

The dual-layer CGuard stent is safe and effective in emergent carotid artery stenting and in tandem occlusions: a multi-centric study

Dr. med Mousa Zidan

Prof. Dr. Franziska Dorn



Disclosure

Mousa Zidan

I do not have any potential conflict of interest



Background

Dual-layer stents have fallen into disrepute after several studies reported high rates of in-stent occlusions in acute stroke treatments

- Yilmaz et al. acute occlusion rate of 45%¹
- Bartolini et al. 52.4%²
- Pfaff et al. 20.8% ³

CGuard: single-center series including 33 patients (9% acute occlusion rate) reported by Klail et al ⁴

Methods:

- Four German comprehensive stroke centers
- All consecutive AIS patients who underwent treatment with the CGuard stent
- Acute symptomatic extracranial ICA occlusion or high-grade stenosis with or without concomitant LVO
- NIHSS admission of \geq 4 and a mRS score \geq 3

Methods

- Successful recanalization (TICI) $\geq 2b$
- Clinical, interventional and neuroimaging data were analyzed.
- Patency of the stent was measured using either CT, MRI or ultrasound within 72 hours.
- Intracranial hemorrhage and mRS at discharge were the main endpoints

Endovascualr procedure

- Tandem occlusions: A retrograde approach was preferred and an antegrade approach was only chosen if the passage of the proximal occlusion was not possible otherwise.
- There were no constraints regarding the use of stent retrievers or aspiration maneuvers for MT of the intracranial occlusion if applicable.
- In addition, there were no constraints regarding the succession of CAS with or without angioplasty and MT.

Periinterventional Heparin and DAP postinterventional

- i.v. heparin 3000 UI, and an additional 1000 IU for every additional hour during the intervention.
- i.v. acetylsalicylic acid (ASA) (500mg) or i.v. weight-adapted Tirofiban before stent-implantation.

- Residual stenosis was identified as stenosis ≥ 50% as assessed by intra-procedural angiography.
- Follow-up with cranial CT within 24 hours to exclude intracranial hemorrhage.
- If no contraindications were detected dual-antiplatelet therapy (DAPT) was started.

Results:	
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of all 96

without

residual

stenosis

stents

(Mean ± STD) [N], % (r/N) or median (IQR)Age70.2 ± 11.8GenderMale68.8% (66/96)Female31.2% (30/96)ComorbiditiesHypertension57.3% (55/96)Diabetes mellitus27.1% (26/96)Dyslipidemia63.5% (61/96)Atrial fibrillation20.8.% (20/96)Previous cardiovascular disease36.5 % (35/96)Preprocedural Characteristics8 (7-9)Baseline ASPECTS8 (7-9)Baseline NIHSS111 (7-17)IV t-PA use4 (3-5)Complete occlusion of the cervical ICA126% (73/96)Tandem lesions and intracranial occlusion site86.4% (83 / 96)Petrous or cavernous segment of ICA13.2% (11/83)M159.0% (49/83)M23.6% (3/83)PCA1.2% (1/83)		Acute carotid artery stenting with CGuard (n=96)
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	M2	18.1% (15/83)
PCA 1.2% (1/83)	ACA	3.6% (3/83)
	PCA	1.2% (1/83)
ICA Dissections 6.3% (6 / 96)	ICA Dissections	6.3% (6 / 96)

