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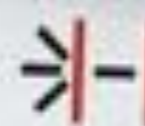
Vem man sticka i ryggen? - spine abnormalities

Thierry Girard,
Basel Switzerland



Klinikum 1
Spitalstrasse 21

Geburt und
Gynäkologische Notfälle
Neonatologie



Universitätsspital
Basel

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Review Article

Neuraxial techniques in patients with pre-existing back impairment or prior spine interventions: a topical review with special reference to obstetrics

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Vertebral column abnormalities

- Examples
- Neuraxial anaesthesia
- Malfusion (spina bifida)
- Trauma
- Scoliosis



CASE REPORT

Foot drop after spinal anesthesia in a patient with a low-lying cord

F. U. Ahmad, P. Pandey, B. S. Sharma, A. Garg

Departments of Neurosurgery and Neuroradiology, Neurosciences Centre, All India Institute of Medical Sciences, New Delhi, India



Int J Obstet Anesth. 2006;15(3):233-6.

Spina bifida, tethered cord and regional anaesthesia

- 25 weeks gestation, vaginal bleeding
premature rupture of membranes
- Spina bifida occulta
- Bladder surgery @ age 4
- self-catheterised
- Regional anaesthesia considered possible (other hospital)

Tethered cord



«...spontaneous vaginal delivery a few hours later...»

«...Although the patient told us that she had spina bifida occulta, in fact she probably had occult spinal dysraphism. Confusingly, the terms spinal bifida occulta and occult spinal dysraphism are often used interchangeably, but spinal dysraphism is not a benign entity like spina bifida occulta...»

always be kept in mind. Patients with neurological abnormalities, cutaneous manifestations or involvement of more than one lamina may have a tethered cord and it is incumbent upon the anaesthetist to understand fully the terminology and extent of the defect before performing neuraxial anaesthesia [6].

L. Ali

G. M. Stocks

Queen Charlotte's & Chelsea Hospital
London, UK

Accidental conus medullaris injury following combined epidural and spinal anesthesia in a pregnant woman with unknown tethered cord syndrome

XUE Ji-xiu, LI Bing and LAN Fei

Keywords: *anesthesia, epidural; anesthesia, spinal; tethered cord syndrome; conus medullaris*



Vertebral column abnormalities

- Anatomical difficulties
- Mechanical difficulties
- Injury to the conus medullaris
- Injury to the caudal equina

Vertebral column abnormalities

- Scoliosis
- Malfusion
- Trauma

Malfusion



Fetal Spina bifida education

Spina bifida

- Spina bifida occulta
- Spina bifida cystica
- Occult spinal dysraphism

Spina bifida occulta



Spina bifida cystica



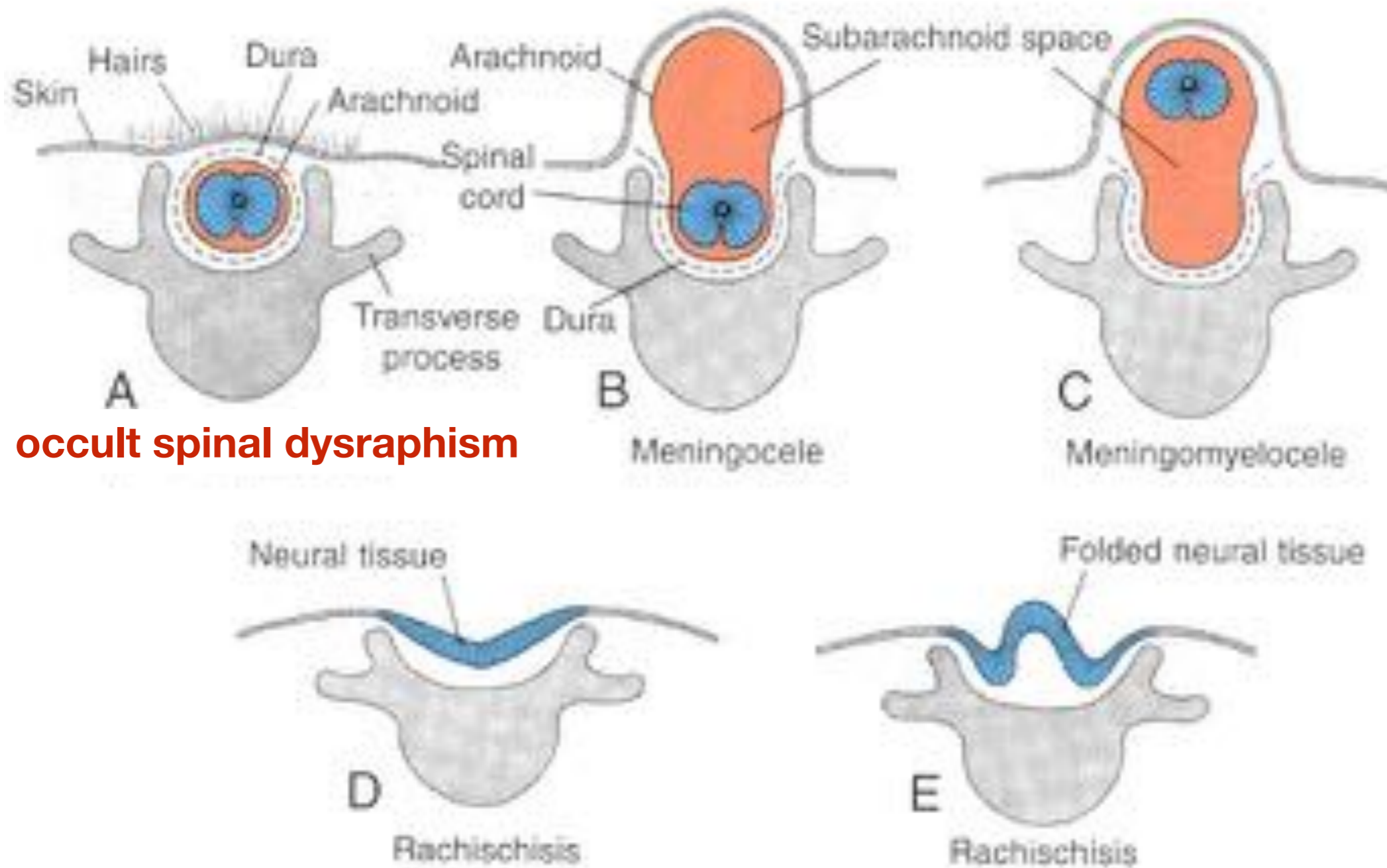
Meningocele



Meningomyelocele

Myeloschisis

Spina bifida cystica



occult spinal dysraphism

Spinal dysraphism

- Skin abnormalities (midline)
- Tethered cord in 35-85 %

Sacral Dimples

Holly A. Zywicke, MD,*
Curtis J. Rozzelle, MD[†]

Objectives After completing this article, readers should be able to:

1. Explain the difference between open and closed neural tube defects.
2. Describe the characteristics of spinal skin dimples that warrant further evaluation.
3. Describe the characteristics of spinal skin dimples that do not warrant further evaluation.
4. Discuss the evaluation of spinal skin dimples and name the findings that suggest occult spinal dysraphism.
5. Discuss the neurosurgical treatment of occult spinal dysraphism.
6. Explain the natural history and clinical manifestations of occult spinal dysraphism.

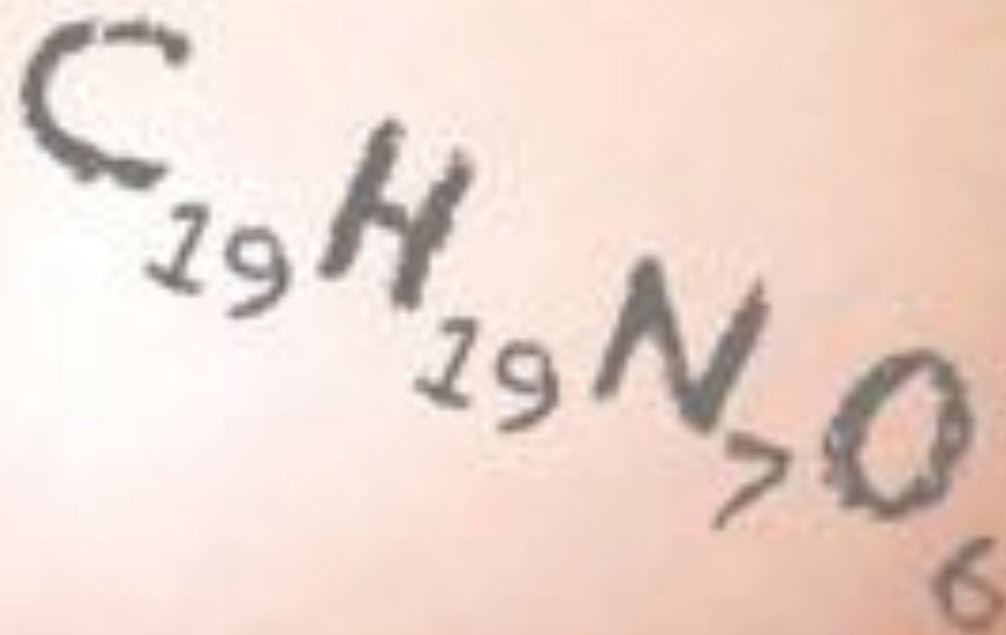


Figure 1. Solitary dimple whose location greater than 2.5 mm above the anus indicated the need for further evaluation, which revealed an occult spinal dysraphism requiring neurosurgical intervention.





