomitant non-contiguous complete occlusion of the left external iliac and superficial femoral arteries (Fig. 1A). Synchronous splenic and renal infarctions were also observed (Fig. 1B).

Under general anaesthesia, the patient underwent urgent bilateral aorto-iliac embolectomy and distal embolectomy of the left femoropopliteal axis using Fogarty catheters. Alongside the recent thrombus, the retrieved embolic material exhibited a yellowish appearance and jelly like consistency, which was submitted to histological analysis. A final angiogram provided confirmation of restoration of the circulation (Fig. 2). Because of significant non-pitting oedema of the left thigh and calf, left limb fasciotomies were performed to prevent compartment syndrome. The patient was transferred to the intensive care unit (ICU) for haemodialysis due to the development of acute renal failure.

Histological analysis confirmed the diagnosis of a myxomatous embolus (Fig. 3). During the ICU stay, transoesophageal echocardiography (TEE) and CTA confirmed the left atrial origin of a myxomatous tumour and ruled out brain infarctions. The residual mass (12 x 7 x 6 mm) was considered too small to require further surgery. Although, all the patient's dorsalis pedis and posterior tibial pulses were restored, the left foot remained slightly dropped with paraesthesia. On post-operative day 6, the patient was discharged from the ICU. During the post-operative course, the patient showed complete clinical regression of the deficits and a progressive improvement of renal function, which led to hospital discharge on post-operative day 41. Short term prophylactic anticoagulation (low molecular weight heparin4 000 UI/day for 14 days) was continued beyond discharge. The follow up consisted of clinical and Duplex ultrasound evaluations at six and 12 months, and yearly thereafter. At the two year follow up, the patient was alive and asymptomatic.

Scoping review

The systematic search identified 553 studies. Fifty one studies were included after the selection process (Supplementary Fig. S1),[5–55] including 59 patients. Study details are listed in Supplementary Table S2.

The median age at presentation was 44.5 years (range 0.5—82), with half of the patients being female. Rutherford's grade IIb ALI was the most observed at presentation ($n = 21$), and systemic embolisation was noted in 31

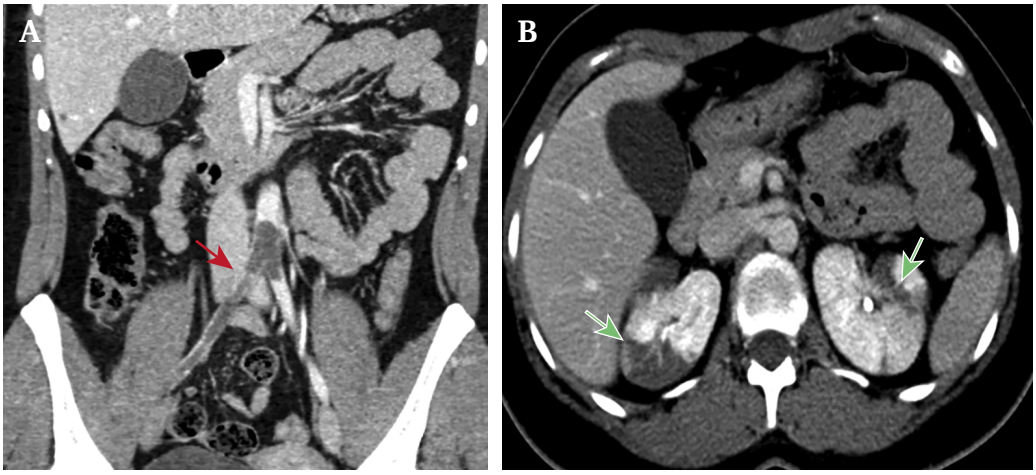

Figure 1. Computed tomography angiography images. (A) Evidence of a saddle embolus of the aortic bifurcation (red arrow) and occlusion of the right iliac axis. (B) Visceral involvement with multiple focal, wedge shaped renal parenchymal defects involving both the cortex and medulla and extending to the capsular surface (green arrows).

Figure 2. Final angiogram displaying successful aorto-iliac recanalisation after surgical embolectomy.

patients. The most common site of embolisation leading to ALI was the infrarenal aorta, including the aortic bifurcation ($n = 26$). Clinical examination combined with CTA was the most frequently used diagnostic method. Details regarding demographics and diagnosis are provided in Supplementary Table S3. The mean maximum diameter of the CM, mostly located in the left atrium, was 4.2 ± 2.1 mm. Details of the medical and surgical management are listed in Table 1.

