

Contents

Part I Diagnostics

1 Biopsy of Bone and Soft Tissue Tumours:	
Hints and Hazards.....	3
Andreas Leithner, Werner Maurer-Ertl, and Reinhard Windhager	
1.1 Introduction	3
1.2 Diagnostic Algorithm	3
1.3 Biopsy.....	5
1.3.1 Biopsy Technique	6
1.4 Hints	7
1.5 Hazards.....	7
1.6 Definitive Diagnosis.....	9
References	10
2 The Role of Intra-operative Pathological Evaluation	
in the Management of Musculoskeletal Tumours.....	11
Robert U. Ashford, Richard A. Scolyer, Stanley W. McCarthy, S. Fiona Bonar, Rooshdiya Z. Karim, and Paul D. Stalley	
2.1 Introduction: Indications for Intra-operative Pathological Evaluation in Musculoskeletal Surgical Oncology.....	11
2.2 Pathological Options for Intra-operative Evaluation	12
2.2.1 Frozen Section	12
2.2.2 Fine Needle Aspiration Cytology	14
2.2.3 Touch Imprint Cytology	16
2.3 Uses of Frozen Section in Musculoskeletal Tumours.....	16
2.3.1 Operative Core Biopsy of Presumed Sarcoma	17
2.3.2 Surgical Margin Biopsy/Imprint.....	18
2.3.3 Confirmation of Diagnosis Prior to Definitive Treatment	19
2.3.4 Evaluation of Tumour Spread	20
2.3.5 Intramedullary Nailing of Presumed Metastasis	20

2.3.6	Frozen Section for Everyone?	20
2.3.7	Beware the Pitfalls of Frozen Section	20
2.4	Cost-Effectiveness	21
2.5	Discussion	22
	References	23
3	Sentinel Node Biopsy in Soft Tissue Sarcoma	25
	Dimosthenis Andreou and Per-Ulf Tunn	
3.1	Introduction	25
3.2	Technique of Lymphatic Mapping and Sentinel Lymph Node Biopsy	26
3.2.1	Preoperative Lymphoscintigraphy	26
3.2.2	Intraoperative Lymphatic Mapping	28
3.2.3	Histopathological Examination	30
3.3	Sentinel Node Biopsy in the Management of Soft Tissue Sarcoma	31
3.3.1	Clear Cell Sarcoma	31
3.3.2	Synovial Sarcoma	31
3.3.3	Rhabdomyosarcoma	32
3.3.4	Epithelioid Sarcoma	32
3.4	Discussion	33
	References	34
 Part II Bone Sarcomas		
4	Modular Endoprosthetic Reconstruction in Malignant Bone Tumors: Indications and Limits	39
	Maurice Balke, Helmut Ahrens, Arne Streitbürger, Georg Gosheger, and Jendrik Hardes	
4.1	Introduction	39
4.2	Surgical Technique	40
4.3	Postoperative Management	42
4.4	Complications	42
4.5	Indications and Limits	44
4.5.1	Tumor Prostheses in Children	45
4.6	Functional Results	46
	Summary	47
	References	48

5	Allograft Reconstruction in Malignant Bone Tumors:	
	Indications and Limits	51
	Kevin A. Raskin and Francis Hornicek	
5.1	Introduction	51
5.1.1	Biology	52
5.2	Indications and Types	52
5.2.1	Intercalary Allografts.....	52
5.2.2	Osteoarticular Allografts	53
5.2.3	Allograft Arthrodesis.....	53
5.2.4	Allograft–Prosthetic Composites	55
5.3	Limits.....	55
	Summary	57
	References	57
6	Expandable Endoprostheses in Malignant Bone Tumors in Children:	
	Indications and Limitations	59
	Rainer Baumgart and Ulrich Lenze	
6.1	Introduction	59
6.2	Principles of Expandable Tumor Endoprosthesis	60
6.3	The Expandable Tumor Endoprosthesis MUTARS Xpand	61
6.4	The “Bioexpandable” Tumor Endoprosthesis MUTARS Bio-Xpand	62
6.5	Indications	64
6.5.1	Step 1	64
6.5.2	Step 2	64
6.6	Limitations.....	65
6.7	Clinical Cases	66
6.8	Conclusion.....	68
	References	72
7	The Long-Term Risks of Infection and Amputation	
	with Limb Salvage Surgery Using Endoprostheses	75
	Lee Jeys and Robert Grimer	
7.1	Introduction	75
7.2	Long-Term Limb Salvage.....	76
7.3	Infection and Endoprostheses.....	77
7.4	New Techniques to Combat Infection.....	81
7.4.1	Surface Treatments	81
7.4.2	Antibiotic Prophylaxis.....	82
7.5	Conclusions	82
	References	82