Folic acid –
the pregnancy vitamin





LOST



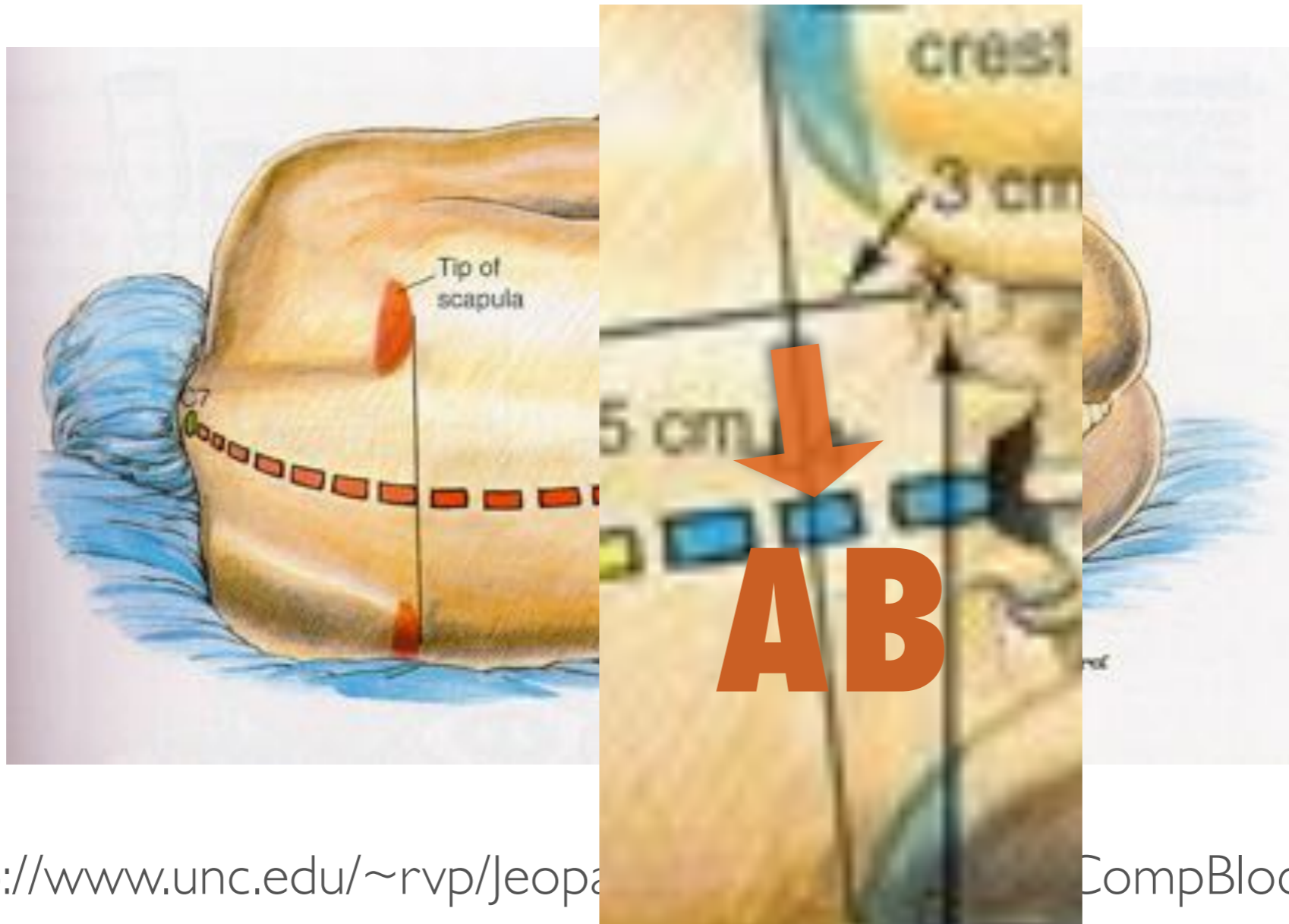
ELSEVIER

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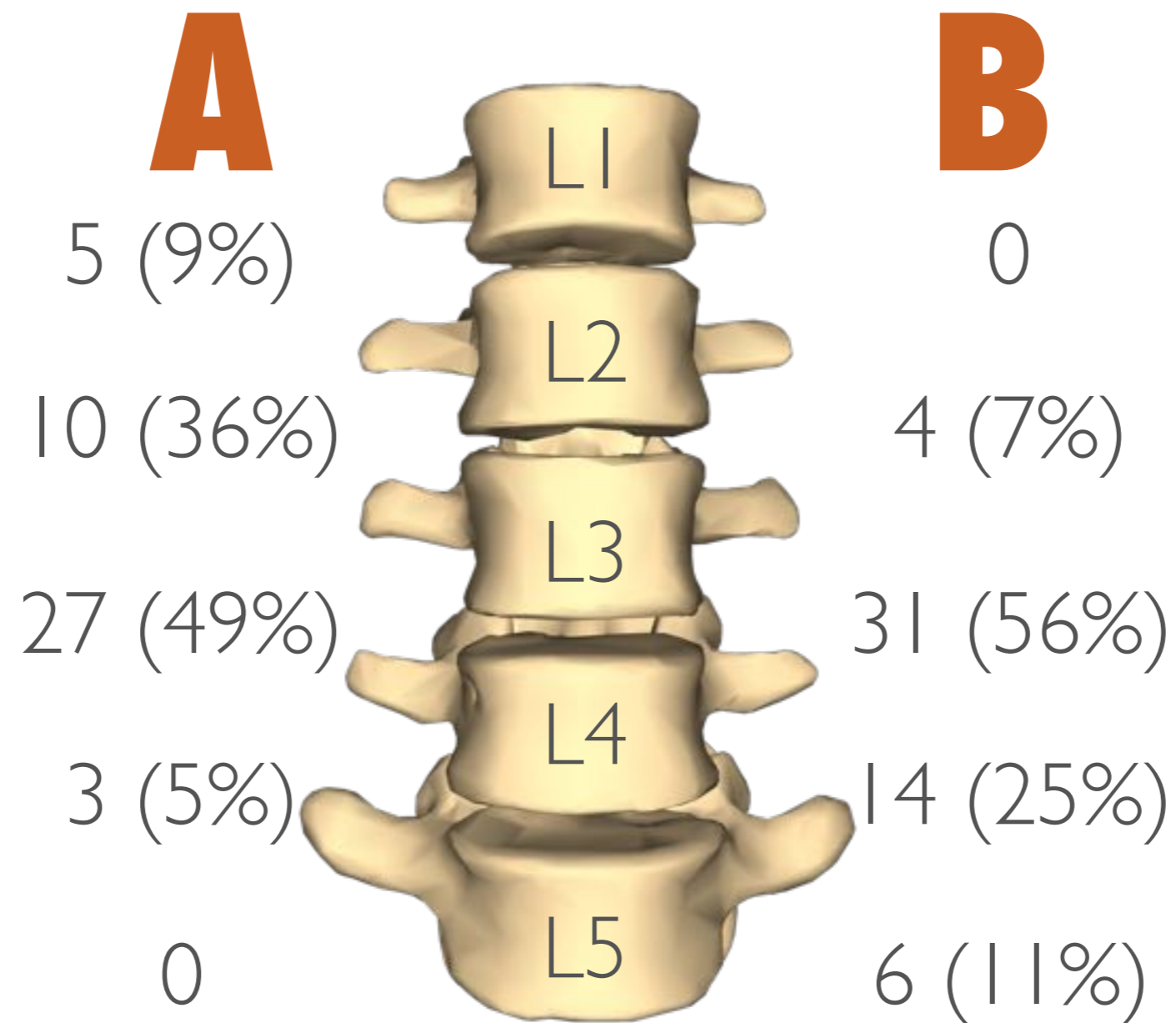
ORIGINAL ARTICLE

Spinal anaesthesia for caesarean section: an ultrasound comparison of two different landmark techniques

K. Kallidaikurichi Srinivasan, M. Deighan, L. Crowley, K. McKeating
Department of Anaesthesia, National Maternity Hospital, Dublin, Ireland



<http://www.unc.edu/~rvp/Jeopa> CompBlock.jpg



http://upload.wikimedia.org/wikipedia/commons/a/a8/Lumbar_vertebrae_-_close-up_-_anterior_view.png

Table 6 Level at which spinal anaesthesia was performed

	Group A (n=55)	Group B (n=55)
L2-3	22 (40.0%)	8 (14.5%)
L3-4	30 (54.5%)	27 (49.1%)
L4-5	3 (5.5%)	15 (27.3%)
L5-S1	0 (0%)	5 (9.1%)

Data are number (%)

Ability of anaesthetists to identify a marked lumbar interspace

C. R. Broadbent,¹ W. B. Maxwell,¹ R. Ferrie,¹ D. J. Wilson,² M. Gawne-Cain³ and R. Russell⁴

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2 Consultant, Department of Radiology, Nuffield Orthopaedic Centre, Oxford, UK

3 Senior Registrar, Department of Neuroradiology, Radcliffe Infirmary, Oxford, UK

In Ability of anaesthetists to identify a marked lumbar interspace

Actual level	Anaesthetists' opinions						
	T ₁₂ -L ₁	L ₁₋₂	L ₂₋₃	L ₃₋₄	L ₄₋₅	L ₅ -S ₁	S ₁₋₂
T ₁₁₋₁₂	2	3		1			
T ₁₂ -L ₁		10	4	2			
L ₁₋₂	1	<u>16</u>	39	24			
L ₂₋₃		5	<u>26</u>	45			
L ₃₋₄				<u>13</u>	5		
L ₄₋₅					<u>2</u>		
L ₅ -S ₁						<u>1</u>	1

Table 3 Percentage of spinal cords ending lower than L₁ or L₂ in studies spanning more than

	No. of subjects	Percentage of cords ending below body of L ₁
Thomson, 1895 [9]	198	48
McCotter, 1916 [10]	234	28
Needles, 1935 [11]	240	55
Reimann & Anson, 1944 [12]	129	58
Broadbent, 2000	100	19

Damage to the conus medullaris following spinal anaesthesia

F. Reynolds

Emeritus Professor of Obstetric Anaesthesia, Department of Anaesthetics, St Thomas' Hospital, London SE1 7EH, UK

«anaesthetists need to relearn the rule that a spinal needle should not be inserted above L3»

Vertebral column abnormalities

- Scoliosis
- Malfusion
- Trauma

British Journal of Anaesthesia **105** (6): 857–62 (2010)
Advance Access publication 15 September 2010 · doi:10.1093/bja/aeq246

BJA

Is spinal anaesthesia at L2–L3 interspace safe in disorders of the vertebral column? A magnetic resonance imaging study

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Br J Anaesth. 2010;105(6):857-

Br J Anaesth. 2010;105(6):857–62.

