Index

a

Absolute crossbite 421
Adam case study
  deband records 527–528
  dental deep bite 526, 528
  diagnostic findings and problem list 525–526
  enlarged adenoids 526
  initial records 524–525
  mixed dentition stage 527
  primary problems list 526
  skeletal deep bite 526, 528
Adenoidal facies 641
  features of 642
  nasal obstruction and mouth breathing 641–642
  scientific evidence 642
Adolescent growth spurt 46
Alaina case study
  asymmetric mandibular growth 775
  diagnostic findings and problem list 774
  early treatment 776–777
  fixed orthodontic appliances 778
  future jaw growth 777
  initial records of 773–774
  lateral CR-CO shift detection 775
  left CR-CO shift 777
  left posterior lingual skeletal crossbite 776
  mandible 775
  mandibular arch 776
  maxillary arch 776
  permanent tooth eruption 778
  progress records 779–780
  space analysis 776
  take-home pearls 778, 780
  treatment options 777
  treatment recommendations 777
  unilateral left crossbite 775–776
Alana case study
  cervical-pull headgear 352
  Class II correction 350–351
  Class II molar relationships 361
  Class II skeletal discrepancy 351–353
  Class II skeletal relationships 350–351
  deband photographs 359–360
  early treatment 358–359
  general ways to reduce OJ 350–351
  high-pull headgear 351–353
  initial records of 347–349
  mandibular incisor inclination 349
  maxillary anterior spacing 349–350
  maxillary incisor angulation 349
  overjet (OJ) 349
  primary problem list 349
  skeletal etiology 350
  take-home pearls 361
Alexandra case study
  cephalometric analysis 398
  diagnostic findings and problem list 394
  early treatment 395, 397
  eventual goals 400
  future jaw growth 398
  initial consultation records 396
  lateral cephalometric radiograph 394
  lip soft tissue coverage 398
  LLHA placement 400
  mandibular arch 395
  mandibular incisor palatal impingement 397
  mandibular primary canines extraction 397
  maxillary arch 395
  OJ and trauma 397–398
  primary problem list 395
  RME 399
  serial extraction 397
  skeletal discrepancies 398
  space analysis 394–395
  treatment options 398–399
  treatment recommendations 398–399
Alex case study
  final records 382
  initial records of 380
  progress records 381
Alicia case study
  cause of delayed eruption 270
  deband records 275–278
  dental open-bite features 270
  diagnostic findings and problems list 269–270
  early treatment 273–274
  ectopically erupting mandibular lateral incisors 273
  initial records of 271–272
  mandibular arch 273
  maxillary arch 273
  maxillary right permanent central incisor 270
  over-correction 278
  primary problems 273
  progress records 276
  retention protocol 279
  RME 279

COPYRIGHTED MATERIAL

Practical Early Orthodontic Treatment: A Case-Based Review, First Edition. Thomas E. Southard, Steven D. Marshall, Laura L. Bonner, and Kyungsup Shin.
© 2023 John Wiley & Sons, Inc. Published 2023 by John Wiley & Sons, Inc.
Companion website: www.wiley.com/go/southard/practical

serial extraction 274
space analysis 272–273
space regaining 273
take-home pearls 279
treatment options 274
treatment recommendations 275
treatment validation 279
vertical facial growth 275, 278
vertical pull chin cup 278–279
Allison case study
anteroposterior correction 461–462
anteroposterior skeletal discrepancies 456–457
Class III orthopedic treatment 457–458
deband records 463–466
diagnostic findings and problem list 451, 454
early treatment 455–456, 466
future jaw growth 459
initial records of 452–453
LLHA placement 466
long-term treatment goals 456
mandibular arch 455
mandibular incisor inclination 455
maxillary arch 454–455
maxillary midline diastema 466
posterior transverse correction 461
primary problems 455
proclined maxillary incisors 455
progress records 462
reverse pull headgear (RPHG) 462–463
serial extraction 456
significant mandibular growth 466
skeletal discrepancies 459
space analysis 454–455
take-home pearls 466–468
treated without RPHG 466
treatment options 459–461
treatment recommendations 461
treatment timing 457
2-year post-treatment 468
undetected CR-CO shift 459
Alveolar bone grafting 494
common problems 494
maxillary arch treatment 495
Amber case study
deband records 135–136
diagnostic findings and problem list 127–128
early treatment 128, 130–131
evidence-based orthodontic practice 135
future jaw growth 131
initial records of 126–127
lower dental midline (LDML) 128
mandibular arch 129
mandibular fixed retainer 136
mandibular skeletal deficiency 129
maxillary arch 129
maxillary dental retraction 134
mixed dentition stage 133
non-extraction treatment 133–135
orthodontic retention 136
primary problems 129
progress records 134–135
at age 12, 132–133
reliable indicator 129
serial extraction 130
skeletal open bite 129–130
space analysis 128–129
take-home pearls 137
treatment options 131–132
upper dental midline (UDML) 128
Amelia case study
anterior crowding 106
changes at age 12, 107–110
deband records of 110–112
dental arch space analysis 105
diagnostic findings and problem list 104
early treatment 105–107
initial records of 103
mandibular arch 105
mandibular right central incisor extraction 110, 112
maxillary arch 105
non-extraction/extraction treatment 109
primary problems list 105
progress records 107–110
retention protocol 112
serial extraction 106
space maintenance 106
space regaining 106, 107
take-home pearls 112
treatment options 109
Angle classification of malocclusion 56
Angle molar classification 392
Anisa case study
digit habits 561–562
fabrication of an LLHA 559–561
initial records 554–556
posterior open bites 557–559
primary problems list 556
Ankylosis 60, 61
maxillary central incisors 266
maxillary primary canines 378
primary molar ankylosis 60
Anna case study
anterior interposition tongue habit 598
bilateral maxillary transverse deficiency 599
causes of open bite 599
crowding 598
dental open bites 597–598
features 596–597
early treatment 600
frontal intraoral photographs observations 600, 601
ideal time for crossbite 600
incisor ankylosis 598
initial records of 597
mandibular asymmetry 599–600
normal maxillary incisor eruption 601
panoramic image 599
progress records 601
take-home pearls 601–602
temporary anterior open bite 598–599
treatment options 600–601
treatment recommendations 601
unilateral right posterior lingual crossbite 599
Anneke case study
deband records 740, 741
dental/skeletal cross bites 706
etiologic factors 699–702
initial records 698–699
left posterior crossbite 738, 740
mandibular asymmetric growth 740
maxillary primary canines 740
primary problems list 699, 737
progress records 738, 739
take-home pearls 740, 742
treatment options 737
treatment recommendations 737
Anterior crossbite correction 442, 476, 784, 785
Anterior tooth crowding range 77