8 Reconstruction of the Pelvis After Resection of Malignant Bone Tumours in Children and Adolescents	85
Martin Dominkus, Eslam Darwish, and Philipp Funovics	
8.1 Introduction	85
8.2 Diagnosis	86
8.3 Biopsy	86
8.4 Preoperative Staging and Therapy	86
8.5 Resection Type I: Os Ilium	88
8.5.1 Partial Resection of the Ilium Without Discontinuity of the Pelvic Ring	88
8.5.2 Complete Resection of the Os Ilium with Discontinuity of the Pelvic Ring	88
8.6 Resection Type II: Acetabulum	89
8.6.1 Biological Reconstruction Methods	92
8.6.2 Endoprosthetic Reconstruction Methods	96
8.7 Resection Type I–II +/- IV	101
8.7.1 Allograft	101
8.7.2 Autograft	102
8.7.3 Flail Hip	102
8.7.4 Hip Transpositionplasty	102
8.8 Resection Type III	103
8.9 Resection Type II, III	104
8.10 Resection Type I–III/IV	104
8.10.1 Flail Hip: No Reconstruction	105
8.10.2 Hemipelvis Allograft	106
8.11 Future Aspects	108
Summary	108
References	109
9 Methods of Biological Reconstruction for Bone Sarcoma: Indications and Limits	113
Pierre Kunz and Ludger Bernd	
9.1 Introduction	113
9.2 Biological Reconstruction Procedures and Outcome	114
9.2.1 Transplantation of Vital Autografts	114
9.2.2 Implantation of Avital Bone: Extracorporeal Devitalized Autografts	119
9.2.3 De Novo Bone Formation: Distraction Osteogenesis	123
9.3 Discussion	127
9.3.1 Vital Bone Grafts: Vascularization	128
9.3.2 Biomechanical Aspects in Free Bone Grafts: Union, Hypertrophy, Fracture	130
9.3.3 Complications and Functional Outcome in Vital Grafts	131
9.3.4 Extracorporeal Devitalized Grafts	131

9.3.5	Distraction Osteogenesis	132
9.3.6	Indications and Limitations	133
9.4	Conclusion	134
	References	135
10	Bone Sarcoma of the Spine	141
	Klaus-Dieter Schaser, I. Melcher, A. Luzzati, and A. C. Disch	
10.1	Introduction and Epidemiology	141
10.2	Clinical Presentation	142
10.3	Diagnostics and Radiographic Imaging	143
10.4	Role and Technique of Biopsy	143
10.5	Oncosurgical Staging Systems of Primary Vertebral Tumors	144
10.6	Surgical Approaches	146
10.6.1	Posterior/Posterolateral Approach	146
10.6.2	Anterior Approaches	146
10.7	Surgical Strategies, Patient Selection, Treatment Decisions and Surgical Techniques	149
10.8	Surgical Technique of En Bloc Spondylectomy/Total En Bloc Vertebrectomy	150
10.8.1	Resection Technique	151
10.8.2	Technique: Spinal Reconstruction	152
10.9	Current Management of Individual Primary Malignant Vertebral Column Tumors	152
10.9.1	Osteosarcoma	152
10.9.2	Ewing Sarcoma	155
10.9.3	Chondrosarcoma	158
10.9.4	Chordoma	158
10.10	Nonsurgical Treatment Options	159
10.10.1	Radiation	159
10.10.2	Chemotherapy	161
10.10.3	Embolization	161
10.10.4	Pain Management	161
10.11	Complications	161
10.12	Prognosis	162
	References	162
11	Computer-Assisted Pelvic Tumor Resection: Fields of Application, Limits, and Perspectives	169
	Sebastian Fehlberg, Sebastian Eulenstein, Thomas Lange, Dimosthenis Andreou, and Per-Ulf Tunn	
11.1	Introduction	169
11.2	Navigation Procedures	171
11.2.1	Preoperative Imaging and Segmentation	171

