

CAROTID NEAR-OCCLUSION IS OFTEN OVERLOOKED WHEN CTA IS REVIEWED IN ROUTINE PRACTICE

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BACKGROUND

With NASCET method of grading carotid stenosis, the first step is to exclude near-occlusion and then only grade cases without near-occlusion with percent¹. In the literature, near-occlusion is often omitted as a category of stenosis degree despite acclaiming NASCET method use²⁻³. Hence, it seems reasonable to suspect that many omit the first step of near-occlusion exclusion when computed tomography angiographies (CTA) are assessed in routine practice; especially near-occlusion without full collapse (without “string sign”).

The purpose of this study was to assess how often carotid near-occlusions are overlooked when CTA is assessed in routine practice.

METHODS

One CTA-expert manually re-reviewed 4403 consecutive CTA performed for all indications. Another CTA-expert audited all possible near-occlusion cases. Systematic interpretation to assess if the internal carotid artery (ICA) distal to the stenosis was small and most likely reduced in size by the stenosis⁴. Assessments were based on ICA asymmetry, ICA size, ICA/external carotid artery (ECA) ratio and stenosis severity⁴. Subtle collapses were acknowledged (near-occlusion without full collapse) in addition to severe collapses (near-occlusion with full collapse, “string sign”). The common near-occlusion mimic of ICA asymmetry caused by anatomical variance in the Circle of Willis was categorized as conventional stenosis⁵.

In all cases with symptomatic $\geq 50\%$ carotid stenosis, the imaging report from routine practice was compared with the expert review.

In addition, 8 near-occlusions cases and 6 control cases were sent to 13 radiologist in 10 hospitals across Sweden. All 14 cases had perfect intra- and interrater agreement for the experts. All 13 participants graded carotid stenosis with CTA in routine practice. Each radiologist assessed the cases as they would have done in clinical routine, not knowing the purpose of the study.

RESULTS

In the local routine practice, 383 consecutive symptomatic $\geq 50\%$ carotid stenosis were included of which 105 were near-occlusion. Sensitivity and specificity in local routine practice was 23% (95%CI 15-31%) and 98%. Sensitivity ranged between 0-71% between seven neuroradiologists who reviewed ≥ 5 near-occlusion cases and averaged 8% among remaining 31 radiologists (figure). 63% of near-occlusion were mistaken for conventional $\geq 50\%$ carotid stenosis

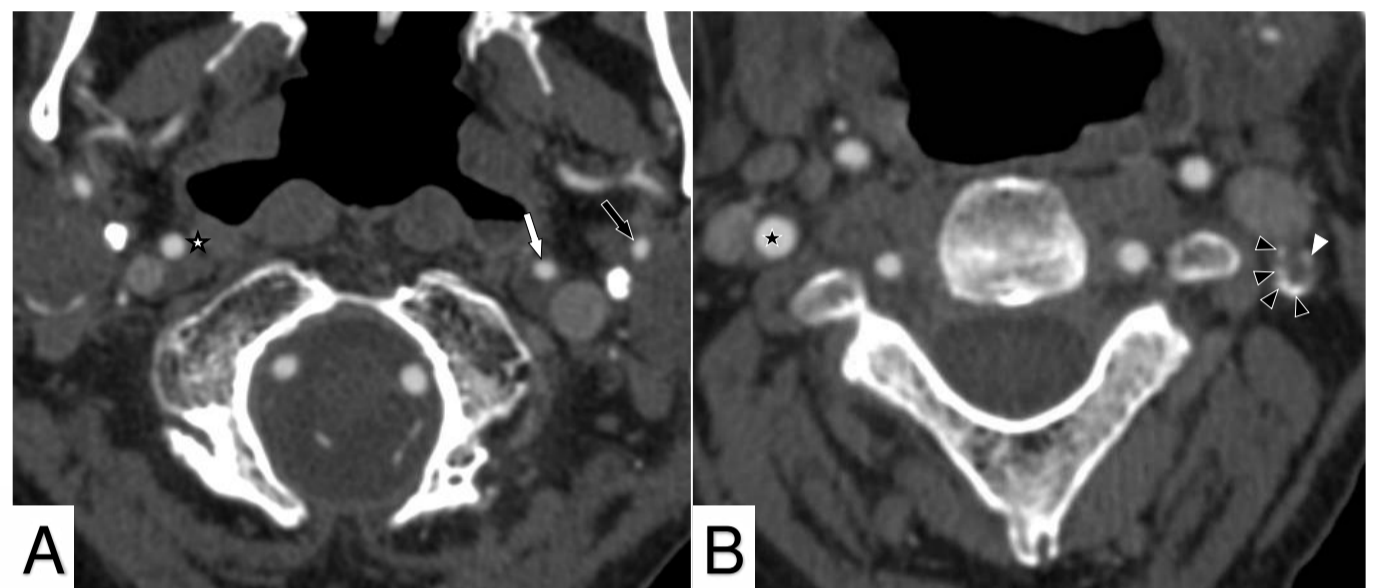
For the 13 radiologists reviewing the same 8 near-occlusions, the average sensitivity was 10% (10/104), ranging from 0-88%; specificity was 100% (78/78). 1 radiologist accounted for almost all (n=7) of detected near-occlusions, whereas 77% (10/13) of the radiologists missed all near-occlusions. 63% of near-occlusion were mistaken for conventional $\geq 50\%$ carotid stenosis

