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TAKAYASU ARTERITIS: ANGIOGRAPHIC FINDINGS & RESULTS OF ANGIOPLASTY

Cardiology

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ABSTRACT

BACKGROUND: Takayasu arteritis (TA) is a rare, chronic, idiopathic, large vessel panarteritis majorly affecting young females in second or third decade of their life. The disease is not biased to any particular ethnicity and prevalence varies as per geological whereabouts. The aim of the present study is to investigate angiographic findings and results of angioplasty in patients suffering from TA.

METHODS: The present study was a single centre, prospective, observational study conducted between October 2012 and March 2015. A total of 25 patients who suffered from TA were included in this study. The patients were considered to be suffering from TA as per the American College of Rheumatology 1990 criteria. The patients underwent systemic examination including angiography and angioplasty and followed up for 6 months.

RESULTS: Patients included in this study had mean age of 26.52 ± 9.47 years and age ranged from 11-40 years. Majority (80%) of patients were females. The most common (80%) presenting feature was hypertension. There were no incidences of major complications like stroke, dissection needing surgical intervention or major bleeding. Of the 24 attempted lesions, angioplasty was successful in 83.33%.

CONCLUSION: TA is a rare disease and should be approached with caution. Medical management should be commenced initially and if not treated with medical management alone, angioplasty and stenting should be considered before surgical intervention.

KEYWORDS

ANGIOGRAPHY; BARE METAL STENTS; TAKAYASU ARTERITIS; PROSPECTIVE

INTRODUCTION

Takayasu arteritis (TA) is a rare, chronic, idiopathic, large vessel panarteritis and was first reported by Mikito Takayasu of Japan in 1908; also known as pulseless disease, occlusive thrombo-aortopathy, young female arteritis or Martorell syndrome. The exact aetiology of TA is unknown but literatures(1, 2) have indicated involvement of human leucocyte antigens portraying significant genetic susceptibility for the immune mediated activity. TA is characterized by granulomatous inflammation in media and adventitia of major arteries. The disease predilection is seen towards young females, usually occurs in second or third decade of their life. However, majority of cases associated with TA are seen in Asian countries like Japan, India, Southeast Asia(1, 3, 4), the disease is not biased to any particular ethnicity and prevalence varies as per geological whereabouts. Diagnosis of TA is quite difficult in its early phase as there is no standard test that can accurately diagnose the disease. The early phase of TA is overshadowed by numerous non-specific symptoms, these involve headache, fever, malaise, night sweats, rashes, anorexia, weight loss, and arthralgia and in some patients marked elevation of erythrocyte sedimentation rate (ESR) was also observed. TA can be suspected from physical examination, laboratory and imaging findings. Several authors have proposed various diagnostic models to detect TA(5-7). Of these, the criteria provided by American College of Rheumatology (ACR)(7) have 90.5% sensitivity and 97.8% specificity. Based on ACR criteria of TA, this study aims to investigate angiographic findings and results of angioplasty in patients suffering from TA.

METHODS

Study design and patient population

The present study was a single centre, prospective, observational study conducted between October 2012 and March 2015 at a hospital located in India. The patients were screened with colour Doppler studies, followed by CT angiography to assess the target lesions. Then invasive angiography was performed on target lesions. A total of 25 patients were included in this study. Basic demographic details like age, gender, family history, socioeconomic status, presenting complains and other vital data of all patients were recorded. After that, all the patients underwent systemic examination which included auscultation, complete blood picture, renal function test, C reactive protein levels, chest X-ray, computed tomography or magnetic resonance angiography, coronary angiography, peripheral angiography, aortogram, 4-vessel angiography.

Inclusion/ Exclusion criteria

Patient was considered to be suffering from TA if at least 3 of the following 6 criteria were fulfilled as per revised ACR 1990 criteria(7) for classification of TA: 1) age ≤40 years at onset of disease, 2) claudication of the extremities, 3) decreased pulse in branchial artery, 4) difference in systolic blood pressure >10 mmHg between the arms, 5) angiographic evidence of narrowing or occlusion of entire aorta, and 6) bruit over the subclavian arteries or aorta. Angiographic classification criteria were used to define types of TA(8), where: type I, main branches from the aortic arch are affected; type IIa, along with aortic arch and its branches ascending aorta is also involved; type IIb, ascending aorta, aortic arch and its branches, and thoracic descending aorta is involved; type III, thoracic descending artery, abdominal aorta and renal arteries are affected; type IV, abdominal aorta and/or renal arteries are involved; type V, combination of type IIb and type IV. Patients with severe comorbidities relating to non-cardiac causes needing emergency management like stroke, renal failure requiring hemodialysis, etc. or not willing for inclusion in the study were excluded.