11.2.2	Tracking Systems	172
11.2.3	Intraoperative Patient-to-Image Registration	173
11.2.4	Intraoperative Visualization	176
11.3	Fields of Application	176
11.4	Clinical Results	178
11.5	Limits and Perspectives	179
	Summary	180
	References	180
12	Pulmonary Metastasectomy for Osteosarcoma: Is It Justified?	183
	Klaus-Dieter Diemel, Heinz-Jürgen Klippe, and Detlev Branscheid	
12.1	History of Osteosarcoma and Pulmonary Metastasectomy	183
12.2	Thoracic Surgery Becomes Important Part of Interdisciplinary Concepts	185
12.2.1	From Single-Centre Experience to Large Databases	187
12.3	Evaluating the Patient with Pulmonary Metastases	187
12.3.1	Computed Tomography of the Lung	188
12.3.2	SPECT and PET Scans	188
12.4	Prognostic Factors and Their Impact for Pulmonary Metastasectomy	189
12.4.1	Factors Correlating to Modalities and Therapies of the Primary Tumour	189
12.4.2	Factors Concerning the Time of Presentation of Metastases	190
12.4.3	Factors Concerning Properties of Metastases and Surgical Remission	190
12.5	Techniques in Pulmonary Metastasectomy	190
12.5.1	Operative Approach to the Metastatic Lung	190
12.5.2	Techniques in Pulmonary Resection	193
12.6	Our Own Results	196
12.7	Discussion	200
12.7.1	The Reviewed Studies	200
12.7.2	Risk Factors Affecting Survival After Pulmonary Metastasectomy	202
12.7.3	Surgical Approach for Pulmonary Metastasectomy	203
12.7.4	A Place for Minimally Invasive Surgery (VATS)?	204
12.8	Conclusions	204
	References	205

Part III Soft Tissue Sarcomas

13	Standardized Approach to the Treatment of Adult Soft Tissue Sarcoma of the Extremities	211
	Per-Ulf Tunn, Christoph Kettelhack, and Hans Roland Dürr	
	Abbreviations	211
13.1	Introduction	212
13.2	Biopsy Techniques	212
13.3	Surgical Therapy in Soft Tissue Sarcoma: General Principles	213
13.3.1	The Influence of Surgical Margins	215
13.3.2	The Influence of an Unplanned Excision	216
13.3.3	The Influence of Local Recurrence	218
13.4	Neoadjuvant and Adjuvant Treatment Modalities in Soft Tissue Sarcoma	218
13.4.1	The Role of Systemic Chemotherapy	219
13.4.2	The Role of Isolated Limb Perfusion	220
13.4.3	The Role of Radiotherapy	220
13.4.4	Response Assessment After Neoadjuvant Treatment in Soft Tissue Sarcoma	222
	Summary	224
	References	224
14	Evaluating Surgery Quality in Soft Tissue Sarcoma	229
	Eberhard Stoeckle, Jean-Michel Coindre, Michèle Kind, Guy Kantor, and Binh N. Bui	
14.1	Introduction	229
14.2	What End-Points for Assessing Local Tumour Control?	230
14.3	Local Recurrence Rates	231
14.4	Margins and Their Impact on Local Control	232
14.4.1	Margin Determination and Local Outcome	232
14.4.2	Co-factors Influencing Margin Quality	235
14.4.3	Impact of Margin and Other Factors on Local Recurrence	237
14.5	Long-Term Follow-Up with Actuarial Estimates in Homogeneous Patient Groups	238
14.6	Recapitulation: Criteria for Evaluating Surgery Quality with STS	238
	References	238
15	Peripheral Nerve Considerations in the Management of Extremity Soft Tissue Sarcomas	243
	Peter C. Ferguson, Anna A. Kulidjian, Kevin B. Jones, Benjamin M. Deheshi, and Jay S. Wunder	
15.1	Introduction	243
15.2	Diagnosis of Peripheral Nerve Involvement	244

15.2.1	History and Physical Examination	244
15.2.2	Imaging.....	245
15.2.3	Other Diagnostic Considerations.....	246
15.3	Management of Peripheral Nerve Involvement.....	246
15.3.1	General Approach.....	246
15.3.2	Epineural Dissection.....	246
15.3.3	Nerve Resection Without Reconstruction	249
15.3.4	Nerve Resection and Reconstruction	252
15.3.5	Distal Functional Restoration: Tendon Transfers	253
15.3.6	Distal Functional Restoration: Distal Nerve Transfers.....	254
15.3.7	Amputation.....	254
15.4	Conclusions	255
	References	255
16	Isolated Limb Perfusion with TNF-α and Melphalan in Locally Advanced Soft Tissue Sarcomas of the Extremities	257
	Dirk J. Grünhagen, Johannes H.W. de Wilt, Albertus N. Van Geel, Cornelis Verhoef, and Alexander M.M. Eggermont	
16.1	Introduction	257
16.2	Isolated Limb Perfusion	258
16.3	The Rationale for Using Tumour Necrosis Factor- α in ILP	259
16.4	TNF-Based Isolated Limb Perfusion for STS	261
16.5	Results with TNFPlus Doxorubicin.....	262
16.6	Toxicity of a TNF-Based ILP	262
16.7	Special Patient Categories	265
16.7.1	Patients with Overt Metastatic Disease	265
16.7.2	Patients with Multiple Tumours in the Extremity.....	265
16.7.3	Patients with Recurrent Tumours in an Irradiated Field.....	265
16.7.4	Elderly Patients (>75 Years Old)	265
16.7.5	TNF-Based ILP Activity in Other Histologies	265
16.8	Future Perspectives	266
16.9	Conclusions	266
	References	266
17	Management of Locally Recurrent Soft Tissue Sarcoma after Prior Surgery and Radiation Therapy	271
	Peter Hohenberger and Matthias H.M. Schwarzbach	
17.1	Introduction	271
17.2	Treatment Options	272
17.3	Problems for Surgery Encountered with Previous Radiotherapy	273
17.4	Practical Management of In-Field Sarcoma Recurrence.....	275
17.5	Treatment Decisions in Surgical Re-intervention	276
17.6	Indication for Multimodal Re-treatment	277
17.7	Conclusion.....	281
	References	281