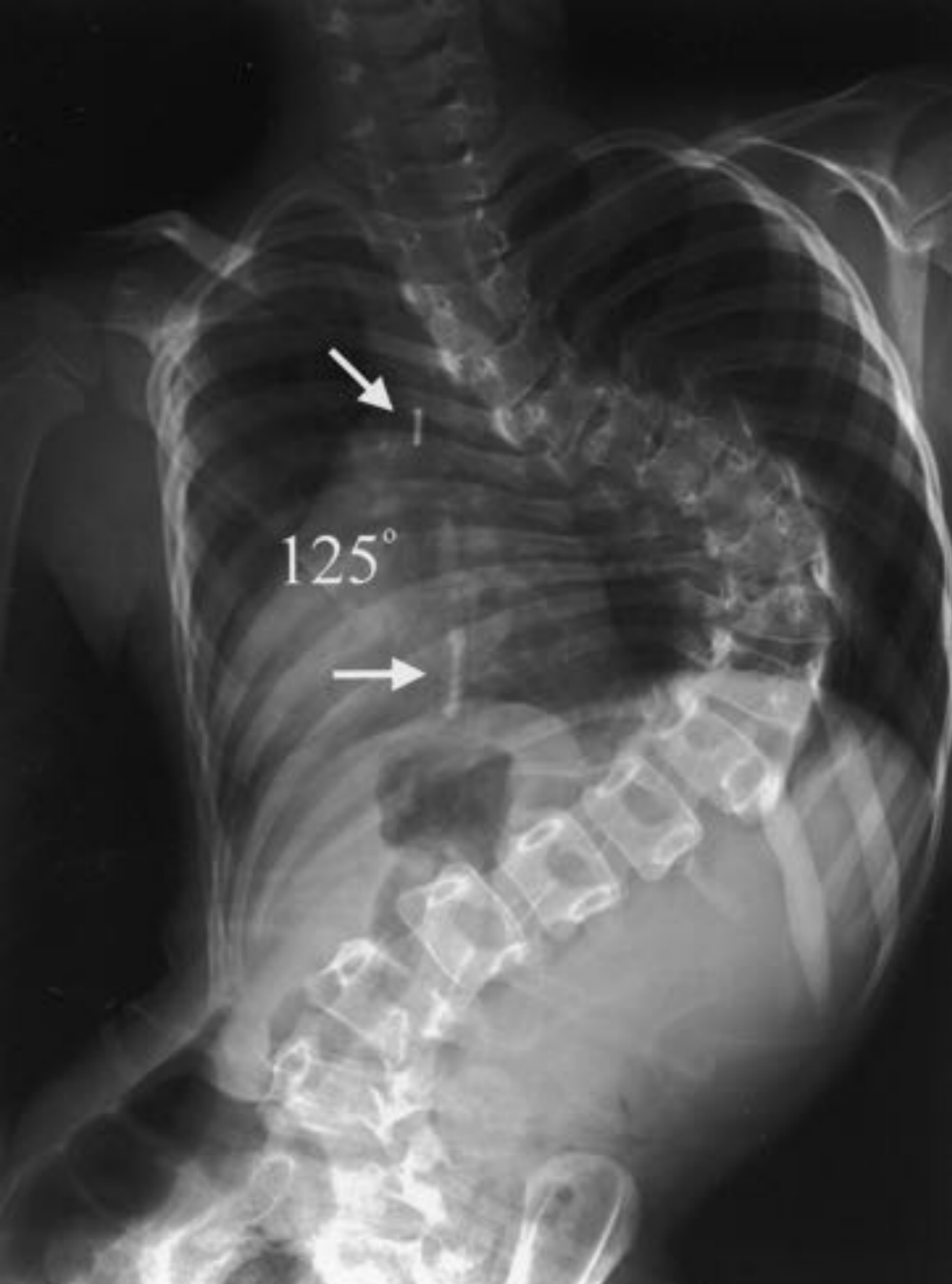
Conclusions. When performing spinal anaesthesia, anaesthesiologists should be aware of potential differences of the CMT location, particularly in female patients with thoracic vertebral compression fractures, who may have a lower CMT than normal, extending to the level of L2. Performing spinal anaesthesia at the L2–L3 interspace would seem to be ill-advised in this patient population.

Vertebral column abnormalities

- Scoliosis
- Malfusion
- Trauma

Scoliosis





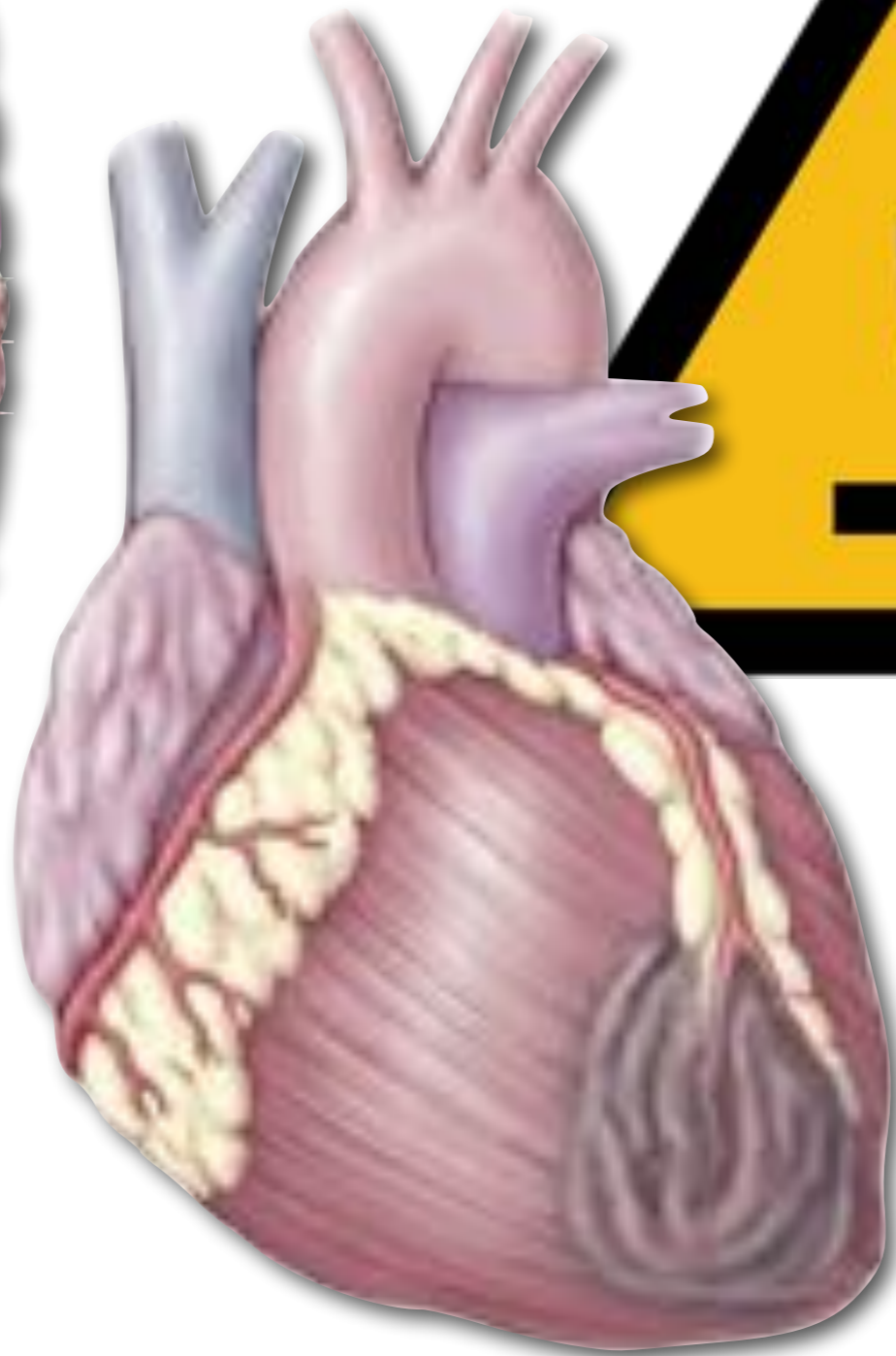
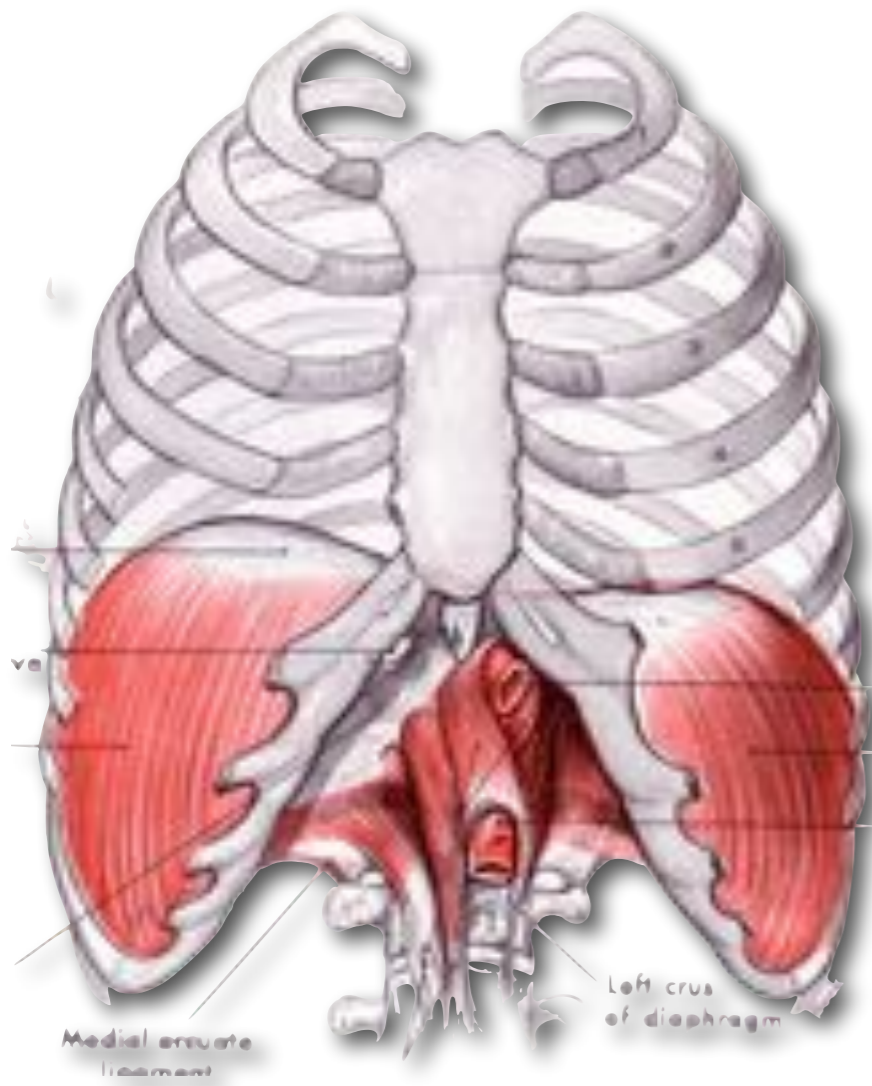


