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The short-term outcome of straight and tapered carotid artery stenting for patients with symptomatic carotid artery stenosis: A prospective case-control study

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Disclosure

Speaker name: Lin Yang

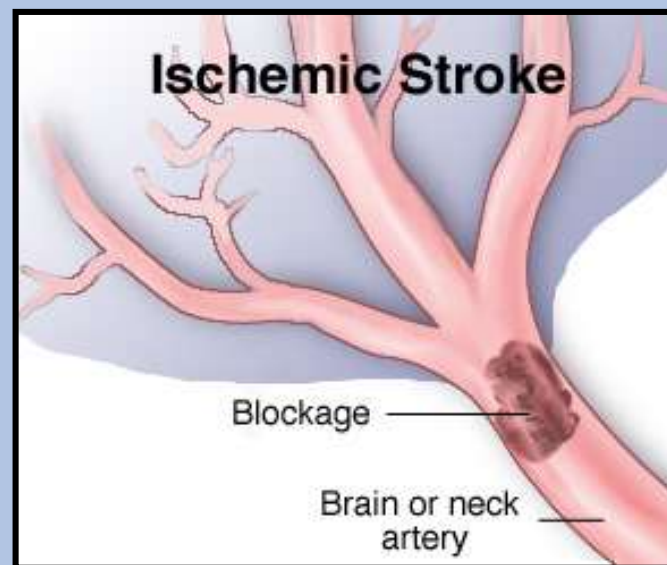
- I do not have any potential conflict of interest



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Background

1. Stroke is the 3rd cause of death
2. 83% is the ischemic stroke
3. Carotid stenting CAS is the effective therapy option