Revascularisation and adjunctive treatment

The patients were treated with bare metal stents and followed up for 12 months. All the patients received standard treatment procedure prior to stenting; 325 mg of aspirin and 300 mg clopidogrel. During the procedure heparin was administered as anticoagulation treatment. The glycoprotein IIb/IIIa inhibitor was not used. After the indexed procedure, dual antiplatelet (150 mg aspirin and 75 mg clopidogrel daily) therapy was recommended for at least one month. Further treatment was individualised according to patients risk profile and disease severity.

Statistical data

Continuous variables are presented as mean ± standard deviation (SD) and categorical variables as counts and percentages. All the data were analysed using the Statistical Package for Social Sciences Software

(Version 15.0, SPSS; Chicago, IL, USA).

RESULTS

Basic demography

A total of 25 patients included in this study had mean age of 26.52 ± 9.47 years and age ranged from 11-40 years. Six (24%) patients in this study were <20 years of age at presentation. The disease predilection was seen towards females, as 80% of the total population in present study were females. The most common presentation was hypertension (blood pressure > 140/90 mmHg) affecting 20 (80%) patients and 1 (4%) patient suffered from malignant hypertension with seizures. Hypertension was controlled with drugs and interventional management; all the patients except one recovered from hypertension and heart failure during the course of disease.

Discrepancy of pulses was present in 21 (84%) patients, of which 15 (60%) patients had discrepancy of pulses in upper limb. One (4%) patient presented with stroke as initial presentation. Left ventricular ejection fraction (LVEF, <50%) was present in 8 (32%) patients, of these 8 patients 7 had moderate LVEF (<40%) and 1 had mild LVEF. Erythrocyte sedimentation rate (ESR) >20 mm/hr was present in 20 (80%) patients. One patient had pulmonary tuberculosis and was recovered with anti-tubercular therapy. Another patient had cerebral vasculitis and responded to medical treatment.

Angioplasty

Angiographic stenosis of >50% for aorta and >70% for peripheral arteries was considered significant with a peak pressure gradient of more than 30 mmHg across lesions. The results from angiographic findings are shown in Table 1. Patients were classified as per the angiographic classification of TA and the findings are depicted in Table 2. The most common reason for percutaneous intervention was involvement of renal artery. Percutaneous transluminal renal angioplasty (PTRA) was performed in patients who had either resistant hypertension or congestive heart failure or elevated renal parameters. PTRA was attempted in 12 patients and the procedure was successfully carried out in 9 patients and failed in 3 patients (all total occlusion). Renal artery stenting improved hypertension over the period of next 1 year but did not improve thereafter.

Aortoplasty and stenting was performed in 6 patients and all of them had significant reduction in stenosis. One of the six patients had residual stenosis of 40% and acceptable gradient across the stenosis. None of our patients had signifinant (defined as >70% stenosis) coronary artery involvement. None of the patient had any procedure related complications and none of them had recurrence of symptoms at 6 months follow up. Carotid artery was not stented in any patient as the conditions were inappropriate for intervention. Total occlusions in long segment with adequate collaterals were not attempted for intervention unless significant symptoms were present.

A total of 16 patients with 24 lesions were attempted for angioplasty, of which 20 were successful. Success was defined as residual stenosis less than 20% and peak pressure gradient of less than 10mmHg. Two cases were abandoned because of occurrence of minimal dissection due to guidewire manipulation and other 2 were due to failure to cross the lesion. All these procedural failures occurred in totally occluded arteries. In one case bifurcation stenting was done for left subclavian and vertebral artery stenosis. There were no incidences of major complications like stroke, dissection needing surgical intervention or major bleeding. Minor dissections occurred in two patients (1 during renal angioplasty and 1 during subclavian angioplasty) and were managed conservatively.

