

Evaluation of visible spinal arteries on CTA before and after BEVAR for TAAA

K. Gallis, P. Kasprzak, K. Pfister, K. Oikonomou, B. Cucuruz, R. Kopp

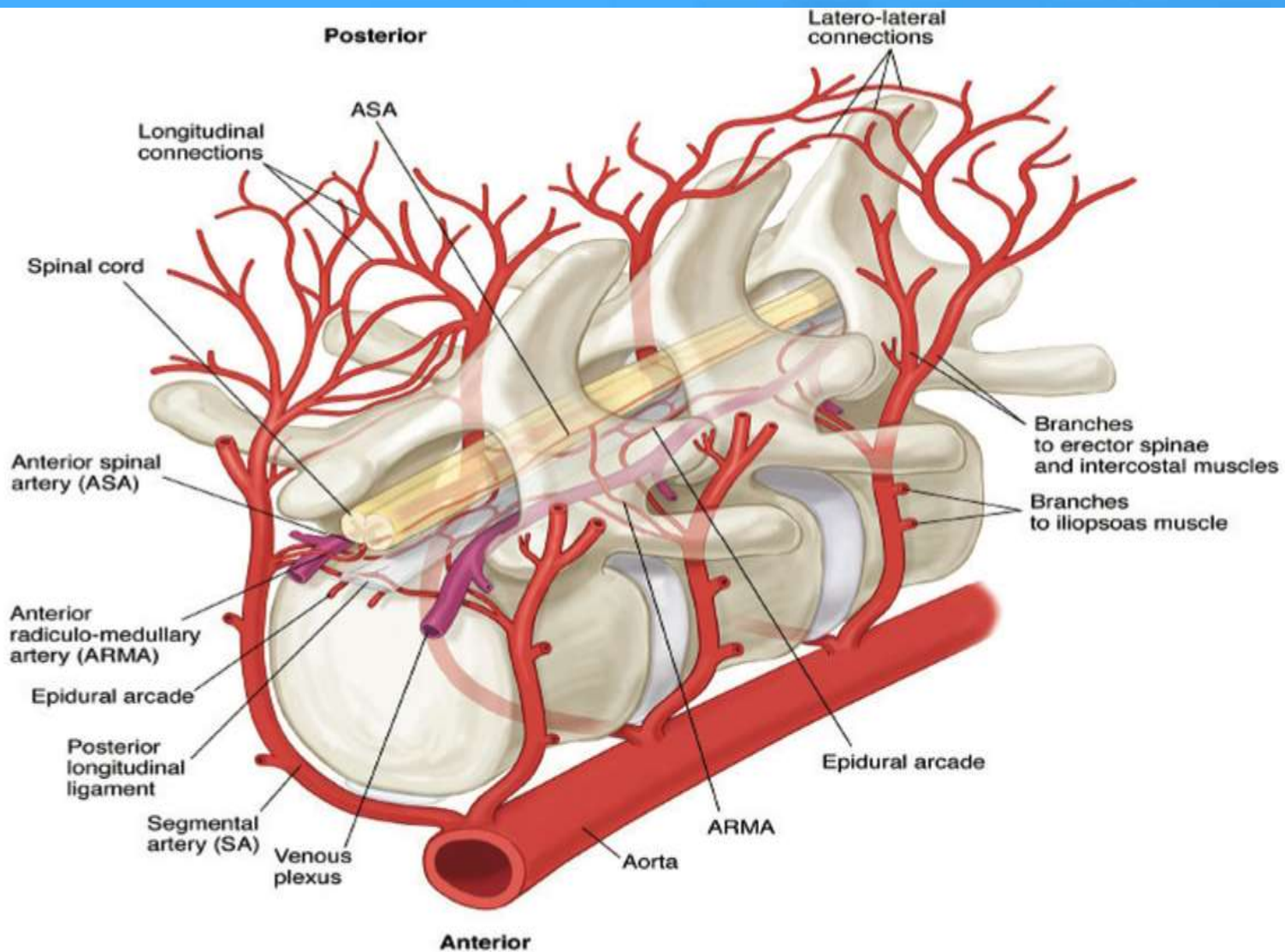
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Thoracoabdominal Aortic Aneurysm (TAAA)

- + Epidemiology: 5.9/100,000 cases per year
- + Median age: 65 years old
- + 5-years survival rate without operation: 54%
- + 3 options
 - + Open repair (OR)
 - + Hybrid repair
 - + Branched endovascular aortic repair (BEVAR)

