



QZ 18.01.2023

## Degenerative Erkrankungen der Halswirbelsäule - Wann braucht es den Neurochirurgen?

PD Dr. med. Sven Berkmann





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Facharzt für Neurochirurgie FMH/SIWF

Interdisziplinärer Schwerpunkttitle Wirbelsäule SIWF

Fähigkeitsausweis interventionelle Schmerztherapie SSIPM



Neurochirurgie USB 2004-2009; Neurochirurgie KSA (2009-2022), 

Leitender Arzt 2016-2022, Sprechstunde KSB seit 2016, Leiter Hirntumorzentrum 2020-2022

chirurgische Schwerpunkte: (komplexe) Wirbelsäulenchirurgie, Tumorchirurgie, Hypophysenchirurgie

Habilitation 2021; wissenschaftliche Schwerpunkte: Hypophyse, intraoperative Bildgebung





## Neurochirurgie Baden

«Neurochirurgie für den Ostaaargau – überregional vernetzt.»

Praxis für allg. Neurochirurgie, Wirbelsäulenchirurgie, Tumorchirurgie, interv. Schmerztherapie

Gründung 11/2022; Eröffnung 01/2023





## Fallbeispiel 1

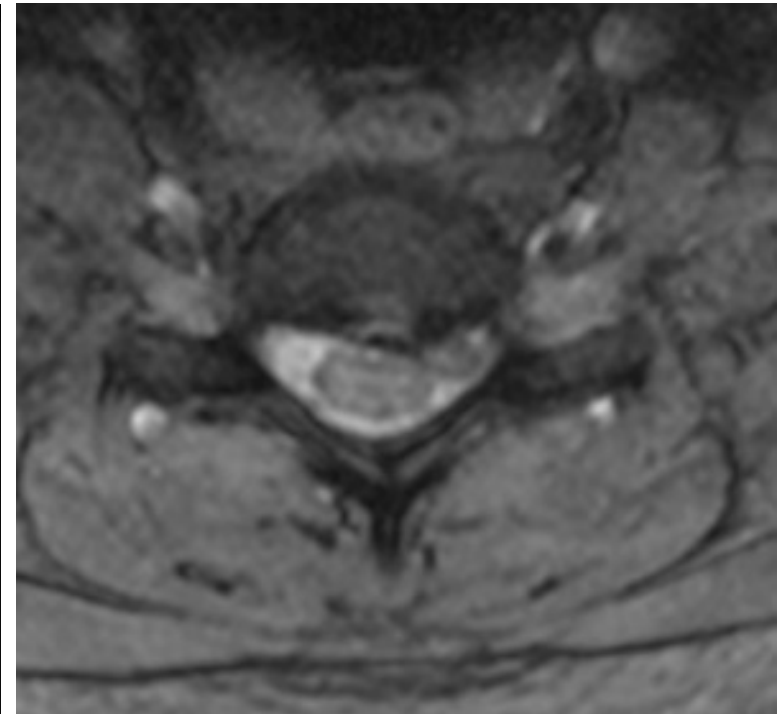
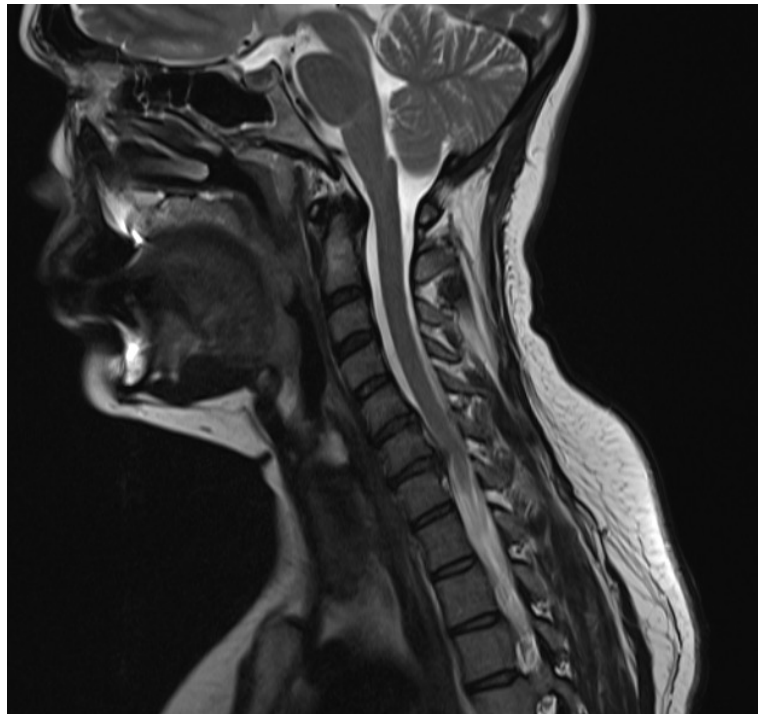
36j. F

SZ C7 li

Triceps li M4

Hypästh li C7

seit 6 Wo







## Fallbeispiel 2

72j. F

Intermitt Cervikalgien

Progr Gangataxie/Monate

Tibialis-SEP: ausgeprägt  
verzögerte cortikale Reizantwort

MEP: oE+uE deutliche  
Verlängerung der zentr mot  
Leitungszeit

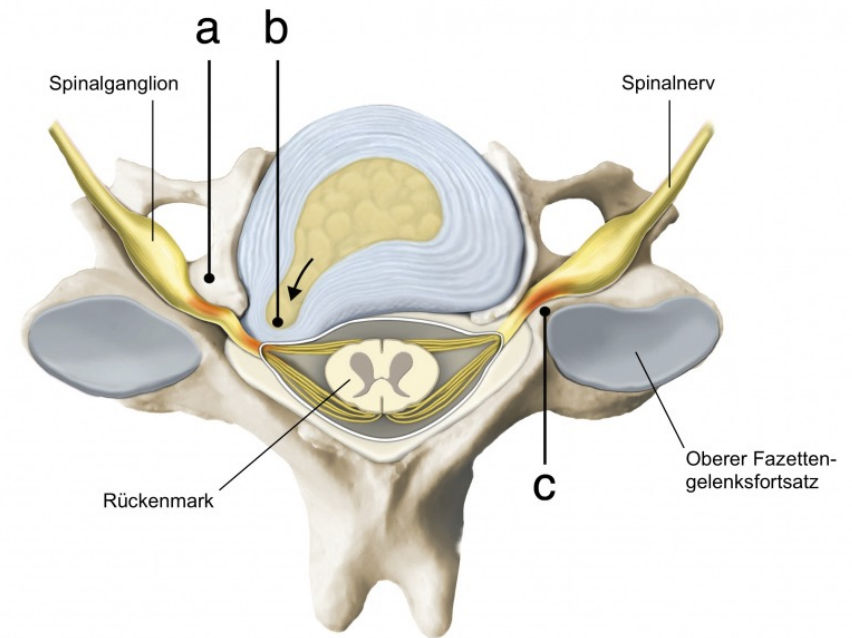






## Cervikale Discushernie

- 5-6/100'000 persons/year
- 300/100'000 persons
- OP in ca. 10%
- Remission unter konservativer Therapie in 70-90% nach 24 Monaten, meistens innert 4-6 Mo



Radhakrishnan K, Litchy WJ, O'Fallon WM, Kurland LT (1994) Epidemiology of cervical radiculopathy. A population-based study from Rochester, Minnesota, 1976 through 1990. *Brain* 117(Pt 2):325–335. <https://doi.org/10.1093/brain/117.2.325>

Bono CM, Ghiselli G, Gilbert TJ et al (2011) An evidence-based clinical guideline for the diagnosis and treatment of cervical radiculopathy from degenerative disorders. *Spine J* 11:64–72. <https://doi.org/10.1016/j.spinee.2010.10.023>

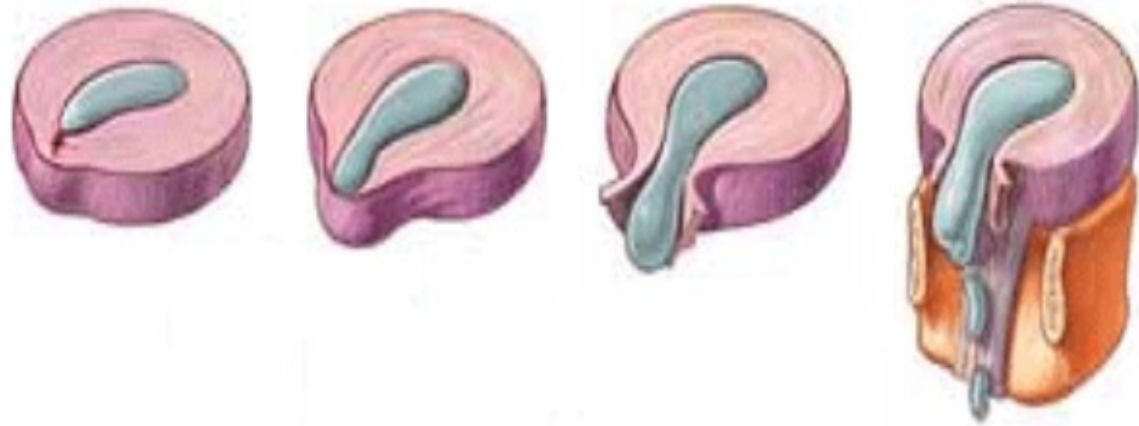
Wong JJ, Côté P, Quesnele JJ et al (2014) The course and prognostic factors of symptomatic cervical disc herniation with radiculopathy: a systematic review of the literature. *Spine J* 14:1781–1789. <https://doi.org/10.1016/j.spinee.2014.02.032>