Anteroposterior problems
Class II functional appliances 354–355
Class II relationship 353
compensatory molar eruption 353
early treatment 344–345
inadequate OJ/anterior crossbite 361, 362
long-term skeletal effects 353
overjet (OJ) 344
Apical base 5
Average mesiodistal widths
permanent mandibular tooth 75
permanent maxillary tooth 75
permanent teeth 105, 115, 120, 129, 140, 149, 157, 160, 171, 176, 181, 187, 197, 204, 258, 272–273, 283–284, 293, 300, 308, 313, 323, 332, 391, 394–395, 401–402, 417, 432, 440, 454, 472, 574, 578, 584, 604, 616, 631, 645, 657, 672, 744, 757, 770, 776, 783
primary mandibular tooth 75
primary maxillary tooth 75
primary teeth 105, 115, 120, 129, 140, 149, 157, 160, 171, 176, 181, 187, 197, 204, 258, 273, 284, 293, 300, 308, 313, 323, 332, 391, 395, 402, 417, 432, 440, 454, 472, 574, 578, 584, 604, 616, 632, 645, 657, 672, 744, 757, 770, 776, 783

b

Bella case study
Class I first molars 121
diagnostic findings and problem list 119
early mandibular anterior crowding 121
early treatment 121
early treatment recommendations 120
follow-up appointment 122–123
initial records of 118
mandibular arch 120
mandibular midline improvement 123
maxillary arch 120
periapical radiograph 119
permanent first molars eruption 119–120
primary problems 120
soldered spur wrapping 122
space analysis 120
take-home pearls 123
transseptal fiber pull 119
treatment options 121–122
Bite plate effect 353
Brian case study
Bolton tooth-size discrepancy 335
bonded FPD 336
comprehensive treatment 335–336
CR-CO shift elimination 335
deband records 337–338
diagnostic findings and problems list 331–332
ideal canine substitution case 334–335
initial records of 330–331
mandible 332
mandibular arch 333
mandibular left primary second molar 338
maxillary arch 332–333
primary problems 333
progress panoramic image 336
progress periapical radiograph 337
space analysis 332–333
take home pearls 337–339
treatment goals 335
treatment options 333
treatment recommendations 333, 336
Brody case study
Class II relationship 260
convex profile and deficient mandible 257–258
diagnostic findings and problems list 254, 257
early treatment 260–261
eruption timing 259
initial records of 256–257
mandibular arch 259
mandibular incisor proclination 260
maxillary arch 258–259
possible eruption etiologies 259–260
primary problems 259
progress photos 261–262
retrusive maxilla 260
space analysis 258–259
space maintenance 261
take-home pearls 262
treatment options 261
treatment recommendations 261

c

Caden case study
early treatment 24
initial records of 22–23
primary problems list 21
treatment recommendations 21, 23
Cara case study
causes of right posterior open bite 300
Class II orthopedic treatment 302
deband panoramic image 305
diagnostic findings and problems list 299–300
early treatment 300, 302
initial records of 301
LLHA placement 304
mandibular arch 300
maxillary arch 300
panoramic images observations 302–304
permanent tooth eruption 302
primary problems 300
primary second molar ankyloses 303
space analysis 300
take home pearls 304
treatment options 303–304
Carlie case study
anteroposterior position of A-Point 490
CBCT image 490
deband records 497–498
diagnostic findings and problem list 489–490
initial records of 488–489
maxillary skeletal anteroposterior deficiency 490
objectives 495
orthopedic treatment options 495
primary problems 490
progress photos 496
right alveolar cleft 494
skeletal Class III 491
take-home pearls 498–499
treatment goals 495
treatment recommendations 496–497
2-year post-deband records 499
unknowns 495–496

Carson case study
causes of 511
dental deep bite 512
initial records 509–510
maxillary central incisal edges 511
primary problems list 511
recall visits 520
skeletal deep bites 512
Carter case study
anterior open bites 633
dental open bite features 630–631
diagnostic findings and problem list 628
early treatment 632–633
etiology of open bite 631
initial records of 629–630
large lip incompetence 630
mandibular arch 632
masking or camouflage 636
maxillary arch 632
orthopedic options 635
orthopedic treatments 634–636
primary problems 632
skeletal Class II treatment 636
skeletal open bite treatment 636
space analysis 631–632
take-home pearls 637–638
transverse relationship 636–637
treatment
guidelines 634
principles 635
recommendations 633–634, 636, 637
undetected CR-CO shift 637
Cephalometric radiographs 797, 798
AP deficient maxilla 804
ideal mandibular AP position 798, 801
ideal maxillary AP position 797, 799
judging mandibular AP position 798–799, 803
LAFH/TAFH 806
mandibular AP position 798
mandibular AP skeletal protrusion 799, 804
mandibular skeletal AP retrusion 799, 804
maxillary AP position 798, 802
TAFH measurement 804
take-home pearls 808
vertical relationships 801–803, 806
Cervical-pull headgears (CPHGs) 517
Clair case study
deband records 209–212
deficient mandible 203
diagnostic findings and problem list 202–203
early treatment 205
future jaw growth 205
initial records of 201–202
mandibular arch 204
maxillary arch 204
minimal buccal corridors 210
occlusal and periapical radiographs 203, 204
over-retract incisors 206
panoramic radiograph 207
primary problems 204–205
progress records at 11 years 9 months of age 207–209
Same Lingual Opposite Buccal (SLOB) 204
serial extraction 205, 210
space analysis 204
symmetric posterior anchorage 206
take-home pearls 210, 212
treatment options 206
treatment recommendations 206–207, 209
Clark's rule 218
Class II functional appliances
bionator 354
create OJ 356
dentoalveolar effects 354
herbst appliance 354–355
orthopedics 408
skeletal Class II dental compensations 356
unlocking the bite 356–357
Class II orthopedics 191, 286, 589, 772
treatment 393–394, 399
Class III orthopedics 383, 496
elastics 383
molar relationships 386
orthopedic treatment 384, 442, 450
treatment timing 384–385
Class III skeletal discrepancy
effects of RPHG 376
high-pull chin cup 379
Cleft lip and palate
clinical features 491
incidence rate of 491
intervention times 491, 492
typical interventions 491
velopharyngeal surgery 494
Cleft palate maxillary expansion 494–495
Controlled slicing 246
Cooper case study
asymmetric mandibular growth 448, 449
cephalometric radiograph 446
chin position evaluation 448
Class III skeletal discrepancy 449
diagnostic findings and problem list 446
discussions with parents 450
early treatment 449
final recommendation 451
future jaw growth 449
initial records of 447
masking/camouflage 450
maxillary first permanent molars 446, 448
primary problems 448
skeletal Class III patient 448
TAD-supported Class III elastic wear 450
treatment options 450–451
treatment timing 450
zero-meridian line 446
Cory case study
Class II orthopedics 420
Class II skeletal discrepancy 419–420
complete left buccal crossbite 421
craniofacial asymmetry 421
CR-CO shift 421
deband records 425–427
diagnostic findings and problem list 414, 417
early mandibular dental arch expansion 425
early treatment options 421–423
early treatment recommendation 423–425
high-pull headgear 424
incisor injury 420–421
initial records of 415–416
jaw growth 421
mandibular arch 418
mandibular deficiency 420
maxillary and mandibular incisors 417