BEVAR

- + Branched endovascular aortic repair (BEVAR)
 - + a minimally invasive therapeutic option for patients with thoracoabdominal aortic aneurysms (TAAAs)
 - + However → perioperative spinal cord ischemia (SCI) with paraplegia 4-25%
- + Recent reports indicate that the regulation of spinal cord perfusion is mediated by
 - + segmental spinal arteries
 - + paraspinal arterial collaterals
 - + dorsal branches of posterior intercostal arteries and
 - + lumbar arteries
- + representing the spinal collateral network



A diagrammatic reconstruction the blood supply to the spinal cord. The multiple inputs into the anterior spinal artery, and the rich matrix of longitudinal and lateral interconnections between the intraspinal and epidural systems are shown.

Griep EB, Luozzo GD, Schray D, Stefanovic A, Geisbüsch S, Griep RB. The anatomy of the spinal cord collateral circulation. *Ann Cardiothorac Surg* 2012;1(3):350-357. doi: 10.3978/j.issn.2225-319X.2012.09.03

Temporary aneurysm sac perfusion (TASP)

- + 2- staged therapy
- + Open branch concept
- + Paraplegia rate: 21% vs. 5%
- + Non-completion → maintain spinal cord perfusion
 - + Prevent aneurysm sac thrombosis
 - + Patent intercostal and/or lumbar arteries

Evaluation of visible spinal arteries (SAs)

- + Retrospective data analysis
- + Pre- and post-operative CTAs from January 2009 to June 2015
 - + Semi quantitatively analysed
 - + The number of visible SA's in the stented aorta before and after BEVAR-FEVAR with at least one branch
 - + Possible correlation with severe spinal cord ischeamia (SCI).

