

# Index

- acetaminophen, 228
- acetylcholine nicotinic receptor (AChR), 307
- acetylcholinesterase inhibitors, 308
- acoustic neuroma, 125
- acromegaly, 161
- activities of daily living, 386
- acute head injury, CT  
indications in, 83t. *see also* head injury
- acute inflammatory  
demyelinating  
polyneuropathy (AIDP), 304–305
- acute motor and sensory axonal neuropathy (AMSAN), 305
- acute motor axonal neuropathy (AMAN), 305
- acute stroke  
anesthetic management  
of, 266  
CTP monitoring, 371  
diagnosis, 263  
epidemiology, 263  
outcomes, 263  
risk, perioperative, 263  
treatment urgency, 263
- acute stroke management  
airway management, 265  
anticoagulation, optimal  
level of, 266  
blood glucose levels, 265  
blood pressure,  
maintaining, 265  
body temperature,  
maintaining, 265  
hemodynamic  
monitoring, 266  
targets for, 264
- acute stroke treatment options,  
263–264  
endovascular stroke  
therapy, 264  
thrombolytic drugs, 264
- acute traumatic spinal cord  
injury, 179t, 179,  
adrenaline, 176
- $\alpha$ 2-adrenergic agonists, 70
- adrenoreceptor antagonists, 71
- airway assessment, 180  
mouth opening, 180  
radiographs, 180  
reduced neck  
movement, 180
- airway edema, 226
- airway management, 174  
acute stroke  
management, 265
- adult TBI patient, 396
- cerebral venous sinus  
thrombosis, 277
- cervical spinal pathology,  
problems associated  
with, 179
- cervical spine injury,  
183–184, 184f
- head injury, 169, 240–241
- pediatric TBI, 220
- soft tissue injury, 180
- spinal surgery and, 173, 174
- subarachnoid  
hemorrhage, 258
- airway obstruction, 163, 227
- airway problem, 150
- albumin solutions, 286
- American Association of  
Neurological Surgeons  
(AANS), 389
- anaemia, 254, 259
- anaerobic metabolism, 43
- anaesthesia for transsphenoidal  
pituitary surgery  
airway management, 163  
general aims of, 162
- anaesthesia maintenance,  
169–170
- anaesthesia, neuroradiological  
procedures, 198
- anaesthetic agents, 60t  
benzodiazepines, 56, 59  
dexmedetomidine, 58  
etomidate, 58  
ideal, properties of, 56–57  
ketamine, 58–59  
mechanisms of action of, 56  
propofol, 57, 59
- remifentanyl, 59
- target controlled infusion  
(TCI) systems, 59
- thiopental, 57
- anaesthetic technique, 377
- ancillary tests for brain  
death, 316
- anesthesia induction  
paediatric neurosurgical  
patient, 208  
posterior fossa lesions, 127  
subarachnoid hemorrhage,  
119–120  
supratentorial neoplasms, 111
- anesthesia maintenance  
paediatric neurosurgical  
patient, 209  
supratentorial  
neoplasms, 111
- anesthesia monitoring,  
electroencephalogram  
for, 363
- anesthetic agents and ischemic  
brain, 49  
barbiturates, 49–50  
etomidate, 50  
ketamine, 50  
propofol, 50  
volatile anesthetics, 50
- anesthetic drugs and EEG,  
359–360
- aneurysmal sac, 202
- aneurysmal subarachnoid  
haemorrhage (aSAH)  
CTP monitoring, 371  
definitive treatment of, 258  
transcranial Doppler  
monitoring, 369
- aneurysm rupture, 257
- angioplasty, 203
- anterior cerebral artery (ACA),  
13t, 13
- anterior pituitary hormones,  
160t
- anticoagulation, 201  
acute stroke  
management, 266  
CVST management,  
277–278

