

Distal Stent-Graft Induced New Entry Tears (SINEs) on aortic remodeling of chronic TBADs How to prevent & treat

Chen-Che Shih MD, Ph.D., Professor
Taipei Heart Institute Taipei Medical University, Taipei, Taiwan.

臺北醫學大學
TAIPEI MEDICAL UNIVERSITY

Financial Disclosure

- “Nothing to Disclose”

臺北醫學大學
TAIPEI MEDICAL UNIVERSITY

Acute :
18.9%
Mean follow-up:
14.0 ± 4.8 months

Chronic:
35.7%
Mean follow-up:
24.8 ± 5.9 months

P = .121

3 years post Op

Late Distal Stent graft Induced New Entry (SINE)

Shih, C.C. et al. JVS 2012;15:1600-1610.

臺北醫學大學
TAIPEI MEDICAL UNIVERSITY

Acute onset → False lumen expansion & rupture
Malperfusion

Delayed progress → False lumen Expansion
Pseudoaneurysm formation
True lumen compression

The Impact of Distal Stent Graft-Induced New Entry on Aortic Remodeling of Chronic Type B Dissection

Shih CC et al | Vasc Surg 2013;57:64-71
Hsiao CY, Shih CC et al. Ann Thorac Surg 2018;105:735-743.

臺北醫學大學
TAIPEI MEDICAL UNIVERSITY

Mechanism of SINE

Stent graft Straightening

Aortic Curvature → Aortic Tortuosity after TEVAR

Relative force on Vascular Wall → Stent graft induced new entry

Dissection characteristics:
Acute/chronic dissection
Complicated dissection
True/false lumen ratio
Number of distal tear

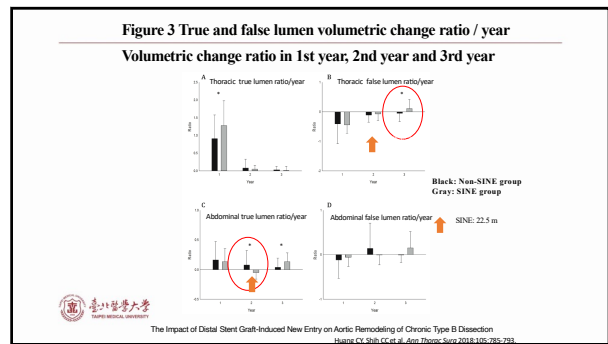
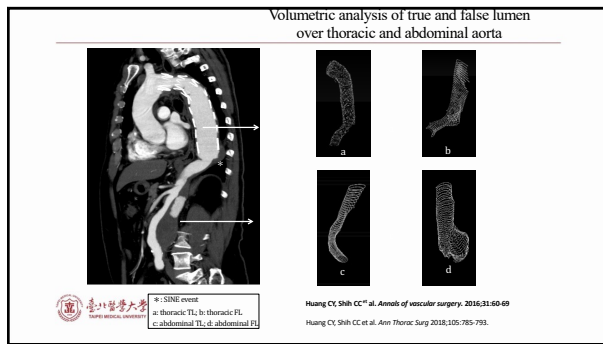
Procedure characteristics:
Oversizing ratio
Stent graft length
Stent graft type
Distal bare stent

Chen CC, Shih CC et al. AJR 2020; 214:679-686

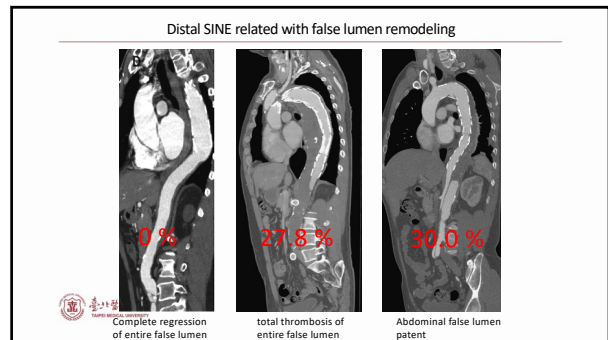
臺北醫學大學
TAIPEI MEDICAL UNIVERSITY

Q1: Any Impact of Distal SINE on Entire Aortic Remodeling ?

