Penn Medicine

How Do Bare Stents Prevent Stent-Graft Induced New Entry Tears (SINEs) After Treatment of Aortic Dissections

Shang Loh, MD, FACS, DFSVS
Professor of Clinical Surgery
Section Chief of Vascular Surgery
Penn Presbyterian Medical Center
Division of Vascular and Endovascular Therapy
Perelman School of Medicine, University of Pennsylvania

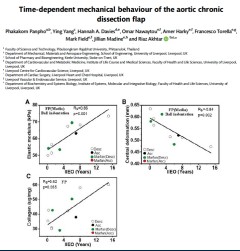
November 20th, 2024

Disclosures

- Cook Medical – Speaker and proctor

Chronic Dissection Flaps Maintain Considerable Elasticity

- Time stages of acute, subacute, and chronic dissection are arbitrary
- Dissection flaps maintain significant plasticity well past a year
- Highly individualistic
- Pliability may increase the risk of dissection flap tears with stenting or ballooning



Distal Stent Induced New Entry Tears (dSINE)

- Originally described in 2010
- Incidence is up to 25%
- Typically involved the distal end of the stent graft
- Most frequently described in chronic dissection and collagen disorder patients
- Thought to be the result of the persistent pressure of the stent graft on the less mobile dissection flap.
- Could also be due to partial pulsation of the dissection flap on the end of the stent graft.

Risk Factors for dSINE Formation

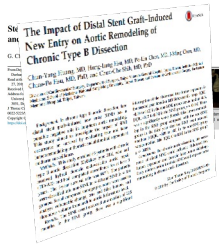

The Impact of Distal Stent Graft–Induced New Entry on Aortic Remodeling of Chronic Type B Dissection

TABLE 1. Subtypes, treatment options, and risk factors for stent graft–induced new entry tear after thoracic endovascular aortic repair

Table 2. Impact Factor of Distal SINE Events by Logistic Regression

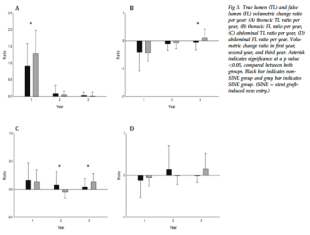
Factor	n	SINE Events	Univariate Crude OR (95% CI)	p	Multivariate Adjusted OR (95% CI)	p
Distal PIGOR						
≤2	39	5	1.00		1.00	
>2	26	13	6.00 (2.00–22.66)	0.002*	6.20 (1.8–21.51)	0.004*
Time Interval from primary dissection to TEVAR, months						
≤10	32	5	1.00		1.00	
>10	33	13	3.91 (1.08–11.45)	0.037*	3.02 (0.66–10.76)	0.088

Proximal to distal stent graft implantation sequence in chronic dissection

TEVAR, Thoracic endovascular aortic repair.

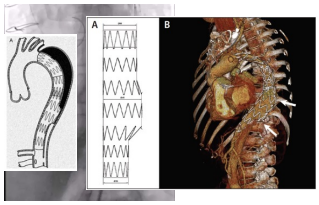
Consequence of dSINE development

- dSINE increases distal FL perfusion
- Promotes negative aortic remodeling with reduction in TL and increase in FL sizes
- In the setting of dSINE development during knickerbocker, can create a large tear leading to near TL collapse due to FL perfusion
- This can occur immediately or in the delayed fashion



Treatment of Chronic Aortic Dissection

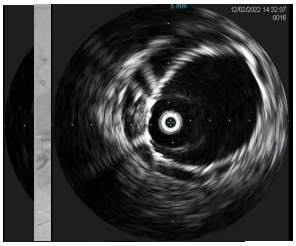
- Often involves placement of heavily oversized stent grafts relative to the TL distally
- Preventing retrograde FL flow involves utilizing techniques such at knickbocker which intentionally ruptures the dissection membrane allowing the stent graft to obliterate FL
- Proposed knickerbocker stent allows FL obliteration while minimizing distal oversizing
- Stent is not available in the US



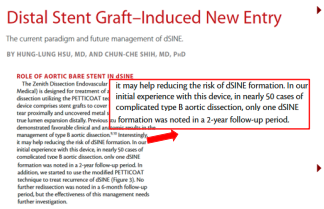
Kölbel T, et al. J Endovasc Ther. 2014;20:484-489.

Immediate dSINE with TL collapse after Knickerbocker

- 60 year old female with an aneurysmal chronic aortic dissection and prior Bolton Dual Branch Arch Device.
- Plan for TEVAR extension with knickerbocker to create a distal seal
- IVUS post knickerbocker confirmed dSINE and total TL collapse
- Utilized dissection bare stent to re-expand TL



Distal Dissection Bare Stent to Prevent dSINE



Distal Stent Graft–Induced New Entry

The current paradigm and future management of dSINE.

BY HUNG-LUNG HSU, MD, AND CHUN-CHE SHIH, MD, PhD

ROLE OF AORTIC BARE STENT IN dSINE

The Zenith Dissection Endovascular Medical) is designed for treatment of dissection utilizing the PETTICOAT device comprises stent grafts to cover tear proximally and uncovered metal true lumen expansion distally. Previous demonstrated favorable clinical and management of type B aortic dissection.[1,2] Interestingly, it may help reducing the risk of dSINE formation. In our initial experience with this device, in nearly 50 cases of complicated type B aortic dissection, only one dSINE formation was noted in a 2-year follow-up period. In addition, we started to use the modified PETTICOAT technique to treat recurrence of dSINE (Figure 3). No further reduction was noted in a 6-month follow-up period, but the effectiveness of this management needs further investigation.

VOLUME 4, NO. 1 SUPPLEMENT TO ENDOVASCULAR TODAY EUROPE

- Initial reports indicate it may help prevent the development of dSINE by reducing the dynamic dissection flap movement at the edge of the stent graft

  During the knickerbocker technique, where the stent graft can be greatly oversized relative to the TL, dissection flap movement at that transition is at high risk for dSINE
- Dissection bare stent provides stability to reduces the amount of dynamic movement at that zone reducing dSINE formation.

Dissection Bare Stent in KB for Chronic Dissection

- The two cases of dSINE showed an average 66.5% diameter oversize.
- Prior knickerbockers without bare stent averaged only 43.5% oversize.
- Preemptive bare stent prior to KB for >50% stent graft oversizing relative to TL
- No new cases of dSINE

	Average SG Diameter	Average TL Diameter (long and short avg)	% oversize	KB distance from distal edge
KB without bare stent	34 mm	23 mm	43.5%	4.5 cm
KB with TL collapse	32 mm	19.25 mm	66.5%	4.5 cm
KB with preemptive bare stent	35.75 mm	21.4 mm	75.4%	4.75 cm

Summary

- Care must be taken when aggressively oversizing stent grafts relative to the TL for the knickerbocker technique
- The dissection bare stent appears to help prevent dSINE development especially during knickerbocker technique application when the graft is heavily oversized.
- The dissection bare stent is useful to help salvage patient with dSINE that cause significant compromise of the true lumen

Penn Aortic Center