## Index

- antiemetic prophylaxis, 228, 229t  
 antiepileptic drug (AED) therapy, 140  
 anti-fibrinolytic agent, 210  
 antifibrinolytic therapy, 257  
 antihypertensive agents, 70–71  
   adrenoreceptor antagonists, 71  
   calcium channel blockers, 71  
   direct acting vasodilators, 71  
 antiplatelet agents, 201  
 apnea test, 314–316  
 apoptosis  
   causes of, 43  
   cerebral ischemia and, 43  
 arachnoid granulations, 3f  
 archicerebellum, 9  
 arterial blood oxygen content, increasing, 340  
 arterial carbon dioxide tension  
   impact on ischemic brain, 52  
   manipulation of, 340  
 arterial system, 13–14  
   ACA and MCA supply, 13t, 13  
   anterior circulation, 13  
   posterior circulation, 13  
 arteriolar vasoconstriction, 21  
 arteriovenous malformations (AVMs)  
   anaesthetic management, 121–122  
   complications, 122  
   diagnosis and treatment, 121  
   pathogenesis and epidemiology, 121  
 ascending tracts, 4, 5f  
 asleep fiberoptic intubation, 183  
 atlantoaxial instability, 181  
 autonomic dysfunction  
   clinical manifestations, 279  
   paroxysmal sympathetic hyperactivity. *see* paroxysmal sympathetic hyperactivity (PSH)  
 autonomic dysreflexia, 174, 236  
 awake craniotomy  
   applications, 146  
   benefits, 146  
   complications, managing, 150  
   contraindications, 146  
   definition, 146  
   postoperative care, 151  
   awake craniotomy, intraoperative care of, 146  
   airway management, 148  
   anesthesia, 149  
   awake phase, 149–150  
   intravenous anesthetic agents, 149  
   patient positioning, 147–148  
   post-awake phase, 151  
   pre-awake phase, 148–149  
   routine monitoring, 147  
 awake craniotomy, perioperative care of  
   patient rapport, establishing, 146–147  
   patient selection, 146  
   pre-medication, 147  
 awake craniotomy procedures, 78  
 awake fiberoptic intubation, 183  
 bacterial meningitis (BM), 269–270  
 bag mask ventilation, cervical spine movement with, 182  
 barbiturates, 49–50, 252–253  
 basal ganglia, 10f, 11  
 baseline blood pressure and cardiovascular reserve, 200  
 benzodiazepines, 258, 299–300  
 bifrontal approach, 91f, 91  
 bifrontal subfrontal approaches and supine position, 100–101  
 bi-partite bone flap, 92f  
 bispectral index monitor (BIS), 363  
 bladder catheters, 200  
 bleeding catastrophes, 202  
 blood-brain barrier (BBB), 16–18  
   disruption and ischemia, 43  
 blood glucose levels, 226  
   acute stroke  
     management, 265  
     impact on ischemic brain, 52  
   pediatric TBI and, 221  
   subarachnoid hemorrhage (SAH), 259  
 blood loss management, 209–210  
 blood pressure management, 170, 396–397  
   acute stroke  
     management, 265  
 blood pressure targets, re-bleeding prevention, 257  
 body temperature, maintaining, 265  
 brain, 27  
   glycogen stores of, 27  
   metabolic requirements, 27  
   oxygen consumption, 20  
 brain arteriovenous malformations, 203  
 brain, blood flow to, 12–13. *see also* cerebral circulation  
 brain death. *see also* death  
   ancillary tests for, 316  
   clinical examination, 314–316  
   medical standards for determining, 314  
   preconditions for, 314  
   TCD confirmation, 370  
   Uniform Determination of Death Act and, 313–314  
 brain herniation  
   definition, 35  
   tonsillar, 36  
   transtentorial, 35  
   types, 35f  
 brain injury following myocardial injury, 242  
 brain oxygen requirement, balance in, 243  
 brain parenchyma, 32, 33  
 brain stem, 2, 8–9  
 brainstem auditory evoked potentials (BAEPs), 352–353  
 brainstem reflex  
   examination, 314  
 brain temperature and ischemic brain, 51  
 brain tissue oxygenation, 248  
 brain tissue oxygen tension (PbtO<sub>2</sub>), 248, 339  
 breathing and head injury, 240–241  
 calcium channel blockers, 71  
 Canadian C-spine rule, 82t, 82  
 carbon dioxide, 340  
 carbon dioxide tension (PaCO<sub>2</sub>), 22–23

