

AN UNUSUAL CASE OF TAKAYASU ARTERITIS PRESENTING AS ACUTE MYOCARDIAL INFARCTION AND ISCHAEMIC STROKE

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ABSTRACT. *Introduction:* Takayasu's arteritis (TA) is well-known yet rare disorder, defined as a chronic large vessel vasculitis mainly involving the aorta and its major branches. We present a complex case of a 51-year-old female patient who first presented with acute myocardial infarction as an initial manifestation of Takayasu arteritis, and later with an acute onset of ischemic stroke. *Case report:* We present a case of 51-year-old female patient who was admitted at the Clinic of Nephrology and Clinical Immunology. During hospitalization, a sudden onset of intense chest pain occurred, followed by a development of heart failure to the level of cardiogenic shock. Electrocardiography showed signs of ST-elevated myocardial infarction (STEMI) of the anterior wall, and an increase in cardiac specific enzymes. CT angiography indicated an occlusion of the left common carotid artery (ACC), subclavian and axillary arteries as well as a penetrating aortic ulcer localized infrarenal. In the further course of treatment, left-sided weakness of the body was registered. Head CT scan showed an acute ischemic lesion high parietal on the right, as well as a chronic ischemic lesion on the front right. Doppler ultrasonography of carotid and vertebral arteries registered left occlusion, right ACC/external carotid artery (ACE) stenosis with suspected "macaroni sign". Final diagnosis of Takayasu arteritis was established and corticosteroids were included in the therapy (primarily in pulse doses) with the first pulse of cyclophosphamide of 1000mg. *Conclusion:* This disease should be considered in female patients who present with chronic inflammation and acute coronary syndrome.

KEYWORDS: Takayasu arteritis, myocardial infarction, vasculitis, immune-mediated diseases, ischaemia, stenosis, occlusion

INTRODUCTION

Takayasu's arteritis (TA) is well-known yet rare disorder, defined as a chronic large vessel vasculitis mainly involving the aorta and its major branches. It

mostly affects young females in the third and fourth life decade, with a highest prevalence in Japan with approximately 40 cases per million, whereas 1-3 per million people in the US and Europe are affected (1-3). Unfortunately, prompt identification of the process is usually delayed, since most patients present first with constitutional symptoms, and only later develop signs that are more specific. In some cases, initial symptoms can occur because of ischemic organ damage, such as cerebrovascular events and acute myocardial infarction (4,5). It is estimated that in young

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women, up to the age of 40, around 10% of myocardial infarction is due to Takayasu's arteritis (5, 6). Coronary artery involvement in adult patients is associated with worse clinical outcomes and increased mortality risk (6).

We present a complex case of a 51-year-old female patient who first presented with acute myocardial infarction as an initial manifestation of Takayasu arteritis. The course of disease was further complicated by acute pulmonary embolism and an acute onset of ischemic stroke. After thorough diagnostic procedures, typical radiographic signs were observed, which led to a diagnosis of Takayasu arteritis and prompt treatment was initiated resulting in an overall improvement.

CASE PRESENTATION

We present a case of 51-year-old female patient who was admitted at the Clinic of Nephrology and Clinical Immunology. The patient was hospitalized 5 months prior in a regional institution due to type 2 acute respiratory insufficiency, as well as elevated values of D-dimer (9730ng/ml). Thoracic computed tomography (CT) scan was performed natively and with contrast, pleural effusions were observed on both sides (up to 12 mm on the right, and up to 5 mm on the left) as well as three ulcers on the aortic arch up to 5 mm in diameter. During hospitalization, a sudden onset of intense chest pain occurred, followed by a development of heart failure to the level of cardiogenic shock. Electrocardiography showed signs of ST-elevated myocardial infarction (STEMI) of the anterior wall, and an increase in cardiac specific enzymes (high-sensitivity cardiac troponin I (hs-cTnI) 20 000 ng/ml, creatin kinase MB (CK-MB) 259 IU/L), after which the patient transferred to a reference health facility. Arterial hypertension, hypercholesterolemia and smoking are among the risk factors for developing acute coronary syndrome.

