



**Universiteit
Leiden**
The Netherlands

Optimizing care in lumbar radiculopathy and neurogenic claudication: from injection to inference, and from clinician to algorithm

Verheijen, E.J.A.

Citation

Verheijen, E. J. A. (2026, June 30). *Optimizing care in lumbar radiculopathy and neurogenic claudication: from injection to inference, and from clinician to algorithm*. Retrieved from <https://hdl.handle.net/1887/4307337>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4307337>

Note: To cite this publication please use the final published version (if applicable).

Optimizing Care in Lumbar Radiculopathy and Neurogenic Claudication

From injection to inference, and from clinician to algorithm

Eduard J.A. Verheijen

Eduard J.A. Verheijen

Optimizing Care in Lumbar Radiculopathy and Neurogenic Claudication.
From injection to inference, and from clinician to algorithm

PhD thesis, Leiden University, Leiden, The Netherlands

Printing: ProefschriftMaken | proefschriftmaken.nl
Layout and design: ProefschriftMaken | proefschriftmaken.nl
Cover design: Wendy Schoneveld
ISBN: 978-94-6534-383-9

Copyright © 2026 Eduard Verheijen

The printing of this thesis was financially supported by Scholten-Cordes Fonds
and Spaarne Gasthuis.

Optimizing Care in Lumbar Radiculopathy and Neurogenic Claudication

From injection to inference, and from clinician to algorithm

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr. S. de Rijcke,
volgens besluit van het college voor promoties
te verdedigen op dinsdag 30 juni 2026
klokke 14:30 uur

door

Eduard Jacques Alfons Verheijen

geboren te 's-Gravenhage
in 1993

Promotoren

Prof. dr. C.L.A. Vleggeert-Lankamp

Prof. dr. ir. M. Staring

Leden promotiecommissie

Prof. dr. J. Gussekloo

Prof. dr. ir. B.F.W. Lelieveldt

Prof. dr. R.H.M.A. Bartels, Radboud Universiteit Nijmegen

Dr. H. Arnts, Radboud Universiteit Nijmegen

TABLE OF CONTENTS

Part I	Optimizing care for lumbar radiculopathy	9
Chapter 1	General introduction and outline	11
Chapter 2	Epidural steroid compared to placebo injection in sciatica: a systematic review and meta-analysis <i>Eur Spine J 2021</i>	23
Chapter 3	The Outcome of Epidural Injections in Lumbar Radiculopathy Is Not Dependent on the Presence of Disc Herniation on Magnetic Resonance Imaging: Assessment of Short-Term and Long-Term Efficacy <i>World Neurosurg 2021</i>	45
Chapter 4	Factors associated with patient outcome after transforaminal epidural injection for lumbar disc herniation and stenosis: a systematic review of current literature <i>Submitted</i>	63
Chapter 5	Transforaminal epidural injection versus continued conservative care in acute sciatica (TEIAS trial): study protocol for a randomized controlled trial <i>BMC Neurol 2019</i>	83
Chapter 6	Prediction of transforaminal epidural injection success in sciatica (POTEISS): a protocol for the development of a multivariable prediction model for outcome after transforaminal epidural steroid injection in patients with lumbar radicular pain due to disc herniation or stenosis <i>BMC Neurol 2024</i>	103
Chapter 7	The Effect of a Transforaminal Epidural Injection in Patients with Lumbar Disc Herniation is not correlated with the Presence of Type II Modic Changes <i>Brain Spine 2025</i>	129

Part II	Improving diagnosis and prognosis in lumbar spinal stenosis	147
Chapter 8	General introduction and outline	149
Chapter 9	External validation of a Novel Comprehensive Grading System for Lumbar Spinal Stenosis <i>Submitted</i>	157
Chapter 10	Artificial intelligence for segmentation and classification in lumbar spinal stenosis: an overview of current methods <i>Eur Spine J 2025</i>	175
Chapter 11	Conclusion and discussion	195
Appendices	Summary	217
	Samenvatting	221
	Acknowledgements	226
	Curriculum vitae	228
	List of publications	229