<http://i.imgur.com/1sl3deV.jpg>



Scoliosis

- Idiopathic
- Congenital
 - Incomplete formation of vertebrae (hemivertebrae)
 - Failure of separation of vertebrae (fusion)
- Neuromuscular
 - cerebral palsy
 - spina bifida
 - myopathies





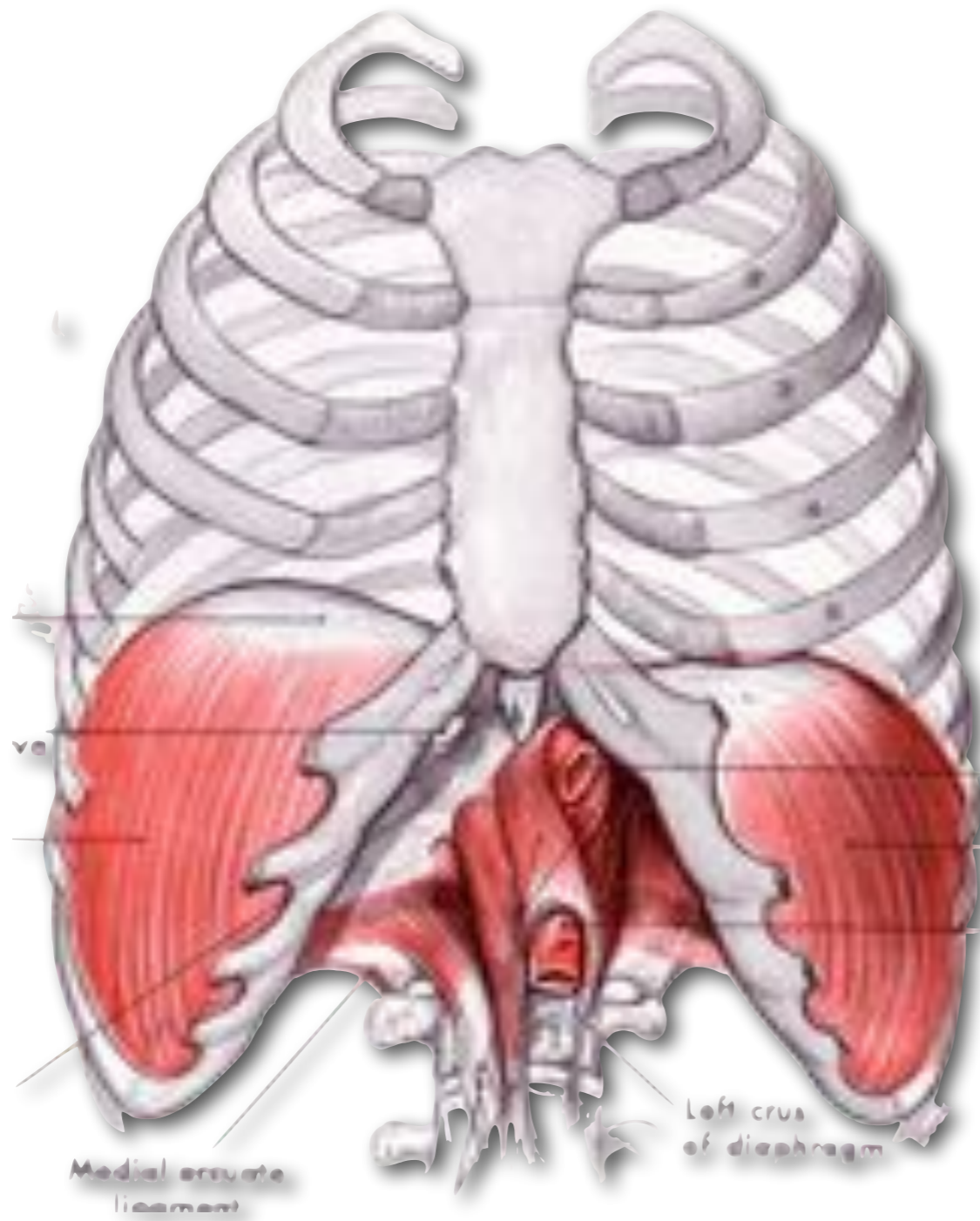
category 1 caesarean section ?



Succinylcholine

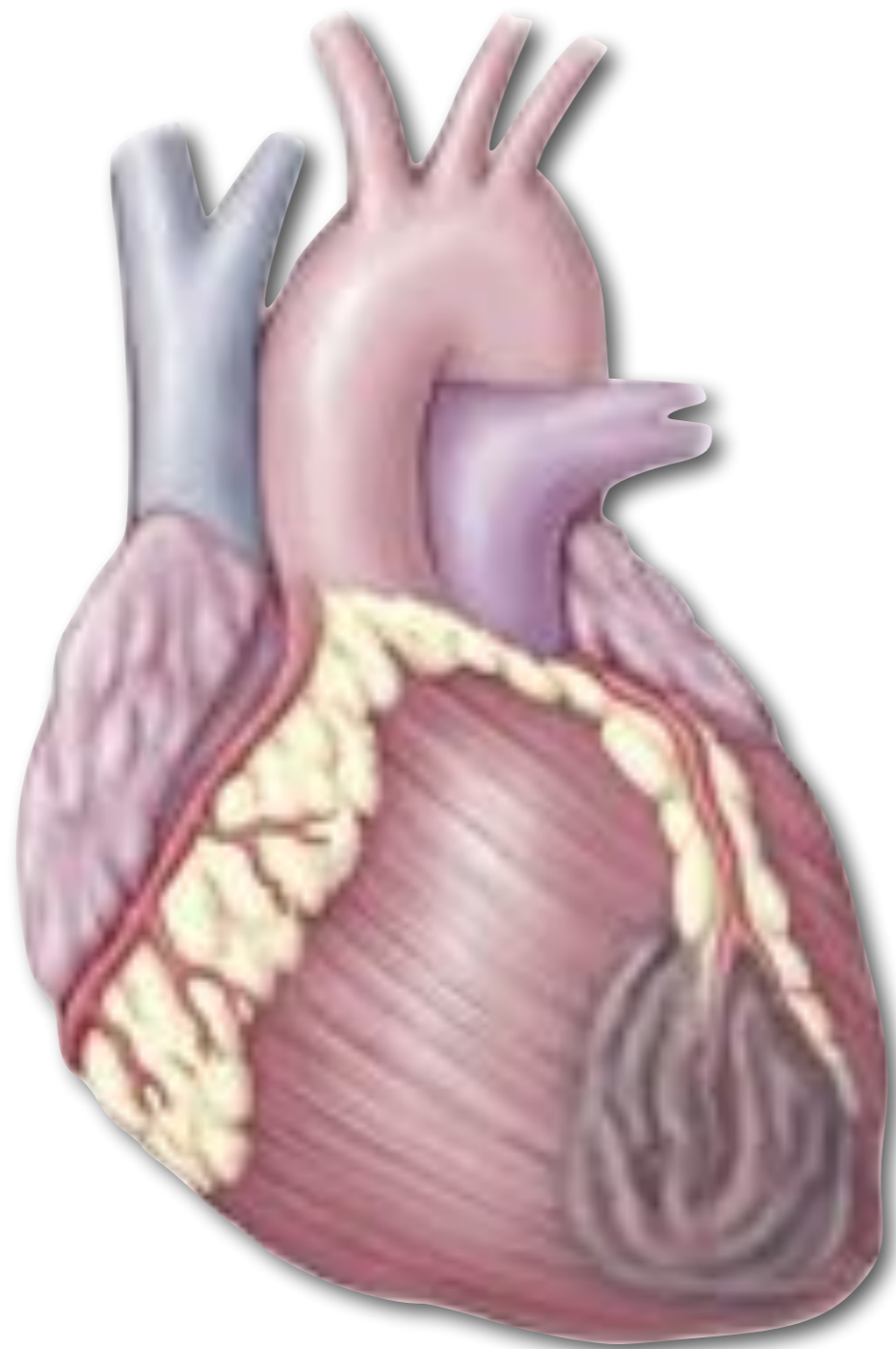


all volatile anesthetics



Pulmonary function

- Restrictive lung disease
- Increased pulmonary resistance (hypoxic)
- Increased minute ventilation in pregnancy
- Aggravated in patients with neuromuscular disease (weakness)



Cardiac function

- Structural cardiac changes
- Increased pulmonary resistance
(hypoventilation, hypoxic pulmonary vasoconstriction).
- Right heart failure !