Mixter & Barr, 1934:

„mechanische Kompression der Nervenwurzel durch  
Discusmaterial führt zu radikulärer Symptomatik“



seit Beginn der 90er:

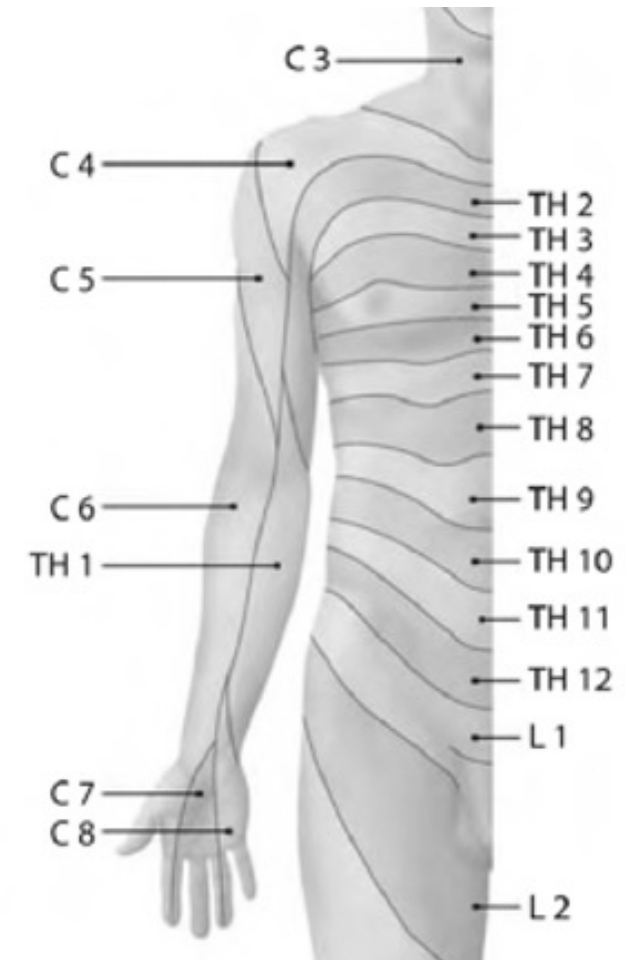
- weg vom rein mechanischen Modell,  
hin zum komplexen entzündlichen Bild
- zentrale Rolle von Entzündungsmediatoren wie  $\text{TNF-}\alpha$ ,  $\text{IL-6}$ ,  $\text{IL-8}$

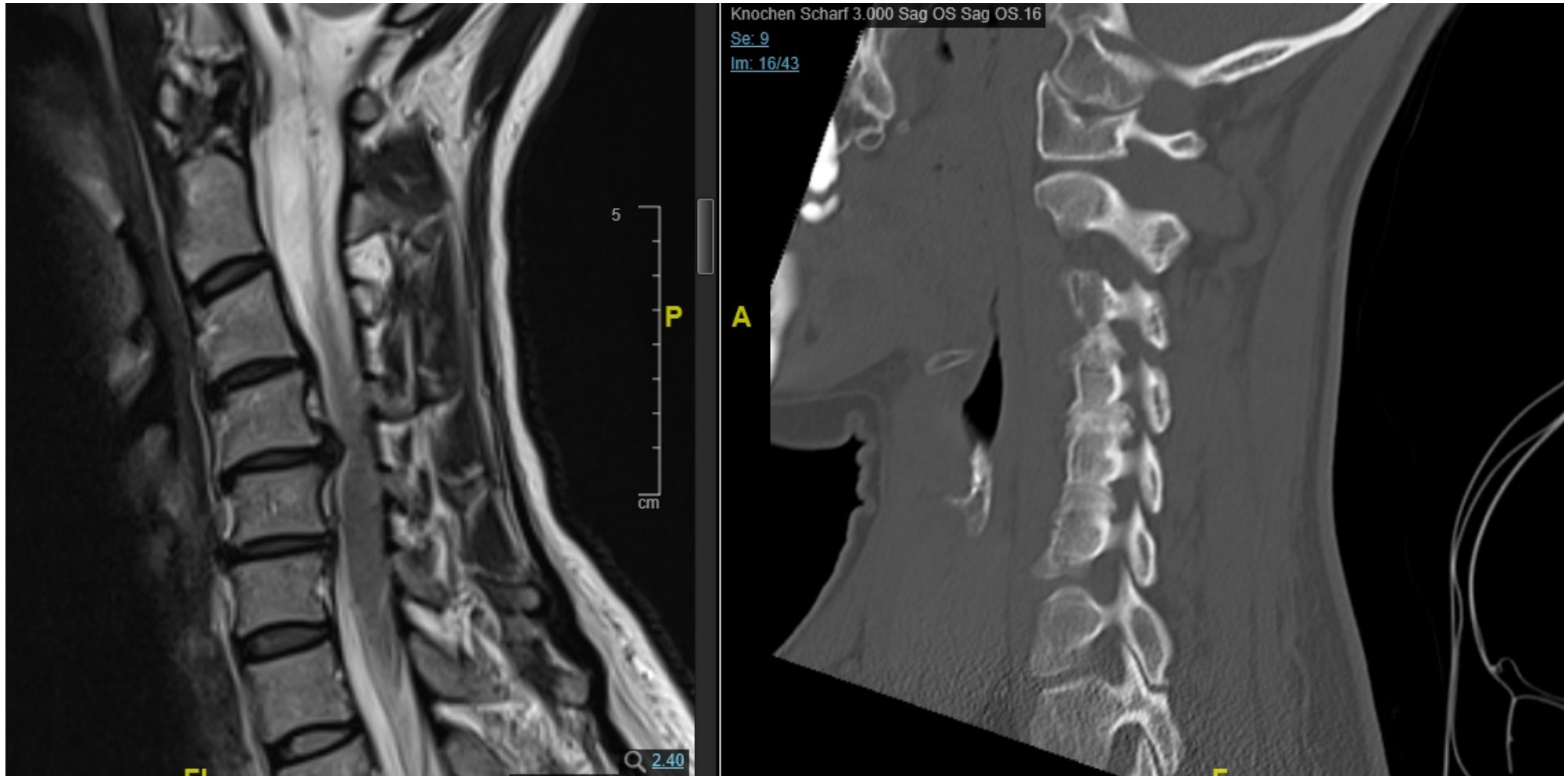






Nerve root	Muscle	Reflex
C3/4	diaphragm deltoid muscle	deltoid reflex (inconsistent)
C5	deltoid muscle, biceps muscle	biceps reflex
C6	biceps muscle extensor carpi muscle	biceps reflex, brachioradial reflex
C7	triceps, wrist flexors, finger extensors	triceps reflex
C8	abductor digiti minimi muscle  interossei muscles	-







## Bildgebung vs. Klinik

- Retrospektiv, n=102
- 10% der Pat Kompression **kontralateral** zu Symptomatik
- Alle operiert, 6 Wo. Postop 80% beschwerdefrei, 3 Mo. Postop 100%

Reliability of cervical radiculopathy, its congruence between patient history and medical imaging evidence of disc herniation and its role in surgical decision

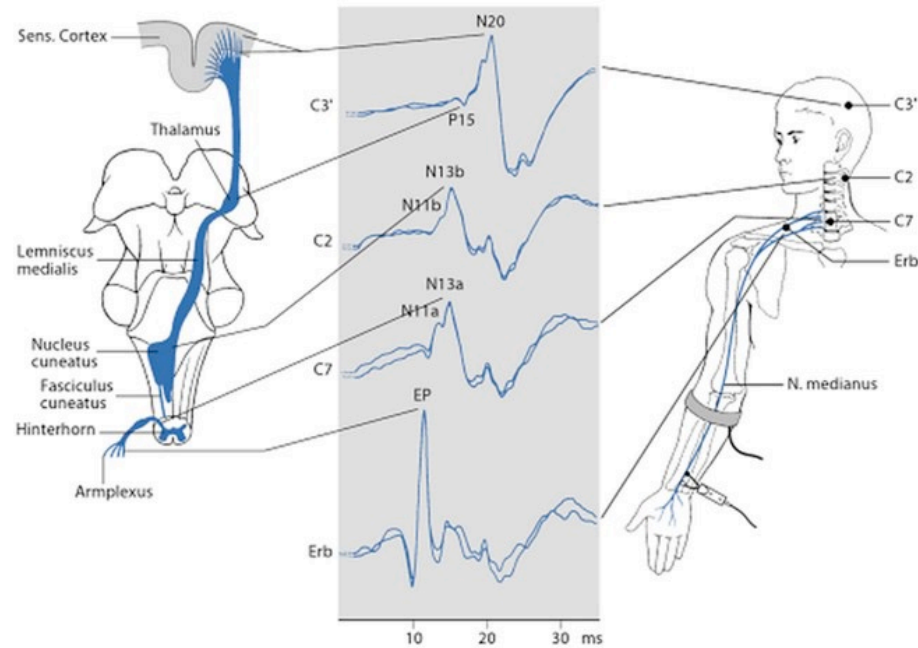
[Keyvan Mostofi](#) & [Reza Karimi Khouzani](#)

[European Journal of Orthopaedic Surgery & Traumatology](#) 26, 805–808(2016) | [Cite this article](#)





