CURRENT STATUS OF HYPERTENSION IN TAKAYASU’S ARTERITIS

Manotosh Panja, Saroj Mondal, Madhumanti Panja, Dilip Kumar, *Kolkata*

INTRODUCTION AND HISTORY

Nonspecific-aortoarteritis or Takayasu’s disease is a rare idiopathic chronic, granulomatous, inflammatory disease of large elastic artery occurring in the young and resulting in typically presenting before the age of 40 years occlusive or ectatic changes mainly in the aorta and its immediate branches as well as pulmonary artery and its branches. It was in 1761, that Morgangi.1 Reported a case of a 40yrs old female with 6yrs absent pulse who subsequently died of pulmonary oedema which can be thought to be the first reported case of TA. In 1908 Takayasu,2 a Japanese ophthalmologist presented a case of a 21yrs old female with disturbed ocular circulation with peculiar changes in central retinal vessels. With Ouish, Takayasu associated the changes to a disease of the major arteries and reported similar other cases of ocular involvement in patients with absent radial pulse. In India Shikhare3 published the first case report in 1921. In 1962 Sen et al4 reported 4 cases with narrowing of the aorta at unusual sites. The following year he published a clinico-pathological study of 60 cases and coined the term “middle aorta syndrome’. It is predominantly a disease of young females in their second and third decades. Though most study reports on this disease comes from Japan and India it is by no means a geographically restricted disease. Reports of the disease have come from almost all part of the world and no race seems to be immune.

DISEASE CLASSIFICATION

The disease is classified in to different types according to site of involvement of the aorta and its branches

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type –I</td>
<td>Aortic arch and branches</td>
<td>Schimizu Sano</td>
</tr>
<tr>
<td>Type-II</td>
<td>Thoraco-abdominal involvement</td>
<td>Kimoto</td>
</tr>
<tr>
<td>Type-III</td>
<td>Mixed</td>
<td>Ueno et al5</td>
</tr>
<tr>
<td>Type-IV</td>
<td>Associated Pulmonary involvement</td>
<td>Lupi Herrera et al6</td>
</tr>
<tr>
<td>Type-V</td>
<td>Associated Coronary art involvement</td>
<td>Panja et al7</td>
</tr>
</tbody>
</table>

HYPERTENSION IN TAKAYASU

Hypertension is one of the most common clinical manifestations in Takayasu disease. It is seen in 72% of cases. Other major manifestations are absent pulses (96%), bruits (94%) and heart failure (28%). The cause of hypertension in Takayasu is multifactorial, these are related to changes of vascular compliance, renal vascular ischemia with hyperreninenmia or increased sensitivity to carotid body.

Causes are:
1. Renal artery stenosis
2. Atypical coarctation
3. Reduced aortic compliance
4. Baroreceptor sensitivity
Renal artery stenosis is the main cause of hypertension in Takayasu (Fig. 1). Renin angiotensin and aldosterone system is the centre of pathophysiology. The critical role of the circulating RAS in the regulation of arterial pressure and sodium homeostasis has been recognized for many years. Angiotensin II is the most powerful biologically active product of the RAS, although there are other bioactive peptides which includes Angiotensin III, Angiotensin IV. Angiotensin II directly constricts vascular smooth muscle cells, enhances myocardial contractility, stimulates aldosterone production, stimulates release of catecholamines from the adrenal medulla and sympathetic nerve endings, increases sympathetic nervous system activity, and stimulates thirst and salt appetite. Angiotensin II also regulates sodium transport by epithelial cells in intestine and kidney.

Other systems, including the release of endothelium derived endothelin, appear to be activated during the development of renovascular hypertension. Increased activity of the sympathetic nervous system is commonly observed, potentially mediated by disturbed afferent signals from the underperfused kidney and/or augmentation of nerve stimuli in the presence of angiotensin II. Aldosterone levels appear to be higher in patients with renovascular hypertension during the long term. This hormone is now recognized to participate in regulation of tissue fibrosis and left ventricular hypertrophy, in addition to its effects on sodium retention.

As a result of obstruction in aorta below the arch there is high blood pressure in supraaortic vessels. The condition is also called as atypical coarctation.

Due to the panaortic nature of the disease there is decrease in the compliance of aorta which also contributes to the genesis of hypertension.

MANAGEMENT OF HYPERTENSION

Hypertension management requires medical management in the form of calcium channel blockers, beta blockers and other antihypertensive agents. Relief of mechanical obstruction of renal artery and aorta by percutaneous intervention or surgery has shown good results in properly selected cases.