Coronary angiography was performed, which verified the narrowing of the ostial segment of the left anterior descending artery (LAD). Bearing in mind the previously mentioned ulcer and coronary angiography findings, percutaneous coronary inter-

vention (PCI) was performed with drug-eluting stent (DES) implantation in left anterior descending artery (LAD). Echocardiography verified ischemic cardiomyopathy with ejection fraction (EF) 38%. Due to the appearance of back pain and quantitative disturbance of consciousness, as well as hemodynamic instability and differences in arterial blood pressure on upper extremities, urgent CT angiography was performed, which indicated an occlusion of the left common carotid artery (ACC), subclavian and axillary arteries as well as a penetrating aortic ulcer localized infrarenal (Photo 1). In the further course of treatment, left-sided weakness of the body was registered in the objective finding. Head CT scan was performed, which showed an acute ischemic lesion with a diameter of 13 mm, high parietal on the right, as well as a chronic ischemic lesion with a diameter of 9 mm on the front right. A neurologist was consulted, who indicated the continuation of dual antiplatelet therapy, and proposed additional imaging diagnostics and immunological testing.

Upon admission to the Clinic of Nephrology and Clinical Immunology, further examinations were performed, including Doppler ultrasonography of carotid and vertebral arteries, which registered left occlusion, right ACC/external carotid artery (ACE) stenosis with suspected "macaroni sign", as well as suspected left vertebral artery (AV) occlusion; the finding was described to correspond to Takayasu arteritis. MRI with MRA were performed and showed chronic (micro) ischemic frontoparietal lesions on the right, and to a lesser extent on the left; on the absence of flow in the extracranial segment of the left AV as well as multiple stenoses on the longer segment of the left internal carotid artery (ACI) as well as a stenosis by about 60-70% of the right ACI on the retreat (Photo 2). CT angiography of the head and neck was also performed, the following was observed: occlusion of the left ACC along its entire length, stenosis of the right and left ACI, occlusion of the left a. subclaviae, as well as moderate narrowing of the truncus brachiocephalicus and right a. subclaviae. Laboratory tests verified negative anti-nuclear antibodies on primate liver and Hep-2 cells, negative anti cytoplasmic antibodies (ANCA), anti Beta2 glycoprotein IgG and anti Beta2 glycoprotein IgM antibodies (Ab), anti-