## Index

- vascular changes in response to, 63
- cardiac output
  - fluid responsiveness and, 285
  - monitors, 242
- cardiopulmonary
  - resuscitation, 176
- cardiovascular function and SCI, 235
- cardiovascular instability, 227–228
- cardiovascular system and spinal surgery, 174
- carotid angioplasty, 203
- carotid endarterectomy (CEA)
  - anesthetic goals, 187
  - carotid cross-clamping, 190
  - definition, 186
  - indication for, 186
  - neurological monitoring during, 190
  - perioperative complications associated with, 191–192t, 191–192
  - popularity, 186
  - postoperative
    - management, 191
  - preoperative assessment, 187
  - primary aim of, 186
- carotid endarterectomy (CEA), anesthetic technique for
  - factors influencing choice of, 188
- general anesthesia, 188t
- key stages associated with, 189
- regional anesthesia, 188t, 190
- carotid sinus distention, 203
- carotid stenosis, 203
- catheters, 169
- cavernous sinus injury, 163
- cellular metabolism,
  - mechanisms of
    - amino and organic acids, 30
    - flow-metabolism coupling, 29f, 30
    - glucose, 27–30
    - ketone bodies, 30
    - lactate, 30
- central diabetes insipidus (CDI), 293f, 293
- central gray matter, 4
- central nervous system (CNS), 2, 2f, 40, 206,
  - brainstem. *See* BrainStem
  - cerebellum. *See* Cerebellum
  - cerebral hemispheres. *See* Cerebral hemispheres
  - cerebrospinal fluid, 2
  - diencephalon. *See* Diencephalon
  - normal functioning of, 27
  - spinal cord. *See* Spinal cord
- central nervous system (CNS)
  - infections, 269
- bacterial meningitis (BM), 269–270
- cerebral abscess (CA), 272–273
- diagnosis, 269
- encephalitis, 270
- immunocompromised
  - patients. *see* immunocompromised patients, infections in
  - ventriculitis, 270–271
- central venous access, 169
- central venous
  - cannulation, 208
- central venous pressure (CVP), 32
- cerebellum, 2, 9–10
- cerebral abscess (CA), 272–273
- cerebral aneurysm
  - formation, predisposing factors related to, 116t
  - pathophysiology of, 116–117
  - surgery, 120
  - treatment of, 117–118
  - types, 116
- cerebral aneurysm ruptures
  - likelihood of, 117
  - pathophysiologic changes with, 117
- cerebral angiography, 316
- cerebral arterial
  - vasospasm, 259
- cerebral autoregulation, 21f, 22, 63, 217
  - definition, 21
  - inhaled anesthetics and, 64f
  - limits of, 22
  - mechanisms for achieving, 22
- cerebral blood flow (CBF), 29f, 40
  - adequacy monitoring with  $\text{SjvO}_2$ , 331–332
  - altering, 340
  - CMRO<sub>2</sub> and, 331
  - dexmedetomidine and, 70
  - factors influencing, 63
  - measurement of, 23–25
  - monitoring using EEG, 362
  - under normal conditions, 63
  - reduction in, 20
  - spatial map of, 24
  - volatile anesthetics effects on, 66t
- cerebral blood flow (CBF),
  - determinants of, 20
  - autoregulation, 21–22
- cerebral perfusion pressure, 20–21
- cerebral vascular
  - resistance, 21
- flow-metabolism
  - coupling, 23
- neurogenic control, 23
- physiological control, 22–23
- rheology, 23
- cerebral blood volume (CBV), 21, 32, 34
- cerebral circulation
  - arterial system, 13–14
  - blood-brain barrier (BBB), 16–18
  - cerebral microcirculation, 15–16
  - venous system, 14–15
- cerebral contusion, 167
- cerebral cortex, 5, 6f
- cerebral edema
  - intraoperative, management of, 112
  - TBI and, 248
- cerebral haemodynamics and TBI, 217
- cerebral hemispheres, 2, 5–7
- cerebral hemodynamics
  - opioid analgesics and, 69
  - pediatric TBI and, 222
- cerebral hyperaemia, 217
- cerebral hypoperfusion
  - clinical observation and neurological examination, 365
  - definition, 365
- cerebral hypoxia clinical considerations, 341
- cerebral ischemia, 40
  - anesthetic agents for. *see* anesthetic agents and ischemic brain
  - approach to problem of, 49
  - cerebral blood flow and, 40–41
  - focal, 40–41