## Elektrophysiologie



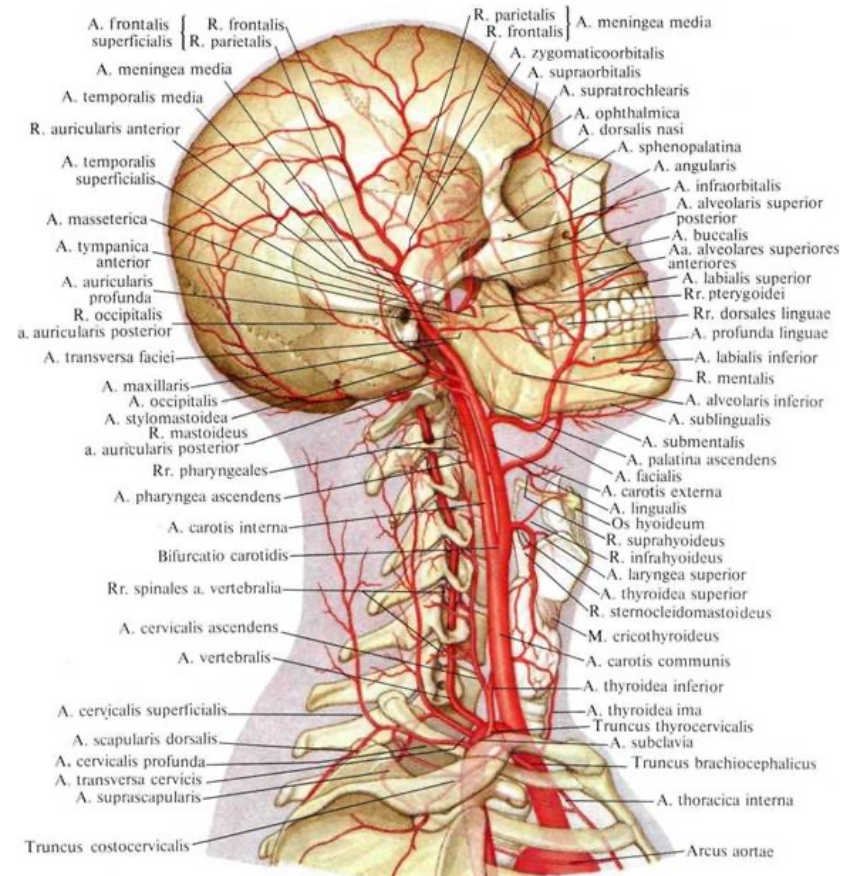
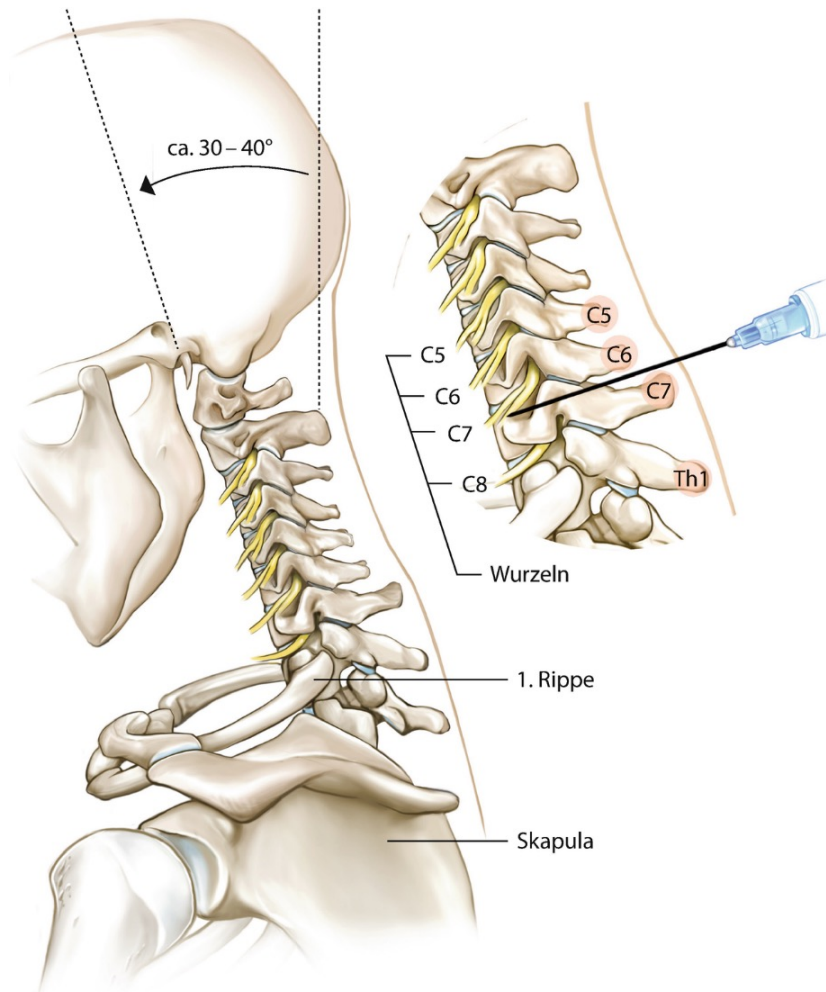
- DD: zentral / peripher / andere neurolog. Ursache (zB ALS)
- Verlaufsparmeter







## Infiltrationsdiagnostik





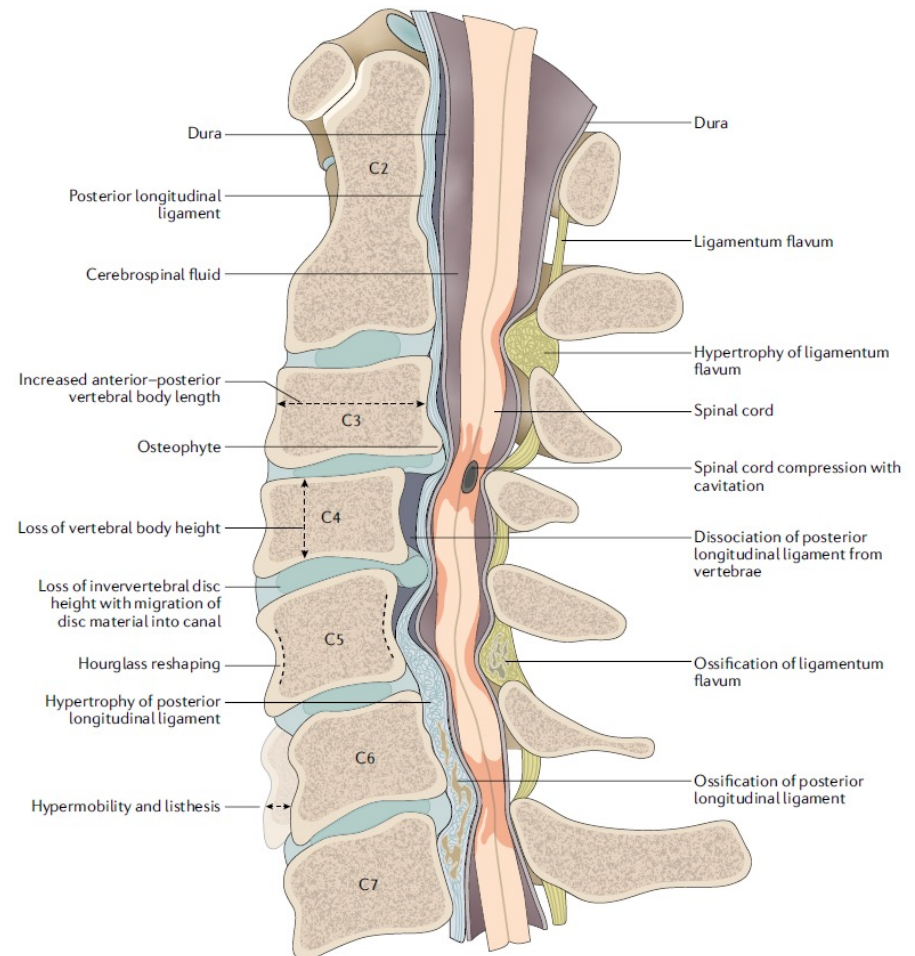
## Degenerative cervikale Myelopathie

- 4/100'000 Personen/J.
- 60/100'000 Personen (>65j. bis zu 10%)

### Degenerative cervical myelopathy — update and future directions

Jetan H. Badhiwala, Christopher S. Ahuja, Muhammad A. Akbar, Christopher D. Witiw, Farshad Nassiri, Julio C. Furlan, Armin Curt, Jefferson R. Wilson & Michael G. Fehlings