Cory case study (*cont'd*)
maxillary arch 418
non-extraction treatment 425–427
primary problems 418
proclined mandibular incisors 425
Schwarz appliance 423, 424
serial extraction 418–419
space analysis 417–418
space maintenance 418
take-home pearls 427–428
Cranial base 29–30
Craniofacial abnormalities, breathing problems 41
Craniofacial growth and development
aberrations 40–41
abnormal 38
anteroposterior skeletal relationships 40
genetic control 28
jaws rotation 43
mechanism 28
normal and abnormal 33–34
transverse dental movements 35–36
transverse morphologic changes 35
transverse skeletal relationships 40
in vertical dimension 39–40
Crossbite
absolute 458
corrections 364–365
dental crossbite 458–459
relative 458
skeletal crossbite 458, 459
Crowding
defer extraction 78, 113, 206
D-space 80
early crowding management 113
early mixed dentition stage 90
"end-on" first permanent molar occlusion 88–89
E-space 80
incisor alignment 87–88
leeway space 80
maintain arch symmetry 87
mandibular E-space 80
maxillary E-space 80
panoramic image 90
panoramic radiograph 89
patient compliance 91
permanent tooth crowding 85
primary/early mixed dentitions 130
principles, non-extraction treatment 78
re-evaluating 130
serial extraction 93–94
space maintenance 78, 88, 113
space regaining 90
space requirements 94–95

d

Delayed chronologic tooth eruption 60
Dental open bites
anterior tooth eruption 545
digit-sucking habits 536
etiology of 537
growth pattern 535
recommendations 541
thumb-sucking habits 536
tongue interposition 538–539
treatments 540–541
vertical facial development 545
Dentoalveolar development 44
Dento maxillary appliance (DMA) 491
before and after treatment 493
Digit-sucking habits
non-compliance based options 537
thumb cribs 538
thumb paints 537–538
Dillon case study
changes after treatment 152–154
diagnostic findings and problem list 148
early treatment 150
facial and cephalometric features 149
final records of 153
Hertwig's epithelial sheath 151
ideal serial extraction 150–151
initial records of 146–147
lateral cephalometric radiograph 146–148
mandibular arch 150
maxillary arch 149
maxillary incisor roots 154
moderate anterior crowding 150
permanent tooth eruption 149
primary problems 150
progress records 152–153
space analysis 149–150
space regaining 147, 151–152
take-home pearls 154
treatment options 151
Direct perimeter measurement 63, 64
Downgraft osteotomy surgery 528, 529
D-space 80
Dylan case study
circumferential supracrestal fiberotomy (CSF) 24
deband records 26–27
early treatment 26
fixed lingual retainer/wire bonded 26
front tooth correction 24
initial records of 25
orthodontic treatment 24
progress records 26
take-home pearls 24, 26–28
treatment recommendations 24

e

Early mesial shift 55
Early orthodontic treatment
anterior crossbite relationships 3
apical base 5
benefits 2
consultation 3
description 1
future treatment complexity 1
goal of 1
lateral cephalometric radiograph 3, 5
maxillary canines 3
options 8
patient evaluation 2
reducing/eliminating unknowns 1
total treatment time 2
traumatic edge-to-edge occlusion 2
Easton case study
bony chin projection 307
diagnostic findings and problems list 305
early treatment 309–310
initial records of 306–307
mandibular arch 309
mandibular plane angle 307
maxillary arch 308–309
maxillary left premolars 311
maxillary left primary second molar extraction 308
maxillary left second premolar guidelines 309
maxillary right permanent central incisor eruption 307–308
panoramic image observations 308

primary problems 307
progress records 310–311
screw distalizer appliance 310
space analysis 308–309
take home pearls 312
treatment options 310
treatment recommendations 310, 312
unfavorable changes 307
Ectopic tooth eruption
adverse sequelae 216, 217
alveolar bone crest levels 227–229, 232
ankylosis 245, 248, 249
anterior and posterior extraction patterns 216
controlled slicing 246
diagnosis of 217
early treatment options 218
extraction cases 238, 241–243
extraction space 241
late tooth germ development 245
mandibular canines 223
mandibular permanent molar 227
alveolar bone crest 245
ankylosis 245, 246
complications 251
delay premolar eruption 229
extraction 233–234
favorable eruption 242
Halterman appliances 231
panoramic image 232
periapical radiographic 237
radiograph progress 236, 241
retention check 242
root development and eruption 233
surgical luxation/elevation 231
treatment 230
treatment recommendations 241
maxillary permanent canine
concomitant extraction 220
early treatment diagnosis 218
lateral incisor roots 219
palpation of 218
panoramic image 218, 219
predict palatal displacement 218
primary canine extraction 220
spontaneous eruption 221
maxillary permanent molar 235, 236
causes 237
initial panoramic image 236
magnified images 242, 245
observation 235
permanent tooth eruption 235, 236
radiograph progress of patient 236
retention check 242
mesiodistal width reduction 246, 248
mixed dentition stage 217
molar extractions 251–254
molars and regaining space lost 224–227
non-extraction cases 237, 238
palatal displacement 217
primary failure of eruption (PFE) 234–235
primary tooth ankylosis 229
recommendations 221, 222
surgical exposure 224
take home pearls 238–239, 251
treatment principles 216
unerupted maxillary permanent molar 235
Edward case study
anterior crossbite 441–442
corrections 445
diagnostic findings and problem list 438, 440
early treatment 440–441, 445
future jaw growth 441
initial records of 439
LLHA placement 445
mandibular arch 440
maxillary arch 440
primary problems 440
progress records of 442–445
pseudo Class III patient 440
serial extraction 441
space analysis 440
take-home pearls 445–446
thin gingival biotype labial 445
treatment options 442
treatment recommendations 442
Elastic chain premaxillary retraction (ECPR) 491, 493
Elijah case study
anterior open bite 529, 531
digit-sucking habit 536, 540
excessive mandibular incisor eruption 531
inadequate maxillary incisor eruption 531
initial records 530–531
LAFH soft tissue 532
primary problem list 529
Emily case study
anterior open bite 605
anteroposterior relationship 608
asymmetric mandibular growth 606
bilateral first permanent molar relationship 610–611
CR-CO shift 606
dental open bite 605
diagnostic findings and problem list 602
early treatment 606–607
eruption times 604
etiology of 605
initial records of 603
lateral CR-CO shift detection 608, 610
left Class II relationship 606
left lingual crossbite 606
left posterior crossbite correction 606
LLHA 610
mandibular arch 604
maxillary arch 604
maxillary left primary second molar 608, 610
maxillary midline diastema 605–606
maxillary second premolar crown calcification 604
mild bilateral Class II 608
primary problems 604
recall records of 608–609
RME 611
space analysis 604
take-home pearls 611
treatment options 607–608
treatment recommendations 608
Emma case study
deband records 101–102
diagnostic findings and problem list 99–100
initial records of 98–99
LLHA 101
premature loss of primary canines 100
serial extraction 100–101
severe mandibular anterior crowding 101
treatment recommendations 101