Peri- and postprocedural antiplatelet and anticoagulation therapy

therapy ASA ASA ASA ASA + Heparin Tirofiban ASA + Heparin+ Tirofiban ASA + Heparin+ Tirofiban ASA + Heparin+ Tirofiban ASA + Clopidogrel ASA + Clopidogrel ASA + Ticagrelor ASA + Ticagrelor		Acute carotid artery stenting with CGuard (n=96) % (n/N)
ASA 45.8% (44/96) ASA + Heparin 14.6% (14/96) 36.5% (35/96) ASA + Heparin+ Tirofiban 3.1% (3/96) Postprocedural antiplatelet and anticoagulation therapy ASA + Clopidogrel 58.3% (56/96) 95.8% ASA + Ticagrelor 37.5% (36/96) 95.8% DAPT	Periprocedural antiplatelet and anticoagulation	
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ASA + Heparin+ Tirofiban Postprocedural antiplatelet and anticoagulation therapy ASA + Clopidogrel ASA + Ticagrelor ASA + Ticagrelor	ASA + Heparin	14.6% (14/96)
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therapy ASA + Clopidogrel 58.3% (56/96) 95.8% ASA + Ticagrelor 37.5% (36/96) DAPT	ASA + Heparin+ Tirofiban	3.1% (3/96)
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ASA + Ticagrelor 37.5% (36/96) DAPT	therapy	
	ASA + Clopidogrel	58.3% (56/96) 95.8%
10/ (1/06)	ASA + Ticagrelor	37.5% (36/96) DAPT
ASA + Apixaban 1% (1/96)	ASA + Apixaban	1% (1/96)
Only ASA 3.1% (3/96)	Only ASA	3.1% (3/96)

	Acute carotid artery stenting with CGuard (n=96) (Mean ± STD) [N] , % (n/N) or median (IQR)
Balloon Angioplasty	
Predilation	35.4% (34/96)
Postdilation	60.4% (58/96)
Applied stent	
Stent diameter (mm)	8 (8-9.5)
Stent length (mm)	40 (40-40)
тісі	
2a	2.1% (2/96)
2b	52.1% (50/96)
3	45.8% (44/96)
Stent patency:	
In-stent occlusion	5.2% (5/96)
In-stent stenosis	3.1% (3/96)
Hemorrhagic transformation or	
intracranial hemorrhage	
Total hemorrhage of any ECASS type	17.7% (17/96)
HI1	9.4 % (9/96)
HI2	2.1% (2/96)
PH1	3.1 % (3/96)
PH2	3.1% (3/96)
sICH	5.2% (5/96)
Clinical outcome	
mRS at discharge	2 (1-4)

Stent patency and outcome:

- In-stent occlusion 5.2% (5/96)
- In-stent stenosis 3.1% (3/96)
- sICH 5.2% (5/96)
- mRS at discharge: 2(1-4)
- Follow-up between 6 to 12-months was available in 52 patients (54.2%) and all stents were patent

• In-stent occlusion 5.2% (5/96)

- a) 1 Patient treat with SAPT for AF with Apixaban
- b) 2 Patients with dissections
- In-stent stenosis 3.1% (3/96)

a) Only one patient with a in-stent stenosis > 70 and was retreated electively

The subgroup analysis depending on the *antiplatelet regimen* did not reveal *any significant differences* regarding in-stent-occlusions or –stenosis

Conclusions:

Difference to other DLSs could be explained :

- by the difference in stent design
- insufficient antiplatelet therapy

Our study shows that the CGuard stent provides reduced thrombogenicity under adequate peri- and postprocedural antiplatelet therapy



Limitations

Retrospective and multicenter nature of the study implies:

- Heterogenous peri- and postinterventional medication regimes possibly influencing patient outcomes as well as the endpoints in-stent occlusion rate and intracranial hemorrhage rate.
- Long-term follow-up data was unavailable in almost half of the cases limiting the long-term assessment of stent patency.

References:

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2) Bartolini B, Puccinelli F, Mosimann PJ, Hajdu SD, Veunac L, Michel P, et al. Evaluating the effectiveness and safety of the carotid Casper-RX stent for tandem lesions in acute ischemic stroke. J Neurointerv Surg. 2019;11(8):772-4.

3) Pfaff JAR, Maurer C, Broussalis E, Janssen H, Blanc R, Dargazanli C, et al. Acute thromboses and occlusions of dual layer carotid stents in endovascular treatment of tandem occlusions. J Neurointerv Surg. 2020;12(1):33-7.

4) Klail T, Kurmann C, Kaesmacher J, Mujanovic A, Piechowiak EI, Dobrocky T, et al. Safety and Efficacy of Carotid Artery Stenting with the CGuard Double-layer Stent in Acute Ischemic Stroke. Clin Neuroradiol. 2022:1-8.

Thank you for your attention!