An approach to neuraxial anaesthesia for the severely scoliotic spine

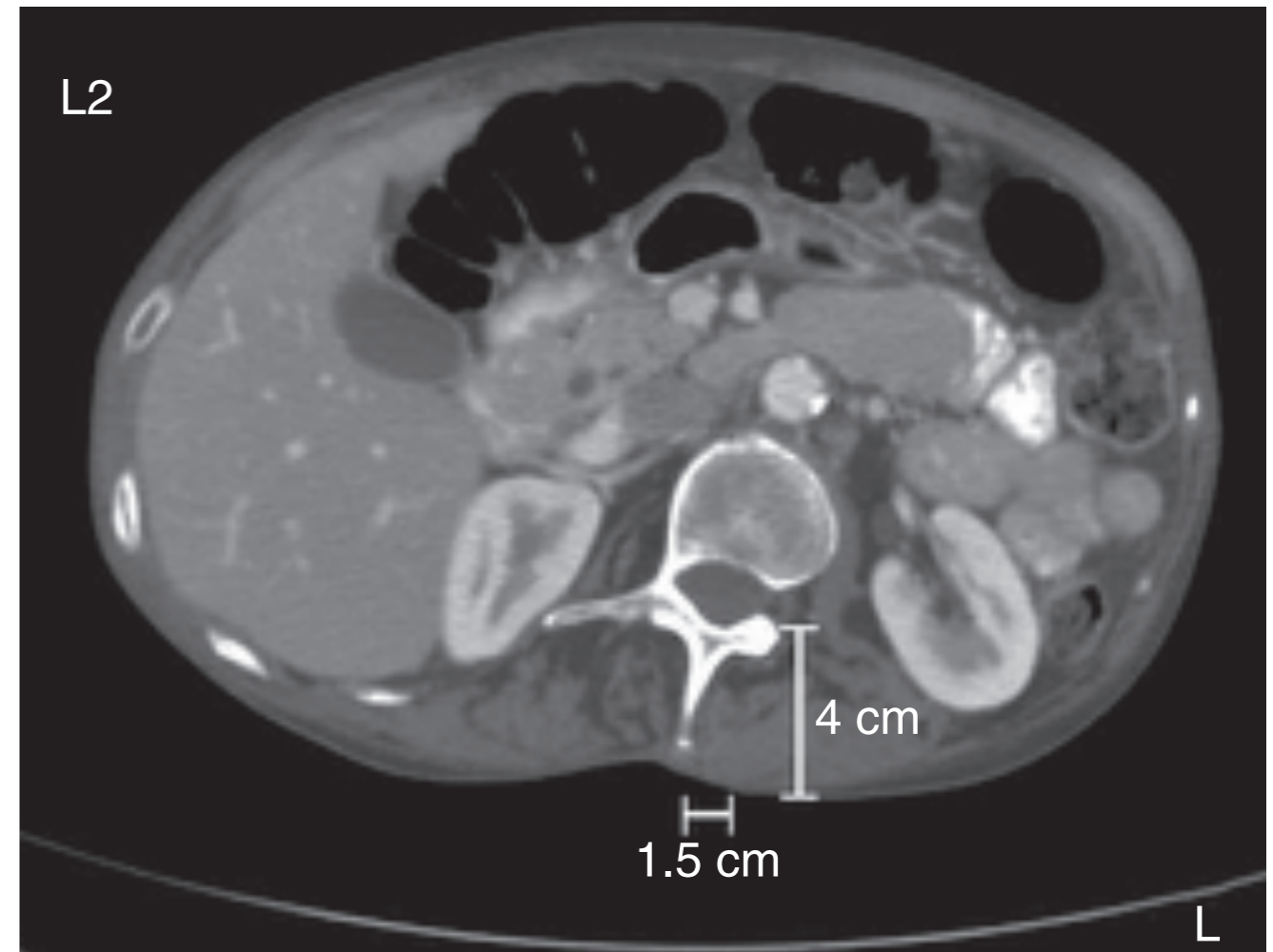
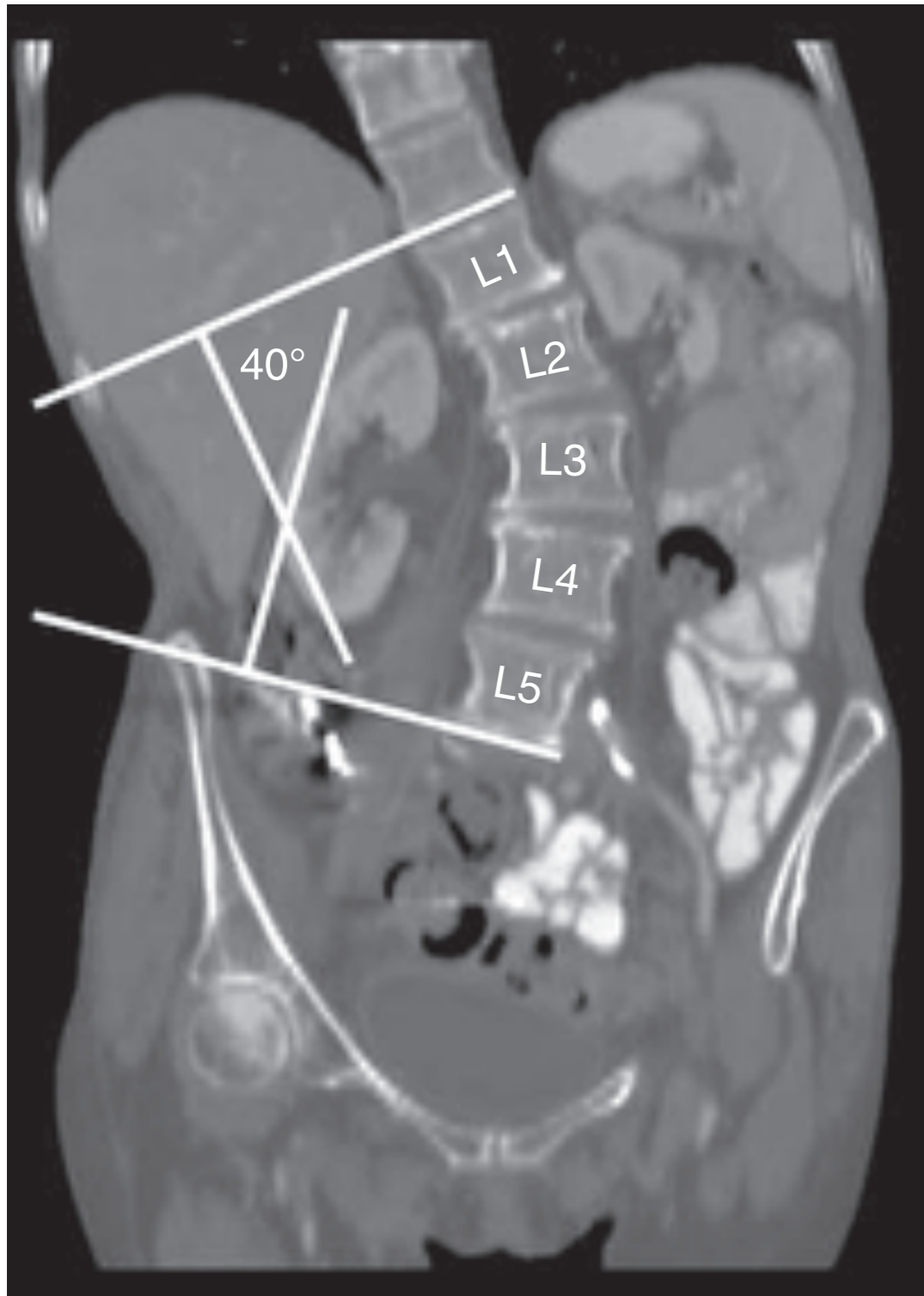
C. Bowens^{1*}, K. H. Dobie¹, C. J. Devin² and J. M. Corey¹

¹ Department of Anesthesiology and ² Department of Orthopaedic Surgery and Rehabilitation, Vanderbilt University School of Medicine, Nashville, TN, USA

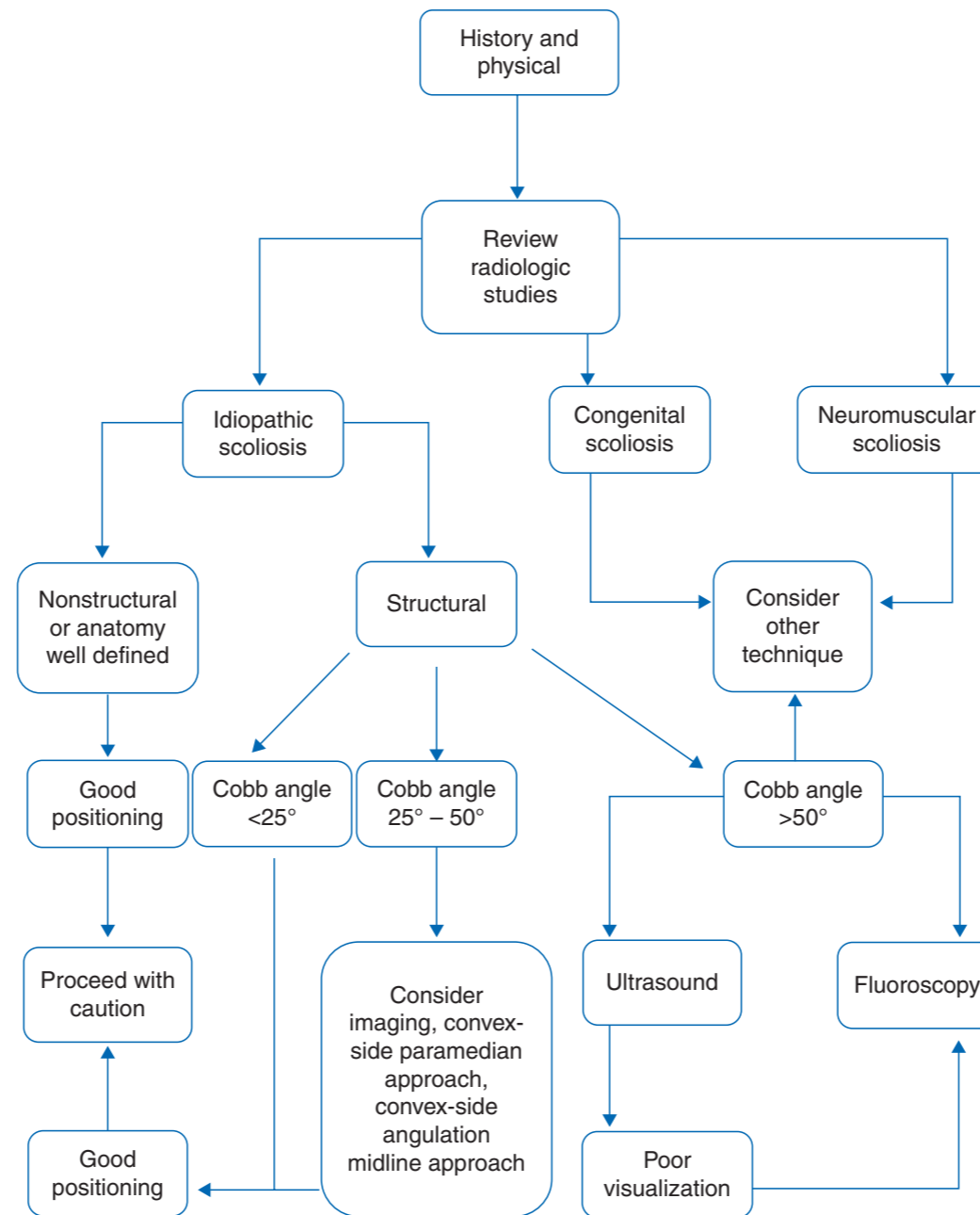
* Corresponding author: Department of Anesthesiology, Vanderbilt University School of Medicine, 1301 Medical Center Drive, 4648 The Vanderbilt Clinic, Nashville, TN 37232-5614, USA. E-mail: clifford.bowens@vanderbilt.edu

