



OPTIMAL MANAGEMENT OF TAKAYASU'S DZ INVOLVING THE SUPRA-AORTIC BRANCHES: TECHNICAL DETAILS FOR OPEN MANAGEMENT AND THE ROLE OF ENDOVASCULAR THERAPY

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DISCLOSURES

- NONE



TAKAYASU'S ARTERITIS

- PRESENTATION**
 - CONSTITUTIONAL SX:
 - FEVER, MYALGIAS, WT LOSS, HEADACHE
 - NOT ALWAYS PRESENT
 - VESSEL TENDERNESS/PAIN; CAROTODYNIA
 - OTHER SX RELATED TO DISEASE DISTRIBUTION
 - CEREBROVASCULAR SX ARE COMMON
- ONSET IS GENERALLY IN TEENS OR TWENTIES
 - DIAGNOSIS IS OFTEN DELAYED
 - STENOSES MAY NOT BECOME SYMPTOMATIC FOR YEARS

TAKAYASU'S ARTERITIS

- DIAGNOSIS**
 - 3/6 CRITERIA
 - 6:1 FEMALE: MALE
 - MORE COMMON IN ASIAN POPULATIONS
 - INVOLVES AORTA AND ITS BRANCHES
 - DISTRIBUTION DIFFERS IN DIFFERENT POPULATIONS


Table 1. The American College of Rheumatology 1990 criteria for the diagnosis of Takayasu arteritis*

Criteria and definition

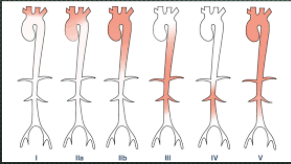
- Age at disease onset ≤ 40 years
- Limf claudication
- Decreased brachial artery pulse
- Difference in systolic blood pressure between arms >10 mm Hg
- Beut over the subclavian arteries or the aorta
- Anteroposterior evidence of narrowing or occlusion of the aorta in primary branches, or large arteries in the proximal upper or lower extremities

*The presence of 3 three of these six criteria demonstrated a sensitivity of 90.5% and a specificity of 97.8%.

(1) Vasc Surg 2013;25:693-700




PATTERNS OF DISEASE



Type	Frequency (%)
Type I	28.0 ~ 35.9
Type II a	9.4 ~ 16.3
Type II b	8.5 ~ 16.6
Type III	0.9 ~ 7.3
Type IV	1.9 ~ 5.9
Type V	25.8 ~ 43.4

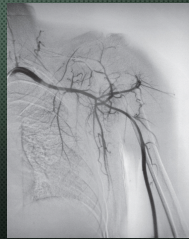

- TYPE I AND V MOST COMMON
- SUPRAAORTIC BRANCH INVOLVEMENT COMMON

(Ow J 2020; 64: 539-557)



TAKAYASU'S ARTERITIS: IMAGING

- CAN CREATE STENOSIS OR ANEURYSM
- STENOSIS IS MORE COMMON
 - OFTEN LONG, SMOOTH, TAPERED
 - CAN BE SHORTER AND SEGMENTAL
 - OFTEN SYMMETRIC
- HISTOLOGY
 - TRANSMURAL DISEASE
 - INTIMAL PROLIFERATION
 - MEDIAL ELASTIN DESTRUCTION
 - ADVENTITIAL FIBROSIS

TAKAYASU'S ARTERITIS IMAGING

- ULTRASOUND
 - PRIMARYLY IN CAROTID DISEASE
 - ACTIVE: PROMINENT WALL THICKENING, MAINTAINED OUTER DIAMETER
 - INACTIVE: MILD WALL THICKENING, DECREASED OUTER DIAMETER

Ultrasound Med 20:371-378, 2001

TAKAYASU'S IMAGING

- CT/MR/DSA
 - LONG, SMOOTH STENOSIS
- PET SCAN
 - CAN SHOW DISEASE ACTIVITY
 - STRONGLY CORRELATED TO MEDICAL THERAPY RESPONSE

JACC Cardiovascular Imaging, Vol. 5, No. 4, 2012

TREATMENT: 2021 ACR GUIDELINES

- MEDICAL FIRST
 - GLUCOCORTICOID AND
 - METHOTREXATE,
 - AZATHYAPRINE
 - TNF INHIBITOR
 - IF RELAPSE
 - CONTINUE STEROIDS
 - SWITCH OTHER AGENTS
- INTERVENTION ONLY IF PROGRESSIVE ISCHEMIA

