**Supplementary Materials**

**Supplementary Tables**

**Supplementary Table S1. The Takayasu arteritis severity scale in Zhongshan Hospital Fudan University.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Items** | **Severe** | **Moderate** | **Mild** |
| **Blood pressure** | Upper limbs:  SBP≥180mmHg OR DBP ≥110mmHg | Upper limbs:  SBP:160-180mmHg OR DBP:100-110mmHg | Upper limbs:  SBP: 140-160mmHg OR DBP:90-100mmHg |
| Upper limbs: undetectable  Lower limbs:  SBP≥200mmH OR DBP≥110mmHg | Upper limbs: undetectable  Lower limbs:  SBP: 180-200mmHg OR DBP: 100-110mmHg | Upper limbs: undetectable  Lower limbs:  SBP: 140-180mmHg  OR DBP: 90-100mmHg |
| Severe hypertension induced hypertensive encephalopathy, heart failure、renal dysfunction | Hypertension induced left ventricular hypertrophy, heart disease |
| **Aortic arc and the branches** | Serious stenosis (narrow rate ≥ 70%) in multiple branches (more than 2) | Serious stenosis (narrow rate ≥ 70%) in 1 ~ 2 branches | Single branch involved, and mild stenosis (narrow rate<50%), not complicated with any nervous ischemic symptoms and signs in daily activities\* |
| Stenosis (narrow rate ≥50%), complicated with the nervous ischemic symptoms and signs. \* | 1 ~ 2 branches involved (narrow rate: 50% ~ 70%) |
| Stenosis (narrow rate ≥50%), complicated with cerebrovascular events. # | Conformed with the above two principles, complicated with dizziness when working but could alleviate in rest |
| **Carotid arteries and the branches involved** | Serious stenosis (narrow rate ≥ 70%) in multiple branches (more than 2) | Unliteral or bilateral vascular stenosis (narrow rate: 50%~70%), with or without dizziness in the presence of mild labor | Single branch involved, and mild stenosis (narrow rate<50%), not complicated with any nervous ischemic symptoms and signs in daily activities\* |
| Stenosis (narrow rate ≥50%), complicated with the nervous ischemic symptoms and signs. \* |
| Stenosis (narrow rate ≥50%), complicated with cerebrovascular events. † |
| **Pulmonary artery involved** | Chest tightness, hemoptysis, dyspnea, pulmonary thrombosis (CTA or Radionuclide lung imaging), respiratory failure (type I) | Pulmonary artery lesion (CTA or Radionuclide lung imaging), with chest tightness after working | Pulmonary arterial hypertension mildly or normal by UCG |
| Chest tightness, dyspnea, severe pulmonary hypertension (UCG) with abnormal heart function (NYH class III, IV). | Moderate pulmonary hypertension (UCG) with abnormal heart function (NYH class I, II). | Inflammation in pulmonary artery, pulmonary artery stenosis or occlusion in image examination. |
| The above signs without chest toughness, dyspnea and hemoptysis. Heart function is NYHA class I, and Normal blood gas tests. |
| **Coronary artery involved** | unstable angina pectoris, or cardiac infarction. | Chest tightness and pain after moderate level of labor, the coronary narrow rate was over 50% by CTA. Heart function is NYH I to II. | Without chest tightness, pain and dyspnea after labor; the narrow rate was less than 50% by CTA. Heart function is NYH I. |
| Ischemic cardiomyopathy by UCG, Heart function better than NYH III. |
| **The aortic valve and root involved** | Severe aortic regurgitation | Moderate aortic regurgitation | Mild aortic regurgitation |
| Aortic valve leakage, aortic annulus avulsion | Aneurysm in the aortic root and / or ascending aortic (the diameter < twice of the normal condition) | Aneurysm in the aortic root and / or ascending aortic (the diameter < 1.5 times of the normal condition) |
| Aneurysm in the aortic root and / or ascending aortic (the diameter > twice of the normal condition) |
| Dilation in the aortic root and / or ascending aorta (≥5cm in diameter) | Dilation in the aortic root and / or ascending aorta (<5cm in diameter) |
| Dissection in the aortic root and / or ascending aorta |
| Any above-mentioned items with abnormal Heart Function NYHA III or IV | Any above-mentioned items with abnormal Heart Function NYHA I or II | Any above-mentioned items with abnormal Heart Function NYHA I |
| **Renal artery involved** | Severe renal artery stenosis, secondary malignant hypertension | Renal artery narrow rate ≥50% with the hypertension of 160-180mmHg (SBP), with left ventricular myocardial hypertrophy, hypertension and heart disease, CKD Ⅱ | Renal artery narrow rate <50%, with /without mild hypertension; or normal serum creatinine, with normal or slightly impaired glomerular filtration rate (GFR) |
| Severe renal artery stenosis, accompanied with increasing serum creatinine or decreasing glomerular filtration rate (GFR) of ≥25%, CKD III |
| **Thoracic and abdominal artery involved** | Hypertension (class III) induced encephalopathy or deteriorated renal function | Hypertension (class II) induced CKD (phase II). | Hypertension (class I) |
| Changes in left ventricular structure and function (by UCG), NYHA cardiac function III or IV. | Cardiac ultrasonography indicates left ventricular myocardial hypertrophy (by UCG), Heart function (NYHA class II) | Without heart, kidney, or brain involvement |
| **Mesenteric artery involved** | Mesenteric artery lesioned, with intestinal obstruction, bleeding, necrosis | Acute ischemic symptoms such as abdominal pain and bloody stool | Without abdominal pain; normal bowel movements |
| Septic shock with fever and hypovolemia | without symptoms of chronic obstruction such as defecation, bowel sound reduction or disappearance |
| Imaging examination indicates serious complications such as intestinal perforation, peritonitis | Imaging examination suggests intestinal obstruction, intestinal edema, mesenteric artery thrombosis, etc. |
| **Iliac artery involved** | Severe ischemic symptoms in lower limbs such as pain and gangrene | Ischemic manifestations such as claudication in the lower limbs | Without limb claudication, pain and other ischemic manifestations. |
| **Aneurysm or arterial dissection** | The new aneurysm anywhere, or an aneurysm with a dimeter more than twice size of the normal | an aneurysm with a dimeter less than twice size of the normal | The diameter of the aneurysm does not change |
| Arterial dissection anywhere | Aneurysm with hypertension <140 / 90mmHg | Aneurysm with hypertension < 130/80mmHg |
| Aneurysms or dissections with uncontrolled hypertension |
| **Refractory conditions** | 1) Glucocorticoids, conventional chemical synthetic immunosuppressive agents are not useful in treatment;  2) AND the disease progresses, with the heart, kidney, and brain organs seriously damaged. |  |  |