*Nature Reviews Neurology* **16**, 108–124(2020) | Cite this article

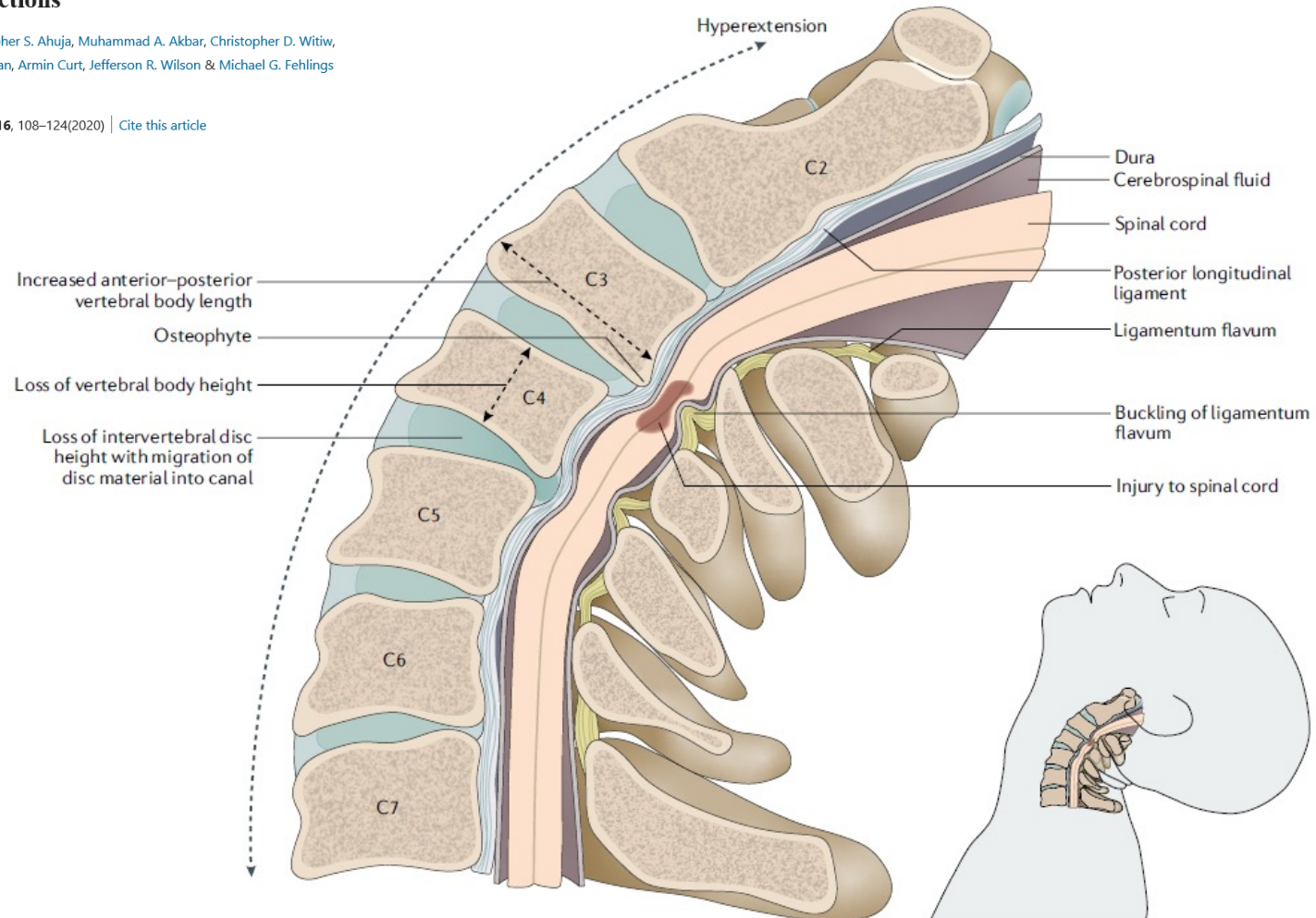




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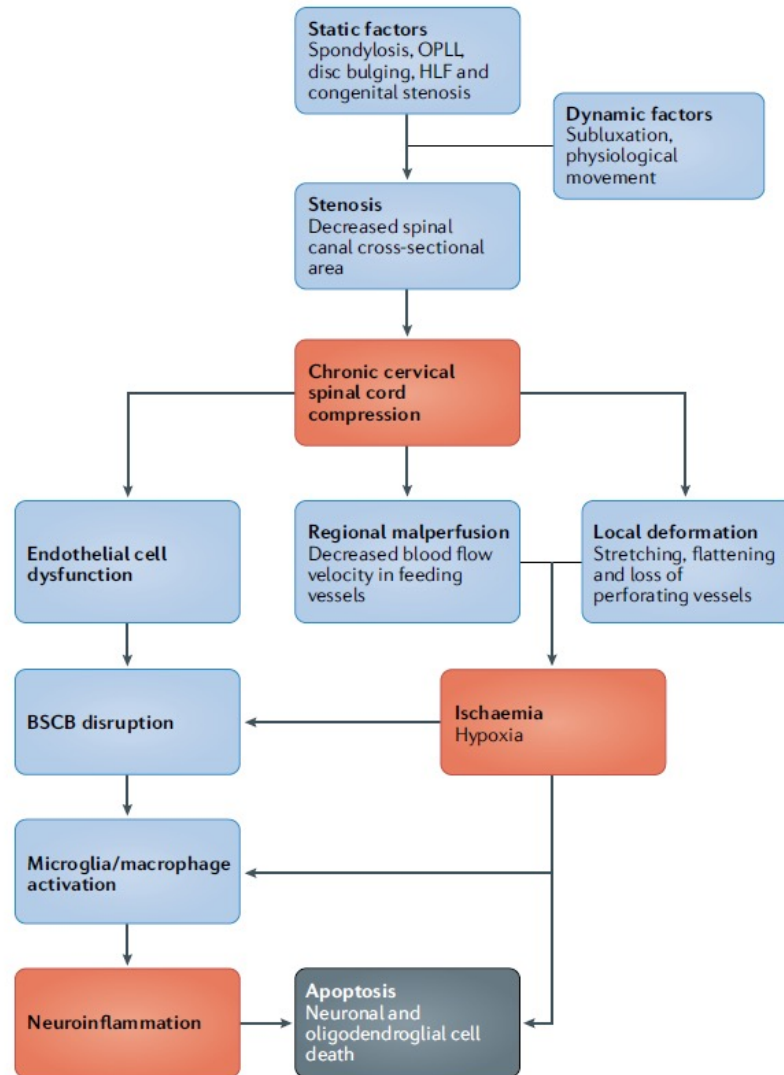




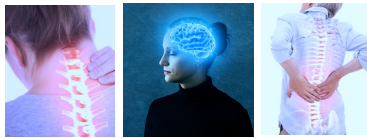
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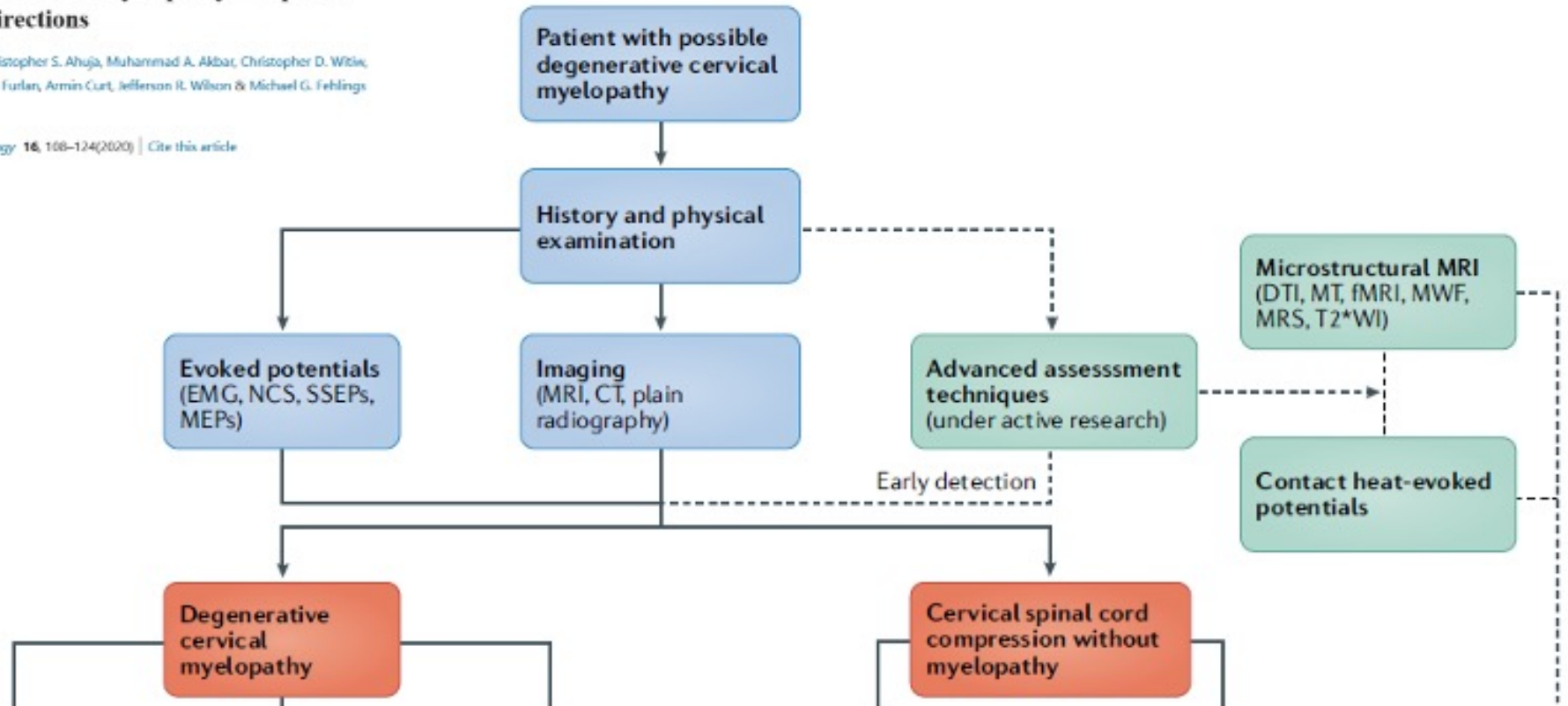




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# Wann braucht es den Neurochirurgen? - Und nun zum eigentlich Chirurgischen.