Arthritis & Rheumatism

TREATMENT

- RECENT JAPANESE GUIDELINES SHOW THE ONLY LEVEL ONE EVIDENCE IS FOR GLUCOCORTICOID AND TOCILIZUMAB
- OPEN OR ENDOVASCULAR INTERVENTION IS A LEVEL II RECOMMENDATION BASED ON C LEVEL OF EVIDENCE

Treatment	Recommendation		Level of evidence
	I	II	
Glucocorticoid (GC)	I	II	C
Beta2 agonist therapy	IIa	II	C
Methotrexate (MTX) ^a	IIa	II	B
Azathioprine (AZA)	IIa	II	B
Cyclophosphamide (CY)	IIa	II	B
Interleukin-6 receptor antibody (IL6R ^a)	IIa	II	C
Tocilizumab (TCZ) ^a	IIa	II	C
Cyclosporin (CsA) ^a	IIa	II	C
Tacrolimus (FK506)	I	II	B
TNF inhibitor ^a	IIa	II	B
Antiplatelet drugs	IIa	II	B
Vascular bypass surgery	IIa	II	C
Endovascular treatment	IIa	II	C

Circ J 2020; 84: 299-309

SO HOW DO WE INTERVENE?

OPEN VS ENDO IN TAKAYASU'S ARTERITIS

- KIM, ET AL (KOREA)
 - 1994-2010: 232 PTS WITH TA
 - 218 (94%) HAD SUPRA-AORTIC VESSEL INVOLVEMENT
- 25 PATIENTS REQUIRED INTERVENTION
 - 10 ENDO; 15 BYPASS
 - DID ENDO FOR <5CM LESIONS
 - ORIGINATED BYPASS OFF ASCENDING ARCH

Feature ^a	Treatment method	
	Bypass surgery	Endovascular
Patients	15	10
Age, years		
At the diagnosis	24 ± 13	24 ± 13
At symptom onset	29 ± 13	32 ± 11
Female	15 (100)	7 (70)
Active stage ^b	12 (80)	8 (80)
At the time of intervention	4 (26.6)	1 (10)
Clinical manifestation	15 (100)	9 (90)
Episodic visual dimness	12 (80)	5 (50)
Postural dizziness	9 (60)	6 (60)
Episodic syncope	4 (26.7)	0
Transient ischemic attack	3 (20)	3 (30)
Minor stroke	0	2 (20)
Symptom of AR	1 (6.7)	0
Aortic arch aneurysm	1 (6.7)	0
Treated arteries	24	15
Descending artery	2	0
Carotid artery	19 ^c	5
Subclavian artery	2 ^d	8
Vertebral artery	0	2

J Vasc Med Biol 2013;25:693-700

OPEN VS ENDO IN TAKAYASU'S ARTERITIS

Table V. Early (<30 days) and late complications after surgical bypass and endovascular treatment for patients with Takayasu arteritis involving supra-aortic arteries

Complication	Bypass surgery, No. (%)		Endovascular treatment, No. (%)	
	Patience (n = 15)	Arteritis (n = 24)	Patience (n = 10)	Arteritis (n = 23)
Early (<30 days)				
Central hypoperfusion syndrome with intracerebral hemorrhage	2 (13.3)	NA	0	0
Cardiac tamponade	1 (6.7)	NA	NA	NA
Severe bradycardia with hemodynamic instability	1 (6.7)	NA	0	0
Technical failure	0	0	2 (20.0)	2 (13.3)
Arterial dissection	0	0	1 (10.0)	1 (6.7)
Late				
Restenosis (>50% of diameter)	1 (6.7)	1 (4.2)	3 (30.0)	0 (40.0)
Griff-vascular	2 (13.3)	2 (8.3)	2 (20.0)	2 (13.3)
Death	1 (6.7)	NA	0	0

NA, Not applicable.
NA, not available for a secondary outcome disease.

STENOSIS OR OCCLUSION
OPEN: 12.5%
ENDO: 53.3%

J Vasc Surg. 2012;45:699-700.