Fifty of the 51 studies reported data on in hospital outcomes, with an overall mortality rate of 12.1% ($n = 7$). The observed in hospital complication rate was 34.5% ($n = 20$), while in hospital re-interventions were observed in 27.6% of patients ($n = 16$). Details about post-discharge follow up were noted for 22 patients, with a mean follow up of 18.0 ± 18.8 months (range 1—120). No deaths, complications, or re-interventions were reported in this group. Follow up details about outcomes are listed in Table 2.

DISCUSSION

This case report adds to the other 59 cases reported in the literature describing acute lower limb ischaemia as a presentation of CM embolisation. The patient, a young female with no prior medical history, aligned with the typical demographic characteristics observed in the literature. As expected, the preferred surgical management strategy for such cases involves embolectomy combined with a second stage CM excision, when feasible. The decision to make a CM excision was primarily driven by the risk of recurrent CM embolisation, which could affect the vital organs. As shown in this review, brain embolisation or involvement of renal and splanchnic arteries are not uncommon and appear to be significant factors influencing outcomes in this

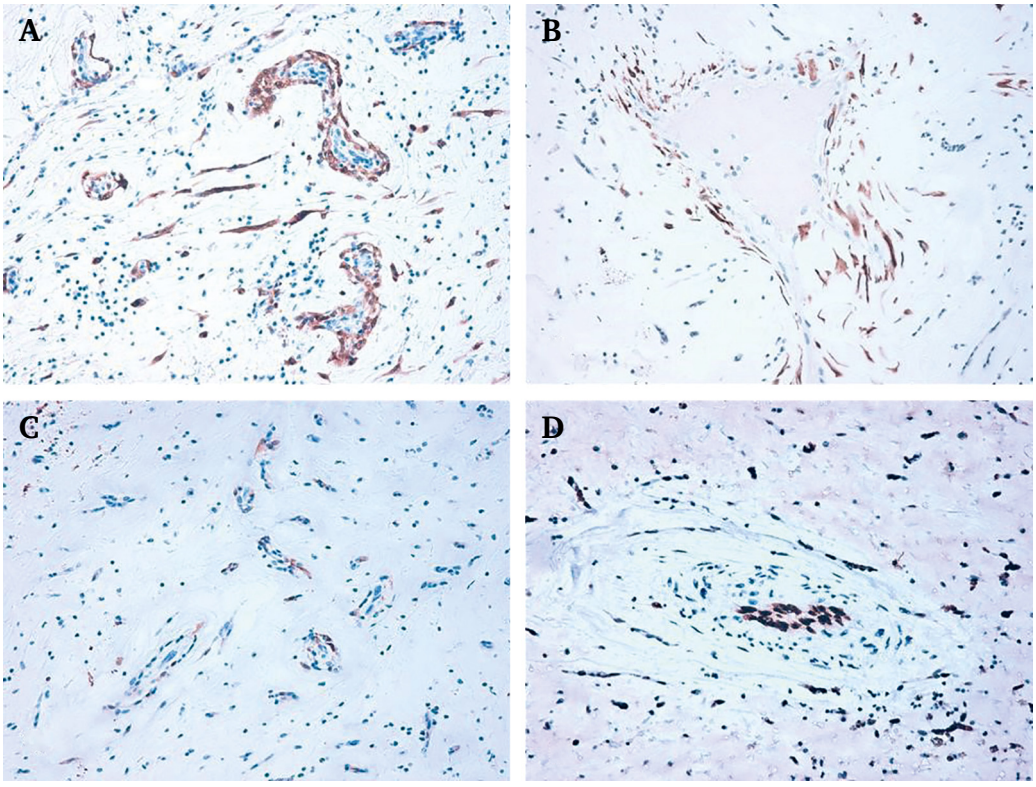

Figure 3. Tumour cell immunoreactivity and identification in the histological analysis of the embolic material. (A) Diffuse immunoreactivity for calretinin and (B) cytokeratin AE1/AE3; (C) focal immunoreactivity for S100 protein; (D) ETS related gene (ERG) highlighting endothelial cells but not perivascular tumour cells (H&E 200x).

Table 1. Medical and surgical management strategies for acute lower limb ischaemia following cardiac myxoma embolisation described in the literature.