## Index

- cerebral ischemia (cont.)
  - global, 40
  - pharmacological agents for, 51
  - time course of injury and repair, 44, 45f
- cerebral ischemia,
  - pathophysiology of apoptosis and necrosis, 43
  - blood-brain barrier disruption, 43
  - excitotoxicity, 41–42
  - inflammation, 43–44
  - neurovascular unit, 45, 46f
  - nitric oxide, 43
  - tissue acidosis, 43
- cerebral lymphoma
  - imaging, 87
- cerebral metabolic rate (CMR), 21
  - definition, 27
  - flow-metabolism coupling and, 23
- cerebral metabolic rate of oxygen
  - decreasing, 340
- cerebral metabolic rate of oxygen (CMRO<sub>2</sub>), 29f, 217
  - inhaled anesthetics and, 63–64
  - measurement, 331
  - volatile anesthetics effects on, 66t
- cerebral microcirculation, 15–16
- cerebral microdialysis, 250
- cerebral monitoring of TBI, 248
  - brain tissue oxygenation, 248
  - cerebral microdialysis, 250
  - ICP monitoring, 248, 250t
- cerebral oedema, 33, 34t
- cerebral oximetry and pulse oximetry, 336f, 338
- cerebral oxygenation
  - definition, 336
  - determinants, 338f
  - parameters, monitored, 339
- cerebral oxygenation monitoring
  - brain tissue oxygen tension, 339
  - cerebral tissue oxygen saturation, 336, 337f
  - patient outcome and, 341
- cerebral oxygenation monitoring, interventions guided by, 339
  - CBF, altering, 340
  - cerebral metabolic rate of oxygen, decreasing, 340
- cerebral perfusion pressure (CPP), 20–21, 32, 40
  - augmentation, 340
  - determinant of, 32
  - impact on ischemic brain, 51–52
  - management, 170, 396
  - monitoring in TBI, 242
  - non-invasive assessment, 321
  - optimal, 324–325
- cerebral perfusion pressure-targets, 170t
- cerebral revascularization procedures, 186
- cerebral tissue oxygen saturation (SctO<sub>2</sub>), 336, 337f
- cerebral vascular resistance (CVR), 21
- cerebral vasodilators, 221
- cerebral vasospasm, 259
- cerebral venous drainage. *see* venous system
- cerebral venous oxygen saturation, 248
- cerebral venous sinuses, 275
- cerebral venous sinus thrombosis (CVST)
  - acquired causes of, 276
  - clinical manifestations, 276–277
  - diagnosis, 277f, 227
  - epidemiology, 275
  - management, 277–278
  - pathophysiology, 275, 276f
  - risk factors of, 276
- cerebrospinal fluid (CSF), 2, 32
  - bulk flow theory, 133
  - drainage, 252
  - dynamics, 133
  - reduced absorption of, 34
- cerebrospinal fluid diversion, 134
  - general anaesthesia for, 136
  - hydrocephalus and, 134
  - patient positioning, 137
  - postoperative analgesia for, 137
- TIVA/inhalational agent for, 137
- cerebrovascular autoregulation (CA) and TCD ultrasonography, 366–368
- cerebrovascular disease, anesthetic management of, 212
- cerebrovascular diseases, procedures for
  - brain arteriovenous malformations, 203
  - carotid stenosis, 203
  - intracranial aneurysm, 202–203
  - ischaemic stroke, 203
- cerebrovascular pressure reactivity, 321–323, 323f
- cerebrovascular tone, neurogenic control of, 23
- cerebrum and neocortices, 5–7
- cervical fractures, incidence and distribution of, 179t
- cervical imaging, 181
- cervical spine clearing, 234
- cervical spine disease
  - acute traumatic spinal cord injury. *see* acute traumatic spinal cord injury
  - airway management techniques, 180–182
  - anaesthetist concern for, chronic, 180
- cervical spine disease, pre-operative assessment of
  - airway assessment, 180
  - radiology, 180
- cervical spine fractures, 218
- cervical spine immobilization, 219–220
- cervical spine injury, 217
  - airway management for, 183–184, 184f
  - case study, 398–400
  - incidence of, 217–218
- cervical spine movement with bag mask ventilation, 182
- with cricoid pressure, 182
- with fiberoptic intubation, 183
- with laryngoscopy, 182

