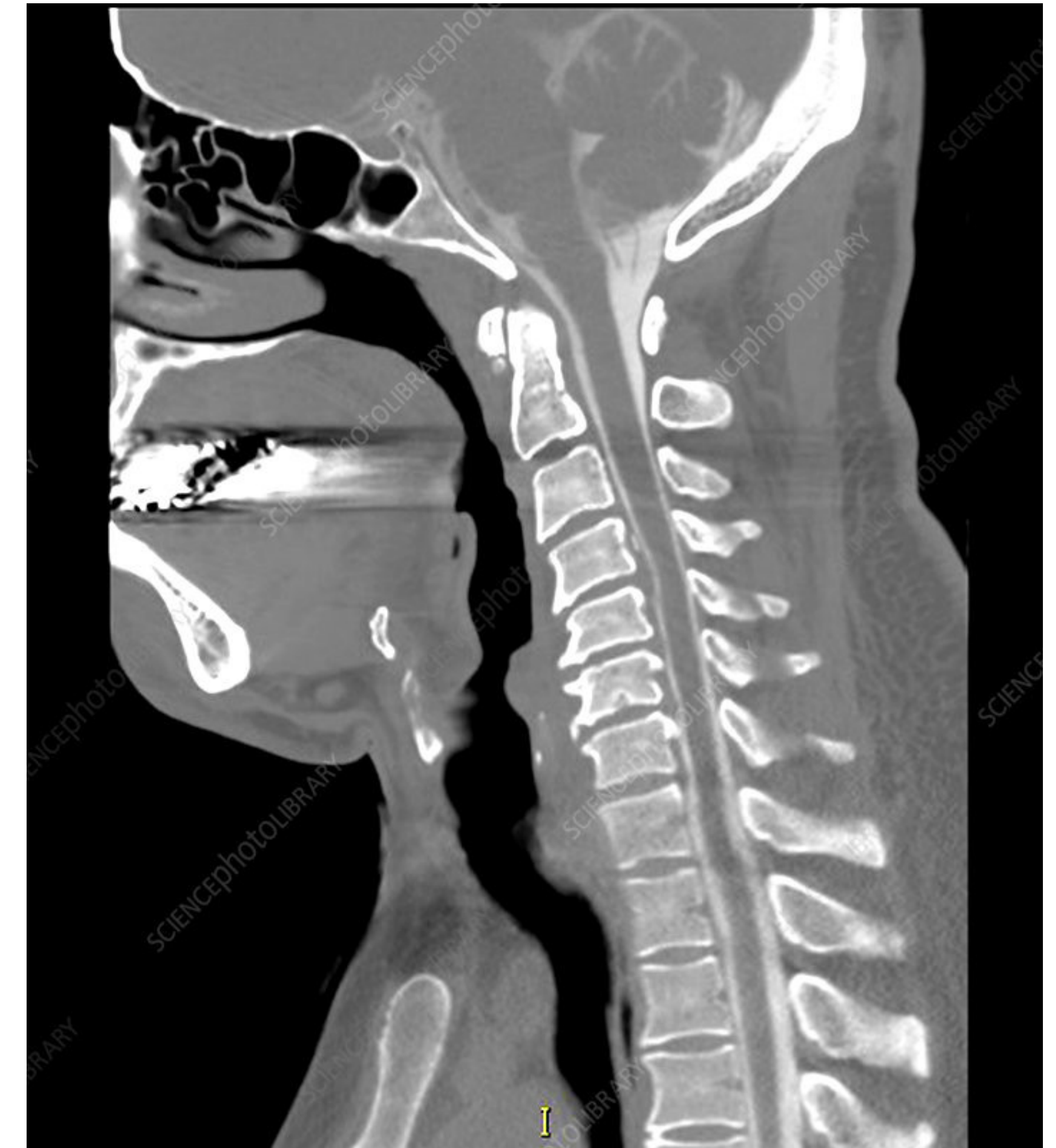


# The normal appearance of CT myelograms

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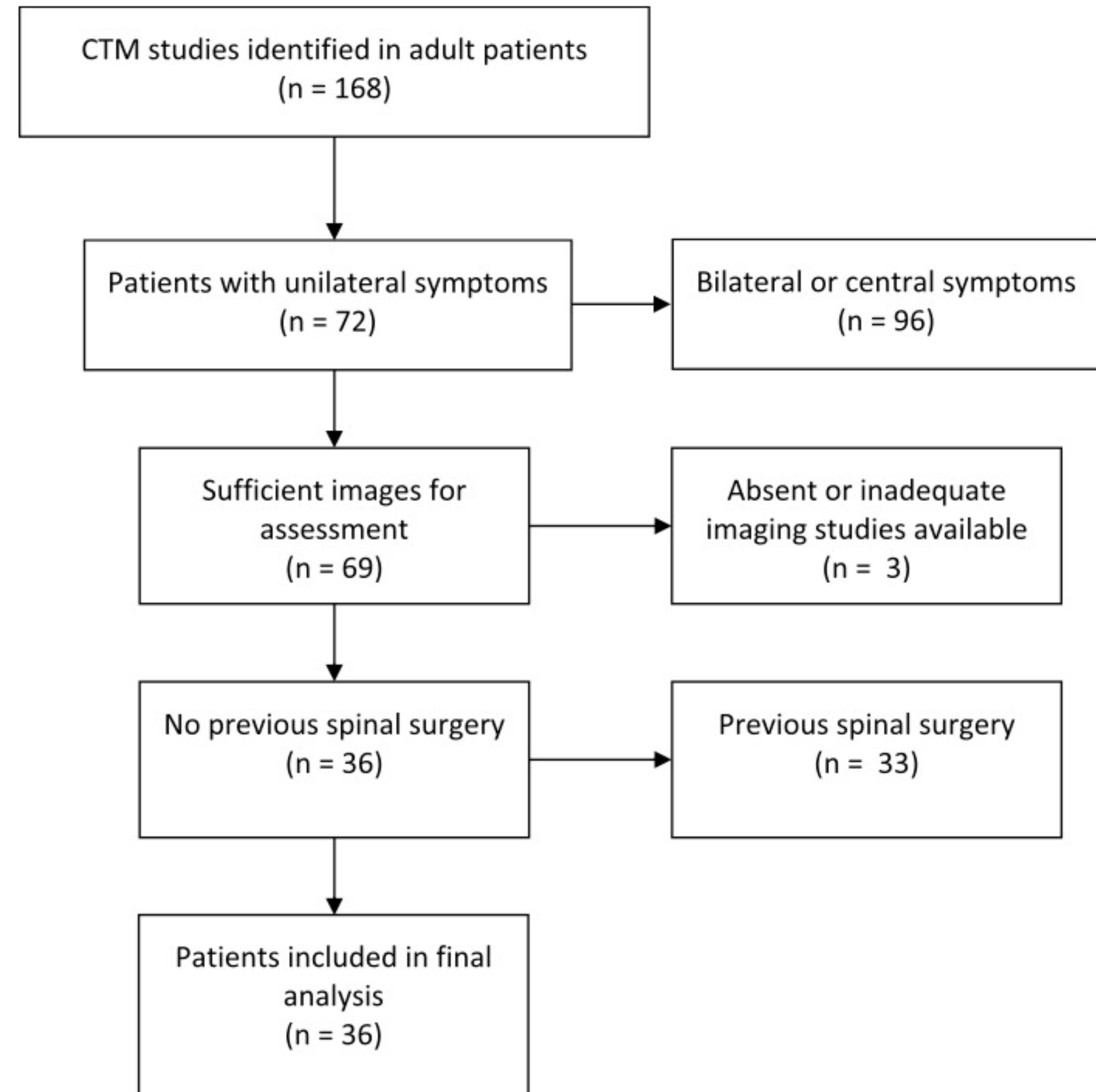
# Background

- Computed tomographic myelography (CTM) has been used since 1976 to investigate the neurological structures in the spine.
- CTM has a sensitivity of between 57 and 92% for HNP and 62% in nerve root compression but has risks of neural injury and is technically difficult.
- The technique is used where MRI is contraindicated, when dynamic stenosis is suspected and in postoperative scans because of its reduced vulnerability to distortion caused by instrumentation
- There is no definition of the normal appearances of the neural structures seen on CTM, so its clinical utility is limited.
- In this case series, we define if the normal appearances to the nerve roots on a lumbar CT myelogram can be reliably identified.