Medical and surgical management	*n* (%)
Anticoagulation regimen	13 (22.0)
Pre-operative	8 (61.5)
Pre-operative + post-operative	2 (15.4)
None	3 (23.1)
Surgical strategy	
Embolectomy	55 (93.2)
Peripheral bypass	2 (3.4)
Above knee amputation	1 (1.7)
Not reported	1 (1.7)
Cardiac myxoma location	
Left atrium	47 (79.7)
Multichambered	1 (1.7)
Not reported	11 (18.6)
Cardiac myxoma diagnosis method	
TTE or TEE + biopsy	27 (45.8)
TTE or TEE	10 (16.9)
Embolus histological analysis	2 (3.4)
CTA + TEE	4 (6.8)
Not reported	16 (27.1)
Cardia myxoma dimensions − mm ± SD	4.2 ± 2.1
Cardiac myxoma excision	
Surgical excision	39 (66.1)
No excision of the residual mass	7 (11.9)
Complete embolisation	8 (13.6)
Not reported	5 (8.4)

CTA = computed tomography angiography; TEE = transoesophageal echocardiography; TTE = transthoracic echocardiography; CTA = computed tomography angiography.

Table 2. Outcomes of patients with acute lower limb ischaemia following cardiac myxoma embolisation.

Outcomes	*n* (%)
Death	7 (12.1)
In hospital	6 (85.7)
Post-discharge*	0 (0)
Not reported	1 (14.3)
Cause of death	
Not reported	4 (57.1)
Stroke	2 (28.6)
Neurological deterioration	1 (14.3)
Complications	
In hospital	20 (34.5)
Stroke	5 (8.6)
ARF requiring haemodialysis	5 (8.6)
Compartment syndrome	3 (5.2)
Pulmonary	2 (3.4)
CLTI	2 (3.4)
ALI	1 (1.7)
Lower limb paralysis	1 (1.7)
ARF not requiring haemodialysis	1 (1.7)
*Post-discharge**	0 (0)
Re-interventions	
In hospital	16 (27.6)
Fasciotomies	10 (17.2)
Lower limb amputation	3 (5.2)
Decompressive craniotomy	2 (3.4)
New embolectomy	1 (1.7)
*Post-discharge**	0 (0)
Mean hospitalisation − days ±SD	15.6 ± 12.0
Patient with post-discharge follow up	22 (37.3)
Follow up − months ±SD [range]	18.0 ± 18.8 [1−120]
Clinical condition of the patient at last follow up	
Alive and well	19 (86.4)
Alive with limitations in everyday life	2 (9.1)
Alive with paralysis	1 (4.5)

ALI = acute lower limb ischaemia; ARF = acute renal failure; CLTI = chronic limb threatening ischaemia; SD = standard deviation.

* Post-discharge data only refer to patients with post-discharge follow up data ($n = 22$).

population. These findings underscore the importance of early identification of the embolus origin. For these reasons, particularly in young patients with cryptogenic ALI, it is suggested that additional vascular beds be examined at the time of diagnosis and a pre-operative echocardiogram, preferably TEE when feasible, be performed.[11]

However, as shown in this case, diagnosing CM embolisation can be challenging, especially when there is complete or near complete detachment of the tumour at the time of embolisation, which could evade diagnostic imaging.[17] Although this event may reduce or eliminate the risk of recurrent emboli, performing a histological examination of the surgically retrieved embolic material is suggested in cases of cryptogenic ALI to avoid a missed diagnosis.

One of the major concerns about the management of CM embolisation is the management of anticoagulation therapy (ACT), and this review showed a lack of data regarding this topic. Some authors suggested ACT even after complete detachment of the tumour, based on residual endothelial abnormalities that may lead to recurrence even after several years.[17] Otherwise, long term post-operative ACT has been proven ineffective in preventing further recurrent embolic episodes,[1] and its therapeutic value remains uncertain, especially after primary tumour excision or complete detachment. Based on this heterogeneity and the lack of consensus in the literature, assessing the risk of recurrence and tailoring treatment to the patient are suggested with prolonged ACT. Further studies are needed to establish the best medical management in these patients.

A recent meta-analysis reported an adjusted estimate rate of CM recurrence after surgical excision of 0.03 cases per one 1 000 person years.[56] The current case had near complete embolisation of the tumour, leaving a residual mass that was difficult to characterise in size. Along with cardiac surgeons, the team considered this to be a radical excision and decided not to perform a high risk and highly invasive procedure due to the low risk of recurrence. However, while there are no reported cases of recurrence following complete CM embolisation, long term surveillance through repeated imaging may still be indicated for vigilant monitoring. This is particularly important for patients with CMs that have multi-chamber distribution, early distant metastases, atypical origin, and family history.