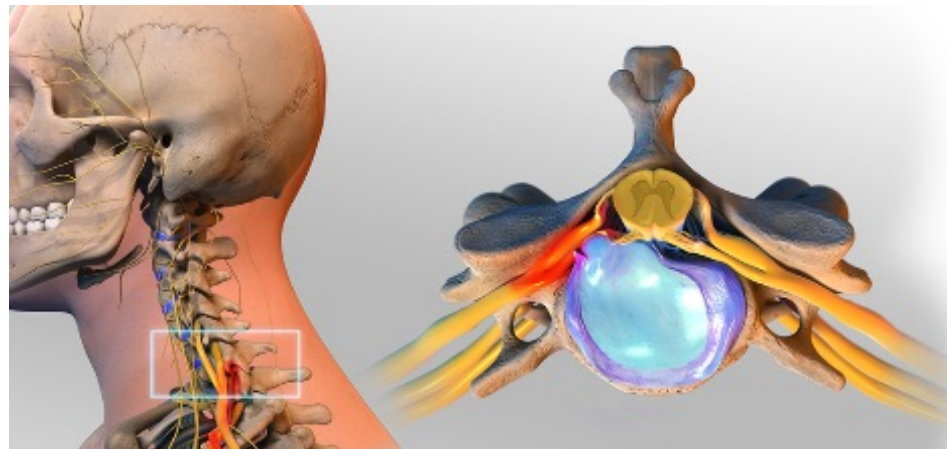




## Indikation

### Radikulopathie (Foraminalstenose, Diskushernie)

- Schmerzen >6-12 Wochen
- Funktionell relevante radikuläre Ausfälle
- Notfall: progrediente Parese (<M3)



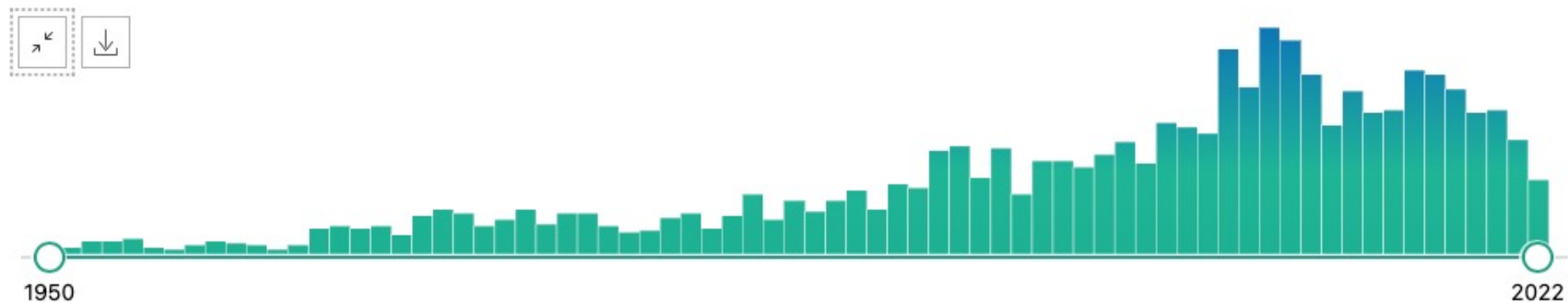


## Evidenz ?

- Pubmed 13.10.22: "cervical disc hernia surgery", n=2169

=> Filter "randomized controlled trial" (evidence level 1a/b), n=93

=> surgery vs non-surg therapy, n=1







Inclusion: Radiculopathie >8 Wo;

Exclusion: u.a. Myelopathie

ACDF+postop Physio, n= 35

Physio, n=33

Crossover, n=5 /2J.

## Surgery Versus Nonsurgical Treatment of Cervical Radiculopathy: A Prospective, Randomized Study Comparing Surgery Plus Physiotherapy With Physiotherapy Alone With a 2-Year Follow-up

Engquist, Markus, MD<sup>†</sup>; Löfgren, Håkan, MD, PhD<sup>‡</sup>; Öberg, Birgitta, PhD, RPT<sup>§</sup>; Holtz, Anders, MD, PhD<sup>¶</sup>; Peolsson, Anneli, PhD, RPT<sup>§</sup>; Söderlund, Anne, PhD, RPT<sup>§</sup>; Vavrouch, Ludek, MD, PhD<sup>‡</sup>; Lind, Bengt, MD, PhD<sup>\*\*††</sup> [Author Information](#)

Spine: September 15, 2013 - Volume 38 - Issue 20 - p 1715-1722





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Spine: September 15, 2013 - Volume 38 - Issue 20 - p 1715-1722

Compared With Baseline	6 mo			12 mo			24 mo		
	Mean	95% CI	P	Mean	95% CI	P	Mean	95% CI	P
<b>Surgical Group</b>									
NDI reduction, score % 0–100	12.1	5.9–18.2	<0.001	13.9	6.5–21.3	<0.001	14.2	5.6–22.7	<0.001
Neck pain reduction, VAS score of 0–100 mm	31.8	18.5–45.1	<0.001	32.5	18.3–46.7	<0.001	32.0	16.6–47.5	<0.001
Arm pain reduction, VAS score of 0–100 mm	21.1	7.0–35.1	0.001	25.1	10.1–40.1	<0.001	18.1	0.4–35.7	0.042
<b>Nonsurgical group</b>									
NDI reduction, score % 0–100	7.7	1.6–13.7	0.006	7.1	–0.2 to 14.4	0.061	11.5	3.0–19.9	0.003
Neck pain reduction, VAS score of 0–100 mm	16.2	3.1–29.3	0.008	14.2	0.2–28.1	0.045	17.4	2.2–32.6	0.017
Arm pain reduction, VAS score of 0–100 mm	16.0	2.1–29.8	0.015	20.3	5.5–35.1	0.002	20.5	3.2–37.9	0.012
<p><i>Values are presented as within group mean change (95% CI). Figures and P values display paired differences within groups. Significance was calculated using paired samples t test with Bonferroni correction.</i></p> <p><i>NDI indicates Neck Disability Index; VAS, visual analogue scale; CI, confidence interval.</i></p>									

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Follow-up	Surgical Group			Nonsurgical Group			Group Comparison		
	Worse* (n)	Better† (n)	Risk	Worse* (n)	Better† (n)	Risk	Risk Ratio	95% CI	P
6 mo	5	26	0.84	10	22	0.69	1.22	0.92–1.39	0.180
12 mo	4	27	0.87	12	20	0.63	1.39	1.03–1.88	0.031
24 mo	6	25	0.81	10	22	0.69	1.17	0.88–1.57	0.281

*Figures display number of patients and risk within each treatment group at the follow-ups. Between-group differences were calculated with risk ratio (95% CI) and significance tested using z-statistics.*

*\*Unchanged/worse/much worse.*

*†Better/much better.*

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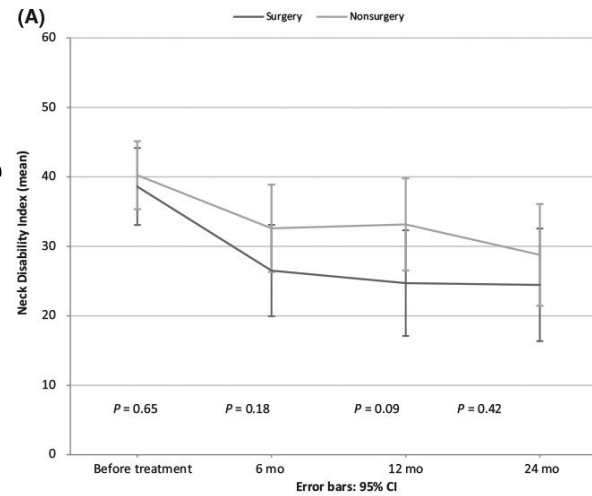


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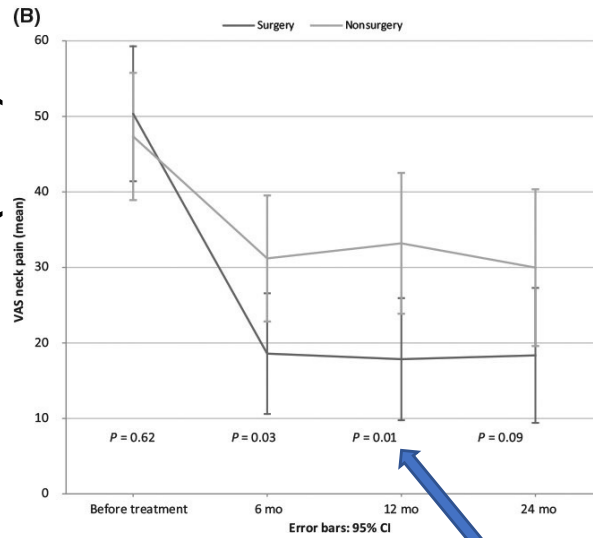
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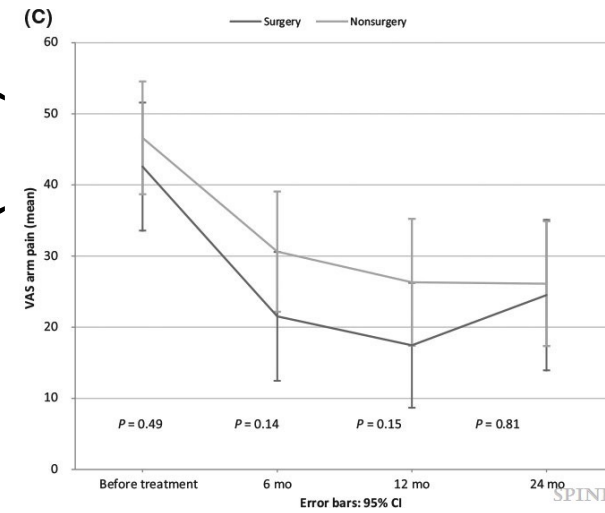
**Neck Disability Index**



**Neck Pain (VAS)**



**Arm Pain (VAS)**







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## Confounders:

- Analgetika: surgery vs physio @1J: 23% vs 43%
- Declined randomization, wanting surgery: 54%
- Pat in surgery-Gruppe signifikant älter
- Div Sozioökonomische Faktoren (zB Bildung) und div red flags (zB Depressionen) nicht ausgewertet





## CAVE: Psychosoziale und psychische Faktoren!



“Only way I could get him to come was to tell him it was massage therapy.”