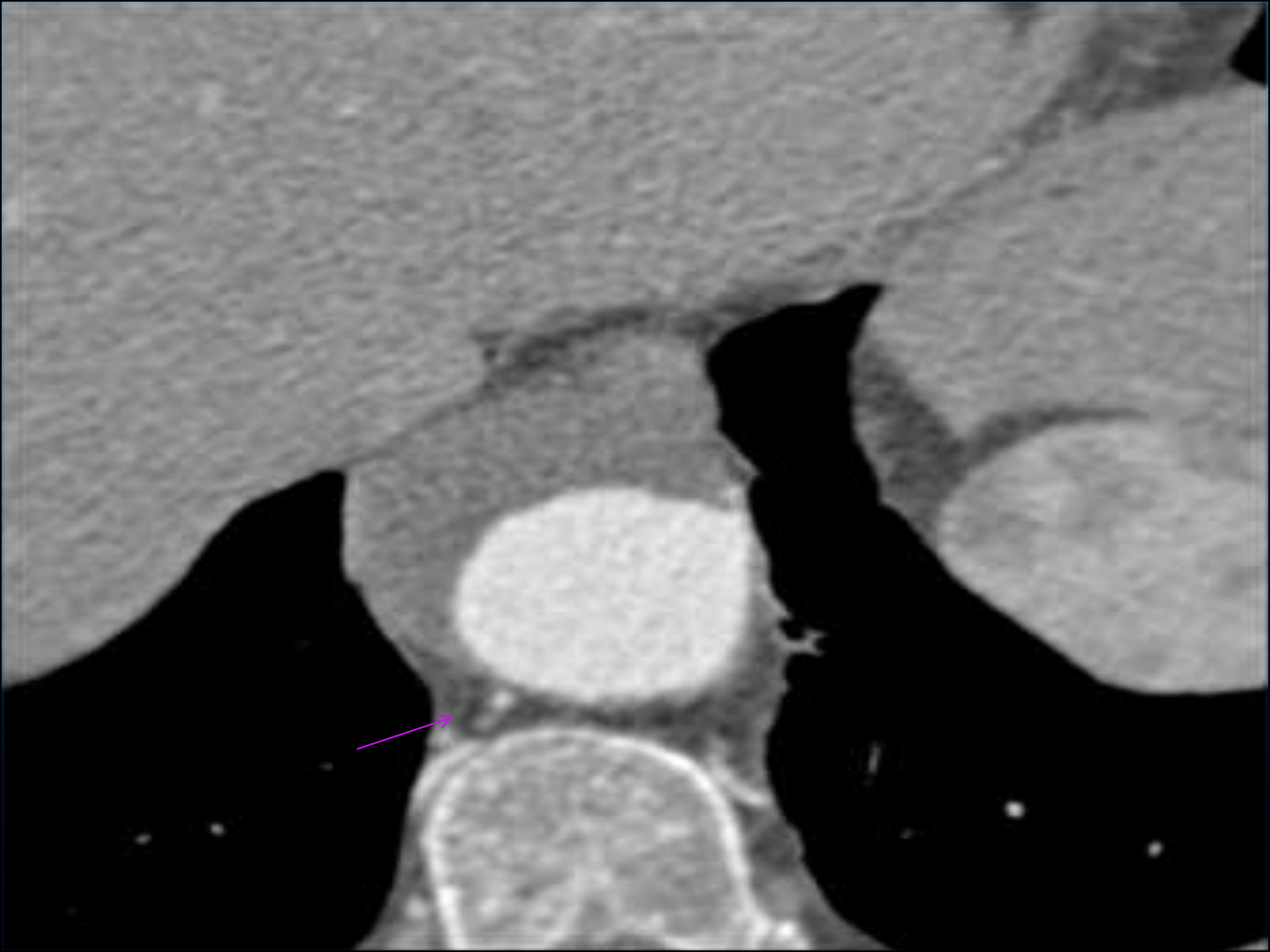
Results

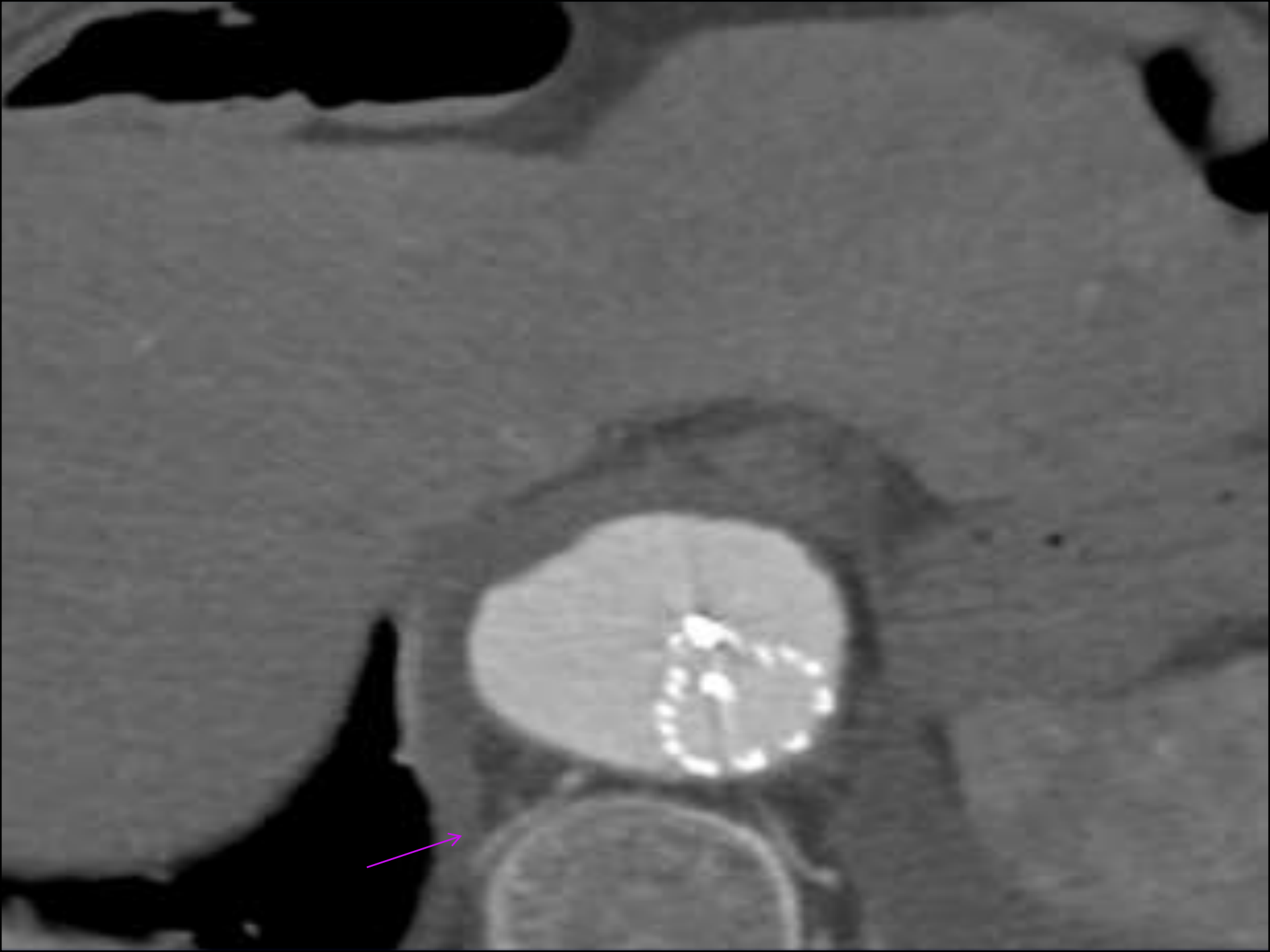
- + Severe SCI or paraplegia was observed in 10 patients (12.3 %)
- + SCI was lower in the open branch/TASP group (2/40) compared to the single step group (8/37; $P=.032$)