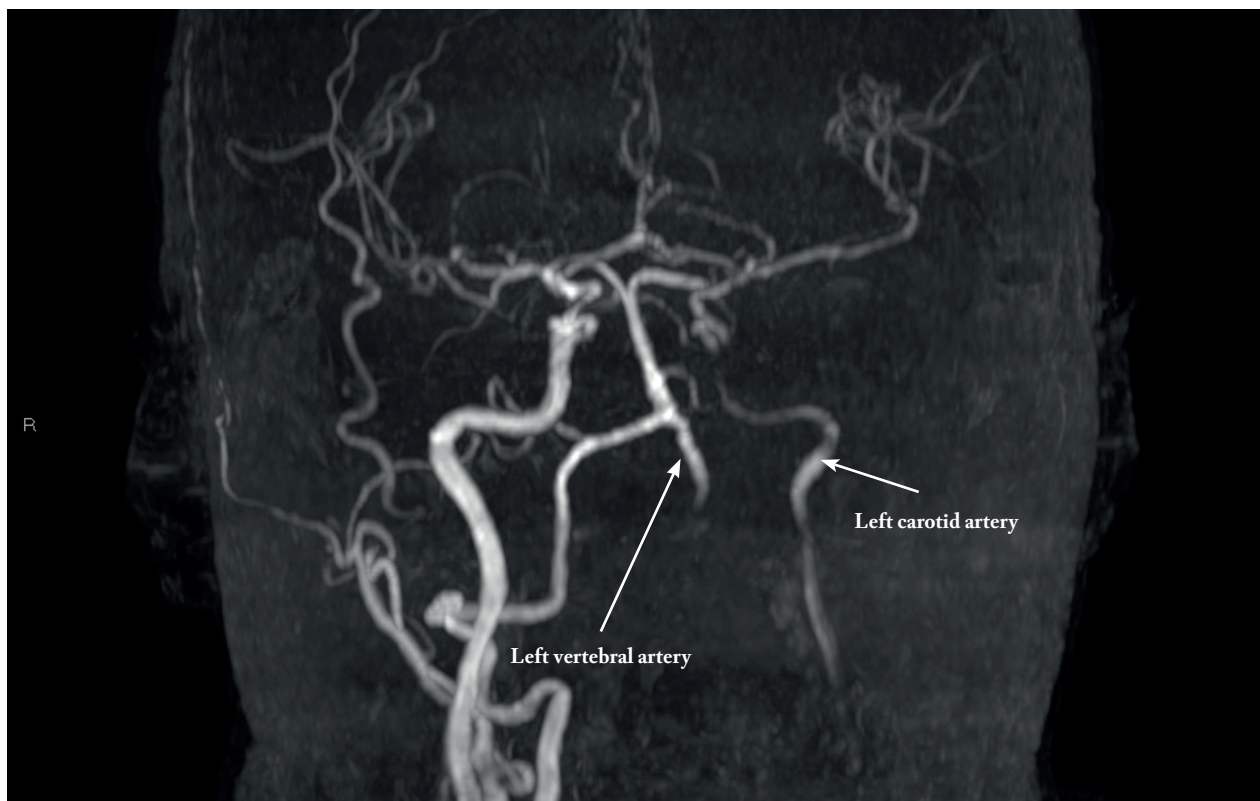


FIGURE 1. Non-contrast MR angiography (Time of flight – TOF) MR angiography without use of contrast agent (Time of flight – TOF) revealed signal intensity loss in C1 segment of the left internal carotid artery, with multiple significant stenosis in the C2 and C3 segment, while having lower signal intensity (slower flow) in the intracranial segment. Furthermore, there was signal intensity loss in V1-3 segments of the left vertebral artery, leading to the differential diagnosis of vasculitis.

cardiolipin Ab and lupus anticoagulant, elevated erythrocyte sedimentation rate (ESR) 56mm/h and a C-reactive protein (CRP) of 54 mg/L.

After all the tests that were performed, a final diagnosis of Takayasu arteritis was established and corticosteroids were included in the therapy (primarily in pulse doses) with the first pulse of cyclophosphamide (CYP) of 1000mg. The patient was in a further hospital course in good general condition, with regression of all the previously mentioned problems, and was discharged for outpatient treatment at a dose of prednisolone and CYP monthly pulses. The values of inflammatory biomarkers, after treatment, were in a significant decline in regard to initial values (ESR 26 mm/h, CRP 2.5 mg/L). On the first check up the patient was feeling well, with no neurological and cardiac problems.

DISCUSSION

TA, characterized by massive intimal fibrosis and vascular narrowing, is a rare chronic nonspecific inflammatory disease of undetermined etiology. This condition is associated with increased biomarkers of endothelial injury and repair, such as circulating endothelial cell, circulating endothelial progenitor cell and vascular endothelial growth factor (7). In TA patients, arterial inflammation leads to structural impairment and irregular thickening of the arteries. It has been shown that endothelial functional impairment leads to platelet aggregation and coagulopathy, which results in lumen stenosis and thrombotic occlusion other than plaque rupture or calcification (7, 8). Angiography is considered the gold standard for diagnosis and is used to classify TA into phenotypes according to the distribution of inflammation (9). The