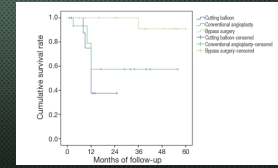


OUTCOMES SUPRA-AORTIC VESSELS

- 42 PTS; MEAN 30 MONTH F/U
- 10 CUTTING BALLOON
- 16 POBA
- 16 BYPASS
- RESULTS
- BYPASS SUPERIOR (6% RESTENOSIS)
- NO DIFFERENCE POBA AND CUTTING BALLOON

Outcomes of different treatments on Takayasu's arteritis

Yu Xiao¹, Jiao Zhou¹, Xiaodong Wu¹, Yuehong Sun, Lei Zhang, Jiaman Feng, Rui Feng, Zhaigang Zhao, Zhaoping Jing



J Chinese J Clin Oncol. 2018;41:981-986

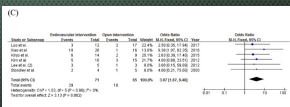


METAANALYSIS: OPEN VS ENDO

- 770 PTS; 1363 LESIONS
- 389 ENDO
- 420 OPEN
- LESS RESTENOSIS WITH OPEN FOR SAA BRANCHES

Endovascular Versus Open Surgical Intervention in Patients with Takayasu's Arteritis: A Meta-analysis

Lin Hui¹, Song Hui¹, Wang He¹, Li J¹, Chen Yi¹, Song Y¹, Han Xian¹, Song Y¹, Liu Hui¹, Han Y¹, Song He¹, Chen Y¹



J Vasc Med Biol. 2018;30:200-208

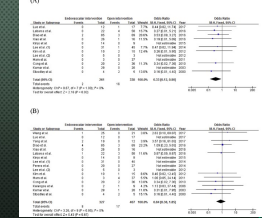


OPEN VS ENDO

- HIGHER STROKE RISK WITH OPEN
- NO DIFFERENCE IN MORTALITY

Endovascular Versus Open Surgical Intervention in Patients with Takayasu's Arteritis: A Meta-analysis

Lin Hui¹, Song Hui¹, Wang He¹, Li J¹, Chen Yi¹, Song Y¹, Han Xian¹, Song Y¹, Liu Hui¹, Han Y¹, Song He¹, Chen Y¹



J Vasc Med Biol. 2018;30:200-208

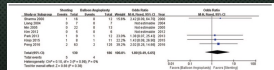
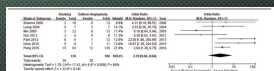


BALLOON VS STENT

- 266 PTS; 316 LESIONS
- 186 POBA; 130 STENT
- NOT LIMITED TO SAA
- NO DIFFERENCE IN RESTENOSIS
- NO DIFFERENCE IN COMPLICATIONS

Endovascular balloon angioplasty versus stenting in patients with Takayasu arteritis

Hui Xian¹, Song Hui¹, Wang He¹, Li J¹, Chen Yi¹, Song Y¹, Han Xian¹, Song Y¹, Liu Hui¹, Han Y¹, Song He¹, Chen Y¹



Medicine (Baltimore). 2023;102:e36727

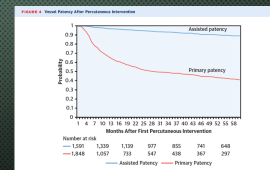


COVERED VS BMS

- 942 PS; 2450 LESIONS
- 2365 STENOSES
- 630 SUBCLAVIAN/AXILLARY
- 333 CAROTID
- MEDIAN F/U: 39 MONTHS
- PRIMARY PATENCY 48.6%
- ASSISTED PATENCY 83.3%

Outcomes of Percutaneous Intervention in Patients With Takayasu Arteritis

George Anand¹, Raj S. Thomas¹, Thomas V. Arakkal¹, Pauline C. Hoffman¹, Joseph R. Saba¹, Michael S. Goepfert¹, George H. Thaler¹, Francis Grigg¹, Michael S. Goepfert¹, Joseph R. Saba¹, John Kallianos¹, Michael S. Goepfert¹



J Am Coll Cardiol. 2023;81:40-44



COVERED VS BMS

Outcomes of Percutaneous Intervention in Patients With Takayasu Arteritis

George J. Storch, MD¹, Val S. Pruthi, MD², Thomas V. arnaucci, MD³, Prabhakar G. Reddy, MD⁴, Anand K. Anandhan, MD⁵, Christopher G. George, MD⁶, Paul V. Garcia, MD⁷, Richard G. Sirin, MD⁸, Tobias K. Scharf, MD⁹, John R. Serrano, MD¹⁰, Vishal Shah, MD¹¹

- 1687 LESIONS ELECTIVELY STENTED
- 88% LATE SUCCESS WITH 1.49 INTERVENTIONS/LESION
 - COVERED 92.4% SUCCESS WITH 1.18 INT/LESION
 - BMS 86.4% SUCCESS WITH 1.51 INT/LESION (P<.001)
- SIGNIFICANTLY HIGHER PRESSURES USED TO DILATE COVERED STENTS