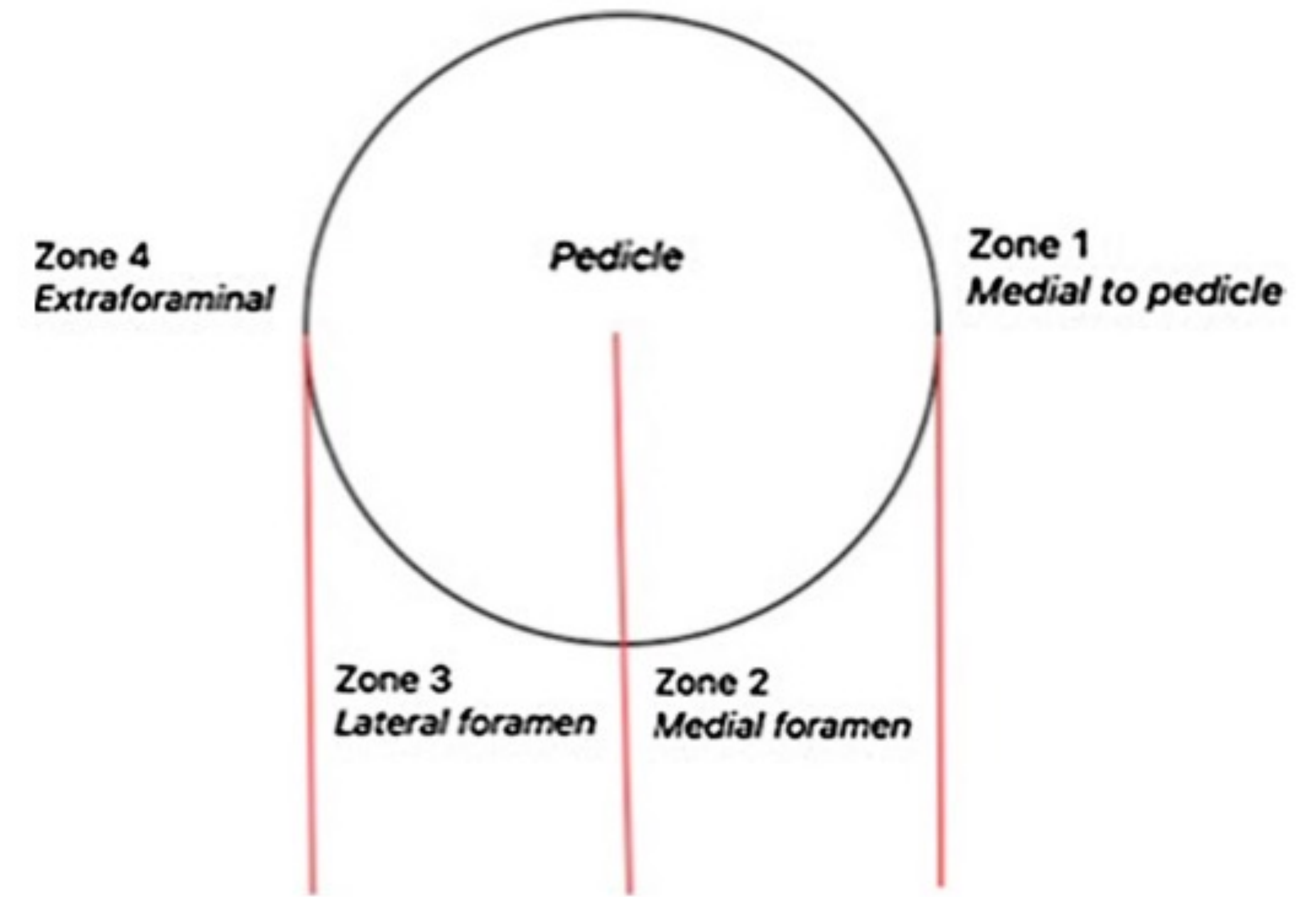
# Methods

- A retrospective analysis of a case series of CTM carried out in a single tertiary referral centre in the UK that cares for both orthopaedic and neurosurgical spinal patients.
- Inclusion: Aged > 18 years, patients who underwent CTM between 2011 and 2018 for unilateral lumbar radiculopathy.
- Exclusion: any previous spinal surgery, bilateral symptoms at any lumbar level, investigated for central canal stenosis or no coronal images available.
- The lateral extent of contrast relative to the L1, L2, L3, L4 and L5 pedicle was measured on the coronal images on the side of the spine identified as asymptomatic by the clinical records.
- The extent of the lateral extent was recorded by zone (figure).
- Four investigators reviewed the images (a consultant spinal surgeon, consultant musculoskeletal radiologist, a senior trainee in orthopaedic spinal surgery and a foundation year one doctor).