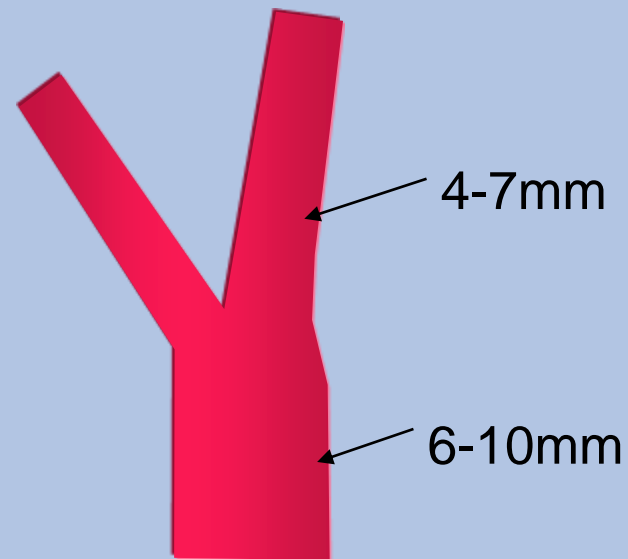




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Rationale

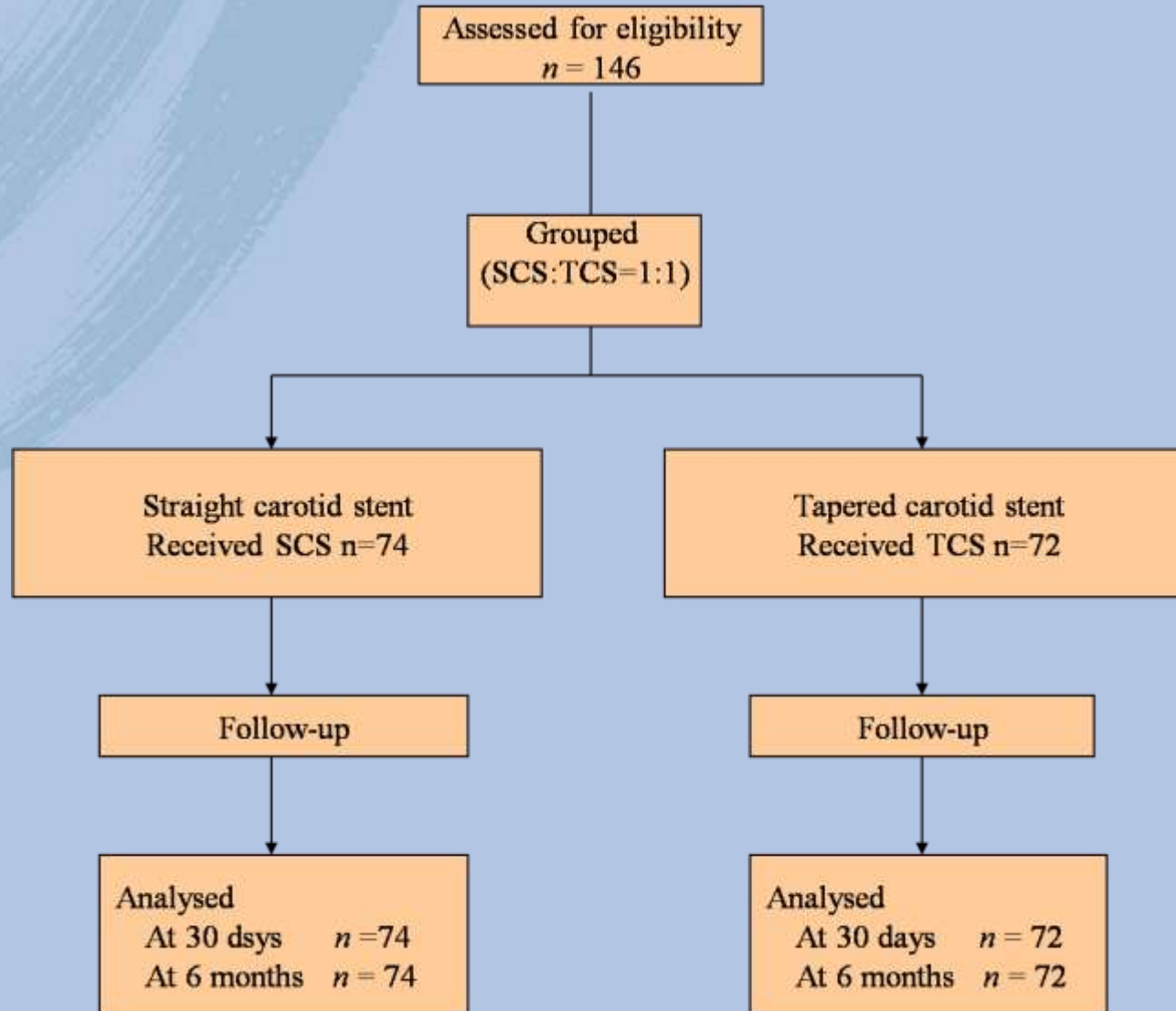
1. CAS need a tapered stent to adapt the normal anatomy
2. There is little literature about the results of straight and tapered stents used in CAS





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Study design





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Inclusion Criteria

symptomatic stenosis $\geq 70\%$ and contralateral $< 50\%$

asymptomatic of coronary atherosclerosis disease (CAD) and stenosis of coronary arterial less than 70%

diameter of CCA $> 30\%$ or 3mm of the diameter of ICA

life expectancy > 2 yrs and age < 80 yrs

Doctors experience > 200 cases of CAS and > 5 yrs



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Exclusion Criteria

diameter of CCA $>50\%$ of the diameter of ICA

symptomatic of CAD and asymptomatic stenosis $> 70\%$

vital organs dysfunction or advanced cancer

uncontrolled hypertension and diabetes

any hemorrhagic disease within 6mths

bilateral carotid stenosis or unilateral carotid occlusion

intracranial artery stenosis $> 70\%$

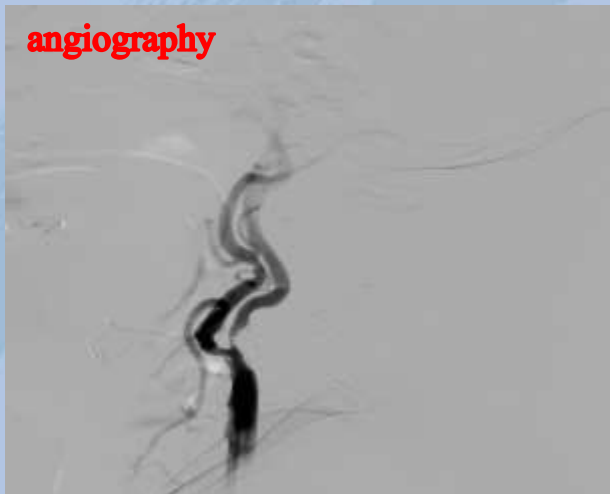
patients refuse.