European Spine Journal (2018) 27:2710–2719  
<https://doi.org/10.1007/s00586-018-5777-8>

ORIGINAL ARTICLE

## Clinical course and prognostic models for the conservative management of cervical radiculopathy: a prospective cohort study

Marije L. S. Sleijser-Koehorst<sup>1,2</sup>  · Michel W. Coppieters<sup>1,3,4</sup> · Martijn W. Heymans<sup>5</sup> · Servan Rooker<sup>6</sup> · Arianne P. Verhagen<sup>7,8</sup> · Gwendolijne G. M. Scholten-Peeters<sup>1,2,6</sup>

- n=61, F/U @6 and 12Mo.
- Analgetika, Physio, Infiltrationen
- "The clinical course of patients with cervical radiculopathy appears to be long, with only approximately half of the patients recovered at 6 and 12 months.
- A longer duration of symptoms, absence of paresthesia, a higher neck pain intensity at baseline, a higher baseline disability score and a lower active rotation towards the affected side were related to poor perceived recovery, poor relief of neck pain and/or disability."





## Indikation

### Myelopathie

- Korrelierende Symptomatik
- Patholog. SSEP/MEP
- Myelonkompression/Myelomalazie
- Notfall: traumatisierte Stenose (<70. Lj.)

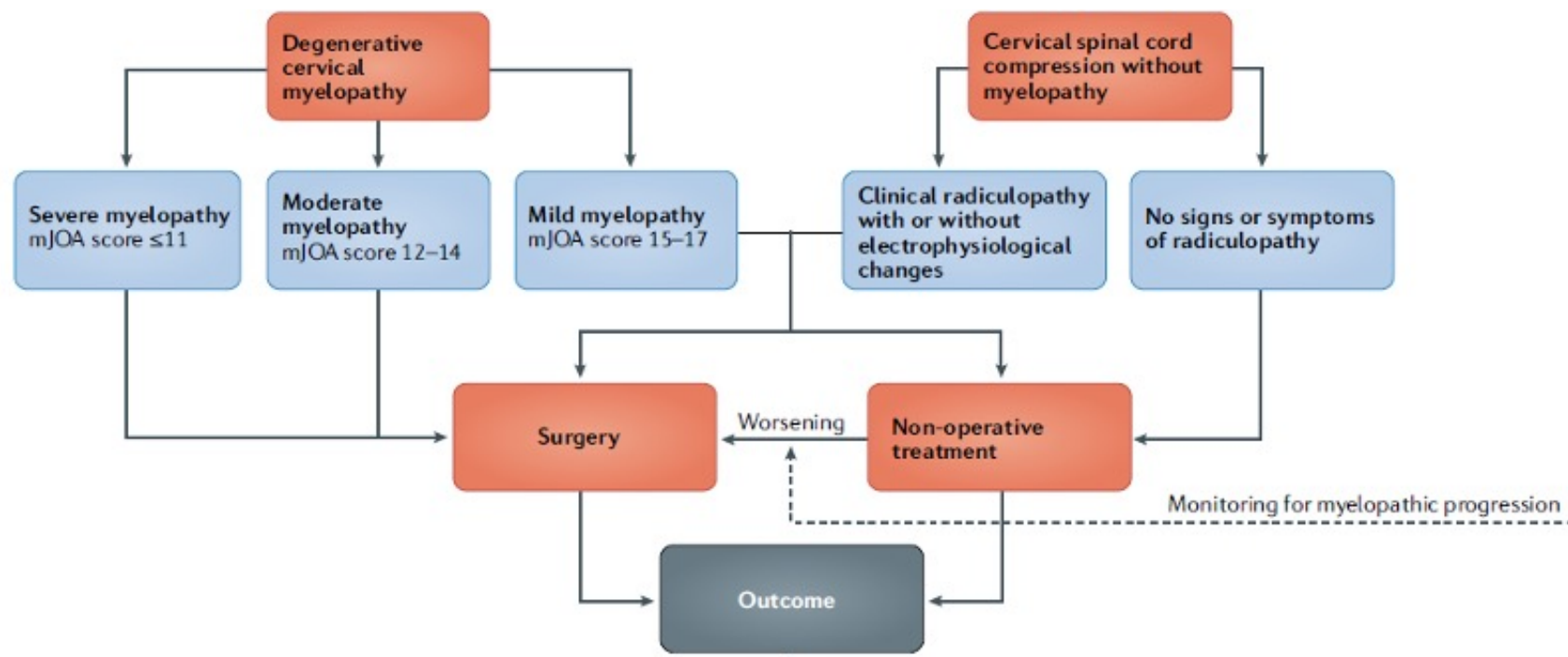




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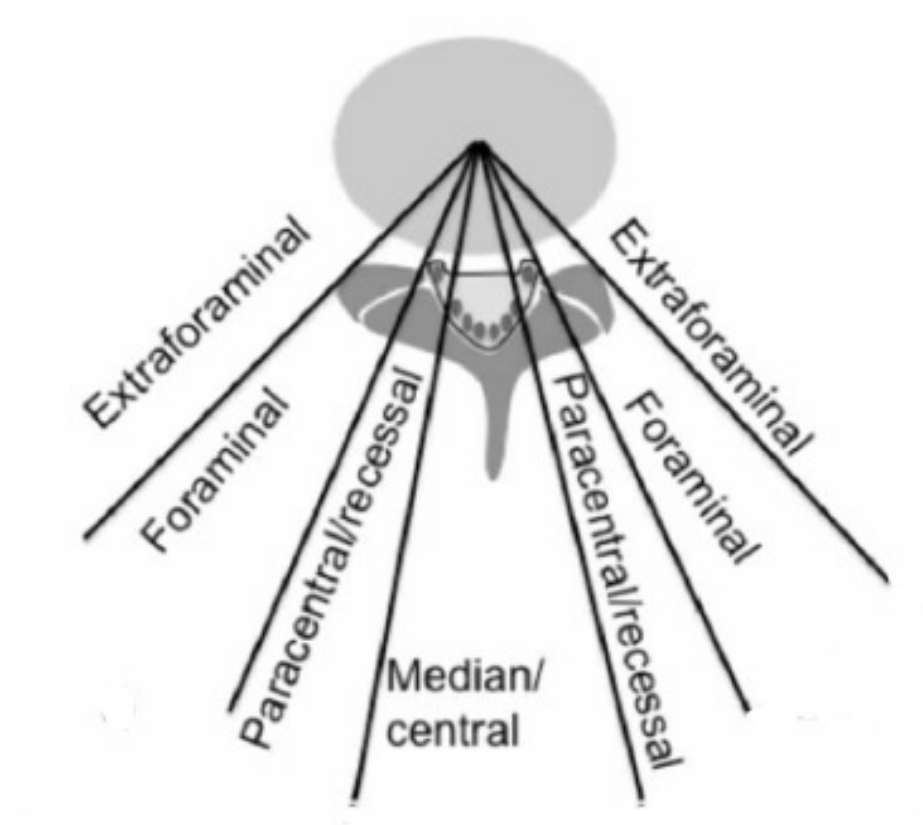
*Nature Reviews Neurology* 16, 108–124(2020) | Cite this article