17 Am Coll Cardiol 2023;81:459-465

AFFECT OF INFLAMMATION

Retrospective Analysis of Surgery Versus Endovascular Intervention in Takayasu Arteritis: A Multicenter Experience

David Suckow, MD, PhD, Mani Lachkar, MD, PhD, Tamas Mikosk, MD, Martin Bracke-Edwin, MD, PhD, Eugene Kozlov, MD, PhD, Philippe Chouh, MD, PhD, Cédric Migon, MD, Yusef Schachar, MD, Larant Eliche, MD, PhD, Purno-Yoo Hwang, MD, Joseph Eversack, MD, PhD, Pierre Crochard, MD

- 79 PTS; 166 PROCEDURES
- 104 SURGERY; 62 ENDO
- MIX OF ALL VESSELS
- RESTENOSIS NOT DIFFERENT IN OPEN VS ENDO
 - MORE ENDO IN RENAL; MORE OPEN IN SAA
- ODDS RATIO FOR COMPLICATION: 7.5 IF INFLAMMATION AT TIME OF INTERVENTION

	SUR	ENDO	Mean (SD)
Late mortality (n=21)			
Stroke	15 (21.4)	0 (0.0)	7 (23.0)
MI	5 (7.1)	3 (4.8)	2 (6.4)
Death	11 (16.6)	3 (4.8)	11 (10.5)
MI			
Late morbidity (n=45)			
Hypertension	35 (54.9)	10 (16.1)	20 (44.1)
Stroke	7 (11.0)	0 (0.0)	1 (2.1)
MI	2 (3.1)	2 (3.2)	0
Death	11 (17.2)	1 (1.6)	3
Death n (%)	4 (6.2)	1 (1.6)	3 (6.5)
Stroke			
MI	29 (44.4)	30 (48.4)	30 (21-43)
Complication grade, median (IQR)	7 (4-21)	5 (4-20)	6 (1-19)
Restenosis n (%)	3 (4.5)	5 (7.9)	4 (9.4)
Stents	20 (80)	10 (100)	18 (21.3)
Interventions	20 (80)	10 (100)	8 (9.1)

17 Circulation 2015;132:2473-2481

TAKAYASU'S ARTERITIS: INTERVENTION

- AGGRESSIVE MEDICAL MANAGEMENT CONTROLS SYMPTOMS IN THE MAJORITY OF CASES
- ONLY INTERVENE IF ONGOING SYMPTOMS THAT ARE NOT TOLERATED
- WAIT UNTIL DISEASE IS QUIESCENT, IF POSSIBLE
 - 0-10% BYPASS REVISION IF QUIESCENT
 - 50-70% BYPASS REVISION IF ACTIVE DISEASE MANAGEMENT PERIOPERATIVELY
 - 7.5X RISK OF COMPLICATION IF ACTIVE DZ

17 Am Coll Cardiol 2023;81:466-474

TAKAYASU'S ARTERITIS: INTERVENTION

- IF ENDOVASCULAR
 - SEEMS TO WORK BETTER WITH SHORTER LESIONS (5CM)
 - COVERED MAY WORK BETTER THAN BMS OR POBA
 - MINIMAL DATA WITH DRUG ELUTION
- IF OPEN
 - ORIGINATE BYPASS OFF ASCENDING ARCH
 - CAN USE VEIN OR PROSTHETIC
 - OFTEN PROSTHETIC IS USED DUE TO SIZE

17 Am Coll Cardiol 2023;81:466-474

TAKAYASU'S ARTERITIS: KEY TAKEAWAYS

- MEDICAL MANAGEMENT IS CRITICAL
- INTERVENE ONLY FOR ONGOING SYMPTOMS
- WAIT TO INTERVENE UNTIL DISEASE QUIESCENT
- OPEN TENDS TO OUTPERFORM ENDO, BUT MAY CARRY MORE RISK (LITERATURE IS MIXED)
- ORIGINATE BYPASSES FROM UNINVOLVED ARTERY (ASCENDING ARCH)
- CONTINUED AGGRESSIVE MEDICAL MANAGEMENT BEFORE AND AFTER INTERVENTION IS THE KEY TO SUCCESS

17 Am Coll Cardiol 2023;81:466-474

THANK YOU

17 Am Coll Cardiol 2023;81:466-474