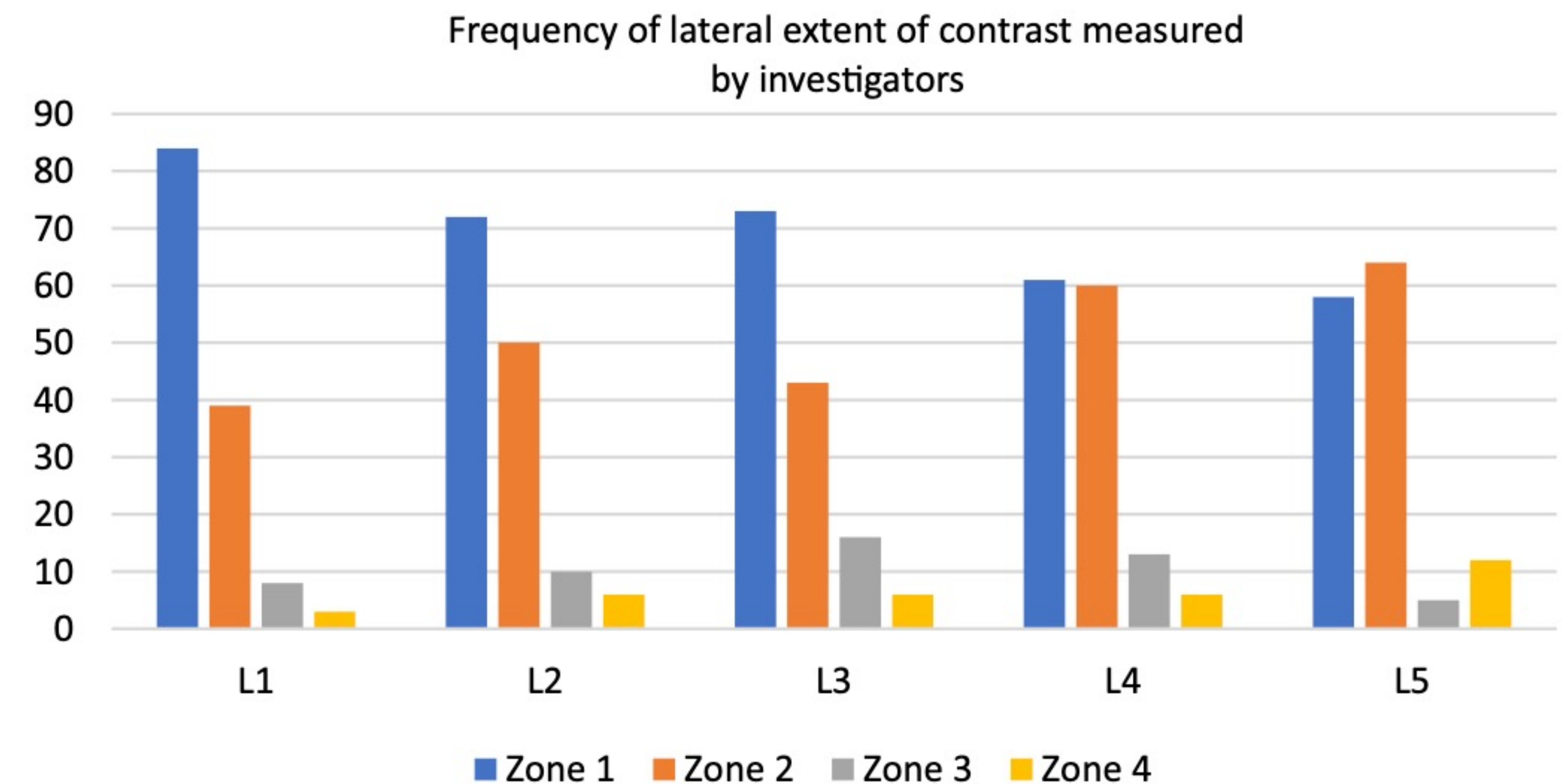


# Results

- 168 adult patients underwent CTM between 2011 and 2018.
- 36 patients were eligible for inclusion
- The majority of kappa scores showed slight or fair agreement between reviewers
- The combined kappa analysis shows that slight agreement between all reviewers was achieved at L2 and L5.
- Fair agreement was observed at the remaining levels.



Definitions of the lateral extent of contrast at each lumbar level



# Results

Level	Kappa value
L1	0.2403
L2	0.1596
L3	0.2782
L4	0.2757
L5	0.1989

The combined kappa scores for each lumbar level

Lumbar level	Reviewer	B	C	D
L1	A	0.2505	0.1529	0.297
	B		0.275	0.5397
	C			0.06
L2	A	0.1169	0.107	0.0354
	B		0.1728	0.5428
	C			0.1728
L3	A	0.2185	0.0187	0.1622
	B		0.3719	0.6342
	C			0.38
L4	A	0.1501	0.2514	0.1414
	B		0.2846	0.6981
	C			0.3111
L5	A	0.0936	0.0642	0.1116
	B		0.2204	0.8843
	C			0.2169

A, musculoskeletal radiologist; B, FY1 doctor; C, consultant spinal surgeon; D, specialist trainee in orthopaedic spinal surgery

Kappa scores for each investigator relative to each other

# Discussion

- Advanced imaging that doesn't rely on high strength magnetic fields is essential for select patients, however CTM causes complications in up to 10 -15% of patients.
- There is poor agreement in the interpretation of results of a normal CTM.
- The kappa values suggest that there may be development in individual skills of interpreting images as experience progresses.
- It is difficult to describe normal CTM findings throughout the lumbar spine in the adult population with sufficient accuracy to make robust treatment decisions.
- Patients may be receiving inappropriate management based on misleading radiographic data.



# Bottom Line

Although useful when MRI is not possible, there is significant disagreement in the interpretation of normal CT myelogram images so abnormal images may not be recognised.

Misinterpretation of images could lead to questionable diagnoses and inadvertently erroneous management if used in isolation.

# Disclosures

None of the authors has any potential conflict of interest