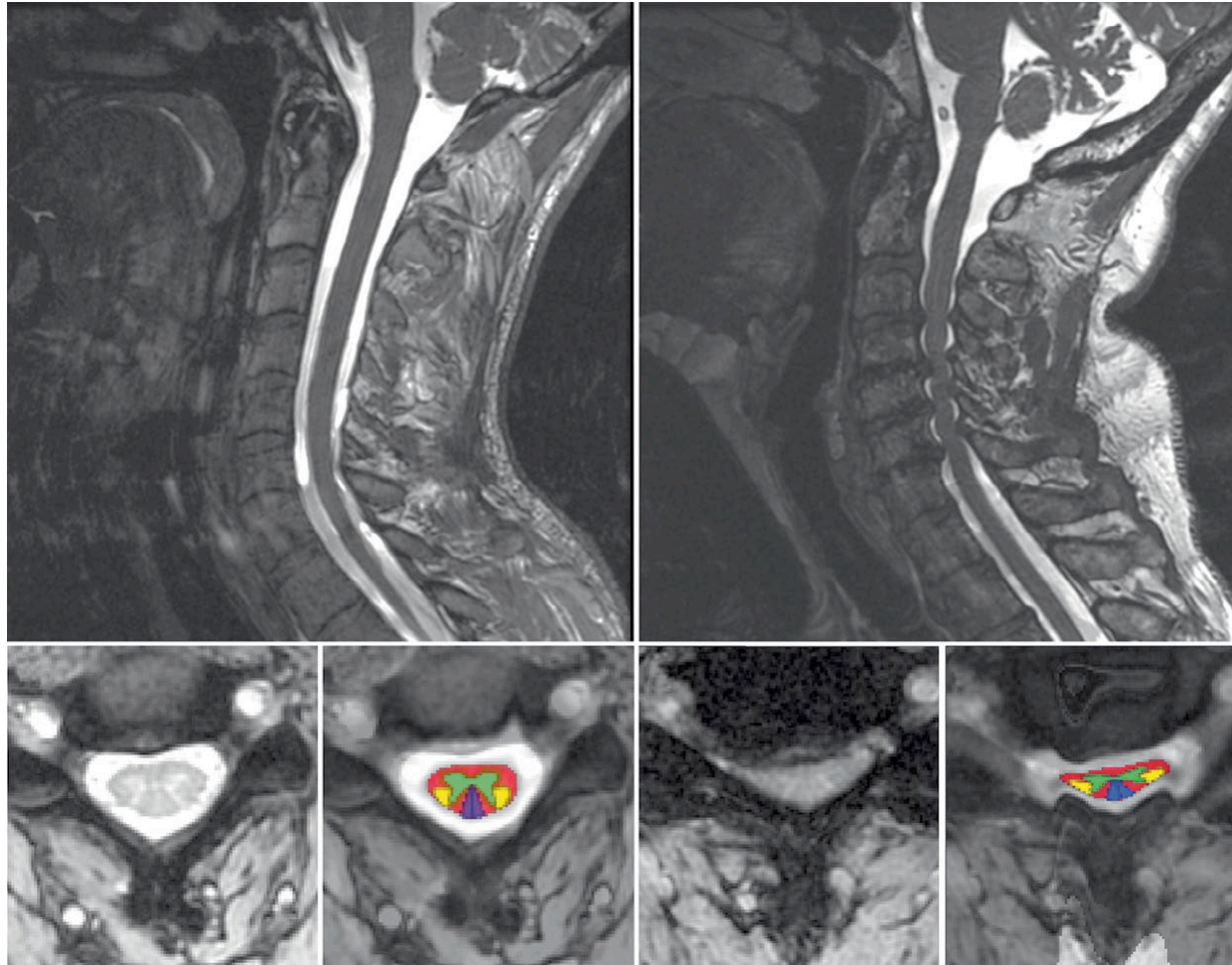






## Lokalisation





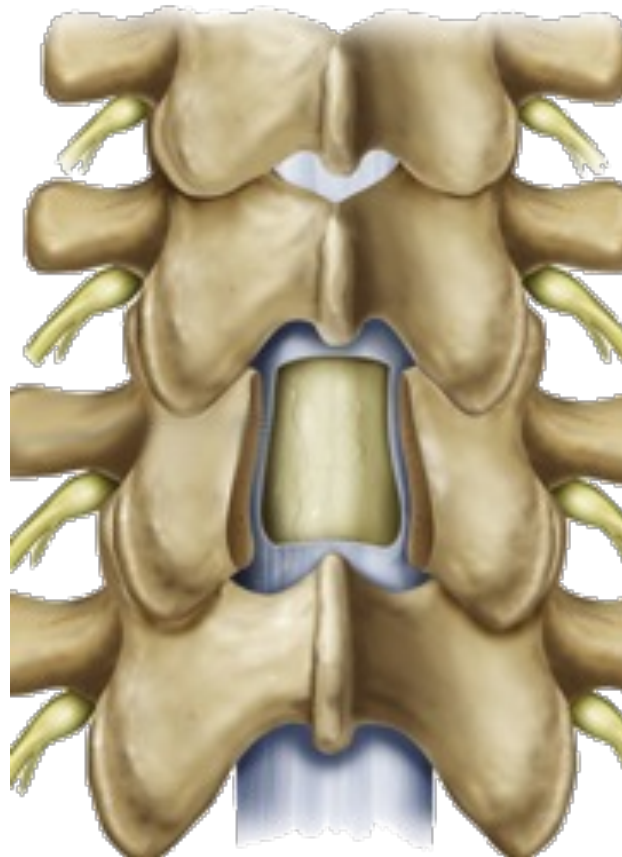








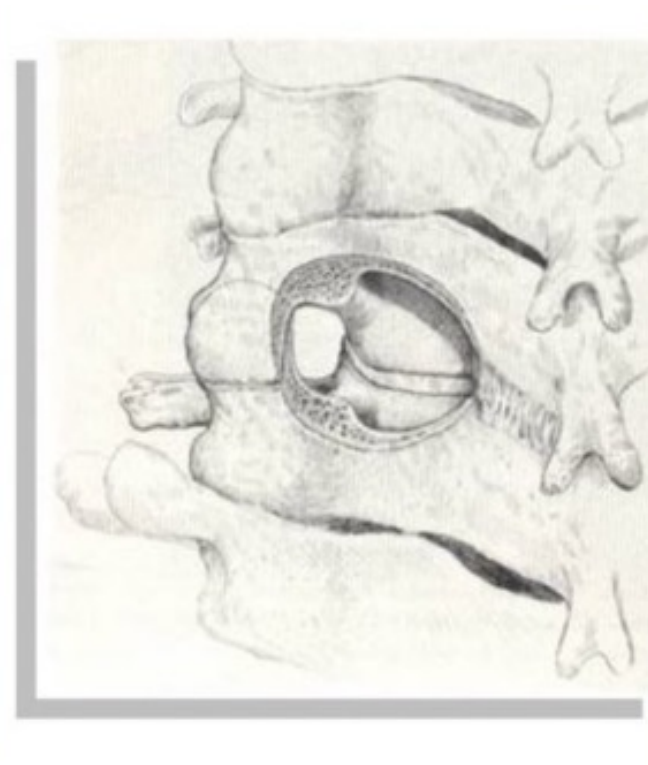
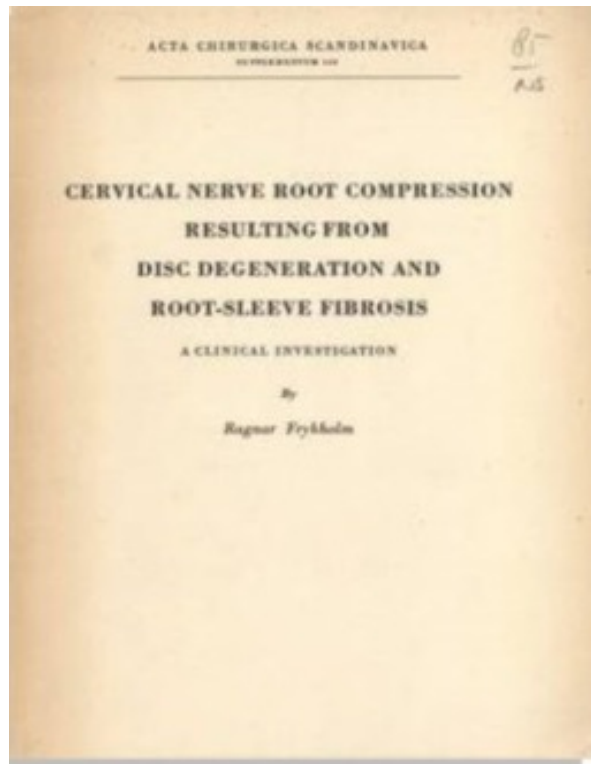
## Dorsale Dekompression







## Dorsale Dekompression

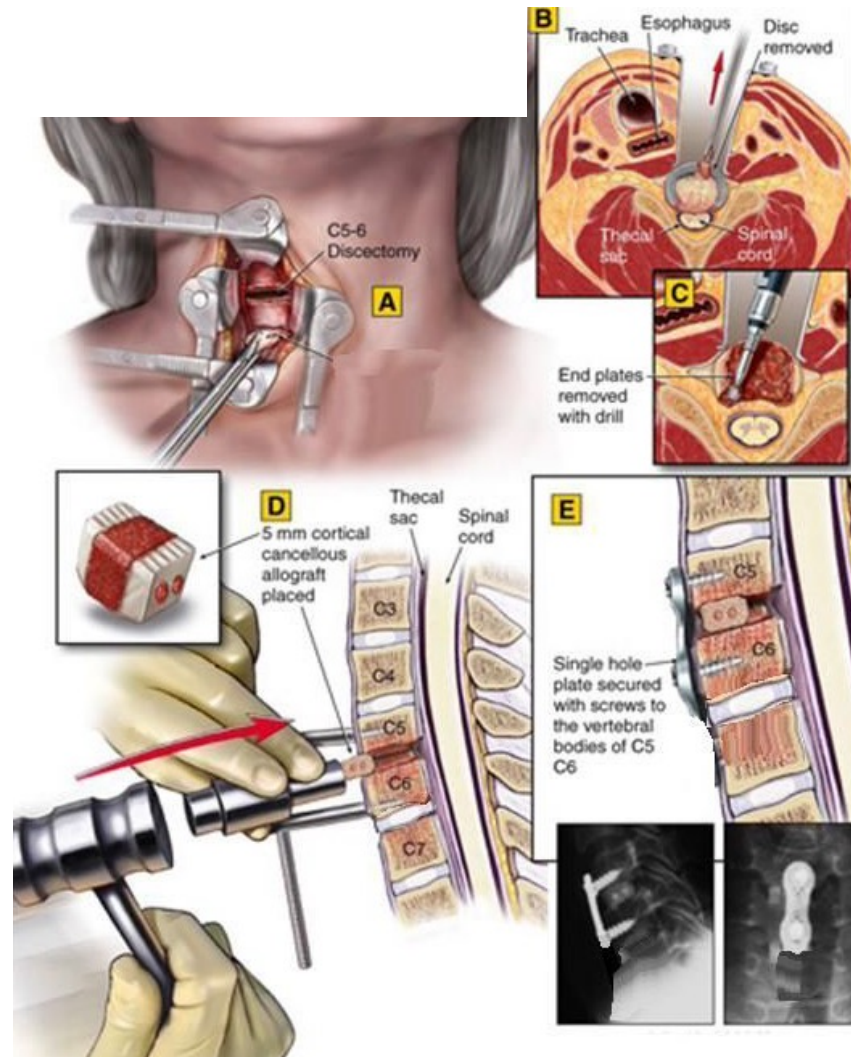


Ragnar Frykholm, Acta chirurgica scandinavica, 1951





# Ventrale Diskektomie & Cageeinlage





*Eur Spine J.* 2018 June ; 27(6): 1432–1439. doi:10.1007/s00586-018-5570-8.