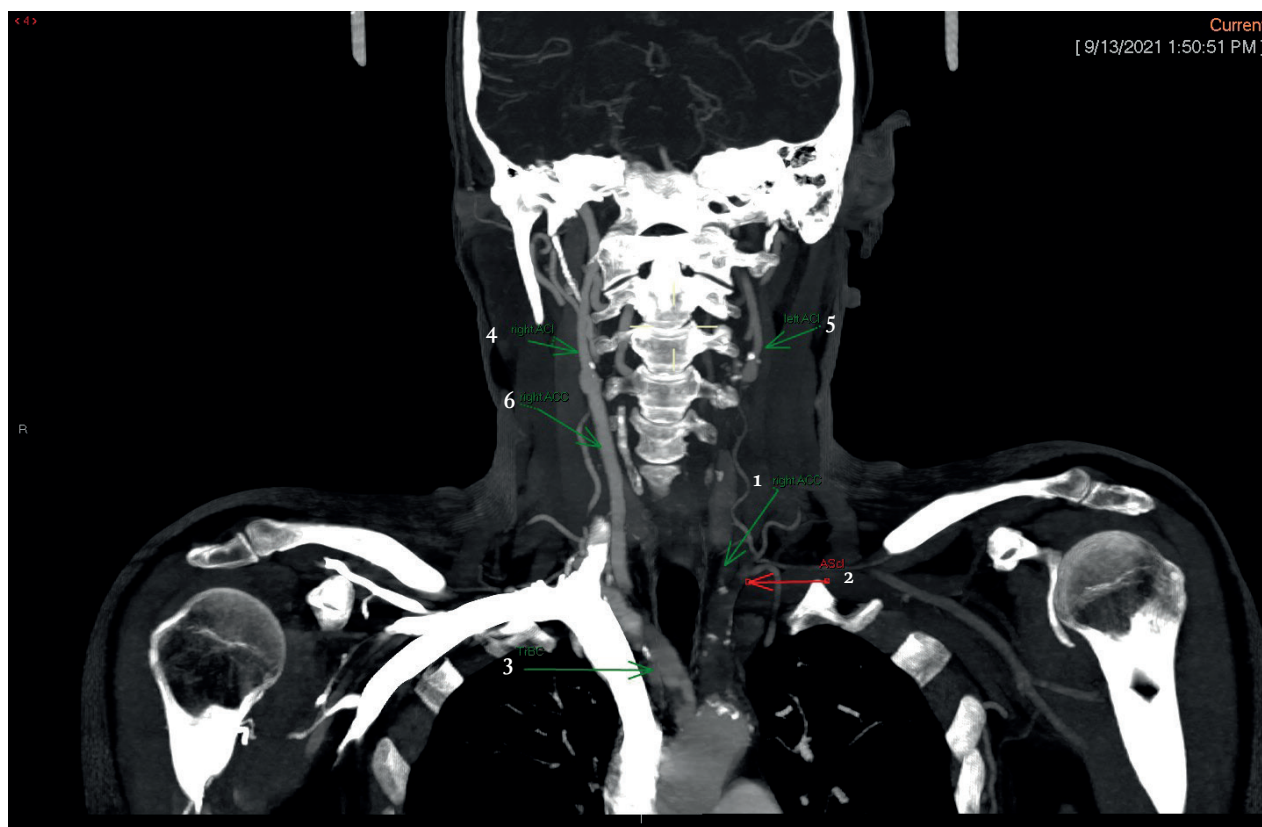


FIGURE 2. CT angiography revealed occlusions of the left common carotid artery (1) and left subclavian artery (2); moderate, non-significant, stenosis of the brachiocephalic trunk (3), right subclavian artery, right (4) and left internal carotid artery (5) at C1 and C4 segments and significant stenosis of external carotid arteries bilaterally. The right internal carotid artery was normal morphology, without stenosis (6).

exact incidence of coronary involvement in patients with TA is mostly reported to be low but varies in literature from affecting 9% to 70% of TA patients (2, 10). The coronary lesions are most frequently seen in the coronary ostia, up to 87.5% in some reports, or the proximal segments of the left and right coronary arteries, with stenosis being the most common lesion (11). This was also the case in our patient who had the narrowing of the ostial segment of the left anterior descending artery (LAD). Despite low incidence, these lesions are major risk factors for sudden cardiac arrhythmias and myocardial ischemia, as one of the major causes of death in TA, with mortality of up to 50% at 5 years (12, 13). According to Yuan and Lin, acute myocardial infarction was diagnosed in 12.1% of TA patients (14). Despite this, acute myocardial infarction is rarely the initial manifestation of the disease as stated in the case description. Ishiyama et al.

described a similar case of a young female patient who developed an acute left-main-trunk myocardial infarction, which was later complicated by cardiogenic shock, as it also happened in the case of our patient (10). Other authors report few cases of acute myocardial infarction in the course of the disease, which was previously well maintained and stable, without symptoms (14). It has been shown that CRP and ESR can be elevated in a disproportionate manner to coronary heart diseases, with an average of 58 mm ESR in some reports, and could indicate an underlying arterial inflammation (14, 15). However, without adequate control of the inflammatory process and accurate diagnosis, disease progression is imminent, as was the case in our patient who developed neurological manifestations in further course of hospitalization. It has been reported that up to 20% of patients with TA present neurological manifestations, with almost a