Conclusion

Cardiac myxoma embolisation presenting as acute lower limb ischaemia is uncommon, with a total of 60 cases reported in the literature, including this one. However, CM embolisation should be considered in healthy young patients presenting with cryptogenic ALI, especially if combined with systemic embolisation, and an early TEE and histological analysis of the retrieved embolus should be considered in these populations. While surgical management with embolectomy combined with CM excision is widely accepted, further studies are needed to assess the importance of ACT in preventing recurrence.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ACKNOWLEDGEMENTS

This study was partially funded by Italian Ministry of Health, current research IRCCS.

REPORTING CHECKLIST

The authors have completed the CARE reporting checklist. Available at https://cdt.amegroups.com/article/view/10.21037/cdt-22-401/rc.

ETHICAL STATEMENT

The authors are accountable for all aspects of this work, in ensuring that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

APPENDIX A. SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejvsvf.2024.07.036.

REFERENCES

1 Kesav P, John S, Joshi P, Gaba WH, Hussain SI. Cardiac myxoma embolization causing ischemic stroke and multiple partially thrombosed cerebral aneurysms. *Stroke* 2021e;10—14.
2 Liu Y, Wang J, Guo L, Ping L. Risk factors of embolism for the cardiac myxoma patients: a systematic review and metanalysis. *BMC Cardiovasc Disord* 2020;**348**.
3 Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;**169**:467—73.
4 Rutherford RB, Baker JD, Ernst C, Johnston KW, Porter JM, Ahn S, et al. Recommended standards for reports dealing with lower extremity ischemia: revised version. *J Vasc Surg* 1997;**26**:517—38.
5 Meng XH, Xie LS, Xie XP, Liu YC, Huang CP, Wang LJ, et al. Cardiac myxoma shedding leads to lower extremity arterial embolism: a case report. *World J Clin Cases* 2022;**10**:10606—13.
6 Eriksen UH, Baandrup U, Jensen BS. Total disruption of left atrial myxoma causing a cerebral attack and a saddle embolus in the iliac bifurcation. *Int J Cardiol* 1992;**35**:127—9.
7 Zhou H, Yin Y, Sun Z. Clinical characteristics of acute lower extremity ischemia due to left atrial myxoma: a rare case report with review of literature. *Heart Surg Forum* 2023;**26**:292—302.
8 Salimi J, Najari K, Farshidmehr P, Toosi R, Naghavi B, Ramim T. Central nervous system and limb embolism concurrence due to atrial myxoma: a case report. *J Tehran Heart Cent* 2017;**12**:145—8.
9 Hiramoto JS, Laberge JM, Bracamonte E, Gordon RL, Kerlan RK. SIR 2005 film panel case: peripheral embolization from cardiac myxoma. *J Vasc Interv Radiol* 2005;**16**:1061—6.
10 Min SY, Lim YH, Lee HT, Shin J, Kim KS, Kim H. Biatrial myxoma and multiple organ infarctions combined with Leriche syndrome in a female patient. *BMC Cardiovasc Disord* 2014;**14**.
11 Wilson YG, Thornton MJ, Prance SE, Wells J, Burrell CJ, Ashley S. Embolisation from atrial myxomas: a cause of acute on chronic limb ischaemia. *Eur J Vasc Endovasc Surg* 1997;**14**:502—4.
12 Horn KD, Becich MJ, Rhee RY, Pham SM. Left atrial myxoma with embolization presenting as an acute infrarenal aortic occlusion. *J Vasc Surg* 1997;**26**:341—5.
13 Kumar N, Raja J, Bansal V, Refai I, Mishra AK. A rare triad in left atrial myxoma. *Indian J Thorac Cardiovasc Surg* 2023;**39**:531—4.
14 Zulfa PO, Habibie YA. Cardiac myxoma misdiagnose as infective endocarditis in a patient with acute limb ischemia and cardioembolic cerebral stroke: a case report. *Bali Med J* 2023;**12**:184—6.
15 Ermacora D, Comunello A, Gorgatti T, Ladurner C, Cemin R. Dramatic massive arterial embolization from a left atrial myxoma in a patient with takotsubo syndrome. *J Cardiovasc Echogr* 2022;**32**:183—4.
16 Li Y, Nensa F, Theysohn J, Henze K, Frank B, Köhrmann M, et al. From acute cerebrovascular occlusion to critical limb ischemia: a multidisciplinary challenge in a patient with ruptured atrial papillary myxoma. *J Vasc Intervent Radiol* 2021:771—3.
17 Ho KKF, Barsoum R, Shepherd B, McGahan T. Bilateral acute lower limb ischemia secondary to complete embolization of cardiac myxoma. *J Vasc Surg* 2020;**71**:1759—61.
18 Mathew R, Agrawal N, Aggarwal P, Jamshed N. Atrial myxoma presenting as acute bilateral limb ischemia. *J Emerg Med* 2019;**57**:710—2.
19 Szymanska A, Syska-Suminska J, Rekosz J, Skrobisz A, Platek AE, Dluzniewski M. Acute limb ischemia due to intracardiac myxoma in a patient with atrial fibrillation. *Cardiol J* 2019:806—7.
20 Latifi AN, Ibe U, Gnanaraj J. A case report of atrial myxoma presenting with systemic embolization and myocardial infarction. *Eur Heart J Case Rep* 2019;**3**:104.
21 Yamashita M, Eguchi K, Ogawa M, Takahashi K, Nagai M, Shimpo M, et al. A case of left atrial myxoma whose initial symptom was finger ischemic symptom. *Int Heart J* 2018;**59**:233—6.
22 Wu Y, Fu XM, Liao XB, Zhou X. Stroke and peripheral embolisms in a pediatric patient with giant atrial myxoma: case report and review of current literature. *Medicine (United States)* 2018;**97**:e11653.
23 Bois MC, Eckhardt MD, Cracolici VM, Loe MJ, Ocel JJ, Edwards WD, et al. Neoplastic embolization to systemic and pulmonary arteries. *J Vasc Surg* 2018;**68**:204—12. e7.
24 AbdullGaffar B, Waslewski K. Myxoid emboli. *Int J Surg Pathol* 2018;**26**:609—16.