### Reoperation and Complications after Anterior Cervical Discectomy and Fusion versus Cervical Disc Arthroplasty: A Study of 52,395 Cases

Michael P. Kelly, MD, MSc<sup>1\*</sup>, Claire D. Eliasberg, MD<sup>2</sup>, Remi M. Ajiboye, MD<sup>2</sup>, Steven J. McAnany, MD<sup>1</sup>, and Nelson F. SooHoo, MD<sup>2</sup>

<sup>1</sup>Department of Orthopedic Surgery, Washington University School of Medicine, Saint Louis, MO

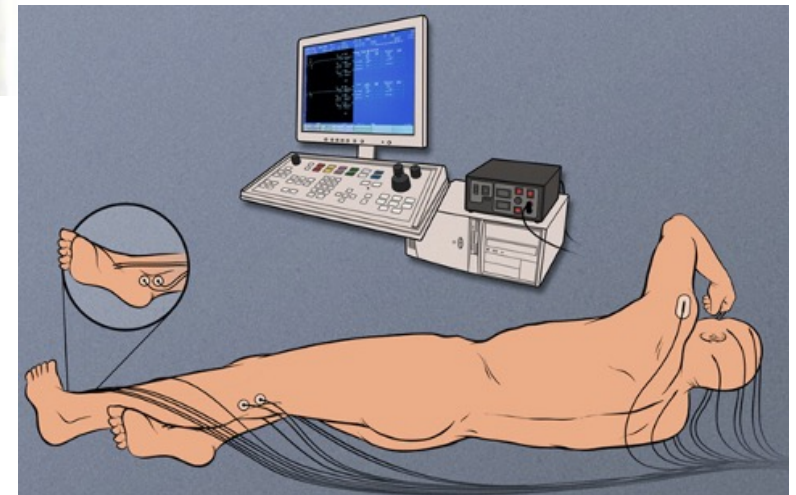
<sup>2</sup>Department of Orthopedic Surgery, University of California, Los Angeles, Los Angeles, CA

Complication	ACDF N = 50,926
Readmission	1991 (3.91%)
Death	93 (0.18%)
Acute Myocardial Infarction	7 (0.01%)
Pneumonia	77 (0.15%)
Pulmonary Embolism	55 (0.11%)
Device Related Mechanical Complication	205 (0.4%)
Wound Infection	140 (0.27%)
Esophageal Injury	2 (0%)
Vertebral Artery Injury	24 (0.05%)
Dural Tear	4 (0.01%)
Subsequent Cervical Surgery (within 90 days)	1707 (3.35%)





## Fallbeispiel 2







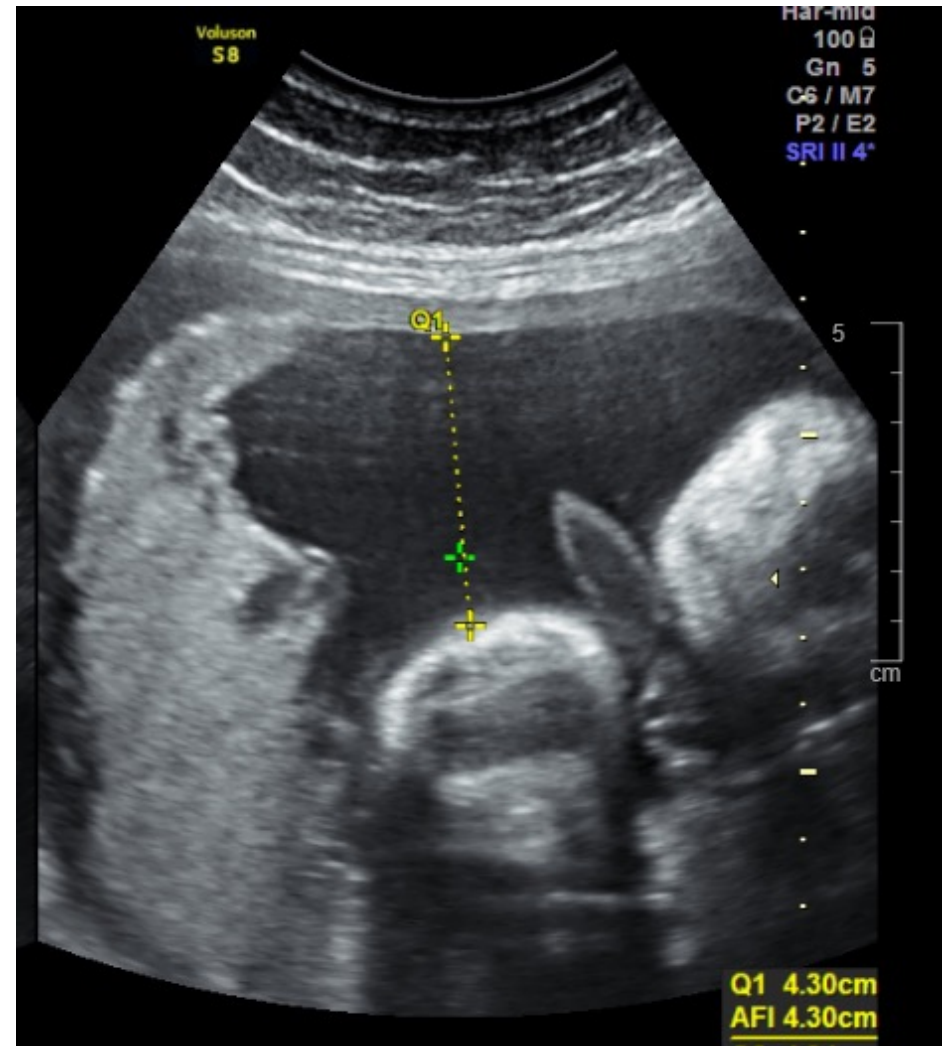
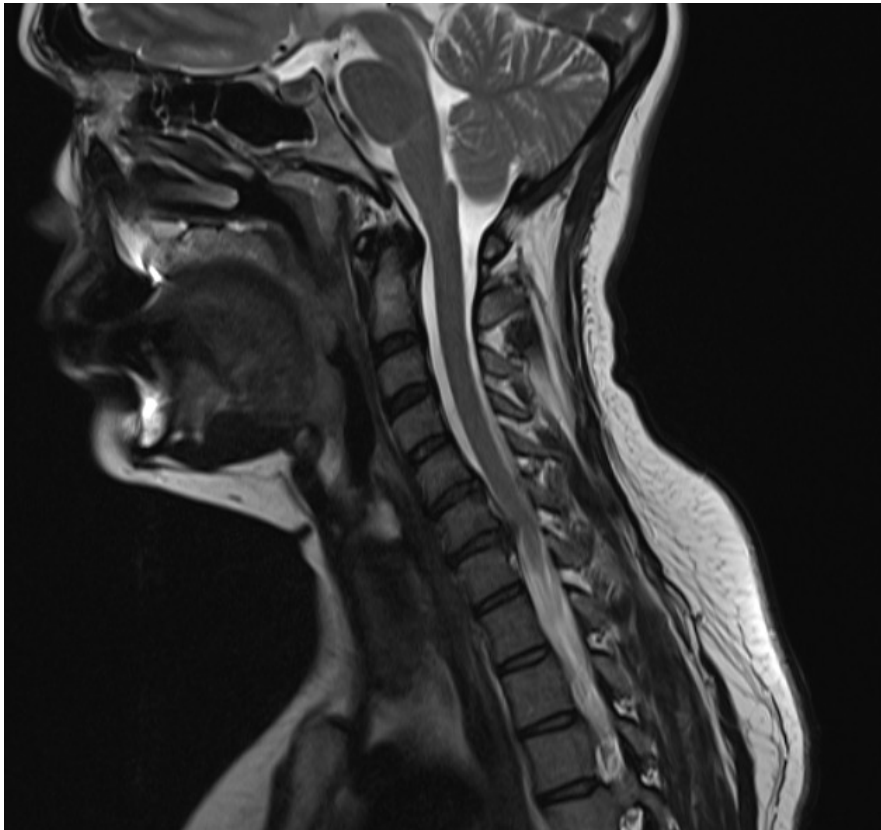
## Fallbeispiel 2







## Fallbeispiel 1





Danke