«As the vertebral body rotates towards the convex-side of the scoliotic curve, a direct path to the neuraxial spaces occurs on the convex-side when using a paramedian approach»

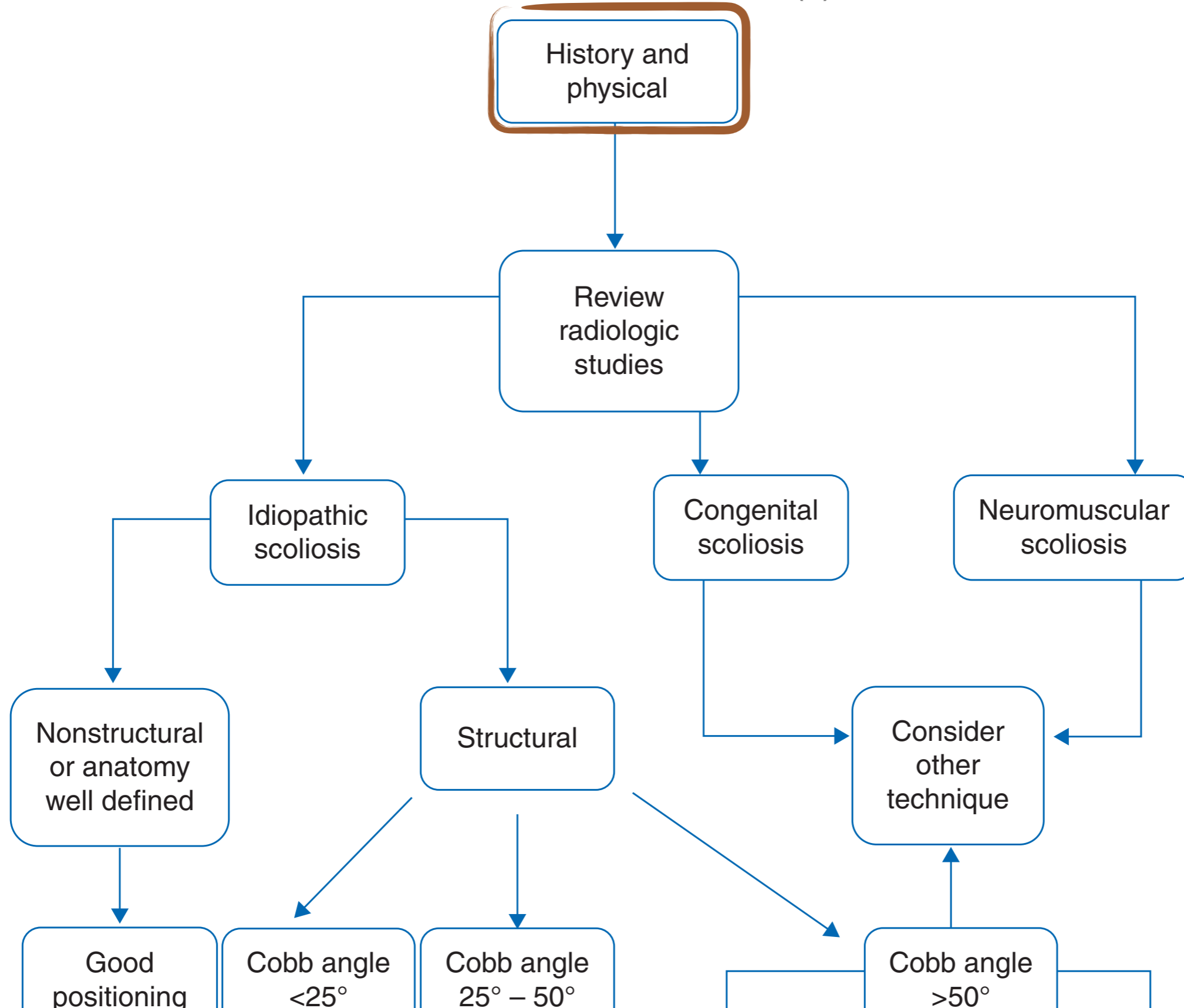
«...a paramedian approach could be attempted on the convex-side of the curve. If a midline approach is used, the spinal needle should be angled in the transverse (axial) plane towards the convex-side of the curve.»¹⁹



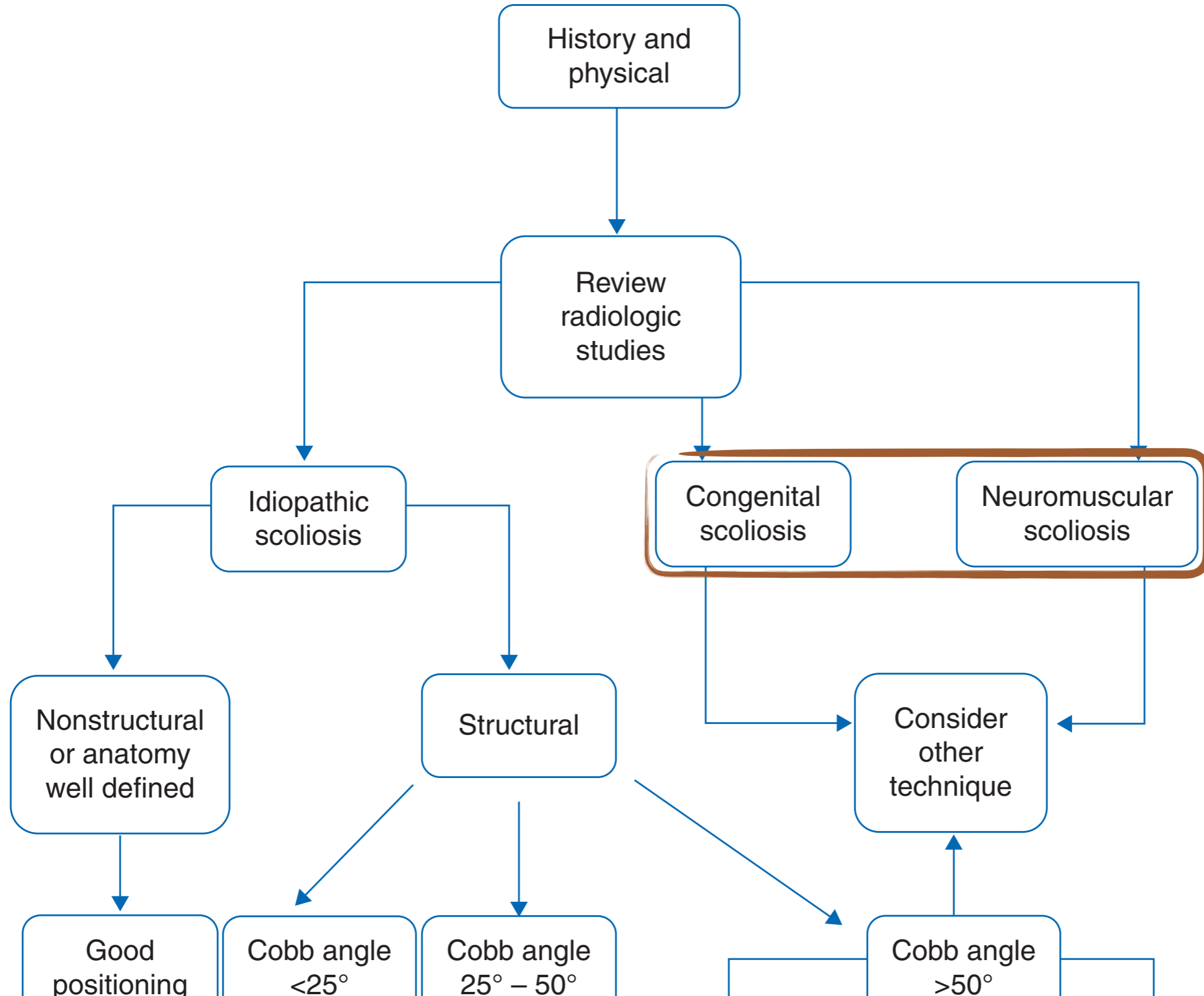
Br J Anaesth. 2013;111(5):807–11.