18	Management of Vascular Involvement in Extremity Soft Tissue Sarcoma	285
	Ashish Mahendra, Yair Gortzak, Peter C. Ferguson, Benjamin M. Deheshi, Thomas F. Lindsay, and Jay S. Wunder	
18.1	Introduction	285
18.2	Indications for Vascular Resection and Reconstruction in Extremity Soft Tissue Sarcoma	286
18.3	Patient Workup	287
18.4	Surgical and Functional Outcome	289
18.4.1	Amputation Risk	290
18.4.2	Use of Muscle Flaps	290
18.4.3	Wound Complications	290
18.4.4	Postoperative Limb Edema and DVT	290
18.4.5	Risk of Local Recurrence	291
18.4.6	Risk of Systemic Disease	291
18.4.7	Functional Outcome	291
18.5	Vascular Outcome	293
18.5.1	Arterial Reconstruction	293
18.5.2	Venous Reconstruction	293
18.5.3	Type of Vascular Graft	294
18.6	Effects of Radiotherapy	296
	Summary	298
	References	298
19	Current Concepts in the Management of Retroperitoneal Soft Tissue Sarcoma	301
	Matthias H.M. Schwarzbach and Peter Hohenberger	
19.1	Introduction	301
19.2	Definitions Referring to Retroperitoneal Sarcomas	302
19.3	Diagnostic Requirements in Retroperitoneal Sarcomas	302
19.4	Vascular Involvement	303
19.5	Surgical Therapy in Localized Soft Tissue Sarcomas of the Retroperitoneum	305
19.6	Surgical Therapy in Metastasized Soft Tissue Sarcomas of the Retroperitoneum	314
19.7	Prognosis	315
19.8	Chemotherapy and Radiation Therapy	315
	Summary	317
	References	317

20	Pulmonary Metastasectomy for Soft Tissue Sarcomas: Is It Justified?	321
	Joachim Pfannschmidt, Hans Hoffmann, Thomas Schneider, and Hendrik Dienemann	
20.1	Introduction	321
20.2	Clinical Features	323
20.3	Radiology	323
20.4	Patient Selection	324
20.5	Surgery	325
20.6	Video-Assisted Thoracic Surgery	326
20.7	Prognostic Factors	327
20.7.1	Overall Survival	327
20.7.2	Recurrent Pulmonary Metastases	331
20.7.3	Perioperative Chemotherapy	331
20.8	Future Directions	332
20.9	Conclusions	333
	References	333
 Part IV Quality of Life Assessment		
21	Quality of Life (QOL) in Patients with Osteosarcoma	339
	Rajaram Nagarajan	
21.1	Osteosarcoma	339
21.2	Treatment and Survival	340
21.3	Quality of Life	340
21.4	Outcomes Model	341
	References	343
22	Clinical Trials in Osteosarcoma Treatment: Patients' Perspective Through Art	345
	Lizzie Burns and Martha Perisoglou	
22.1	Introduction	345
22.2	Patients with Osteosarcoma and the EURAMOS 1 Clinical Trial	346
22.3	Bringing Medicine to Life	346
22.4	The Patients' Perspective	347
22.4.1	Syed	347
22.4.2	Omar	350
22.4.3	Shane	350
22.4.4	Laura	351
22.4.5	Meg	352
22.4.6	Simon	353

22.4.7	Bhavin.....	355
22.4.8	Sam.....	357
22.4.9	Charlie	357
22.5	Art and Cancer	359
22.6	Conclusion.....	360
	Acknowledgements	360
	References	360



<http://www.springer.com/978-3-540-77959-9>

Treatment of Bone and Soft Tissue Sarcomas

Tunn, P.-U. (Ed.)

2009, XXII, 362 p. 166 illus., 130 illus. in color.,

Hardcover

ISBN: 978-3-540-77959-9