Erin case study
diagnostic findings and problem list 320
early treatment 325–327
final records 327–328
initial records 321–322
mandibular arch 323–324
mandibular right primary second molar 326–327
maxillary arch 323
non-extraction treatment 327
primary problems 324
rotated maxillary molar 322–323
serial extraction 325–326
soft-tissue chin projection 320, 322
space analysis 323–324
take home pearls 327–329
thin periodontal biotype 323
treatment options 324–325
treatment recommendations 324
E-space 80, 188
Evan case study
early treatment 126
immediate placement of LLHA 123
initial records of 124–125
LLHA 125
Nance holding arch 123, 125
non-extraction comprehensive treatment 126
progress photographs 125
space maintenance 126
take-home pearl 126

f

Facial bone surface drift 29
Facial growth 44
Facial skeleton 28, 29
normal development 34
temporal relationships 38–39
First permanent molar emergence
body mass index (BMI) 50
congenital absence 50
timing of 50, 55
Fixed appliance orthodontic treatment 496–497
Fixed orthodontic appliances 600, 621
Frankfort Horizontal and the mandibular plane (FMA) 805
Functional appliance Class II orthopedics 423

g

Gabby case study
anteroposterior jaw descriptions 615
archwire biomechanics 625–626
breathing-related questions 617
cephalometric measurements 615
chin position 615
Class II molar relationship 624
Class II orthopedic treatment 620
deband records 622–624
dental open bite features 617–618
diagnostic findings and problem list 612
early treatment 616–617, 626
etiology of dental open bite 618
facial convexity 624
fixed orthodontic appliances 625
future jaw growth 621
hyperdivergence 618
inadequate incisal display 614–615
initial records of 613–614
LLHA placement 622
long-term treatment goals 621
magnitude of Class II discrepancy 619–620
mandible 620
mandibular anteroposterior position 615
mandibular arch 616
mandibular first premolars extraction 620–621
mandibular incisors eruption 626
maxillary anteroposterior position 615
maxillary arch 616
maxillary first premolars 625–626
midpalatal suture expansion 625
open bite returns 625
orthodontic treatment 625–626
primary problems 616
retention protocol 626
skeletal discrepancies 618–619
skeletal open bite 618
space analysis 616
take-home pearls 626–627
thumb habit 618
transverse skeletal discrepancy 620
treatment options 621–622, 624
treatment recommendations 622
Growth rotation 42–43
angular remodeling 43
apparent rotation 42–43
dentoalveolar development 44
diagnostic indices 43
duration, and direction 43
forward/backward 43
true rotation 43
vertical dimension 43

h

Haas maxillary expander 720, 721
Halee case study
anterior crossbite correction 787
central incisor anterior crossbite correction 786
diagnostic findings and problem list 782
early treatment 783–784
initial records 780–781
mandibular arch 783
maxillary arch 783
molar inclination 783
primary problems 783
progress records 785, 786
at 11 years and 7 months of age 788–789
right posterior lingual crossbite correction 784
space analysis 783
take-home pearls 786, 787, 789
treatment options 784
undetected lateral CR-CO shift 783
unilateral right posterior skeletal crossbite 783
Halterman appliance 227, 231
Headgear 133, 189, 424
cervical-pull headgear 352, 353
Class II malocclusions 356
Class II orthopedics 422–423
force applied 353–354
high-pull headgear 353
straight-pull headgear 353
Herbst appliance
hyperdivergent Class II growing child 355–356
ideal candidate 355
profile improvement 356
High-pull chin cup 378–379, 460, 476–477

anterior crossbite correction 379
Class III skeletal discrepancy 379
duration 383
temporomandibular joint disorder (TMD) 383
Hyperdontia 62
Hypodontia 61
cause of 61
dental or craniofacial anomalies 61–62
Hyrax expander 721

i

Infant orthopedic treatment
controversies associated 492
dento maxillary appliance (DMA) 491
elastic chain premaxillary retraction (ECPR) 491
goal of 491
presurgical 491
Infraocclusion 50, 52
Interocclusal relationships 50
Iowa AP classification primer
angle classification scheme 808
Class I malocclusion 810
ideal Class I occlusion 809
shorthand notation 810
subdivision patient 810–811
Iowa classification of malocclusion 56–57
Iowa molar classification 392

j

Jack case study
diagnostic findings and problem list 19–20
early orthopedic treatment 20–21
initial records of 18–19
primary problems 20
progress records 21
treatment recommendations 20
Jake case study
chin projection 393
Class II orthopedics 393
Class I molar relationship 394
diagnostic findings and problem list 389–391
early treatment 392–393
initial records of 390
mandibular arch 391–392
maxillary arch 391
palatal pain/tissue damage 393
primary problems 392
space analysis 391–392
treatment options 393–394
Jasmin case study
bilateral posterior overjet deficit 745
Class II compressed springs 751
Class II elastics 751
CR-CO shift 744
deband records 751–753
diagnostic findings and problem list 744
early treatment 745
future jaw growth 746
initial intraoral frontal photos 745
initial records of 743
inter-arch Class II treatments 749, 751
late asymmetric mandibular growth 751
lateral CR-CO shift 748
left mandibular growth 746
mandible 745
mandibular growth asymmetry 745
maxillary expansion 747, 748
occlusal settling 751–752
permanent incisor crowding 744
primary problems 745, 748
progress records 749
at age 10 750
retention protocol 752, 754
right lateral shift 744–745
take-home pearls 753–754
treatment options 746
treatment recommendations 746–747, 751
unilateral mandibular growth 746
Jasmine case study
dental arch space analysis 114, 116
diagnostic findings and problem list 114–115
early treatment 116
initial records of 113–114
LLHA 117
mandibular arch 115
maxillary arch 115
primary problems 116
treatment options 116–117
treatment recommendations 117
"washout"/enamel decalcification 117
Jaw growth 37–38
Jeff case study
anteroposterior relationship 186
bimaxillary protrusion 193–194
Class II dental relationship 186–187
deband records 191–193
deep bite corrections 189
diagnostic findings and problem list 186
early treatment 189–190
future maxillary/mandibular growth 190
initial records of 185
late mixed dentition stage of development 189
LLHA placement 191, 193
mandibular arch 187
maxillary arch 187
maxillary permanent canines eruption 185, 193
premature loss of primary canines 187–188
primary problems 187
proclined mandibular incisors 193
root resorption 194
serial extraction 188
severe mandibular anterior crowding 187–188
skeletal Class II 188
space analysis 187
take-home pearls 194
treatment options 190–191
treatment recommendations 191
undetected CR–CO shift 190
vertical and anteroposterior facial growth 191
Jenna case study
apical root resorption 767
chin projection 759
Class II functional appliance 759
Class II molar relationship 759
correction 765, 766
Class II relationship 762, 764
coincident midlines 767
diagnostic findings and problem list 755
early treatment 758–759
final panoramic image 766–767

Jenna case study (*cont'd*)
final records 764–767
Hyrax appliance 762, 764
initial records of 756–757
labial ectopic eruption 762
mandibular arch 758
mandibular midline deviation 758
maxillary arch 758
maxillary left primary canine eruption 758
maxillary posterior dentition 762
permanent canine crown overlap 758
primary problems 758
progress records
at 10 years and 3 months of age 761
at 11 years and 1 month of age 762–764
at 12 years and 6 months of age 765
rapid maxillary expansion (RME) 762
retention protocol 768
right posterior lingual skeletal crossbite 759–760
root resorption 767
space analysis 757–758
take-home pearls 768
treatment options 760
treatment recommendations 760–762
Jessa case study
dental open bite 532–535
skeletal open bite 532–535
tongue-interposition habit 535
vertical facial growth 534–535
Jonathan case study
bilateral posterior lingual crossbite 771
Class II orthopedic treatment 771
diagnostic findings and problem list 770
early treatment 771
initial records 769
lateral CR-CO shift 771
mandibular arch 770
mandibular incisor alignment 772
maxillary arch 770
primary problems 770–771
space analysis 770
take-home pearls 772
treatment options 771–772