臺北醫學大學
TAIPEI MEDICAL UNIVERSITY



Q2: Better aortic remodeling with lower Distal SINE Occurrence ?



Factors Affecting Optimal Aortic Remodeling after Thoracic Endovascular Aortic Repair of Type B (III b) Aortic Dissection

	Total (N = 90)	Complete regression (n = 22)	Total thrombosis (n = 18)	Inadequate regression (n = 50)	P
Stent graft induced new entry	20 (22.2)	0 (0)	5 (27.8) [†]	15 (30.0) [†]	0.004*

Continuous data are presented as mean ± standard deviation, and categorical as * p < 0.05, significant difference among the three groups, number (percentage)
 † p < 0.05, significant difference as compared with the complete regression group and ‡ total thrombosis group

Optimal aortic remodeling would be associated with lower Distal SINE occurrence rate

Statically, complete regression group is significantly different with other two groups..

Chen JM, Shih C.C. et al. *Cardiovasc Intervent Radiol* 2017;40(5):671-681

Q3: Any Predictive Factors of Distal Stent Graft-induced New Entry ?

Shih CC et al. *JTCVS* 2013;146:623-630
 Shih CC et al. *J Vasc Surg* 2013;57:64-71

How to measure of distal size of true lumen of aortic dissection ?

Longitudinal maximal diameter X_m

Average of longitudinal & transverse maximal diameter X_A

Area and circumference

SHH CC et al JTCVS 2013; 146:623-630
Shih CC et al J Vasc Surg 2013;57:66-71

Proximal

Distal

Pre-stent Graft Oversizing Ratio = $(X_m - X_A) / X_c$

Oversizing Ratio: The ratio between the size of distal end of selected graft and distal landing zone before procedure.

SHH CC et al JTCVS 2013; 146:623-630
Shih CC et al J Vasc Surg 2013;57:66-71

Table 4: Pre-stent Graft Oversizing Ratio

(mean ± SD)	SINE	Non-SINE	P value
Longitudinal maximal diameter	0.35±0.31	0.16±0.17	0.208
Longitudinal maximal diameter	2.74±1.56	1.73±0.51	0.082
Mean Diameter	0.94±0.47	0.61±0.18	0.115
Area	4.00±2.96	1.98±0.66	0.031*
Circumference	0.77±0.39	0.50±0.19	0.115

Pre-stent Graft Area over sizing more than 4 times is highly related with distal SINE

*p<0.05, significant difference

SHH CC et al JTCVS 2013; 146:623-630

Only area size measurement with significant difference between groups.

Expansion Mismatch Ratio of True Lumen = $X'_G / X'_A 2cm$

During follow up, the ratio between the size of distal end of stent graft and 2 cm distal of non stented segment of true lumen is called expansion mismatch ratio of true lumen size.

SHH CC et al JTCVS 2013; 146:623-630
Shih CC et al J Vasc Surg 2013;57:66-71

Table 6 Expansion mismatch ratio of true lumen= $X'_c / X'_A 2cm$

(mean ± SD)	SINE	Non-SINE	P value
Longitudinal maximal diameter	1.29±0.28	1.13±0.17	0.343
Longitudinal maximal diameter	1.89±0.54	1.45±0.38	0.115
Mean Diameter	1.48±0.29	1.22±0.15	0.039*
Area	2.39±0.85	1.58±0.42	0.031*
Circumference	1.43±0.27	1.18±0.14	0.016*

Post-stent graft : distal area expansion mismatch over 2.4 times is highly related to distal SINE

The result showed that the parameter of mean diameter, area and circumference calculation with significant difference between groups.

