

# Index

Note: Page numbers of article titles are in **boldface** type.

## A

### Adult spinal deformities, **143–156**

case example of, 154

causes of, 145

classification of, **185–193**

background of, 186–188

Lenke, 174–181, 186–188

radiographic, 189–190, 192

Schwab, 160, 188–189, 191

clinical evaluation of, 145–147

definition of, 143, 294

glossary for, 143–144

radiography for. See Radiography.

sagittal pelvic alignment in, **157–162**

statistics on, 294–295

treatment of

algorithms for, **219–230**

cervical, **249–274**

coronal realignment technique for, **195–202**

health economic analysis of, **293–304**

minimally invasive, **231–248**

osteotomies for. See Osteotomies.

planning for, **163–172**

previous, 145–146

proximal junctional failure in, **213–218**

spondylolisthesis, **275–291**

Surgimap planning software for, **163–172**

versus adolescent scoliosis, **173–183**

### Ankylosing spondylitis, osteotomies for

cervicothoracic junction pedicle subtraction,  
264–268

Smith-Petersen, 262–264

Anterior column support, for spondylolisthesis, 286

Anterior strategies, for cervical deformities, 254

Anterior-posterior strategies, for cervical deformities,  
255

Antifibrinolytics, for high-risk spinal surgery, 227

Axial rotation, 150

## B

Boxall slip angle, 277, 282

Bracing, for scoliosis, 173

Bundled payments analysis, 302

## C

C7 plumb line, 144, 149, 277

Camptocormia, 146, 254

Cardiac evaluation, for high-risk spine surgery, 222

Central sacral vertical line (CSVL), 148–149

### Cervical deformities, **249–274**

assessment of, 252

conservative treatment of, 253–254

surgical treatment of

algorithm for, 255

cervicothoracic junction pedicle subtraction

osteotomy for, 264–268

circumferential osteotomy for, 268–272

complications of, 271–272

craniocervical junction osteotomy for, 259–262

myelopathy and, 256–258

options for, 254–256

osteotomies for, 258–272

preoperative considerations in, 258–259

Smith-Petersen osteotomy for, 262–264

versus normal cervical alignment, 250–252

Cervical sagittal vertical axis, 250

Cervicothoracic junction, alignment of, 250–251

Cervicothoracic junction pedicle subtraction

osteotomy, 264–268

Chin-brow vertical angle, 251–252

Chronic obstructive pulmonary disease, high-risk  
spine surgery and, 222

Circumferential osteotomy, for cervical deformities,  
268–272

Cobb angles, 150, 189

Combination technique, for coronal realignment, 198

Compensatory curves, 148, 150, 165–166

Computed tomography, 152–154

for cervical deformities, 252

for minimally invasive techniques, 234

Computed tomography angiography, 152–154

Computed tomography myelography, 152–154, 234

Cone of economy, 157–158

Coronal alignment, 148

Coronal cervical deformities, 256

Coronal decompensation, 148

Coronal plane, evaluation of, 164

Coronal realignment, **195–202**

complications of, 200–201

concepts of, 195–196

diagnostic criteria for, 200

techniques for, 196–200

Corpectomy, for cervical deformities, 258

Costs, of spinal deformity surgery, 294–295, 299–300

Curves

classification of, 174–181

Curves (*continued*)

- radiography for, 148–150
- types of, 144

**D**

- Decision analysis, of spinal deformity surgery, 301
- Decompression
  - for spondylolisthesis, 286–287
  - minimally invasive techniques for, 232, 241–244
- Deep venous thrombosis, risk for, in high-risk spine surgery, 224
- Degenerative spinal deformities, minimally invasive techniques for. *See* Minimally invasive techniques.
- Demand, for surgical treatment, 302
- Demyelination, in cervical deformities, 256–258
- Derotation, for coronal realignment, 197–199
- Dextroscoliosis, 148
- Direct vertebral derotation, for coronal realignment, 197–198
- Discectomy, for cervical deformities, 254–255
- Double curves, treatment of, 176–179
- Dubousset lumbosacral angle, 277, 282

**E**

- Electromyography, for neuromonitoring, 235
- Extreme lateral interbody fusion, 237–238

**F**

- Fusion
  - for spondylolisthesis, 286–287
  - minimally invasive techniques for, 232–246