k

Kasandra case study
clear/vacuum-formed retainer 199–200
dental Class III 197
diagnostic findings and problems list 196
early treatment 198
E space 197–198
fixed orthodontic appliances 199
initial records of 194–195
LLHA placement 197
with spurs soldered distal 199, 200
mandibular arch 197
maxillary arch 197
primary problems 198
progress records 199
serial extraction 200
space analysis 197
take-home pearls 200
treatment options 198–199
Kate case study
deband records 144–145
diagnostic findings and problem list 139
early treatment 141
ideal serial extraction 142
initial records of 137–138
keratinized attached tissue labial 145
keratinized gingival tissue 141
labial biotype 141
mandibular anterior crowding 141–142
mandibular arch 140
maxillary arch 140
maxillary first molar mesial rotation 140
periapical radiograph 140
primary problems 141
progress panoramic radiographs 143
space analysis 140
steep MPA 140
take-home pearls 145–146
treatment options 142–143
treatment recommendations 143–144
Katie case study
diagnostic findings and problems list 312–313
distal shoe appliance 313
early treatment 315–316
ectopic eruption 313
elastomeric separator 317
future jaw growth 317
initial records of 314–315
mandibular arch 315
maxillary anterior crowding 315
maxillary arch 313–315
maxillary left molar 313
maxillary primary canines extraction 318
primary problems 315
progress record 317, 319
space analysis 313–314
take home pearls 318–319
treatment options 316
treatment recommendations 317–318
undetected CR-CO shift 317

l

Late mesial shift 56
Leeway space 80
Lower anterior face height (LAFH) 346
Lower incisor angulation 807
Lower lingual holding arches (LLHA) 78, 79
banding primary second molars 89
Class II mixed-dentition patient 589
crowded mandibular anterior teeth 80–82
crowded mandibular incisors 79–80
first reported 82
lateral incisor distal drift 87
made with bands 88–89
mandibular permanent first molar eruption 82
mandibular primary second molars 88
mandibular second molar impaction 85–86
and permanent tooth eruption 82–83
placement of 85–86
prevent mesial drift 89
second molar impaction 85
uses of 84, 85
Lucas case study
additional anchorage 182
anterior open bite 181

diagnostic findings and problem list 180
early teeth extraction guidelines 183
early treatment 182–183
initial records of 179
mandibular arch 181
maxillary arch 181
maxillary incisal display 181–182
posterior cross bite 182
primary problems 181
serial extraction 183
space analysis 180–181
take-home pearls 184
treatment options 183–184
Lynnear case study
chin projection 574
chin-throat length 574
diagnostic findings and problem list 574
early treatment 575
initial records of 573
mandibular arch 575
maxillary arch 575
nasal tip angle 574
primary problems 575
space analysis 574–575
tissue indentation 574
treatment options 575–576
treatment recommendations 576

m

Madison case study
Class II elastic wear 167
common mistake during initial canine movement 164–165
cross bite 160
deband records 166–167
diagnostic findings and problem list 156
early treatment 157–158
elastic force 165
erupted teeth crowns 162, 163
future jaw growth 157
initial records of 154–155
mandibular arch 157, 161
maxillary arch 157, 160–161
maxillary permanent canine impaction 164
maxillary right lateral incisor 165–166
maxillary right permanent canine eruption 165
mesial drift of molars 159
occlusal cant 155–157
overjet (OJ) 167
primary problems 157
proclined maxillary incisors 167–168
progress panoramic image 164
progress records
at 9 years and 2 months of age 159–160
at 11 years and 1 month of age 162–163
retention protocol 168
right-to-left occlusal size 157
root canal therapy 165
roots resorption 164
serial extraction 158, 162
shallow OB 168
space analysis 157
at 9 years and 2 months of age 160–161
space maintenance 161, 162
take-home pearls 168–169
treatment options 158, 161, 162
treatment recommendations 158–159, 161, 163, 164
vertical ramus growth 156–157
Malocclusion, oral habits 63–64
Mandible alveolar process 32
Mandible coronoid process 32
Mandibular anterior crowding
estimating 75–77
LLHAs (lower lingual holding arches) 79
in mixed dentition patient 78–79
non-extraction treatment 79
reliable indicator 78
space maintenance 79
Mandibular anterior repositioning appliance (MARA) 346
Mandibular AP skeletal retrusion 799
Mandibular AP skeletal WRN 800
Mandibular arch length 57
Mandibular arch model 82, 83
after LLHA placement 82
Mandibular dental expansion 459
Mandibular E-space 80
Mandibular incisor angulation 807
Mandibular permanent incisor eruption 604
Mandibular permanent molar
alveolar bone crest 245
ankylosis 245, 246
complications 251
delay premolar eruption 229
extraction 233–234
favorable eruption 242
Halterman appliances 231
panoramic image 232
periapical radiographic 237
radiograph progress 236, 241
retention check 242
root development and eruption 233
surgical luxation/elevation 231
treatment 230
treatment recommendations 241
Mandibular primary canines
extraction 87–88
loss 58
Mandibular primary first molars *vs.* second molars 50–52
Mandibular space maintenance 296, 310, 408, 421–422, 433, 442, 450, 459, 476
Mandibular space regaining 399, 408
Mara case study
ankylosed maxillary left primary second molar 668
A-point 676
cause of posterior open bites 671–672
cephalometric findings 676
deband records 681–684
dental deep bite 673
dental effects of CPHG wear 684
diagnosis 676
diagnostic findings and problem list 667–668
early treatment 674, 685–686
eruption and mesial tipping 670, 671
fixed orthodontic appliances 680
headgear 679
hygiene instructions 680
impacted maxillary left second premolar 679
incisor proclination 685
initial records of 669–670
interposition tongue habit 672
intraoral photos of 686
left second premolars 685
LLHA placement 685
mandibular arch 673
mandibular left primary second molar 668