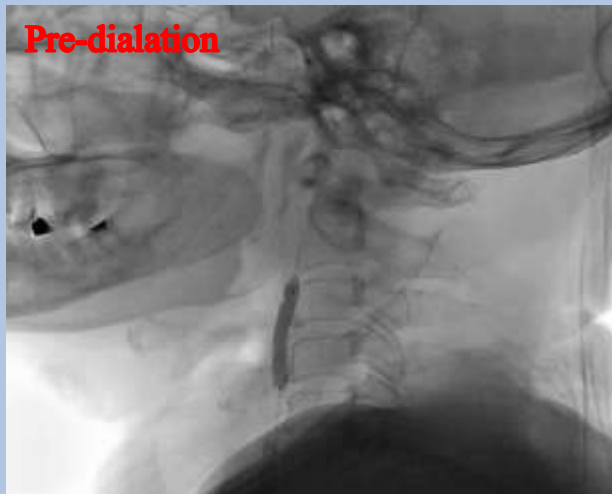
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Process of SCS

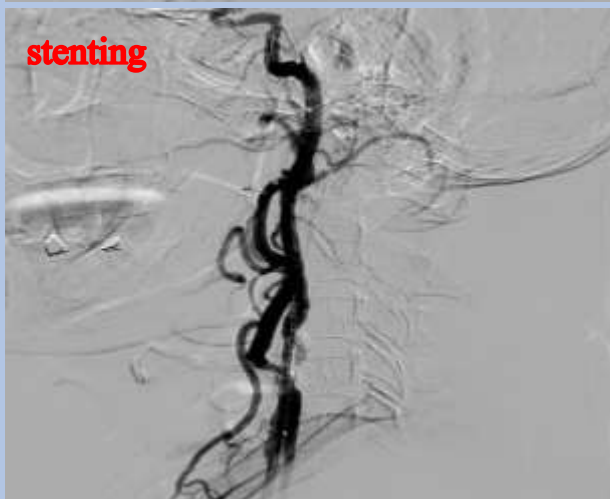
angiography



Pre-dilatation



stenting



DSA after stenting

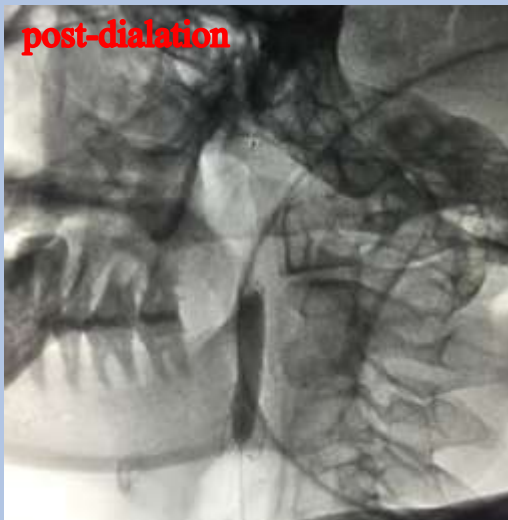
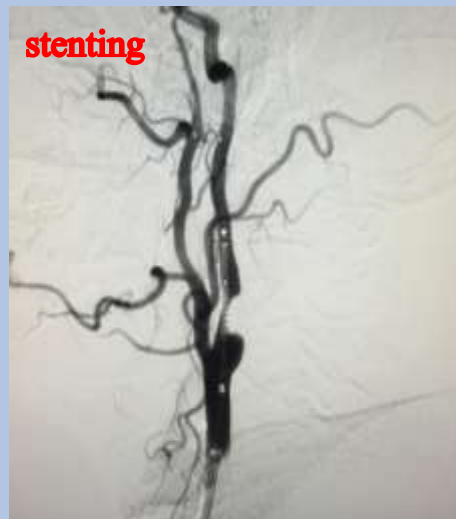


Straight stent



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Process of TCS



Tapered stent



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Evaluation

All clinical data were collected

Complications after operation

Endpoint events (stroke, myocardial infarction and death)

at 30 days and 6 mths were analyzed

SPSS 11.1 was used for statistical analysis



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Results

1. The demographic characteristics data between two groups

	SCS (n=74)	TCS (n=72)	<i>P</i> value
Gender(F/M)	16/58	13/59	0.59
Age (years)	64.99 ± 7.88	65.07 ± 8.82	0.95
Weight(Kg)	66.74 ± 8.63	66.26 ± 9.37	0.69
Stroke type			0.24
Stroke/ TIA	50/24	55/17	
Smoking	40	43	0.74
Hypertension	38	41	0.50
2-diabetes	19	17	0.77
CAD	10	10	0.95
PAD	8	9	0.75
Hyperlipidemia	21	23	0.64
H-HCY	46	43	0.76

SCS, straight carotid stenting; TCS, tapered carotid stenting; TIA, transient ischemic attack; CAD, Coronarytherosclerotic disease; PAD, peripheral arterial disease; H-HCY, Hyperhomocysteinemia. *P* Value, SCS compared with TCS.