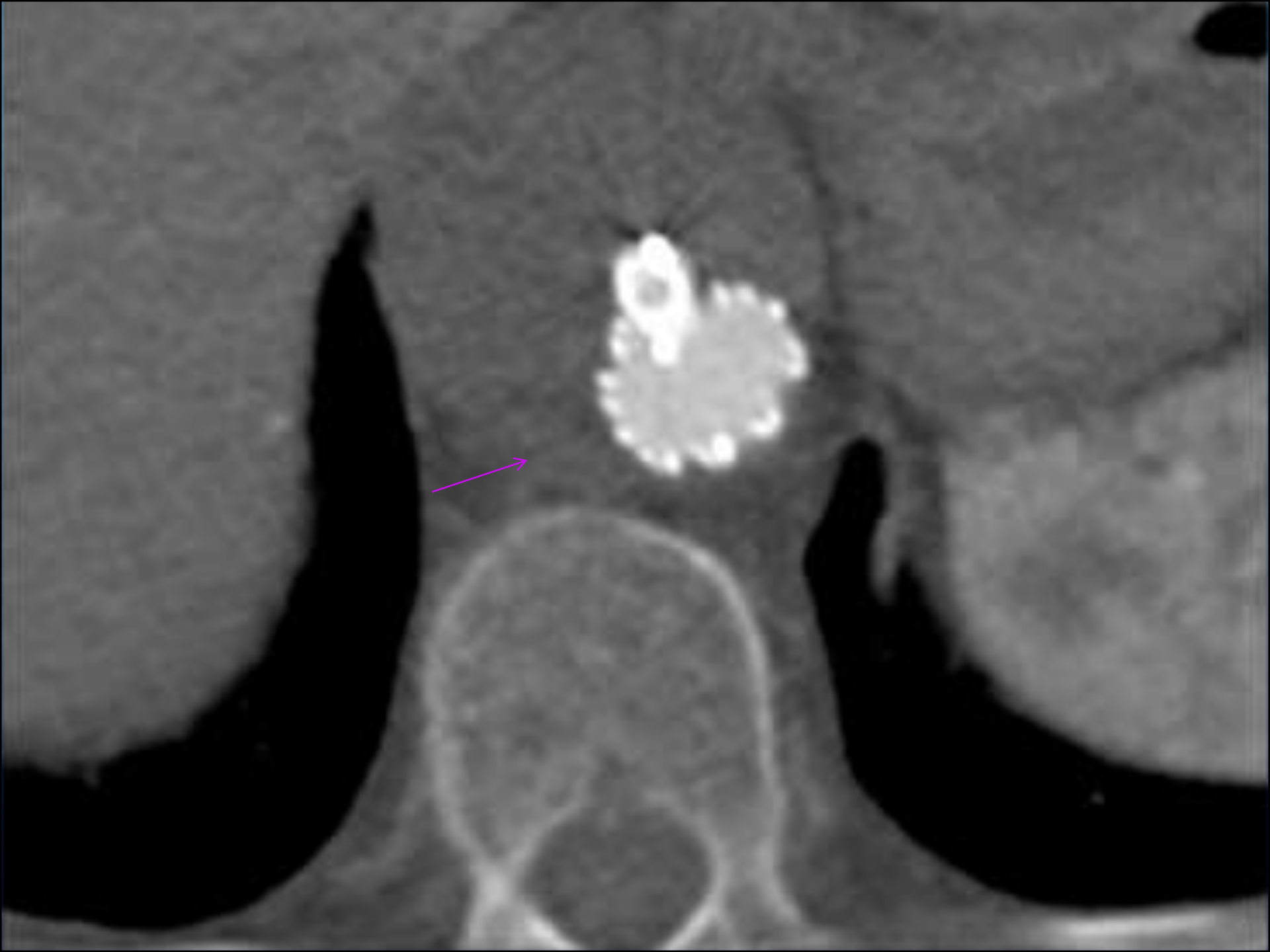
severe SCI	single step	open branch	P
none	29/37 (78.3%)	38/40 (95%)	
occurrence	8/37 (21.6%)	2/40 (5%)	.032