Mara case study (*cont'd*)
mandibular right permanent canine 675
maxillary arch 673
maxillary left first permanent molar 680, 681
maxillary midline diastema 686
Nance holding arch placement 670–671
oral hygiene 675
panoramic image
at 11 years and 1 month of age 675
at 12 years and 1 month of age 675, 676
panoramic radiograph observations 675
poor hygiene 673–674
poor orthodontic bracket 684
primary problems 673
primary tooth ankylosis 668
progress records 680
at 12 years and 4 months of age 675–678
right posterior crossbite options 679
RME 685
skeletal crossbite 673
skeletal effects of CPHG wear 684
small posterior open bites 688
space analysis 672–673
take-home pearls 686–688
treatment options 674
Marc case study
Class III skeletal discrepancy 377
Class III skeletal relationship 375–376
deficient anteroposteriorly maxilla 374
excessive anteroposteriorly mandible 374
final records 387–388
initial records of 373
maxillary lateral incisor bracket 374
maxillary left lateral incisor 373, 374
panoramic image 373, 374
primary problems list 374
progress panoramic image 387
progress records 386
RPHG treatment 376–378
TAD-supported RPHG 385, 386
take-home pearls 387–389
Mark case study
Class II molar relationship 407
Class II orthopedic treatment 405, 410, 412
Class II relationship 410
Class II skeletal discrepancy 404–405
deband records 411–412, 566–567, 569–570
dental deep bite 404, 406
diagnostic findings and problem list 400, 564
early mandibular arch treatment 409
early treatment 403–404
headgear treatment 406
incisor overeruption 403
initial records 401–402, 562–564
lingual crown torque 406–407
mandibular arch 402–403
maxillary and mandibular growth 407
maxillary arch 402
maxillary left permanent primary molar 565
maxillary left permanent second molar 567
maxillary posterior teeth 406, 407
midline diastema 404
models viewed from front 403
non-extraction treatment 410, 412–413
overcorrect and maintain 410
overerupted mandibular incisors 403
overerupted maxillary incisors 403
periapical radiograph 566
permanent first molars 407
posterior open bite etiologies 565
primary failure of eruption (PFE) 569, 570
primary problems 403, 565
recall records 567, 568
re-treatment progress 567, 568
RME 412
serial extraction 404
severe OJ 406
space analysis 401–403
take-home pearls 413–414, 571–572
10-year recall records 413
treatment
changes 410
options 407–408
recommendations 409, 565–566
undetected CR-CO shift 407
Mason case study
anterior crossbite 433–434
CR-CO shift 430–432
deband intraoral photos 436
deficient mandible 430
diagnostic findings and problem list 430
discontinuing treatment 436
early treatment 432–433, 436, 438
fixed appliances 434
future jaw growth 433
initial records of 429
intraoral photographs of 431
lateral cephalometric radiograph 431
LLHA placement 435, 436
long skeletal LAFH 431
mandibular arch 432
maxillary and mandibular skeletal deficiencies 432
maxillary arch 432
maxillary incisors angulation 431
maxillary lateral incisor roots 436
maxillary permanent lateral incisors 434–435
primary problems 432
progress records 434
after crossbite correction 435
protruded mandibular lip 432
recall records of 435, 437
serial extraction 433
space analysis 432
take-home pearls 438
treatment options 433
true dental relationship 430
Maxillary anterior crowding estimation 75–77
Maxillary AP skeletal retrusion 799, 800
Maxillary arch expansion 496
Maxillary arch length 57
Maxillary central incisors, delayed eruption etiology 265
Maxillary E-space 80
Maxillary incisal display 515, 516
Maxillary incisor angulation 806–807
Maxillary permanent canine, ectopic tooth eruption
concomitant extraction 220

early treatment diagnosis 218
lateral incisor roots 219
palpation of 218
panoramic image 218, 219
predict palatal displacement 218
primary canine extraction 220
spontaneous eruption 221
Maxillary permanent incisors
average eruption age 599
ectopic/mesial eruption 62–63, 292
eruption 604
lateral position of 49–50
Maxillary permanent molar
causes 237
initial panoramic image 236
magnified images 242, 245
mobile 91
non mobile 91
observation 235
permanent tooth eruption 235, 236
radiograph progress of patient 236
retention check 242
Maxillary primary canine loss 59
Maxillary skeletal expansion 607
Maxillary space maintenance 90, 296, 310, 422, 433, 442
Melissa case study
diagnostic findings and problems list 293
early treatment 295
ectopic maxillary permanent canine 295
initial records of 294
mandibular arch 295
maxillary arch 295
maxillary left first premolar eruption 295
maxillary right lateral incisor 293
Nance holding arch 297
panoramic image
at 6 years and 10 months of age 296
at 9 years and 8 months of age 297
primary problems 295, 297
progress records of 298–299
space analysis 293–294
take home pearls 297, 299
treatment
guidelines 295–296
options 296
recommendations 296–297
Mesial molar drift 83–84
Misaligned incisor 24
Mixed dentition
early 188
ectopic tooth eruption 217
late 188
mandibular anterior alignment 82
mandibular anterior crowding 78–79
molar interocclusal relationships 57
skeletal Class III patient, LLHA placement 384
space analysis 84
spontaneous alignment 79–82
without severe crowding 130
Moyer's analysis 85
Mudathir case study
Class III molar relationship 175
diagnostic findings and problem list 174–175
distorted panoramic image 175
early treatment 176–177
initial records of 173–174
mandibular arch 176
maxillary arch 176
primary problems 176
serial extraction 177
space analysis 175–176
take-home pearls 178
treatment options 177–178
Multiple piece maxillary osteotomy (MPMO) 732–734
Muriel case study
diagnostic findings and problem list 170
early treatment 171–172
early treatment options 172–173
initial records of 169–170
mandibular arch 171
maxillary arch 171
primary problem 171
serial extraction 172
skeletal/dental arch asymmetry 170, 171
space analysis 171
treatment recommendations 173

n

Nance holding arch 89–90, 316, 460
cementation 125
Nasio alveolar molding (NAM) 491, 492
before and after treatment 493
Nasion perpendicular line 257, 797
Nasomaxillary complex 30–32
Nathan case study
alveolar bone crest 479
anterior crossbite occlusion 472
canine anteroposterior position 477
cephalometric diagnostic findings 470, 472
Class III orthopedics 479
deband records 483–485
diagnostic findings and problem list 470
early treatment 473–474, 486
fixed partial denture 486
future apical root resorption 486
future jaw growth 475
high-pull chin cup 479, 480, 485–486
incisal embrasures 486
initial records of 468–469
left maxillary and mandibular bonded bridges 486
long-term goals 474
mandibular arch 473
mandibular growth 485
mandibular left ankylosed primary second premolar 482
mandibular left primary second molar 477
maxillary arch 473
maxillary incisor angulation 472
maxillary incisor root resorption 486
maxillary left canine-first premolar roots 483
maxillary midline diastema 476
Nance holding arch placement 470
non-extraction treatment 480, 482
observations 9 months later 479
previous panoramic images 471, 472
primary problems 473
progress panoramic image 479
progress radiographs 480
of edentulous sites 482–483
progress record 480–481
after advancing maxillary incisors 477–478
made previous year 470–471

Nathan case study (*cont'd*)
serial extraction 474
shorter clinical crowns 479
skeletal Class III 470, 473
skeletal discrepancies 475
space analysis 472–473
take-home pearls 487
traditional angle molar classification 470
treatment options 476–477
treatment recommendations 477, 482
treatment timing 475–476
worsened ANB angle 479
Natural head position 807–808
Ned case study
Class II skeletal discrepancy 585–587
deband records 592–594
deep bite correction 595
deep labiomental sulcus 584
dental deep bite 587–588
diagnostic findings and problem list 582–583
diastema 584
early treatment 585
facial convexity 594
four first premolar extractions 595
future jaw growth 589
HPHG wear 594
initial records of 581–582
labiomental sulcus 594
LLHA removal 592
mandibular anterior labial periodontal biotype 592
mandibular arch 584
mandibular incisor palatal impingement 590
maxillary anteroposterior position 583
maxillary arch 584
maxillary dental arch space 592
maxillary incisor angulation 594
maxillary midline frenum 584
mixed dentition diastemas 595
non-extraction treatment 595
orthodontic forces 587
primary problems 584
progress records 590–591
1 year later 590–592
protrusive lower lip 584
retention protocol 595–596
RME appliance 592
skeletal crossbite 588
skeletal discrepancy 588
space analysis 584
take-home pearls 596
transverse dental compensations 588
treatment
goals 589
options 589
recommendations 584, 590, 592
undetected CR-CO shift 589
uprighting mandibular molars 588
Nora case study
ankylosis of primary molars 659
anterior crossbite recommendations 658
bilateral posterior tongue 658
causes of posterior open bites 658
Class II functional appliance 658
dental deep bite 660
diagnostic findings and problem list 654
digit-sucking habit 659
early treatment 660–661
incisor trauma 658
initial records of 655–657
LLHA 663, 664
mandibular arch 657–658
maxillary arch 657, 658
maxillary incisal angulation 656–657
posterior tongue-interposition habit 658
primary failure of eruption (PFE) 659–660
primary problems 658
progress panoramic image at 11 years 663, 665
progress records 662–663
5 months later 663, 664
at 13 years of age 663, 665–666
RME 660
space analysis 657–658
take-home pearls 666–667
tongue-interposition habit 658, 660
treatment options 661–662
treatment recommendations 662
Normal interocclusal dental relationships 34, 35