**Notes.**

a. Abbreviation: CKD, chronic kidney disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; NYH, New York heart function classification; GFR, glomerular filtration rate.

b. \* Nervous system ischemic symptoms and / or signs: including darkening, convulsions, syncope, TIA attacks, impaired vision, blindness, defective visual field, mood changes, abnormal positioning, lateral limbs and / or sensory disorders, etc.

c. † Cerebrovascular events: transient cerebral ischemic attack, acute cerebral infarction, acute cerebral hemorrhage, etc.

**Supplementary Table S2**. The lesioned arteries of AVD and the AVD subtypes during follow-up.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Locations** | **Cases,**  **n (%)**  **(n=69)** | **AVD** | | | |
| **Stenosis,**  **n (%)** | **Dilation,**  **n (%)** | **Thickening,**  **n (%)** | **New lesions,**  **n (%)** |
| Left subclavian artery | 27(39.1) | 26(96.3) |  |  | 1(3.7) |
| Right subclavian artery | 31(44.9) | 30(96.8) |  |  | 1(3.2) |
| Left vertebral artery | 5(7.2) | 5(100) |  |  |  |
| Right vertebral artery | 3(4.3) | 3(100) |  |  |  |
| Left carotid artery | 9(13.0) | 9(100) |  |  |  |
| Right carotid artery | 3(4.3) | 3(100) |  |  |  |
| Left kidney artery | 2(2.9) | 2(100) |  |  |  |
| Right kidney artery | 5(7.2) | 5(100) |  |  |  |
| Left iliac artery | 4(5.8) | 4(100) |  |  |  |
| Right iliac artery | 6(8.7) | 5(83.3) | 1(16.7) |  |  |
| Femoral artery | 3(4.3) | 2(66.7) |  |  | 1(33.3) |
| Ascending aorta | 1(1.4) |  | 1(100) |  |  |
| Aortic arc | 1(1.4) |  |  | 1(100) |  |
| Thoracic aorta | 3(4.3) | 1(33.3) | 1(33.3) | 1(33.3) |  |
| Abdominal aorta | 4(5.8) | 4(100) |  |  |  |

**Notes**.

a. Abbreviation: AVD, aggravated vascular damage.

b. The evaluation of carotid arteries includes their branches.