Surgery or PTA for Renal Artery Stenosis

Steno obstructive lesion of renal artery is seen in 34% to 85%of patients. In majority of cases there is localised or diffuse involvement of the ostia and proximal segment of the renal arteries. The results of PTRA in aortoarteritis reported in literature are comparable to those in atherosclerosis and fibromuscular dysplasia. Cutting balloon angioplasty has been find even better due to the toughness of the lesion and has been considered as approach of choice while dealing with renal vessels in takayasu patients. Obstructive dissection and unsatisfactory response to PTRA can safely be treated by stent implantation with excellent angiographic results. Successful angioplasty leads to improvement in hypertension in 80 to 90% of cases. Kieffer et al\textsuperscript{9} reported a satisfactory early and long-term outcome in 24 patients. Renal artery revascularization
was unilateral in 46% and bilateral in 54%. During follow-up for 61.3 months, repeated renal artery revascularization was required in only 4 patients. Hypertension was cured in 63%, improved in 31%, and unchanged in 6%. Sharma et al\textsuperscript{10} published the midterm results of PTA for renovascular hypertension in 66 patients. The indications included uncontrollable hypertension, evidence of >70% stenosis of the renal arteries with a peak systolic gradient of >20 mm Hg, and clinically inactive disease. Technical success was obtained in 91 stenotic lesions in 62 patients. Clinical success was seen in 89%. The stenosis decreased, systolic pressure gradient decreased, blood pressure improved, and drug requirement decreased.

**BALLOON ANGIOPLASTY OF AORTA**

Intermediate and long term follow up results of dilatation of lesions of aorta by balloon angioplasty are excellent (Fig. 2). The procedure is highly effective for discrete stenotic lesion and much less effective for long segment, ectatic, or calcified lesions. Restenosis is also seen more often in longer lesions and in children

Tyagi et al\textsuperscript{11} reported series of 36 patients with favourable initial and midterm outcome, especially in dilating discrete-type aortic stenoses. Persistent relief was observed during the follow-up of 43 months, except for 1 case (2.7%) of restenosis. In contrast to PTA for congenital coarctation of the aorta, no aneurysm developed even after forced balloon dilatation. However, because the stenosis is rigid and noncompliant in TA, higher balloon inflation pressure is required to stretch and split the thick and more rigid fibrous tissue compared with atherosclerotic aortic stenosis. Restenosis develop in 15 to 20% of the cases. To prevent marked restenosis, stenting is currently added, especially for long-segment lesions, or incomplete dilatation of stenosis and dissection after PTA. In a cohort study involving 75 patients, a discouragingly high occurrence (78%) of restenosis, even after initially successful PTA, was reported. Consequently, at present, it appears reasonable to attempt less invasive PTA with stenting for stenotic/occlusive lesions of the aorta.

Chug et al reported in a study of Renovascular Hypertension due to Takayasu arteritis among Indian patients where they studied 205 patients over a period of 16 years and found among patients with renovascular Hypertension 61% had Takayasu’s arteritis. Surgical intervention consisting of bypass procedure, autotransplantation or nephrectomy was performed in 13.6% patients and angioplasty 7.2% patients. Improvement of blood pressure in 82.4% and 78.8% respectively. Adequate control of blood pressure with drug only was 22.2% patients.

**Surgery for Atypical Coarctation:**

The acceptable long-term survival rate after surgery was described in a series of 33 patients followed up from 1960 to 2004.\textsuperscript{12} In 29 patients with aortic coarctation proximal to the origin of the renal arteries and hypertension in the upper half of the body, aortoaoctic bypass with the use of a 10- to 16-mm prosthetic graft was the most commonly performed procedure. The outcome was favorable, with 4 hospital deaths (12.1%) only in the early period before 1968. However, hypertension was not relieved in 55.6% of the 27 survivors. Long-term complications after surgery included anastomotic false aneurysms, congestive heart failure, cerebrovascular accident, graft deterioration, abdominal aortic aneurysms, and renal failure at any time after surgery. The survival and event-free survival rates at 20 years were 62.3% and 58.4%, respectively. In this series, the presence of postoperative residual hypertension likely influenced the event-free and survival rates.
Anastomotic False Aneurysm

After surgery for TA, anastomotic false aneurysms (anastomotic detachment) occur anytime in the long term, although the incidence seems to be low even in the active phase of TA compared with surgeries on aorta in other diseases. In the largest series from Japan\textsuperscript{13}, the incidence of anastomotic false aneurysm was 8.5% However, of the 22 aneurysms, 18 occurred in early cases in which silk threads were used. In recent cases in which synthetic suture material was employed, only 1.8% of the patients at 10 years and 3.5% at 20 years developed anastomotic false aneurysms. These low incidences were comparable to those observed after more common surgeries for atherosclerotic lesions. The incidence of anastomotic false aneurysm seems to be unrelated to systemic inflammatory reactions. In regard to anastomotic stenosis related to intimal hyperplasia, the incidence was also reasonable. Ando et al summarized the characteristics of surgery for TA as follows: abrasion around the aorta or artery is difficult because of dense adhesion to the surrounding tissue, which makes extraanatomic bypass frequent. Anastomotic false aneurysms forming because of suture insufficiency are the most serious complications. To prevent this complication, reinforcement of sutures with the use of a Teflon felt strip is recommended. In addition, if possible, sites of normal tissue without inflammatory changes should be chosen as anastomotic sites.

CONCLUSION

Hypertension is the most common manifestation of Takayasu disease; its management requires choosing the options from medical to surgical/percutaneous interventions on an individual basis. Judicious use of therapeutic options often leads to satisfactory outcome.

REFERENCES