o

Occlusal disarticulation 353
Orthodontic movement, surgically exposed canines 225, 226
Orthopedic treatment, Class III elastics 384
Osteogenic mechanisms 28–29
Overbite (OB)
definition 506
techniques to reduce 521–522
Overcorrection 356, 458, 476
Overjet (OJ)
excessive OJ 345, 346
soft tissue injuries 345
traumatic dental injuries 344
ideal OJ 345
magnitude of 344
measure of 345
treatment options 346–347
variables that affect susceptibility 344

p

Palatally displaced permanent maxillary canines
cause of 62
prevalence of 62
Pediatric obstructive sleep apnea 41
Pediatric OSA 41–42
Peg-shaped permanent maxillary lateral incisors 62
Permanent average mesiodistal widths 75
Permanent first molar anteroposterior relationship 57
Permanent incisor eruption 363–364
mandibular primary intercanine width 57
Permanent tooth
emergence 48
mesiodistal dimension 47
root length development 48, 49
sequence of emergence 48–49, 51–54
spatial relationship 48
Pharynx
adolescence 33
mature pharynx 33
newborn 33
Posterior Face Height (PFH) 806
Posterior lingual crossbites 458
Posterior open bites

causes of 557–558
deband models 566–567
deband records 569–570
diagnostic findings and problem list 564
digit habits 561–562
fabrication of an LLHA 559–561
initial records 554–556, 562–564
maxillary left permanent primary molar 565
maxillary left permanent second molar 567
periapical radiograph 566
primary failure of eruption (PFE) 569, 570
primary problems list 556, 565
recall records 567, 568
re-treatment progress 567, 568
take-home pearls 571–572
treatment 558–560
treatment recommendations 565–566
Presurgical infant orthopedic treatment 491
Primary dentition
features of 48
vertical occlusal characteristics 47
Primary molar ankylosis
dental anomalies 61
prevalence of 60
signs of 60
treatment alternatives 60
vertical alveolar growth 61
Primary teeth
age range 46
anterior crossbite correction 450
exfoliation 46–47
spacing 47
Primate space 47
Proclining maxillary incisors 356
Pseudo Class III malocclusion 361–363
etiologic factors 361–362
vs. true skeletal Class III malocclusions 363
Pubertal growth acceleration 44
facial growth pattern 45
females 44
growth in cms 45
males 44
measurable indicator 45–46
peak facial growth velocity 44
periods 46
rate of forward and downward growth 45

r

Rachael case study
adenoidectomy 549, 550
airway evaluation 549
cephalometric radiographs 549
deband records 553–554
diagnostic findings and problem list 548
initial records 546–547
lip incompetence 549
maxillary first permanent molars 549
molar relationships 549
nasal obstruction and facial morphology 549–550
primary problems list 552
recommendations 552
skeletal and dental open bite 550–551
tonsillectomy 549
treatment 551
VME features 551
Ramus case study
anterior crossbite correction 370, 371
Class I malocclusion 366
factors to treat anterior crossbite 369
initial records of 368
mildly convex profile 366
orthodontic cement placement 370
panoramic image 366, 369
permanent central incisors eruption 369–370
progress records 369–370
removable maxillary appliances 370, 372
tongue blade 370
treatment 370
Rapid maxillary expansion (RME) 286, 326, 408, 460, 601, 621, 674, 746, 760, 771, 777, 784
bonded appliances 722, 724
buccal crown torque 720
Class II improvement 726–727
effect of 42
fan-shaped expander 495
hemi-maxillae 712, 713
ideal amount of 601
long-term retention 716
mandibular posterior teeth 716, 718
maxillary left first premolar band 725, 726
midpalatal suture separation 714
nasal cross-sectional area 726
obstructed breathing 42
obstructive sleep apnea 726
overcorrection/overexpansion 716, 717
periodontium 720
post-activation retention periods 716, 717, 719
post-expansion maxillary molar 716
recommendations 715–716
root resorption 720
signs 715
skeletal expansion 719
skeletal resistance 712–714
treatments 726
Rebecca case study
ankylosis of the maxillary central incisors 266
central incisor situation 265
deband records 266, 268
diagnostic findings and problems list 262–263
initial records of 264
panoramic image observation 265
permanent tooth eruption timing 263, 265
possible risks of monitoring 266
primary problems 263
progress records of 267
retention protocol 266–267
take-home pearls 267, 269
treatment options 265–266
treatment recommendations 266
undetected CR-CO shift 266
zero-meridian line 263
Recall 116, 131, 158, 161, 162, 172, 177, 183, 190, 206, 261, 274, 285–286, 296, 303, 310, 316, 326, 393, 398–399, 407–408, 421, 433, 442, 450, 459, 476, 575–576, 580, 589, 600, 607, 621, 674, 746, 760, 771, 777, 784
Relative crossbite 421
Relative intrusion 587

Reverse-pull facemask 376
Reverse pull headgear (RPHG) 460, 476
A-Point advance 376–377
early Class III treatment 377
effects of 376
miniplate anchorage RPHG 377
overcorrection 378, 383
treatment plan 376

s

Schwarz appliance 423
Sella-Nasion line and the mandibular plane (SN-MP) 805
Serial extraction 93–94, 117, 121, 122, 132, 143, 151, 158, 161, 162, 173, 178, 184, 191, 199, 206, 274, 286, 296, 316, 326, 408, 433, 442, 461, 477, 589
drawback of 130
external apical root resorption 98
extraction sequence 95–96
incisor stability 98
vs. later conventional premolar extractions 97, 98
normal anteroposterior relationship 93–94
normal incisor angulation/proclined incisors 94
normal transverse relationship 94
normal vertical relationship 94
poor patient selection 96–97, 188
severe amount of anterior crowding 93
vs. space maintenance 206
Severe mandibular anterior crowding
premature loss of primary canines 57
reliable indicator 57, 100, 187–188
Severe mandibular skeletal deficiency 422
Skeletal deep bites 39
downgraft osteotomy surgery 528, 529
etiology of 514, 516
favorable mandibular growth 518
features of 532
mandibular incisors 518–520
masking 517–518
maxillary incisors 520
orthopedic treatment 516–518
surgery 518
unfavorable mandibular growth 518
vertical facial growth 514, 515, 534–535
Skeletal open bites 39
etiology of 541
masking 542–544
orthopedic treatment 541–544
surgery 542–545
vertical facial development 545
SNA and SNB angles 800–801
Space maintenance 59–60, 78, 116, 122, 131, 142, 151, 158, 161, 162, 172–173, 177, 183–184, 190, 198, 206, 274, 286, 303, 316, 326, 393, 399, 408, 576, 580, 589, 607, 621–622, 674, 746, 772, 777, 784
Space regaining 90–93, 116, 122, 131, 142, 151, 158, 161, 162, 173, 177–178, 190, 198–199, 206, 261, 274, 286, 303, 310, 316, 326, 433, 442, 459–460, 476, 589
elastomeric separator insertion 91
Halterman appliance 91
maxillary right primary second molar extraction 91
split plate 94
Spontaneous alignment
crowded mandibular anterior teeth 80–82
crowded mandibular incisors 79–80
Straight-pull headgears (SPHGs) 517
Straight (flush) terminal plane 50, 55
Surgically assisted rapid maxillary expansion (SARME) 732, 734
Sydney case study
dental and skeletal deep bite 512–514
diagnostic findings and problem list 577–578
early treatment 579
initial records of 576–577
mandibular arch 578
maxillary arch 578
maxillary midline labial frenum 579–580
primary problems 579
soft tissue trauma 578
space analysis 578
treatment options 580
treatment recommendations 580