25 Keshelava G, Vashakmadze N, Jaiani S, Kovziridze D, Kurashvili G. Left ventricular myxoma with embolization causes acute infrarenal aortic occlusion. *Int J Angiol* 2018;**27**:43—5.
26 Bernatchez J, Gaudreault V, Vincent G, Rheaume P. Left atrial myxoma presenting as an embolic shower: a case report and review of literature. *Ann Vasc Surg* 2018;**53**:266.e13—20.
27 Kawabata T, Kasahara S, Ohtsuki SI, Kuroko Y, Kotani Y, Fujii Y, et al. Left ventricular myxoma occluding the suprarenal abdominal aorta in an infant. *Ann Thorac Surg* 2015;**100**:309—11.
28 Mohamed MA, Tawil A, Al Salihi M, Mattos M. Left atrial myxoma embolization presenting as acute limb ischemia: an unusual presentation. *Cureus* 2018;**10**:e2764.
29 Zuin M, Sacco A, Pisano L, Olga Bernasconi M, Roncon L. Abdominal aortic occlusion caused by a cardiac myxoma: a multi-modality imaging approach. *Eur Heart J Cardiovasc Imag* 2017;**18**:606.
30 Knight M, Wise RD. Atrial myxoma-related embolism resulting in acute limb ischaemia in a critical care patient. *South Africa J Crit Care* 2015;**31**:62—3.
31 Habbab L, Alfaraidi H, Lamy A. Surviving catastrophic disintegration of a large left atrial myxoma: the importance of multidisciplinary team. *J Surg Case Rep* 2014;**2014**:93.
32 Zhang T, Zhang X, Zhang X, Jiang J, Chen J, Zhou B. Management of multiple embolization arising from atrial myxoma. *Ann Thorac Surg* 2012;**94**:646—9.
33 Muhammad Amin AU. A rare case of massive systemic embolisation secondary to atrial myxoma: case report. *Med J Malaysia* 2013;**68**:471—2.
34 Cengiz Çolak M, Kocatürk H, Bayram E. A catastrophic picture; recurrent and multiple embolisms of left atrial myxoma: case report. *Turkiye Klinikleri J Med Sci* 2011;**31**:1563—6.
35 Kaul P, Balaji S, Prescott S, Welsh C. Left atrial myxoma with aortobifemoral thromboembolism, rhabdomyolysis, acute tubular necrosis and ischaemic paraparesis mimicking metastatic renal cell carcinoma. *Br J Diabetes Vasc Dis* 2012;**12**:72—7.
36 Nicholls GM, Clearwater G. Emergency presentation of emboli to multiple sites from an atrial myxoma. *EMA - Emerg Med Australas* 2012;**24**:336—8.
37 Lee SJ, Kim JH, Na CY, Oh SS. Eleven years' experience with Korean cardiac myxoma patients: focus on embolic complications. *Cerebrovasc Dis* 2012;**33**:471—9.
38 Hofer A, Hoermandinger K, Gombotz H. Bilateral limb ischemia and acute lung edema in a healthy woman during jogging. *J Cardiothorac Vasc Anesth* 2009;**23**:211—4.
39 Tasoglu I, Tutun U, Lafci G, Hijaazi A, Yener U, Ulus AYT, et al. Primary cardiac myxomas: clinical experience and surgical results in 67 patients. *J Card Surg* 2009;**24**:256—9.