**G**

- Gait analysis, 146
- Gill lesion, 281
- Global spinopelvic alignment, 165, 189–190
- Glucose control, for high-risk spine surgery, 223
- Graphical planning, 167–169

**H**

- Harrington technique, for coronal realignment, 196
- Health economic analysis, of spinal deformity surgery, **293–304**
  - bundled payment analysis in, 302
  - cost-effectiveness studies of, 300–301
  - costs in, 294–295, 299–300
  - decision analysis in, 301
  - demand and utilization of, 302
  - future of, 301–302
  - health-related quality-of-life outcomes in, 297–299
  - research in, 295–301

- trends in surgery and, 294–295
- Health-related quality-of-life outcomes, of spinal deformity surgery, 297–299
- Hemivertebrae, resection of, 208–210
- High-risk spine surgery, **219–230**
  - intraoperative protocol for, 224, 227
  - postoperative protocol for, 225–227
  - preoperative protocol for, 220–224

**I**

- In situ bending, for coronal realignment, 196

**K**

- Kidney, evaluation of, for high-risk spine surgery, 223
- King-Moe classification, 174, 186
- Kyphosis
  - cervical. *See* Cervical deformities.
  - definition of, 144–145
  - proximal junctional, **213–218**
  - radiography for, 150–152

**L**

- Lateral interbody fusion, minimally invasive, 232–233, 235–239
- Lenke classification, 174–181, 186–188
- Levoscoliosis, 148
- Limb length discrepancy, 148
- Liver, evaluation of, for high-risk spine surgery, 223
- Lordosis, 166–167
  - cervical, 250–252
  - definition of, 144–145
  - in spondylolisthesis, 277
  - radiography for, 150–152
- Luque technique, for coronal realignment, 196

**M**

- MacThiong classification, of spondylolisthesis, 278–280
- Magnetic resonance angiography, 152–154
- Magnetic resonance imaging, 152–154
  - for cervical deformities, 252
  - for minimally invasive techniques, 234
- Major curves
  - radiography for, 148, 150
  - treatment of, 176–179
- Marchetti and Bartolozzi classification, of spondylolisthesis, 276–279
- Mathematical planning, 167
- Meyerding classification, 282
- Microscopic lumbar foraminotomy, 232, 239
- Minimally invasive techniques, **231–248**
  - algorithm for (MiSLAT), 241–246
  - evaluation for, 234–235

- outcomes of, 236–239
- rationale for, 232–234
- rehabilitation after, 246
- techniques for, 235–240
- Minimum clinically important difference, in
  - health-related quality-of-life outcomes, 297
- Mini-open pedicle screw fixation, 235–240
- Minor curves, radiography for, 148, 150
- MiSLAT algorithm, for treatment, 241–246
- Model for End-Stage Liver Disease, for high-risk
  - spine surgery, 223
- Multiplanar rendering, 154
- Myelopathy, with cervical deformities, 256–258

## N

- Nash-Moe method, 150
- Neurologic deficits
  - after spondylolisthesis surgery, 288
  - evaluation of, 145
- Neutral vertebrae, in scoliosis, 176
- Nutrition evaluation, for high-risk spine surgery, 223

## O

- Osteoporosis, high-risk spine surgery and, 223
- Osteotomies
  - for cervical deformities, 258–272
  - for degenerative deformities, 245–246
  - for rigid deformities, **203–211**
    - approaches to, 204–210
    - complications of, 210–211
    - patient preparation for, 204
    - postoperative care for, 210
    - preoperative planning for, 203–204
    - rehabilitation for, 210
  - for sagittal plane deformities, **163–172**

## P

- Pain
  - evaluation of, 145
  - in spinal deformities, 234
  - in spondylolisthesis, 280–281
- Patient Protection and Affordable Care Act,
  - cost-effectiveness studies for, 300
- Patient-Centered Outcomes Research Institute, 300
- Pediatric patients, spondylolisthesis in, 284
- Pedicle screw fixation
  - for scoliosis, 174
  - percutaneous, 232–233, 235–240
- Pedicle subtraction osteotomy
  - for cervical deformities, 255–256
  - for rigid deformities, 206–208
- Pelvic incidence, 151–152, 159
  - in lordosis, 167