half experiencing visual disturbances due to vertebral artery involvement and around 80% exhibiting transient ischemic attacks or cerebrovascular incidents (16, 17). Embolism from inflamed areas, carotid aneurysms, intra and extracranial stenosis are proposed possible underlying mechanisms (4, 18, 19). Our patient who further exhibited one-sided limb weakness, dysphasia and hemianopsia, underwent a CT scan which showed an acute ischemic lesion high parietal on the right, as well as a chronic ischemic lesion the front right. Similar manifestations of the disease were described in a 50-year-old patient who presented with symptoms mimicking acute ischemic stroke (4). A multicenter case-controlled study included 17 patients with a diagnosis of TA, out of which only 8 patients presented with acute stroke after the diagnosis was made (16). Bearing all of this in mind, recognition of signs and symptoms, which are characteristic for the disease, is of uttermost importance. Specific diagnostic criteria for Takayasu's arteritis includes age, blood pressure discrepancies of 10mmHg between extremities, weakened pulse, claudication, and hypertension (20, 21). Biopsy is essential to receive a histological diagnosis, however, is difficult to obtain and usually is performed during surgical re-vascularization procedures (22). In acute phase, treatment consists of corticosteroids, prevention of thrombotic incidents with anticoagulants/anti-platelet agents and other anti-inflammatory agents. Corticosteroids are usually given in combination with methotrexate or cyclophosphamide, with promising results for the use of biologics, such as anti-tumor necrosis factor drugs and anti-interleukin 6 agents (3, 23). Since the diagnosis was only established in the later course of treatment in our patients, corticosteroids and cyclophosphamide pulses were introduced with a late onset but proved to be the right choice ultimately leading to complete resolution of symptoms. As was the case with our patient, urgent endovascular treatment including percutaneous transluminal angioplasty and stent implantation is feasible in cases of severe stenosis and large ischemic comorbidity (24). It is recommended to perform these procedures after hemodynamic stability is achieved, since endovascular procedures can damage the vascular wall and contribute to further inflammatory response (25, 26). If uncontrolled symptoms persist, surgical treat-

ment can be considered, but one should be alert for graft rejection and complications.

CONCLUSION

In this case report, we present an unusual course of Takayasu arteritis, presenting initially with acute myocardial infarction. This disease should be considered in female patients who present with chronic inflammation and acute coronary syndrome. This article emphasizes the importance of prompt, accurate diagnosis, and adequate intensive treatment, in order to reduce complications and improve survival.

REFERENCES

1. Salvo F. Takayasu arteritis in young women with acute ischemic heart disease: Time to shift from anecdote to clinical practice? *Int J Cardiol.* 2018;252:37–8.
2. Sun T, Zhang H, Ma W, Yang L, Jiang X, Wu H, et al. Coronary artery involvement in takayasu arteritis in 45 Chinese patients. *J Rheumatol.* 2013;40(4):493–7.
3. Eleftheriou D, Varnier G, Dolezalova P, McMahon AM, Al-Obaidi M, Brogan PA. Takayasu arteritis in childhood: retrospective experience from a tertiary referral centre in the United Kingdom. *Arthritis Res Ther.* 2015;17(1):36.
4. Sikaroodi H, Motamedi M, Kahnooji H, Gholamrezanezhad A, Yousefi N. Stroke as the first manifestation of Takayasu arteritis. *Acta Neurol Belg.* 2007;107(1):18–21.
5. Yokota K, Shimpo M, Iwata T, Hirose M, Ikemoto T, Ohya K, et al. A case of Takayasu arteritis with repeated coronary artery restenosis after drug-eluting stent implantation successfully treated with a combination of steroids. *Intern Med.* 2012;51(7):739–43.
6. Cavalli G, Tomelleri A, Di Napoli D, Baldissera E, Dagna L. Prevalence of Takayasu arteritis in young women with acute ischemic heart disease. *Int J Cardiol.* 2018;252:21–23.
7. Dogan S, Piskin O, Solmaz D, Akar S, Gulcu A, Yuksel F, et al. Markers of endothelial damage and repair in Takayasu arteritis: are they associated with disease activity? *Rheumatol Int.* 2014 Aug;34(8):1129–38.
8. Shibata N, Taniguchi T, Umemoto N, Shimizu K, Murohara T. Multimodality findings of coronary stenosis and aneurysm in Takayasu arteritis: a case report. *Coron Artery Dis.* 2019;30(7):551–552.
9. Hata A, Noda M, Moriwaki R, Numano F. Angiographic findings of Takayasu arteritis: new classification. *Int J Cardiol.* 1996;54 Suppl:S155–63.
10. Ishiyama Y, Eguchi K, Yokota K, Ikemoto T, Kario K.