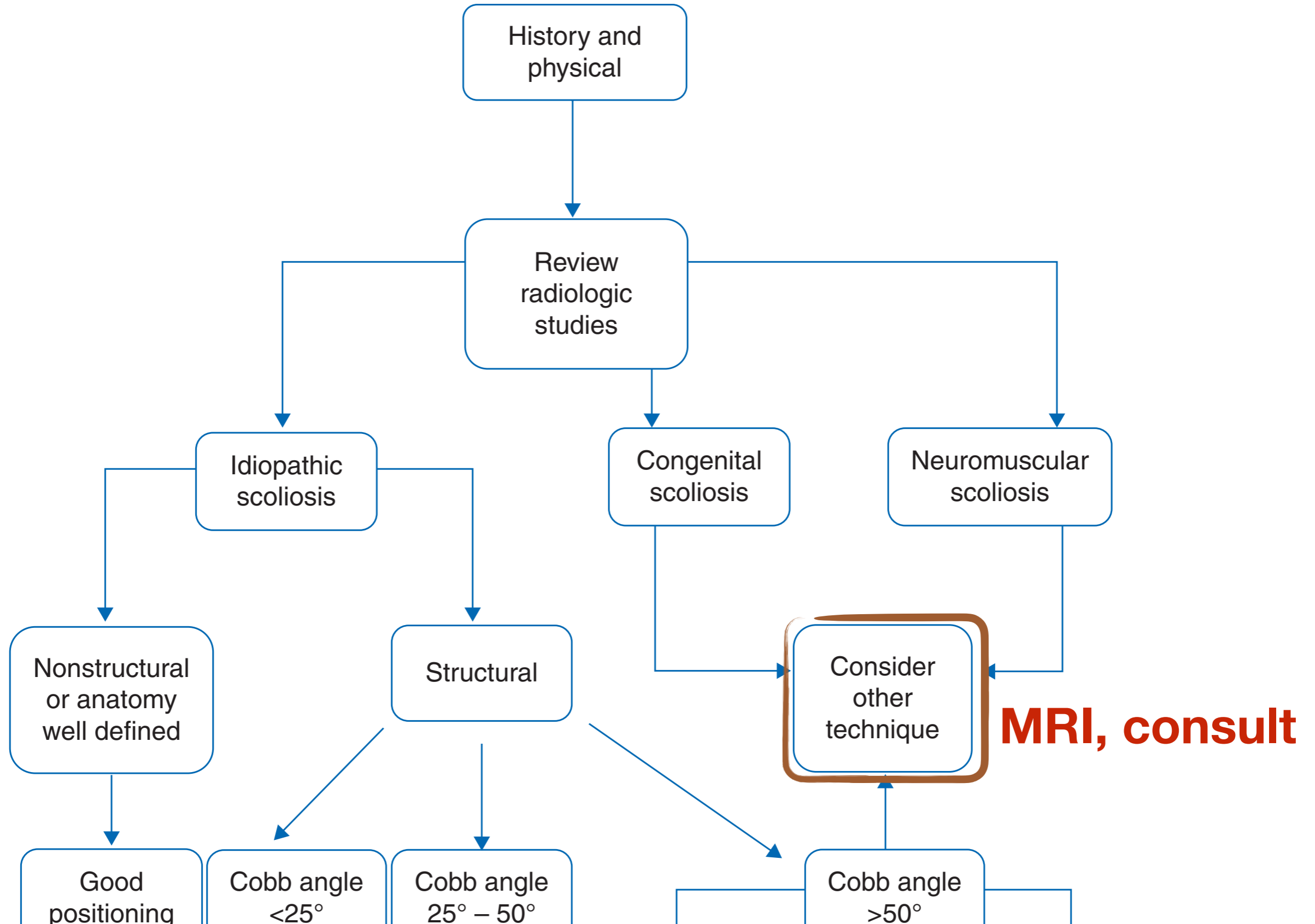
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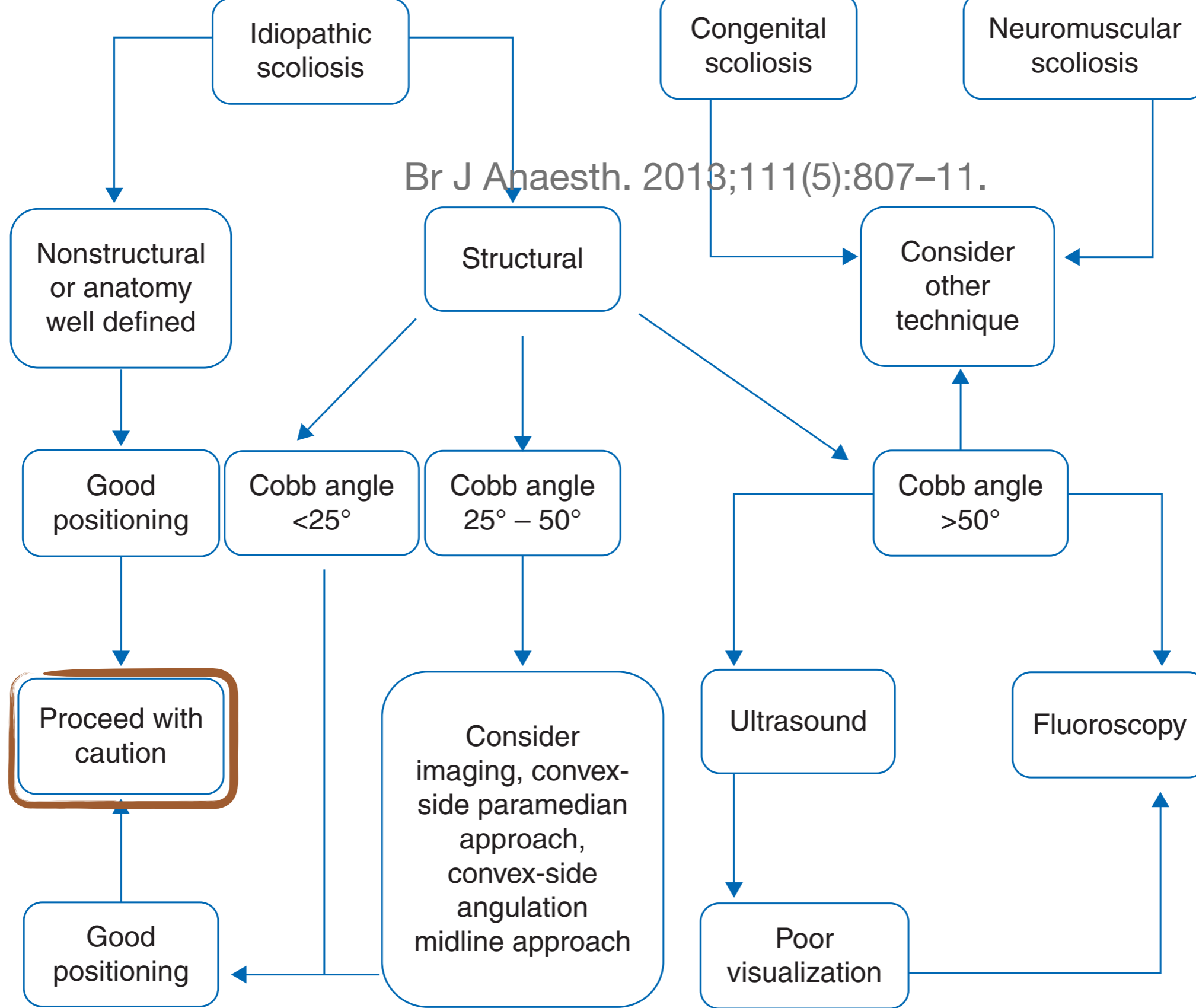


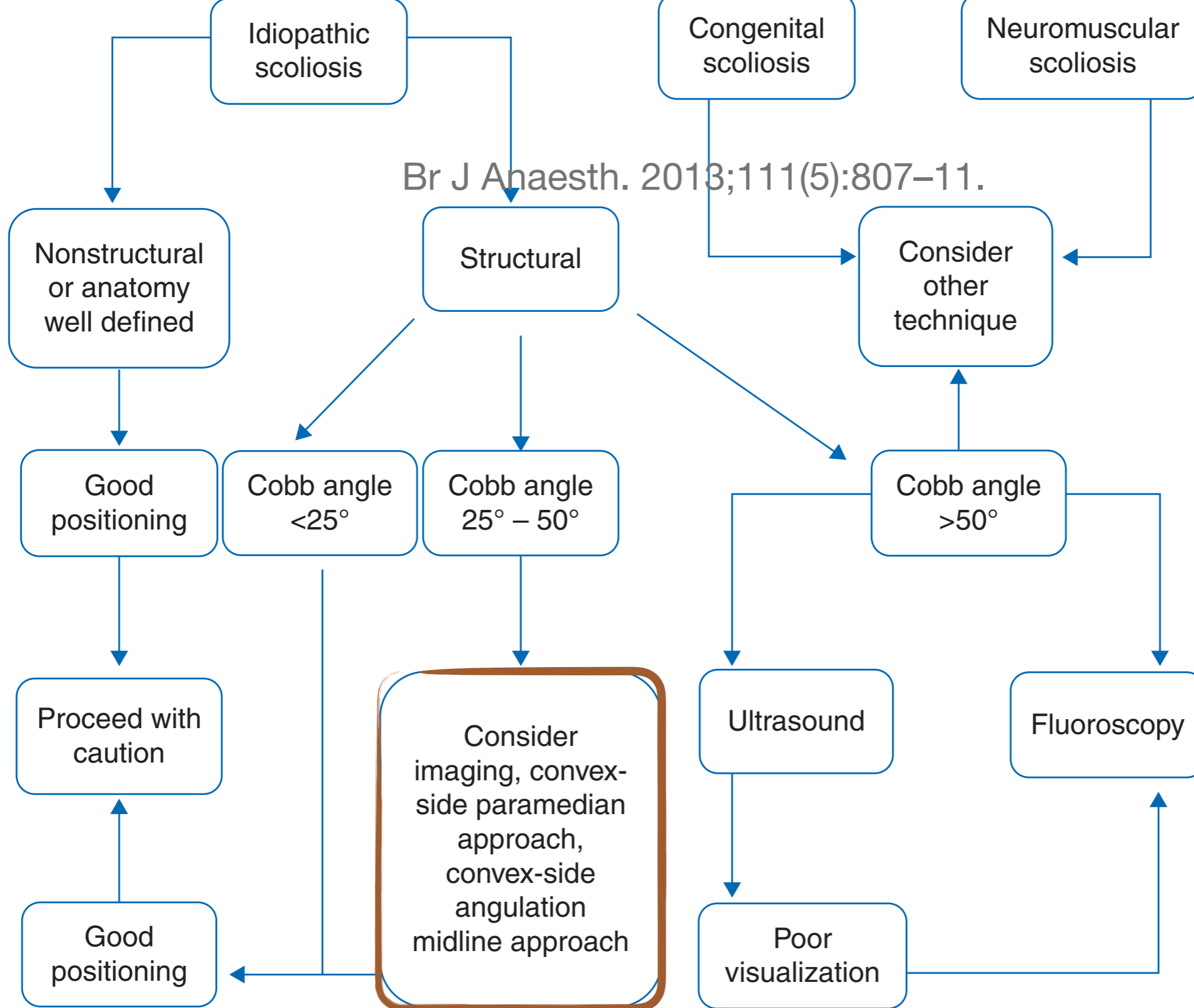
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Br J Anaesth. 2013;111(5):807–11.