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2. The operative parameters in SCS and TCS

	SCS (n=74)	TCS (n=72)	<i>P</i> value
Stenosis (%)	85.41 ± 10.11	84.50 ± 10.81	0.52
Lesion position (R)	34	36	0.62
Pre-dilation (%)	100	100	Null
Post-dilation	10	6	0.32
Type of CPD			
Ev3/Abbott	59/15	54/18	0.49
Type of CPD			
Ev3/Abbott	51/23	54/18	0.41
HD	44	37	0.37
Failed closure	7	6	0.81

SCS, straight carotid stenting; TCS, tapered carotid stenting; CPD, cerebral protection devices; HD: Hemodynamic depression. *P* Value , SCS compared with TCS



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3. Peri-operative complications between SCS and TCS

N (%)	SCS (n=74)	TCS (n=72)	P value
CHS	7 (9.46)	7 (9.72)	0.96
HD	38 (51.35)	25 (34.72)	0.043
Hypertension	5 (6.76)	7 (9.86)	0.50
Occlusion ICA	0	0	Null
Hospital stay (days)	4.34 ± 1.76	3.68 ± 1.31	0.012
Hematoma	3 (4.05)	2 (2.82)	0.97
Bruising	8 (10.81)	8 (11.11)	0.95
Infection/DVT	0	0	Null
Pseudoaneurysm	0	0	Null
Arteriovenous fistula	0	0	Null

CHS, cerebral hyperperfusion syndrome; HD, hemodynamic depression; ICA, internal carotid artery; DVT, deep vein thrombosis. P Value, SCS compared with TCS.



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4. Outcome at 30 days of post-procedures

N (%)	SCS (n=74)	CAS (n=72)	<i>P</i> value*
Total stroke	3 (4.05)	2 (2.78)	0.97
Disabling stroke	1 (1.35)	0 (0)	0.99
Nondisabling stroke	2 (2.70)	2 (2.78)	0.63
Hemorrhagic stroke	0	0	Null
Death	0	0	Null
MI	1 (1.35)	1 (1.39)	0.49

SCS, straight carotid stenting; TCS, tapered carotid stenting; MI, myocardial infarction.

**P* Value, SCS compared with TCS.



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5. The short-term outcome at 6months after procedures

N (%)	SCS (n=74)	TCS (n=72)	<i>P</i> value
Total stroke	4 (5.41)	3 (4.17)	0.97
Ipsilateral stroke	2 (2.71)	2 (2.78)	0.63
Hemorrhagic stroke	1 (1.35)	0 (0)	0.99
Death	0	0	Null
MI	1 (1.35)	1 (1.39)	0.46
Major adverse events	5 (6.76)	4 (5.56)	0.76
ISR	3 (4.05)	1 (2.78)	0.63

SCS, straight carotid stenting; TCS, tapered carotid stenting; MI, myocardial infarction; ISR, in stent restenosis. *P* Value, SCS compared with TCS.



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Discussion

1. Diameter difference of CCA-ICA $>2\text{mm}$ in 64% cases
2. $>4\text{mm}$ in 15-20% cases
3. 80% lesions located in carotid bifurcation

So, the tapered stent is the best choice for CAS and more suitable for anatomical morphology



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- 1. Lower stimulation on carotid sinus and decreased hemodynamic depression (hypotension and bradycardia)**
- 2. Reduce postoperation stroke due to persistent hypotension**
- 3. Fast recovery after operation, decreased hospital stay and medical costs**



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- 1. Maybe more lower restenosis rate, but no difference
need long-term follow-up**
- 2. Tapered stent IS NOT suitable all cases, diameter
difference >50%, maybe the CEA is the best option**



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Conclusion

- 1. TCS procedure could decrease the incidence rate of hemodynamic complications and hospital stay**
- 2. TCS procedure should be the preferred method for most CAS**

Thank you for your attention



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