t

Teeth drift 59
Temporary anchorage device (TAD)
advantages 383–384
Class III orthopedic effects 383
disadvantages 384
supported Class III elastics 460–461, 477
Theo case study
Angle classification system 7
anterior incisor crossbite correction 11
assessment issue 3
cephalometric findings 16–17
changes at age 15 11
deband photographs 10
diagnostic findings and problems list 5–6
early treatment 16
deband photographs 10
options 8–9
principles 8
initial records of 4–5
lateral cephalometric radiograph 5
LLHA placement 11, 13
mandibular anterior labial periodontium 11
mandibular skeletal anteroposterior position 6
maxillary canine problem 11
maxillary fixed appliances 9–10
nasion-perpendicular line 6
orthodontic diagnosis 3
orthodontic treatment 16
panoramic radiograph 3
primary problems list 8
progress records 14–15
at 15 years of age 12–13
recalling recommendations 9–10
skeletal jaw discrepancies 17
thin labial periodontal biotype 7
treatment recommendations 13, 16
Thumb habit correction 621
Timing of puberty 46
Tomas case study
anterior crossbite 366
dentally Class I 366, 367
initial records of 367
Tooth crowding 63
arch perimeter 63
etiology of 63
tooth-size 63

Tooth emergence 46
age range 46
permanent tooth root maturation 48
timing and sequence 46–47
Tooth eruption 46
delayed chronologic 60
gender differences in timing 50
habit duration or force magnitude 618
modal sequence 49, 53
primary failure 61
rate of 48
stages of 48
timing of 47
tooth movement 48
Tooth position equilibrium 63
Tooth-size arch length discrepancy (TSALD) 47
Transitional dentition crowding 63
Transverse orthopedics 589
Transverse posterior dental compensations 36–37
Transverse problems
bilateral crossbite 733–734
bonded maxillary expanders 722
buccal crown torque 695, 696
causes 700
crossbite corrections 697
cusp-to-cusp occlusion 696, 697
cusp-to-fossa occlusion 696, 697
dental crossbites 704–705, 709–711
dental relationships 697
diagnosis and treatment plan 702–704
Haas maxillary expander 720, 721
Hyrax expander 721
Hyrax expansion screw appliance 711, 712
lingual crown torque 695, 696
mandibular
arch expansion 722, 724, 725
asymmetry 697
surgeries 734–737
masking skeletal crossbites 727–730
maxillary
anchor teeth 710
arch expansion 722, 724, 725
molar transverse occlusion 695
MPMO 732, 733
occlusal interferences 707
posterior crossbites 707–709
quad-helix 711, 712
rapid maxillary expansion (RME)
bonded appliances 722, 724
buccal crown torque 720
Class II improvement 726–727
hemi-maxillae 712, 713
long-term retention 716
mandibular posterior teeth 716, 718
maxillary left first premolar band 725, 726
midpalatal suture separation 714
nasal cross-sectional area 726
obstructive sleep apnea 726
overcorrection/overexpansion 716, 717
periodontium 720
post-activation retention periods 716, 717, 719
post-expansion maxillary molar 716
recommendations 715–716
root resorption 720
signs 715
skeletal expansion 719
skeletal resistance 712–714
treatments 726
right molar problems 710
SARME *vs.* MPMO 732
Schwarz expanders 729, 730
skeletal crossbites 704–705
split plate appliance 710, 712
treatment goals 706
treatment options 707
unilateral crossbite 697, 702, 723
Tricia case study
adenoidal facies 642
adenoidectomy 639
bonded RME 652
chin projection 639, 641
Class II relationship 639, 647
convex profile 647
deband records 650–652
dental open bite 644, 646
diagnostic findings and problem list 638–639
early treatment 642–643
future jaw growth 649
hyperdivergent growth pattern 644
incisor eruption 652
initial records of 640–641
intraoral scan views 644
lip competence 642
mandible 647
mandibular arch 645
mandibular incisor crowding 645
masking (camouflage) 648
maxillary arch 645
mentalis strain 639
open bite treatment 649
orthopedic treatment options 647–648
posterior crown torques 644–645
posterior overjet/posterior crossbite 644
posterior transverse relationship 648–649
primary problems 645
progress records 650
retention protocol 653
second adenoidectomy 641
skeletal open bite 643–644, 646–647
space analysis 645
take-home pearls 653
tonsillectomy 639
treatment recommendations 649–650
vertical-pull chin cup wear 652
Trista case study
Class II molar relationship 283
Class II orthopedics 283
CR-CO shift 280
diagnostic findings and problems list 279–280
early treatment 283–285, 288
FMIA 288
Herbst appliance 286–287
initial records of 281–282
LLHAs 287–288
mandible 280
mandibular arch 284
mandibular dental arch crowding 288
mandibular first permanent molar eruption 287–288
maxillary arch 284
primary problems 284, 291
progress records 287–290
serial extraction 285
space analysis 283–284

Trista case study (*cont'd*)
stainless-steel ligature wire 289
take home pearls 292
transverse dental compensations 283
treatment options 285–286, 290–292
treatment recommendations 286, 292

V

Vertical condylar growth 40
Vertical problems
dental deep bites
erupting posterior teeth 515
etiology of 514, 515
vertical facial growth 514, 515, 534–535
dental open bites
anterior tooth eruption 545
digit-sucking habits 536
etiology of 537
growth pattern 535
recommendations 541
thumb-sucking habits 536
tongue interposition 538–539
treatments 540–541
vertical facial development 545
digit-sucking habits
non-compliance based options 537
thumb cribs 538
thumb paints 537–538
ideal overbite 506–508
mandibular incisor palatal soft tissue impingement 522–523
overbite (OB)
definition 506
techniques to reduce 521–522
posterior open bites
causes of 557–558
deband models 566–567
deband records 569–570
diagnostic findings and problem list 564
digit habits 561–562
fabrication of an LLHA 559–561
initial records 554–556, 562–564
maxillary left permanent primary molar 565
maxillary left permanent second molar 567
periapical radiograph 566
primary failure of eruption (PFE) 569, 570
primary problems list 556, 565
recall records 567, 568
re-treatment progress 567, 568
take-home pearls 571–572
treatment 558–560
treatment recommendations 565–566
skeletal deep bites
downgraft osteotomy surgery 528, 529
etiology of 514, 516
favorable mandibular growth 518
features of 532
mandibular incisors 518–520
masking 517–518
maxillary incisors 520
orthopedic treatment 516–518
surgery 518
unfavorable mandibular growth 518
vertical facial growth 514, 515, 534–535
skeletal open bites
etiology of 541
masking 542–544
orthopedic treatment 541–544
surgery 542–545
vertical facial development 545