**Supplementary Table S3**. The intervention strategy of patients before the baseline and during follow-up.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total**  **(n=235)** | **Without AVD**  **(n=166)** | **With AVD**  **(n=69)** | ***P* value** |
| **Previous Intervention Strategy** | | | | |
| Prednisone, n (%) | 20(8.6) | 10(6.1) | 10(14.5) | 0.037\* |
| Cyclophosphamide | 8(3.4) | 5(3.0) | 3(4.3) | 0.696 |
| Methotrexate | 5(2.1) | 3(1.8) | 2(6.9) | 0.625 |
| Azathioprine | 4(1.7) | 3(1.8) | 1(1.4) | 1.000 |
| Leflunomide | 4(1.7) | 1(0.6) | 3(4.3) | 0.077 |
| Mycophenolate Mofetil | 2(0.9) | 1(0.6) | 1(1.4) | 0.502 |
| TNF-α antibody | 1(0.4) | 0(0) | 1(1.4) | 0.294 |
| **Present Intervention strategy** | | | | |
| Initial prednisone dose, mg/d | 30.0(15.0-40.0) | 30.0(15.0-40.0) | 40.0(15.0-40.0) | 0.872 |
| Prednisone dose at 6 months, mg/d | 15.0(10.0-15.0) | 15.0(10.0-15.0) | 13.8(10.0-15.0) | 0.456 |
| Leflunomide, n (%) | 104(47.5) | 77(50.0) | 27(41.5) | 0.252 |
| Cyclophosphamide, n (%) | 65(30.0) | 45(29.4) | 20(31.3) | 0.787 |
| Methotrexate, n (%) | 26(13.2) | 16(11.6) | 10(16.9) | 0.309 |
| Leflunomide, n (%) | 104(47.5) | 77(50.0) | 27(41.5) | 0.252 |
| Azathioprine, n (%) | 29(13.2) | 23(14.9) | 6(9.2) | 0.255 |
| Mycophenolate Mofetil, n (%) | 25(11.4) | 13(8.4) | 12(18.5) | 0.033\* |
| IL-6R antibody | 23(9.8) | 11(7.1) | 12(18.5) | 0.013\* |
| TNF-α antibody | 8(3.4) | 3(1.8) | 5(7.2) | 0.050 |
| **Accumulated types of immunosuppressants** | |  |  |  |
| 0 | 34(14.5) | 23(14.9) | 11(16.9) |  |
| 1 | 114(48.5) | 83(53.9) | 31(47.7) |  |
| 2 | 43(18.3) | 29(18.8) | 14(21.5) |  |
| 3 | 19(8.1) | 13(8.4) | 6(9.2) |  |
| 4 | 9(3.8) | 6(3.9) | 3(4.6) | 0.949 |

**Notes**.

a. \**P*-value < 0.05 was considered to indicate statistical significance.

b. Abbreviations: AVD, aggravated vascular damage.