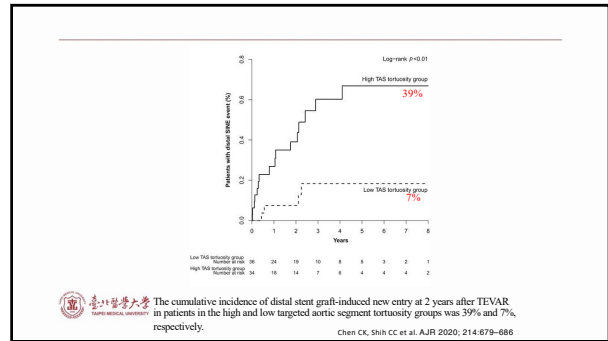
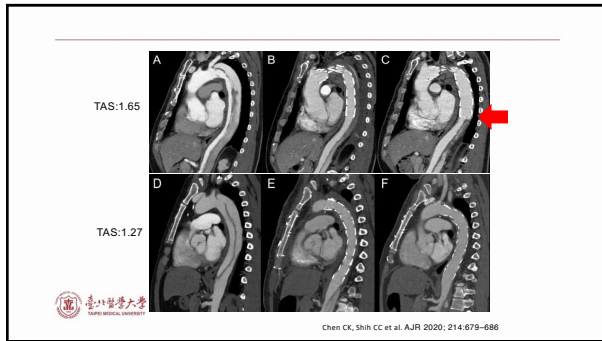
SHH CC et al JTCVS 2013; 146:623-630

Anatomic Aortic Tortuosity vs Aortic Tortuosity after TEVAR

Fig 5. Targeted aortic segment (TAS) tortuosity calculation.

The TAS tortuosity index was calculated by dividing the path length by the straight distance of the segment

Chen CX, Shih CC et al. AJR 2020; 214:679-686



Q4: How to Prevent ?

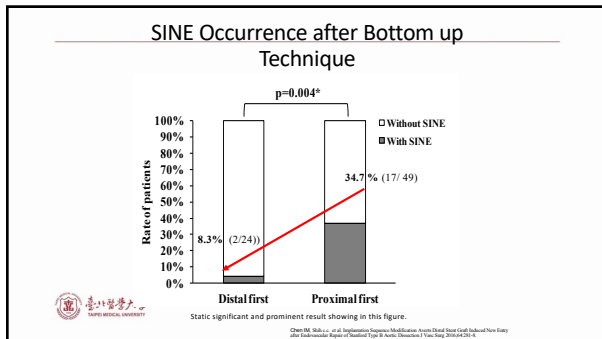
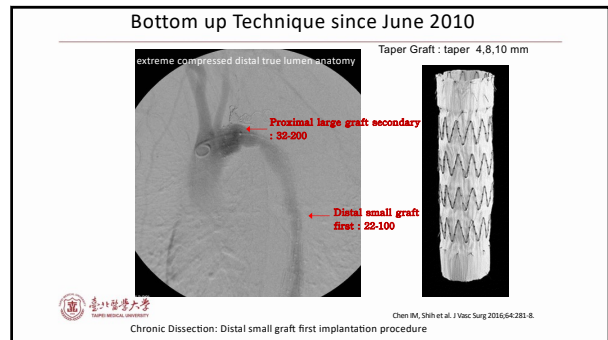
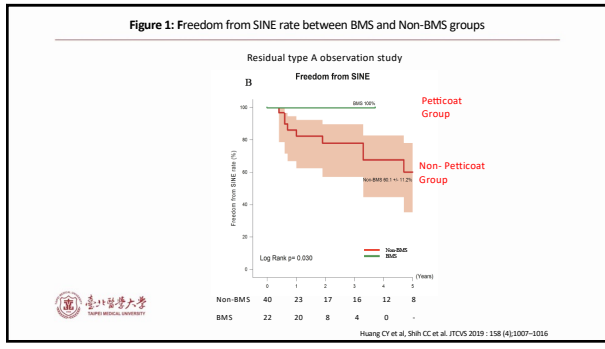


Figure 1: Freedom from SINE rate between BMS and Non-BMS groups



Conclusions

- DSINE is not rare and is a potentially life-threatening
- Distal oversizing, mismatch ratio or tortuosity index seems predictive of the formation of DSINE
- The late distal SINE occurrence could worsen thoracic false lumen regression and counteract abdominal true lumen expansion significantly
- Early re-intervention for distal SINE might be considered for better abdominal aortic remodeling of chronic aortic dissection.
- Tapered-diameter design, the bottom-up technique can be used to reduce the risk of DSINE.
- For Type B aortic dissection the usage of PETTICOAT technique within the subacute phase could effectively promote true lumen expansion and false lumen reduction.

Tha... sion