REFERENCES

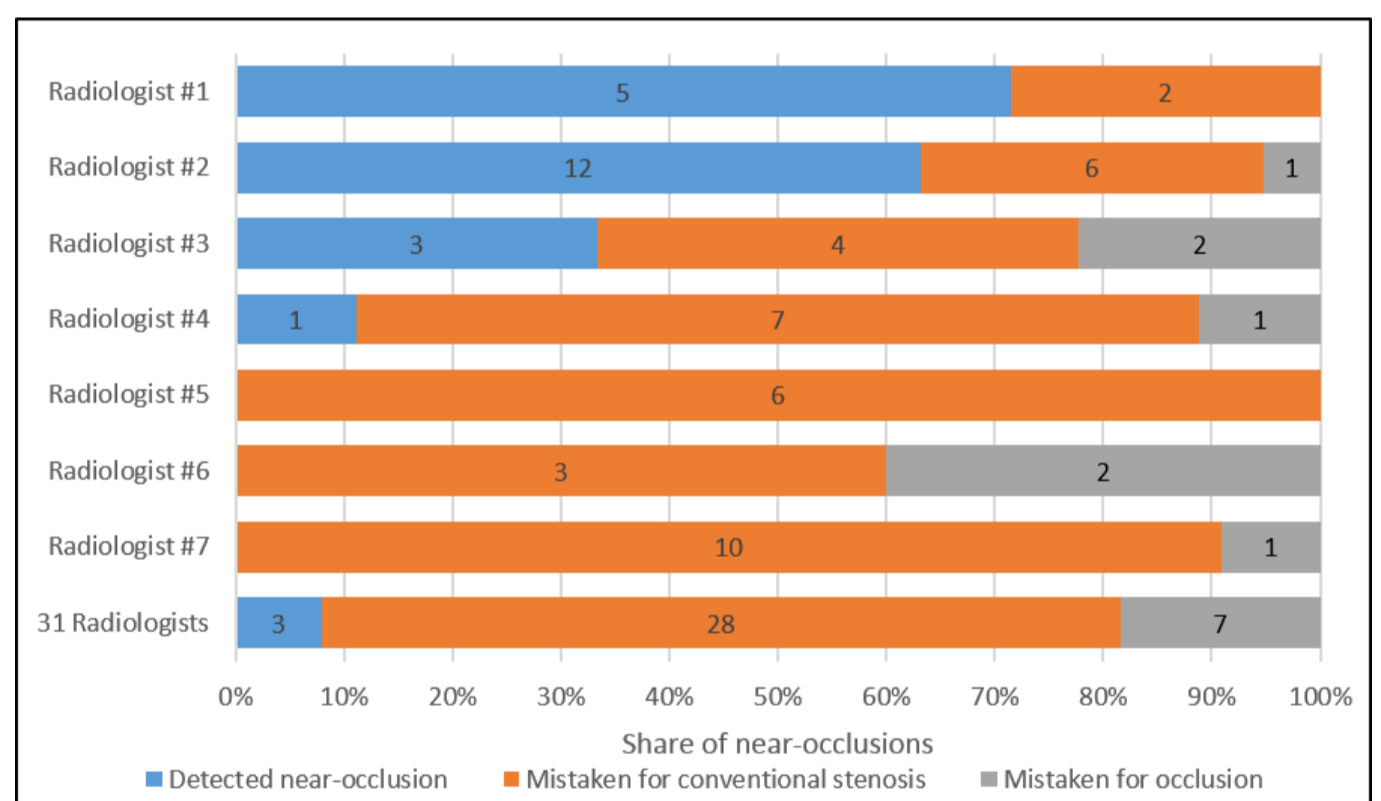
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BASIC FACTS ABOUT NEAR-OCCLUSION

- Near-occlusion is severe stenosis causing distal artery size reduction
- Near-occlusion is an angiography diagnosis
- Near-occlusion is likely caused by flow reduction
- Near-occlusion includes more than “string sign” – the distal collapse is often subtle
- Major trial findings for 50-99% stenoses are not applicable to near-occlusion.
- In guidelines, symptomatic near-occlusion does not have a strong indication for CEA/CAS



Left-sided near-occlusion. A) Axial view distal to the stenosis. B) Axial view of stenosis. Distal ICA (white arrow) is small, smaller than right ICA (White star) and similar as left ECA (Black arrow). The left-sided stenosis is severe (White arrowhead), a calcified stenosis (black arrowheads). No relevant stenosis on right side (black star). CTA was misclassified as conventional stenosis when interpreted in routine practice and by 12 of the 13 Swedish Radiologists.



CONCLUSIONS

- 1) Carotid near-occlusion is systematically overlooked when CTA is assessed in routine practice.
- 2) Given 0-88% range in sensitivity between radiologists examining the same cases, there are clear differences in radiologist proficiency – which will likely vary between centers.