During follow up, one case of death was reported in a patient with dilated cardiomyopathy. He had lesions at multiple sites and comorbidities and was managed conservatively. Another patient who underwent angioplasty and stenting to right subclavian artery had total occlusion later during follow up, and re-intervention failed to open the occluded artery; the patient was managed conservatively and continued to do well with features of critical limb ischemia. In two patients there was progression of mild stenosis of vessels to significant stenosis.

DISCUSSION

Annual prevalence rate of TA is 0.4-2.6 cases/million/year in various countries(9, 10). The primary goal in treatment of TA is to mitigate inflammation of the arteries and reduce complications(11). The disease is considered rare and lack of any "gold standard" imaging modality makes it difficult to diagnose in the quiescent phase. Even with early diagnosis, the disease is difficult to manage(11). Immunosuppressive and corticosteroids are used as first-line treatment. Patients that have major complications and do not respond to medical therapy, revascularisation therapy can be considered. Bypass graft surgery has disadvantages like graft stenosis, morbidity and aneurysms. Hence, percutaneous transluminal angioplasty and stenting were commenced. In present study, stents were implanted in all the patients who underwent successful angioplasty. Angiographic findings of 25 patients who were diagnosed with TA are presented in the present study. The most common cardiovascular risk factor was hypertension in the presenting study affecting 80% of the population. A cohort study of TA in US(12) showed contrary results where only 28% had hypertension as clinical feature and the most common presenting feature in Indian population was vascular bruits (68%) followed by hypertension (52%).

The mean age of presentation was 26.52 ± 9.47 years. The youngest patient was 11 years old, patients younger than that were managed at a different facility and were not included in this study. The majority (80%) of the study population was females and the gender quotient observed was 4:1. A nationwide study(13) from Japan showed similar gender quotient (83.8% females) but the median onset of age showed disease arose in third decade of life. A multicentre study from France(14) also showed 79.7% female population and mean age 39 years.

History of tuberculosis or streptococcal infection was incorporated in the Fiessinger criteria(5) and is considered an influential aetiological element for diagnosis of TA. A study of TA done on Indian population also identified tuberculosis as the commonest comorbidity(15). In present study, two patients were diagnosed with tuberculosis and both of them were <20 years of age.

Majority of patients (40%) were suffering from type-V TA followed by type-I (20%) and type-IIb (20%) in the present study. Similarly, a Mexican study(16) showed that 69% patients suffered from type-V followed by 19% with type-I, whilst a study conducted in China(17) reported showed more patients suffered from type-I (29.3%) followed by type-V (25.8%) TA. In present study, success rate was 83.33% for angioplasty and stenting (20 successful out of 24 attempted).

CONCLUSION

TA is a rare disease and should be approached with caution. Medical management should be commenced initially and if not treated with medical management alone, angioplasty and stenting should be considered before surgical intervention. Stenting can be used as a valuable alternative in suitable lesions, as stenting provide high procedural success rate and low complications rates compared to surgery. Patency rates were acceptable in the present study as only one patient was reported with restenosis.

Table 1: Arterial involvement in Takayasu arteritis

Site	Number of patients	Number of stenosis
Carotid artery	10 (40%)	14
Left carotid		9
Right carotid		4
External carotid artery		1
Verterbral artery	4 (10%)	4
Left		3
Right		1
Subclavian artery	15 (60%)	20
Left		14
Right		6
Renal artery	12 (48%)	16
Left		8
Right		8
Others	7 (28%)	7
Right bronchio-cephalic artery	1 (4%)	1
Right anterior cerebral artery	1 (4%)	1
Coelic axis	2 (8%)	2
Superior masentric artery	1 (4%)	1
Right common iliac artery	1 (4%)	1
Femoral artery	1 (4%)	1

Table 2: Angiographic classification of takayasu arteritis

Classification type	Number of patients
Type 1	5 (20%)
Type 2a	0 (0%)
Type 2b	5 (20%)
Type 3	2 (8%)
Type 4	3 (12%)
Type 5 (combined type 2b & 4)	10 (40%)

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