**Supplementary Table S4.** The comparison of characteristics between the derivation and validation cohorts.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Derivation cohort**  **(n= 235)** | **Validation cohort**  **One (n= 65)** **†** | ***P* value** |
| **General Data** |  |  |  |
| Age, years | 31.0(23.0 – 43.0) | 29.0(23.0 – 39.0) | 0.450 |
| Female, n (%) | 192(81.7) | 59(90.8) | 0.080 |
| Disease course, months | 13.0(3.0 – 53.0) | 15.0(5.0 – 52.0) | 0.615 |
| Follow-up period, months | 13.0(7.0 – 29.0) | 8.0(6.0 – 22.5) | 0.013\* |
| **Imaging Type** |  |  |  |
| I | 58(24.7) | 13(20.0) |  |
| IIa | 15(6.4) | 3(4.6) |  |
| IIb | 23(9.8) | 8(12.3) |  |
| III | 8(3.4) | 4(6.2) |  |
| IV | 22(9.4) | 9(13.8) |  |
| V | 109(46.4) | 28(43.1) | 0.681 |
| **Symptoms and Signs** |  |  |  |
| Fever, n (%) | 23(10.0) | 4(6.6) | 0.619 |
| Fatigue, n (%) | 64(27.7) | 15(24.6) | 0.746 |
| Neck pain, n (%) | 12(5.3) | 6(10.3) | 0.222 |
| Abdominal pain, n (%) | 6(2.7) | 1(1.7) | 1.000 |
| Claudication, n (%) | 10(4.3) | 2(3.3) | 1.000 |
| Pulselessness, n (%) | 80(34.6) | 20(33.3) | 0.880 |
| Vascular bruit, n (%) | 78(33.8) | 20(33.3) | 1.000 |
| **Disease Severity** |  |  |  |
| Mild | 44(18.8) | 15(23.1) |  |
| Moderate | 76(32.5) | 18(27.7) |  |
| Severe | 114(48.7) | 32(49.7) | 0.656 |
| **Disease** **remission at 6 months, n (%)** | 161(81.7) | 49(79.0) | 0.710 |
| **Laboratory results** |  |  |  |
| ESR, mm/H | 34.5(15.0 – 63.0) | 16.0(4.0 – 40.0) | < 0.001\* |
| CRP, mg/L | 10.0(2.1 – 30.9) | 3.6(0.6 – 20.5) | 0.002\* |
| IL-6, pg/mL | 5.1(2.2 – 11.8) | 5.4(2.7 – 14.9) | 0.343 |
| C3, g/L | 1.16(1.00 – 1.33) | 1.06(0.89 – 1.27) | 0.054 |
| C4, g/L | 0.24(0.19 – 0.28) | 0.20(0.18 – 0.28) | 0.156 |
| **NIH Score ≥ 2, n (%)** | 205(89.5) | 22(34.9) | < 0.001\* |
| **Previous Intervention** | | | |
| Previous prednisone, n (%) | 20(8.6) | 34(53.1) | < 0.001\* |
| Previous immunosuppressants, n (%) | 20(8.5) | 28(57.1) | < 0.001\* |
| **Present Treatment strategy** |  |  |  |
| Prednisone dose at original point, mg/d | 30.0 (15.0 – 40.0) | 20.0(10.0 – 40.0) | < 0.001\* |
| Prednisone dose at 6 months, mg/d | 15.0(10.0 – 15.0) | 12.5(7.5 – 17.5) | 0.015\* |
| Cyclophosphamide, n (%) | 65(30.0) | 10(17.2) | 0.053 |
| Leflunomide, n (%) | 104(47.5) | 23(39.7) | 0.303 |
| Azathioprine, n (%) | 29(13.2) | 3(5.3) | 0.107 |
| Thalidomide, n (%) | 15(6.8) | 1(1.8) | 0.207 |
| Mycophenolate Mofetil, n (%) | 25(11.4) | 14(24.6) | 0.011\* |
| Methotrexate, n (%) | 30(13.7) | 3(5.2) | 0.075 |
| Rapamycin, n (%) | 23(10.5) | 7(12.3) | 0.701 |
| Bioagents, n (%) | 24(16.2) | 13(22.8) | 0.014\* |

**Notes**.

a. \* *P*-value: comparison between groups, *P*-value < 0.05 was considered to indicate statistical significance.

b. **†** 4 cases in the validation cohort exceeded the interval follow-up of 36 months, which restrict the ability to perform the calibrate curves of 3-years and 5-years.

**Supplementary Figures and Figure Legends**

**Supplementary Figure S1**. The representative figures of vascular changes in magnetic resonance angiography (MRA).

(A) The representative figures of aggravated vascular damage with lesions at subclavian artery;

(B) The representative figures of aggravated vascular damage with lesions at iliac artery and its branches;

(C) The transverse section figures of vascular alleviation with thickening in carotid artery.

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**Supplementary Figure S2.** The Kaplan-Meier curves of aggravated vascular damage in TA.

(A – B) The Kaplan-Meier curves of using MMF or IL-6R antibody for aggravated vascular damage in TA.