- in spondylolisthesis, 277
- Pelvic incidence/lumbar lordosis mismatch, 189–190, 192
- Pelvic obliquity, 147–149
- Pelvic retroversion, 147, 151, 160
- Pelvic tilt, 151–152, 159–160, 165–166
  - in classification, 189–190
  - in spondylolisthesis, 277
- Pelvis, morphology of, 159
- Phalen-Dickson sign, 281
- Physical therapy, for cervical deformities, 253
- Ponte osteotomy, for rigid deformities, 206
- Posterior fixation, 232–233
- Proximal junctional kyphosis and proximal junctional failure, **213–218**
  - definitions of, 213–214
  - mechanisms of, 216–217
  - prevalence of, 215–216
  - risk factors for, 215–216
- Pulmonary evaluation, for high-risk spine surgery, 222

## R

- Radiography, 147–152
  - for cervical deformities, 252, 258
  - for classification, 189–190, 192
  - for high-grade spondylolisthesis, 281–283
  - for minimally invasive techniques, 234–235
- Reduction procedure, for spondylolisthesis, 284–288
- Retroperitoneal approach, to lateral interbody fusion, 235
- Retropharyngeal approach, to cervicothoracic junction pedicle subtraction osteotomy, 261–262

## S

- Sacral slope, 151–152, 160, 277
- Sagittal plane
  - deformities of, treatment of, **163–172**
  - evaluation of, 165–167
- Sagittal spinal alignment, 150–151, **157–162**
  - components of, 158–160
  - cone of economy in, 157–158
  - definition of, 157
  - evaluation of, 146–147
- Sagittal spinopelvic malalignment, 147
- Sagittal vertical axis, 150, 158–159
  - cervical, 250
  - in spondylolisthesis, 277
- Schwab classification, Scoliosis Research Society, 160, 188–189, 191
- Scoliosis
  - adolescent, **173–183**
    - causes of, 173
    - incidence of, 173
    - Lenke classification of, 174–181, 186–188
    - treatment of, 173–181

Scoliosis (*continued*)

- angles of, 150
  - definition of, 144–145
  - degenerative, minimally invasive techniques for.
    - See Minimally invasive techniques.
  - physical evaluation of, 146–147
  - radiography for, 148–150
- Scoliosis Research Society
- Schwab classification of, 160, 188–189, 191
  - terminology of, 143–144
- Segmental rod translation, for coronal realignment, 188, 196–197
- Shoulder height, in scoliosis, 175–176
- Slip progression, in spondylolisthesis, 283
- Smith-Petersen osteotomy
- for cervical deformities, 255, 262–264
  - for rigid deformities, 206
- Spinal alignment, subdivisions of, 159
- Spinal deformities, adult. See Adult spinal deformities.
- Spinal vertical axis, 283
- Spine Deformity Study, 278
- Spinopelvic alignment, 160, 165
- Spinopelvic inclinations, 150
- Spondylectomy, for spondylolisthesis, 287
- Spondylolisthesis, high-grade, **275–291**
- classification of, 276, 278–280
  - clinical presentation of, 280–281
  - definition of, 275
  - natural history of, 283
  - parameters of, 276–277
  - pathophysiology of, 275–276
  - radiology for, 276–277, 281–283
  - treatment for
    - anterior column support in, 286
    - complications of, 288–289
    - decisions for, 283
    - indications for, 283
    - options for, 286–287
    - pediatric versus adult, 284
    - reduction, 284–286
    - techniques for, 287–288
- Spondylosis, cervical, myelopathy in, 256–258
- Structural curves, 148, 150
- Surgimap Spine software, **163–172**

## T

- Thomas test, 146
- Thoracolumbar junction alignment, 150
- Thoracolumbar/lumbar curves, treatment of, 179–181
- Thromboembolism, risk for, in high-risk spine surgery, 224
- Tilting, neck, 251
- Traction, for cervical deformities, 253–254
- Transforaminal lumbar interbody fusion, 233, 239
- Transsacral fibular dowel graft, for spondylolisthesis, 287
- Triple major curves, treatment of, 179–180
- Trunk shift, 146

## U

- Utilization, of surgical treatment, 302

## V

- Vertebrae, abnormalities of, 144
- Vertebral column resection, for rigid deformities, 208–210

## W

- Wide posterior release technique, for rigid deformities, 204–206
- Wiltse classification, of spondylolisthesis, 276, 278