

Table of contents

1 Why spine arthroplasty? 5

1.1 Fundamentals of degenerative disc disease	5
1.2 Common causes of back pain	6
1.2.1 Intervertebral discs	6
1.2.2 Facet joints	6
1.2.3 Nerve roots	7
1.2.4 Ligaments and muscles	7
1.2.5 Sacroiliac joint	7
1.3 Treatment options for discogenic low back pain in degenerative lumbar disc disease	8
1.4 Why fusion surgery fails	8
1.5 Treatment goals for total disc replacement	10
1.6 Preliminary clinical results with total disc replacement	12
1.7 Summary	13

2 Total disc development and design 19

2.1 History of spine arthroplasty	19
2.2 Biomechanics of total disc replacement	20
2.3 PRODISC® design and development	21
2.3.1 Modular design	21
2.3.2 Biomechanical principles	24
2.3.3 Mechanical testing	26
2.4 PRODISC® instruments	30
2.5 Summary	32

3 Indications and patient selection for total disc replacement 37

3.1 Diagnostic tools	37
3.1.1 X-ray	37
3.1.2 Magnetic resonance imaging	38
3.1.3 Computed-tomography scan	39
3.1.4 Three-dimensional CT angiography	39
3.1.5 Osteodensitometry	39
3.1.6 Semi-invasive tests	40
3.2 Indications for total disc replacement	41
3.3 Contraindications for total disc replacement	45
3.3.1 General contraindications	45
3.3.2 Specific contraindications	45
3.4 Clinical cases	46
3.5 Extended indications	52

4	Preoperative considerations	63
4.1	Preoperative planning	63
4.2	Templating	65
5	Surgical technique	71
5.1	Prior to surgery	71
5.1.1	Preoperative preparation of the patient	71
5.1.2	Anesthesia	71
5.1.3	Patient positioning	72
5.1.4	Instruments, retractor systems and illumination	74
5.2	Minimally invasive approach	76
5.2.1	L5/S1	76
5.2.2	L4/5	80
5.2.3	L3/4	83
5.2.4	L2/3	83
5.2.5	Multilevel approaches	84
5.3	Mobilizing the segment and preparing the endplate	85
5.3.1	Marking the midline	85
5.3.2	Discectomy and endplate preparation	87
5.3.3	Mobilization of the motion segment	89
5.3.4	Inserting the trial implant	90
5.3.5	Keel bone bed preparation	93
5.4	Inserting the PRODISC®	94
5.4.1	Assembling the insertion instrument	94
5.4.2	Inserting the plate components	96
5.4.3	Preparing the polyethylene inlay	98
5.4.4	Distraction	98
5.4.5	Inserting the polyethylene inlay	100
5.4.6	Removing the insertion instrument	102
5.4.7	Radiographic verification of implant position	103
5.5	Closing the wound	103
6	Postoperative management	109
6.1	First postoperative days	109
6.2	Follow-up	109