40 Yadav S, Alvarez JM. Catastrophic presentation of atrial myxoma with total occlusion of abdominal aorta. *Interact Cardiovasc Thorac Surg* 2009;**9**:913—5.
41 Tsao JH, Lo HC, How CK, Yen DHT, Huang CI. Embolic occlusion of the aorta caused by cardiac myxoma. *Resuscitation* 2010;**81**:511.
42 Shavit L, Appelbaum L, Grenader T. Atrial myxoma presenting with total occlusion of the abdominal aorta and multiple peripheral embolism. *Eur J Intern Med* 2007;**18**:74—5.
43 Neff CM, McCowan CL. Complete aortic occlusion caused by cardiac myxoma emboli. *Am J Emerg Med* 2008;**26**:110.e1—2.
44 Ammar T, Huang DY, Pomplun S, Jones K, Evans DR. Aortic saddle embolus from an atrial myxoma in a 10-year-old footballer. *Eur J Radiol Extra* 2007;**64**:53—6.
45 Van Der Mieren G, Duchateau J, Herijgers P. Left atrial myxoma: presentation with acute aortic occlusion and "resolution" of the primary tumor. *Acta Chir Belg* 2007;**107**:687—9.
46 Ahmed AK, Rajendran R, Shaukat N, Nishtar S, Mc Adam J. A rare case of atrial myxoma with biatrial extension. *Int J Cardiol* 2008;**127**:e50—1.
47 Zhang J, Duan Z-Q, Wang C-J, Song Q-B, Luo Y-W, Shi-Jie X. Case report: acute aortic occlusion as an unusual embolic complication of cardiac myxoma. *Chin Med J* 2006;**119**:342—4.
48 Kapur P, Rakheja D, Amirkhan RH. Acute-onset, bilateral lower extremity pain in a 30-year-old man. *Lab Med* 2006;**37**:533—5.
49 Markovic M, Davidovic L, Mikic A, Predrag D, Svetozar P. Rare forms of peripheral arterial embolism: review of 11 cases. *Vascular* 2005;**13**:222—9.
50 Ali T, Castro J, Young CP, Burnand KG. Complications of reperfusion in acute aortic artery occlusion following saddle embolization originating from an atrial myxoma case report. *Vascular* 2004;**12**:202—5.
51 Fernando Val-Bernal J, Acebo E, Javier Gómez-Román J, Garijo MF. Cardiac myxoma in embolectomy specimens. *Pathol Int* 2003;**53**:489—94.
52 Fang BR, Chang CP, Cheng CW, Yang NI, Shieh MC, Lee N. Total detachment of cardiac myxoma causing saddle embolization and mimicking aortic dissection. *Jpn Heart J* 2004;**45**:359—63.
53 Weerasena NA, Groome D, Pollock JG, Pollock JC. Atrial myxoma as the cause of acute lower limb ischaemia in a teenager. *Scott Med J* 1989;**34**:440—1.
54 Taşdemir K, Emiroğullari ÖN, Ceyran H, Aşik R, Yasim A. Intracardiac masses. *Asian Cardiovasc Thorac Ann* 2000;**8**:378—80.
55 McMullin GM, Lane R. A rare cause of acute aortic occlusion. *Aust N Z J Surg* 1993;**63**:65—8.
56 Oktaviono YH, Saputra PBT, Arnindita JN, Afgriyuspita LS, Kurniawan RB, Pasahari D, et al. Clinical characteristics and surgical outcomes of cardiac myxoma: a meta-analysis of worldwide experience. *Eur J Surg Oncol* 2024;**50**:107940.