Evaluation of the SAs

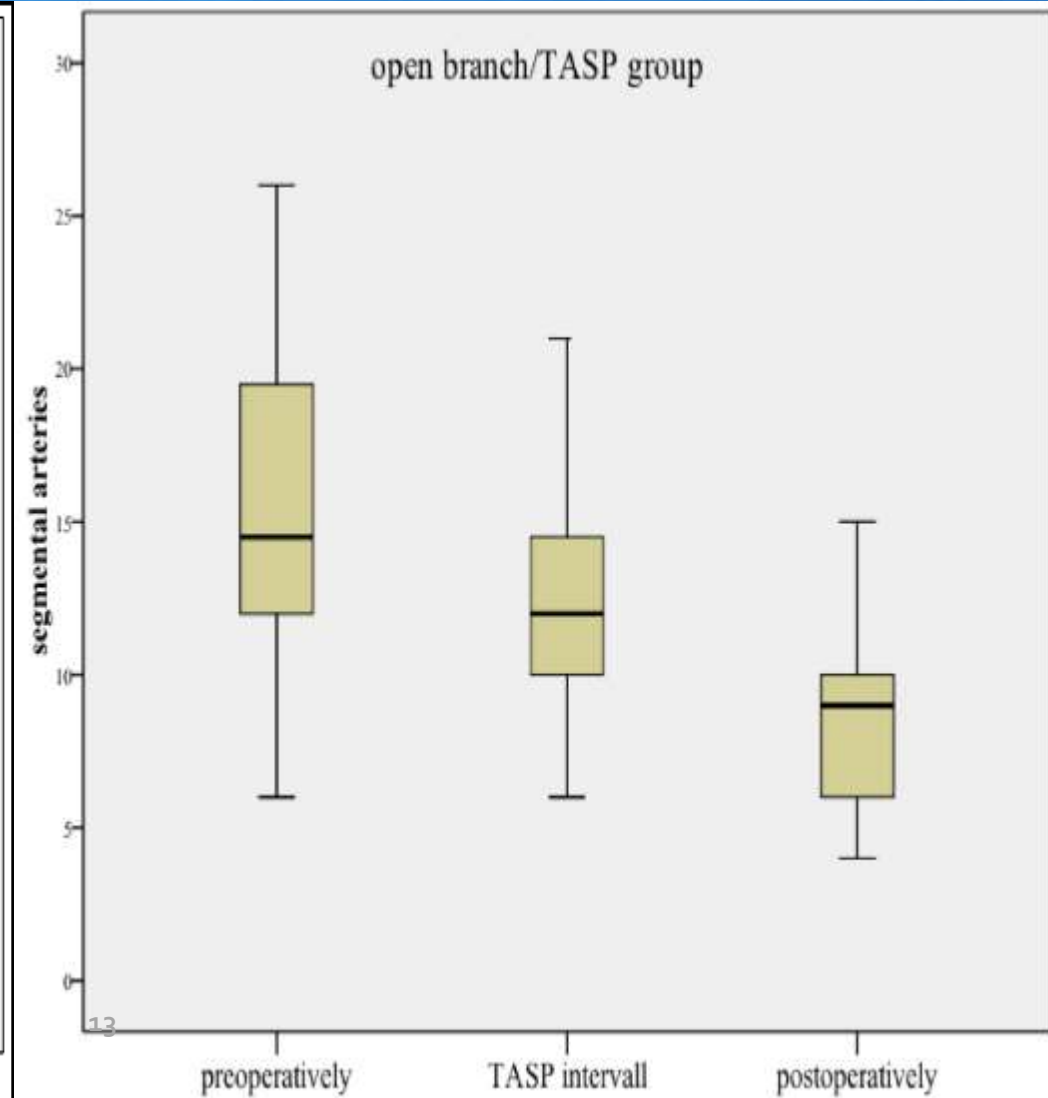
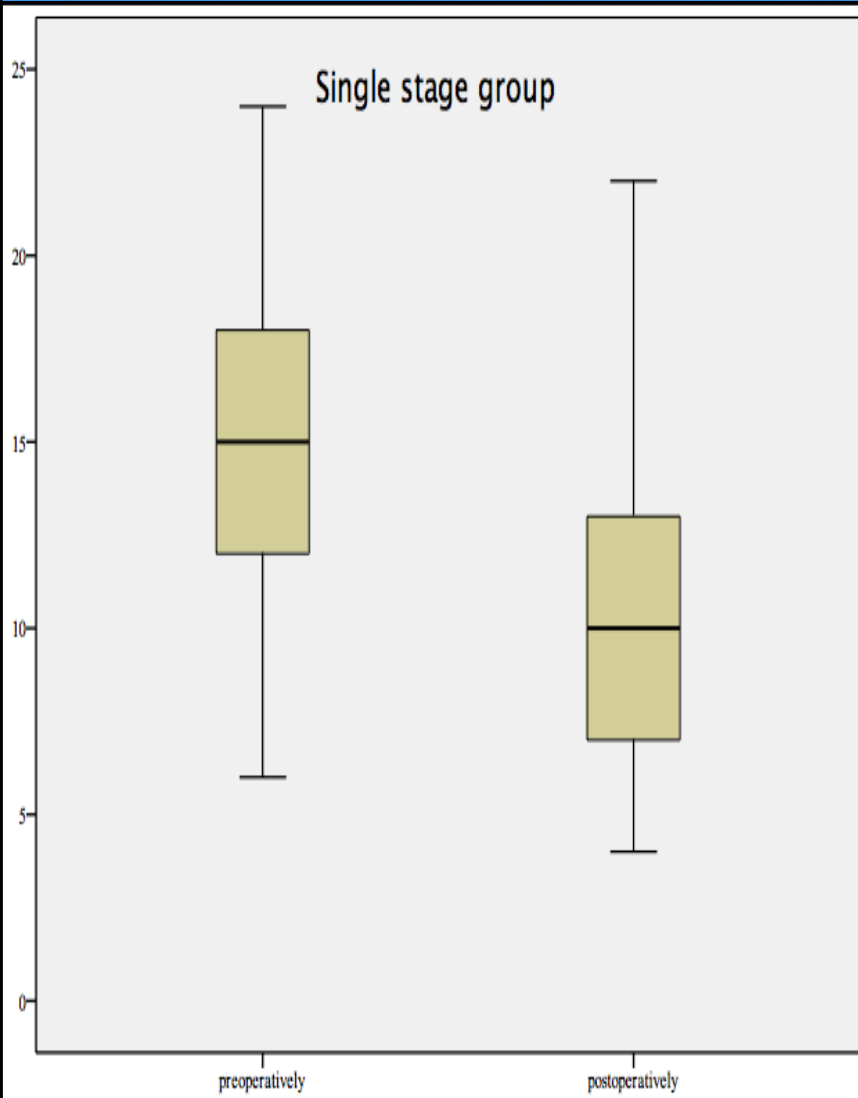
- + The number of visible SAs in the overstented aortic segment was reduced on postoperative CTAs (10.0 vs 15.57 SAs; $P < .001$) in comparison to preoperative CTA imaging,
- + similar results in both of groups
 - + TASP \rightarrow 9.48 vs. 15.83 SAs
 - + single stage \rightarrow 10.57 vs. 15.30 SAs
- + TASP group \rightarrow more visible SAs detected during the TASP interval in comparison to the CTA after completion (12.93 vs. 9.48 SAs; $P < .001$).







Box plots



Results

- + We performed a ROC curve analysis in the single stage group
Cut-off point of 15 SAs on pre-CTA with correlation to severe SCI
($P=.006$).
- + Patients with TASP had a reduced paraplegia risk in
comparison to the single step patients when >15 SAs were
overstented
($1/20$ vs $8/22$, $P=.008$).

Tables

Single stage group		
number of SAs	severe SCI	P
0-4	-	
5-9	0/4 (0%)	
10-14	0/11 (0%)	
15-19	5/15 (33%)	
≥20	3/7 (43%)	.008

	Severe SCI		
SAs	single step	open branch/TASP	P
<15	0/15	1/20 (5%)	
≥15	8/22(36%)	1/20(5%)	.018

Conclusion

- + The study seems to support the reported protective effect of the open branch concept with TASP regarding the risk of paraplegia during branched EVAR
- + More spinal arteries are visible during the TASP interval, supporting the concept of spinal cord preconditioning through TASP to reduce severe SCI in BEVAR.
- + An intentional coverage of more than 15 SAs in single step BEVAR is associated with an increased risk of SCI

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