



Universiteit  
Leiden  
The Netherlands

**Reconstructive techniques in musculoskeletal tumor surgery :  
management of pelvic and extremity bone tumors**  
Bus, M.P.A.

**Citation**

Bus, M. P. A. (2018, April 12). *Reconstructive techniques in musculoskeletal tumor surgery : management of pelvic and extremity bone tumors*. Retrieved from <https://hdl.handle.net/1887/61174>

Version: Not Applicable (or Unknown)

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

Downloaded from: <https://hdl.handle.net/1887/61174>

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

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/61174> holds various files of this Leiden University dissertation.

**Author:** Bus, M.P.A.

**Title:** Reconstructive techniques in musculoskeletal tumor surgery : management of pelvic and extremity bone tumors

**Issue Date:** 2018-04-12

# **Reconstructive Techniques in Musculoskeletal Tumor Surgery**

---

*Management of Pelvic and Extremity Bone Tumors*

Michaël P.A. Bus

# **Reconstructive Techniques in Musculoskeletal Tumor Surgery – Management of Pelvic and Extremity Bone Tumors**

PhD thesis, Leiden University, Leiden, the Netherlands

Copyright © 2018 M.P.A. Bus, Amsterdam, the Netherlands

All rights reserved. No parts of this thesis may be reproduced, stored in a retrieval system of any nature or by any means, without prior written consent of the author. The copyright of the articles that have been published has been transferred to the respective journals.

**ISBN/EAN**            978-94-6332-316-1

**Cover design**       Jeroen Luijt Photography ([jeroenluijt.nl](http://jeroenluijt.nl)), Amsterdam,  
the Netherlands

**Lay-out**            Ferdinand van Nispen tot Pannerden,  
Citroenvlinder DTP & Vormgeving, [my-thesis.nl](http://my-thesis.nl)

**Printing**            GVO Drukkers & Vormgevers B.V., Ede, the Netherlands

The research projects in this thesis were supported by an unconditional research grant from implantcast GmbH, Buxtehude, Germany.

Publication of this thesis was kindly supported by: Nederlandse Orthopaedische Vereniging (NOV), Universiteit Leiden, implantcast Benelux, Bislife Foundation, ChipSoft and Anna Fonds|NOREF.

# **Reconstructive Techniques in**

# **Musculoskeletal Tumor Surgery**

*Management of Pelvic and Extremity Bone Tumors*

Proefschrift

ter verkrijging van  
de graad van Doctor aan de Universiteit Leiden  
op gezag van Rector Magnificus prof. mr. C.J.J.M. Stolk  
volgens besluit van het College voor Promoties  
te verdedigen op donderdag 12 april 2018  
klokke 16:15 uur

door

Michaël Peter Alexander Bus

geboren te Naarden  
in 1988

**Promotores**

Prof. dr. P.D.S. Dijkstra

Prof. dr. R.G.H.H. Nelissen

**Co-promotor**

Dr. J.A.M. Bramer

*Academisch Medisch Centrum, Amsterdam*

**Leden promotiecommissie**

Prof. dr. J.V.M.G. Bovee

Prof. dr. D.A. Campanacci      *Azienda Ospedaliero-Universitaria Careggi, Florence, Italië*

Dr. M.A.J. van de Sande

Prof. dr. H.W.B. Schreuder      *Radboud Universitair Medisch Centrum, Nijmegen*

Prof. dr. ir. A.A. Zadpoor      *Technische Universiteit Delft, Delft*

*"Some of my operations are great triumphs and tremendous.*

*But they're only triumphs because there are also disasters"*

Henry Marsh (Do No Harm, 2014)

# Contents

Chapter 1	General introduction	9
<b>Part I</b>	<b>Management of Pelvic Bone Tumors</b>	29
Chapter 2	Conventional primary central chondrosarcoma of the pelvis: prognostic factors and outcome of surgical treatment in 162 patients MPA Bus, DA Campanacci, JI Albergo, A Leithner, MAJ van de Sande, LC Gaston, G Caff, J Mettelsiefen, R Capanna, PU Tunn, LM Jeys, PDS Dijkstra <i>Accepted for publication (J Bone Joint Surg Am).</i>	31
Chapter 3	Clinical outcome of pedestal cup endoprosthetic reconstruction after resection of a periacetabular tumor MPA Bus, EJ Boerhout, JAM Bramer, PDS Dijkstra <i>Bone Joint J 2014;96-B:1706-12.</i>	53
Chapter 4	LUMiC® endoprosthetic reconstruction after periacetabular tumor resection: short-term results MPA Bus, A Szafranski, S Sellevold, T Goryn, PC Jutte, JAM Bramer, M Fiocco, A Streitbürger, D Kotrych, MAJ van de Sande, PDS Dijkstra <i>Clin Orthop Relat Res 2017 Mar; 475(3): 686–695.</i>	69
<b>Part II</b>	<b>Management of Extremity Bone Tumors</b>	91
Chapter 5	Intercalary allograft reconstructions following resection of primary bone tumors: a nationwide multicenter study MPA Bus, PDS Dijkstra, MAJ van de Sande, AHM Taminiaw, HWB Schreuder, PC Jutte, ICM van der Geest, GR Schaap, JAM Bramer <i>J Bone Joint Surg Am 2014;96:e26(1-11).</i>	93

Chapter 6	<b>Hemicortical resection and inlay allograft reconstruction for primary bone tumors: a retrospective evaluation in the Netherlands and review of the literature</b>	115
	MPA Bus, JAM Bramer, GR Schaap, HWB Schreuder, PC Jutte, ICM van der Geest, MAJ van de Sande, PDS Dijkstra	
	<i>J Bone Joint Surg Am 2015;97:738-50.</i>	
Chapter 7	<b>Is there still a role for osteoarticular allograft reconstruction in musculoskeletal tumor surgery? A long-term follow-up study of 38 patients and systematic review of the literature</b>	137
	MPA Bus, MAJ van de Sande, AHM Taminiau, PDS Dijkstra	
	<i>Bone Joint J 2017;99-B:522–30.</i>	
Chapter 8	<b>Factors affecting nonunion of allograft-host junctions in intercalary reconstructions of the femur and tibia</b>	163
	MPA Bus, JI Albergo, MAJ van de Sande, GL Farfalli, LE Ritacco, LA Aponte-Tinao, PDS Dijkstra	
	<i>Accepted for publication (Int Orthop).</i>	
Chapter 9	<b>What are the long-term results of MUTARS® modular endoprostheses for reconstruction of tumor resection of the distal femur and proximal tibia?</b>	179
	MPA Bus, MAJ van de Sande, M Fiocco, GR Schaap, JAM Bramer, PDS Dijkstra	
	<i>Clin Orthop Relat Res. 2017 Mar; 475(3): 708–718.</i>	
Chapter 10	<b>General summary</b>	201
Chapter 11	<b>General discussion</b>	209
Chapter 12	<b>Summary in Dutch (Nederlandstalige samenvatting)</b>	237
Appendices		245
	List of publications	246
	Acknowledgements	248
	Curriculum vitae	250