ANALYSIS OF VERTEBRAL
MORPHOLOGY IN IDIOPATHIC
SCOLIOSIS WITH USE OF MAGNETIC
RESONANCE IMAGING AND
MULTIPLANAR RECONSTRUCTION

BY ULF R. LILJENQVIST, MD, THOMAS ALLKEMPER, MD, LARS HACKENBERG, MD,
THOMAS M. LINK, MD, JÖRN STEINBECK, MD, AND HENRY F.H. HALM, MD

Investigation performed at the Department of Orthopaedics, Universitätsklinikum Münster, Germany

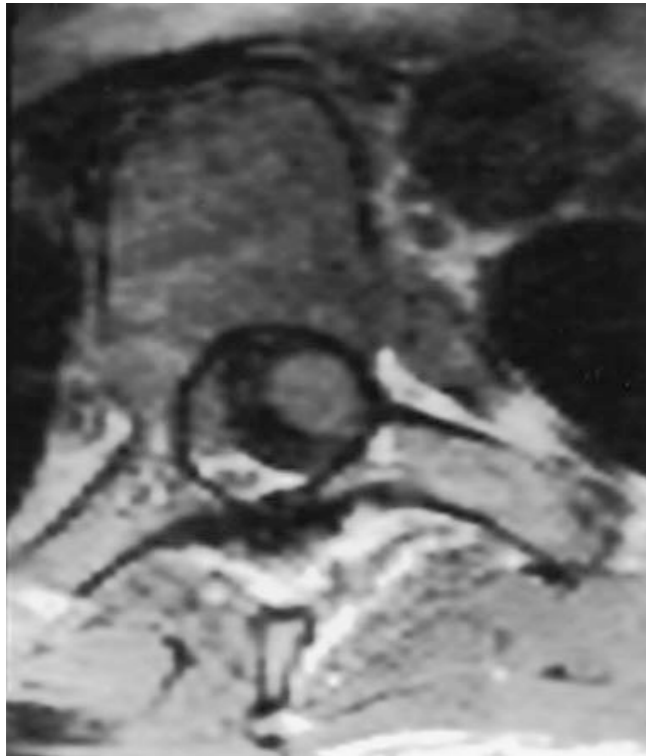
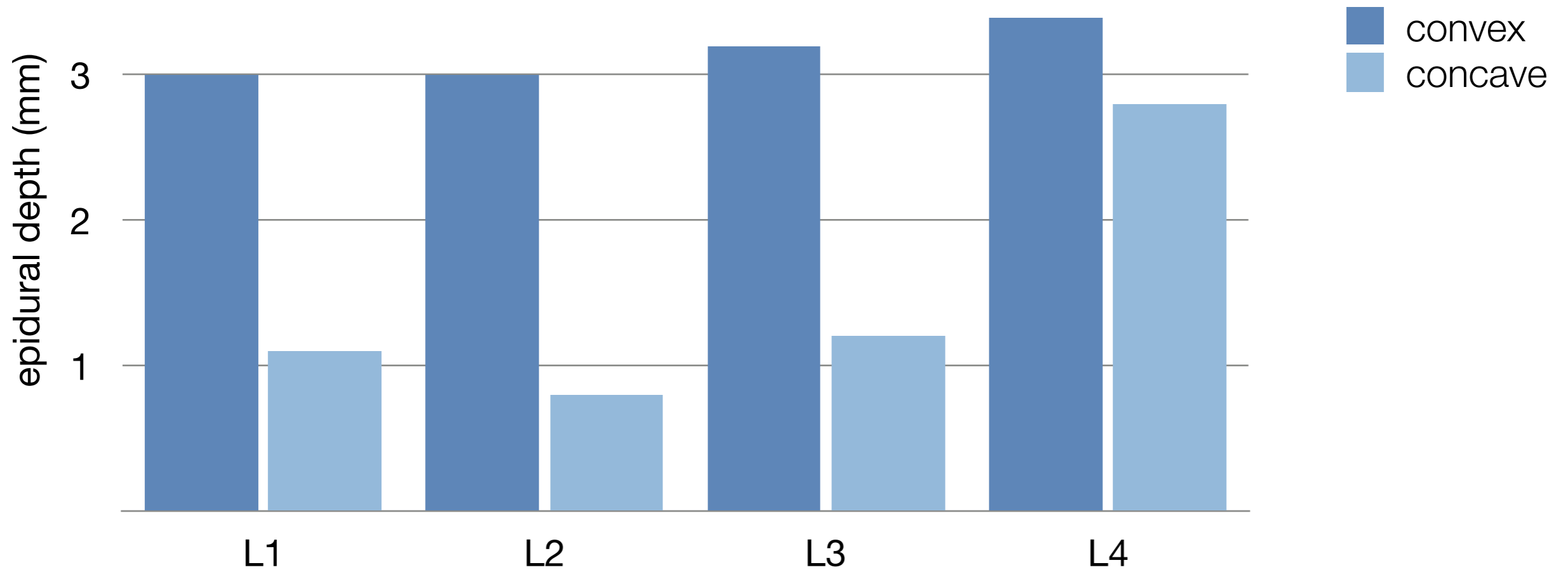
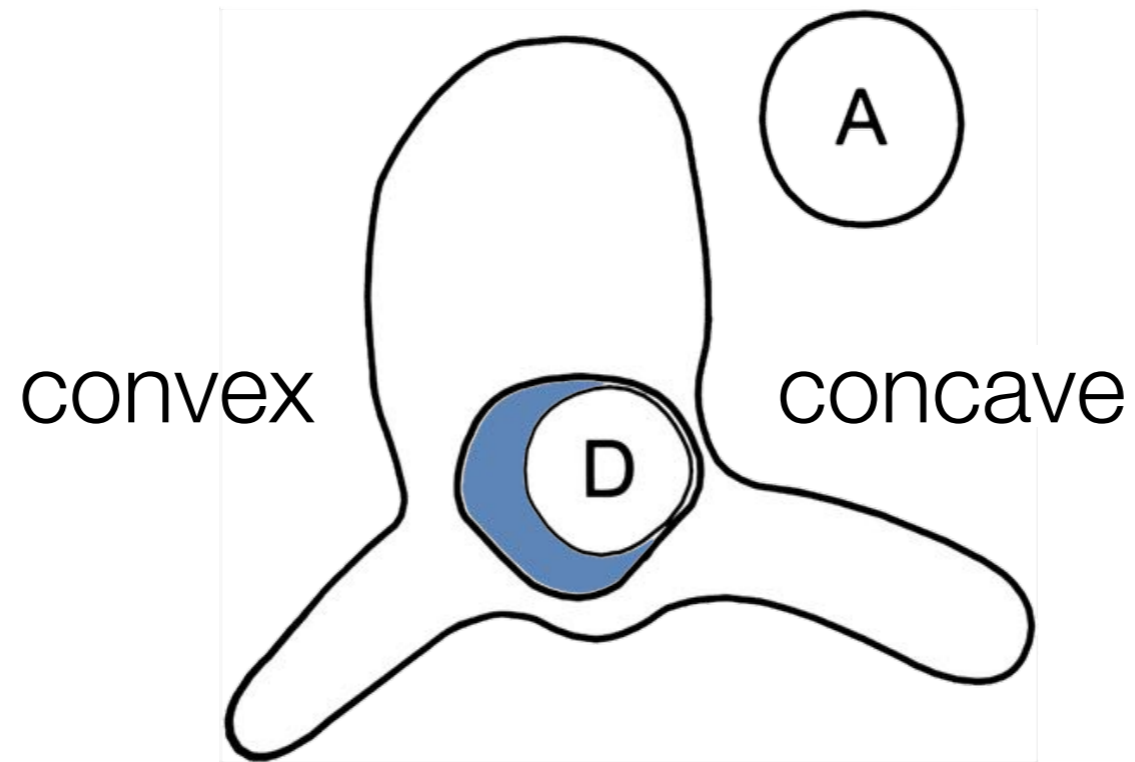


Fig. 6-A





Scoliosis - anaesthetic management

- Antepartum consultation
 - Respiratory function
 - Cardiac function
 - Neuromuscular disorder
 - Anatomy, Surgery
- Antenatal MRI ? Ultrasound ?
- Technical difficulties, increased failure rate

Learning points

- Stay below L3 (and you frequently don't know where that is)
- Spina bifida occulta \neq Occult spinal dysraphism
 - Beware of 'sacral dimples'
 - Generous indication for MRI
- Scoliosis
 - Congenital and neuromuscular scoliosis: heart and lung
 - Convex side
- Multidisciplinary

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