- New-onset Takayasu's Arteritis as Acute Myocardial Infarction. *Intern Med.* 2018;57(10):1415-1420.
11. Soeiro Ade M, Almeida MC, Torres TA, Franken M, Lima FG, Ganem F, et al. Clinical characteristics and long-term outcome of patients with acute coronary syndromes and Takayasu arteritis. *Rev Port Cardiol.* 2013;32(4):297-302.
 12. Soto ME, Espinola-Zavaleta N, Ramirez-Quito O, Reyes PA. Echocardiographic follow-up of patients with Takayasu's arteritis: five-year survival. *Echocardiography.* 2006;23(5):353-60.
 13. Hlavaty L, Diaz F, Sung L. Takayasu Arteritis of the Coronary Arteries Presenting as Sudden Death in a White Teenager. *Am J Forensic Med Pathol.* 2015;36(3):221-3.
 14. Zhang T, Peng B, Tu X, Zhang S, Zhong S, Cao W. Acute myocardial infarction as the first manifestation of Takayasu arteritis: A case report. *Medicine (Baltimore).* 2019;98(15):e15143.
 15. Yuan SM, Lin HZ. Coronary artery involvements in Takayasu arteritis: systematic review of reports. *Gen Thorac Cardiovasc Surg.* 2020;68(9):883-904.
 16. Couture P, Chazal T, Rosso C, Haroche J, Léger A, Hervier B, et al. Cerebrovascular events in Takayasu arteritis: a multicenter case-controlled study. *J Neurol.* 2018;265(4):757-763.
 17. Monti L, Servillo R, Grazzini I, Khader L, Acampa M, Cerase A. Neuroimaging of Takayasu Arteritis in a Patient with Ulcerative Colitis. *J Stroke Cerebrovasc Dis.* 2017;26(7):e129-e132.
 18. Kumral E, Evyapan D, Aksu K, Keser G, Kabasakal Y, Balkir K. Microembolus detection in patients with Takayasu's arteritis. *Stroke.* 2002;33(3):712-6.
 19. de Paula LE, Alverne AR, Shinjo SK. Clinical and vascular features of Takayasu arteritis at the time of ischemic stroke. *Acta Reumatol Port.* 2013;38(4):248-51.
 20. Ozen S, Pistorio A, Iusan SM, Bakaloglu A, Herlin T, Brik R, et al. EULAR/PRINTO/PRES criteria for Henoch-Schönlein purpura, childhood polyarteritis nodosa, childhood Wegener granulomatosis and childhood Takayasu arteritis: Ankara 2008. Part II: Final classification criteria. *Ann Rheum Dis.* 2010;69(5):798-806.
 21. Guo J, Zhang G, Tang D, Zhang J. A case report of Takayasu arteritis with aortic dissection as initial presentation. *Medicine (Baltimore).* 2017;96(45):e8610.
 22. Yaqoob M, El-Sameed YA. 23-year-old female with dyspnea, hematuria, and seizure progressing to respiratory failure. *Sarcoidosis Vasc Diffuse Lung Dis.* 2013 Mar;30(1):78-81
 23. Yang S, Dong K, Zheng S. Abdominal pain as the presenting symptom of Takayasu arteritis in an adolescent male: A case report. *Medicine (Baltimore).* 2018 Jun;97(26):e11326.
 24. Wu X, Duan HY, Gu YQ, Chen B, Wang ZG, Zhang J. Surgical treatment of multivessel lesions in Takayasu's arteritis: report of a case. *Surg Today.* 2011;41(4):552-5.
 25. Hellmich B, Agueda A, Monti S, et al. 2018 Update of the EULAR recommendations for the management of large vessel vasculitis *Annals of the Rheumatic Diseases* 2020;79:19-30
 26. Diao YP, Liu CW, Song XJ, Chen YX, Guo LL, Lian LS, et al. Surgical treatment of multivessel lesions in Takayasu arteritis. *Chin Med J (Engl).* 2013;126(24):4804-5.