## Index

- with supraglottic devices, 183
- cervical spine surgery,
  - extubation after, 183
- cervical vertebral column, 181f
- chest compressions, 176
- chiari malformations, 125–126
- choroid plexus, 3f
- chronic anticonvulsant therapy, 209
- circle of Willis, 14, 15f
- circulation and fluid resuscitation, 241–242
- clinical information
  - resources, 388
  - electronic journals and databases, 388–389
  - privacy and security, 389–391
  - PubMed, 388
  - ClinicalKey, 389
- clonidine and
  - dexmedetomidine, 70, 177
- closed brain biopsy, 153
- coagulation management, 201
- coagulopathy, 242, 254
- codeine, 228
- coil embolization, 202
- collateral blood flow, 202
- coma, 314
- communicating
  - hydrocephalus, 133
- computed tomography (CT),
  - 81–82
  - indications in acute head injury, 83t
  - intracranial hypertension, 85–86
  - neuroimaging, 195
  - spinal trauma, 82, 83
- computed tomography perfusion (CTP), 24f, 25
- acute stroke monitoring by, 371
- aSAH monitoring by, 371
- basic principles, 370
- interpretation, 370–371
- limitations, 371
- consent, 78
- copeptin, 293
- cortical mapping, 147
- cost-effectiveness
  - of rehabilitation, 386
- cranial nerve dysfunction, 227
- cranial vault, 32
- craniectomy, 222
- craniotomies, 89
- cricoid pressure, cervical spine movement with, 182
- critical illness myopathy (CIM), 310–311t
- cross-clamp intolerance, 190
- cryptococcal infections, 271
- crystalloids, 221, 285–286
- Cushing's disease, 162
- DBS electrodes, 154
- death. *see also* brain death
  - concept of, 313
  - definition, 313
- decompressive craniectomy (DC), 253
- deep brain stimulation (DBS)
  - anatomical targets, 154
  - anesthetic management complications, 156
  - intraoperative management, 155–156
  - pre-operative evaluation, 154–155
  - benefits, 154
  - definition, 153
  - surgery for, 154f,
- deep brain stimulators,
  - 153–154
- deep cervical plexus block, 188
- deep vein thrombosis, 229
- deep venous thrombosis (DVT) prophylaxis, 260
- delayed cerebral ischaemia, 369
- delayed cerebral ischemia (DCI), 258–259, 395
- delayed neurologic deterioration (DND), 258
- deliberate hypertension, 202
- deliberate hypotension, 201
- delirium precautions, 258
- delivery plan and surgical timing, 375–376
- deoxygenated blood from brain, 329
- descending tracts and dorsal horn, 5f
- desflurane, 65
- dexmedetomidine, 70, 143, 149, 209, 220
- diabetes insipidus (DI), 163
- diencephalon, 2, 7
- diffuse axonal injury, 84
- dilutional
  - thrombocytopenia, 210
- direct acting vasodilators, 71
- direct cortical stimulation (DCS), 144
- disconnection theory, 280
- disordered coagulation, 254
- Doppler shift, 24
- drug-resistant epilepsy (DRE), 140
- dysrhythmias, 127–128
- edrophonium (tensilon), 308
- elective neurosurgery
  - procedures, 376
- electrocorticography (ECoG),
  - 142, 147
  - intraoperative, 143–144
- electroencephalogram (EEG)
  - amongst normal individuals, 358
  - anesthetic drugs effect on, 359–360
  - CBF monitoring using, 362
  - concept and devices, 360
  - depth of anesthesia monitoring by, 363
  - scalp, 358
  - seizure focus localization and surgery by, 362–363
  - set of tracings, 358
  - signal characteristics, 358, 359
  - during sleep, 359
  - surface recordings, 358
- electroencephalographic (EEG) changes, 69
- electrolyte abnormalities,
  - SAH, 260
- electrolyte disorders, 290
  - hyponatremia, 292–294
  - hypomagnesemia, 294–295
  - hyponatremia, 290–292
  - hypophosphataemia, 295
  - potassium disorders, 294
  - sodium disorders, 290
- electromyography, 351
- anesthetic
  - considerations, 351
- applications in neurosurgical procedures, 350
- lesions for monitoring, 350
- motor evoked potentials and, 350t
- electronic journals and databases, 388–389

## Index

- elevated intracranial pressure (ICP). *see* intracranial hypertension
- eloquent brain regions, 6
- emergence agitation, 229
- encephalitis, 270
- encephaloceles, anesthetic management of, 210
- endonasal transsphenoidal approach, 162
- endoscopic third ventriculostomy (ETV), 135–136
- endoscopy and hydrocephalus, 135–136
- endotracheal intubation, brain injury, 240, 241
- endovascular embolization, 203
- endovascular platinum coil occlusion, 118
- endovascular stroke anesthetic management of, 266
- therapy, acute stroke, 264
- endovascular surgery post-operative management, 202
- energy failure, 40, 41
- epidural analgesia, 177
- epidural hematomas, 222
- epidural probes, 321
- epilepsy, 75
- anesthetic management, 211–212
- classification, 139t
- epidemiology, 139, 150
- etiology, 139–140
- focal seizures, 139
- generalized seizures, 139
- epilepsy surgery
- general principles of, 140
- success rate, 140
- types, 141t
- epilepsy surgery, anesthesia techniques for
- intraoperative
- electrocorticography, 143–144
- intraoperative functional mapping, 144
- without electrophysiological monitoring, 142–143
- epilepsy surgery, diagnostic workup for, 141
- electroencephalography, 141
- extraoperative ECoG, 142
- neuroimaging, 141
- neuropsychological testing, 141
- epilepsy treatment
- antiepileptic drug therapy, 140
- surgical treatment, 140. *see also* epilepsy surgery
- epileptic focus localization, 143–144
- epileptic seizure
- clinical presentation, 297
- definition, 297
- erapamil, 301
- esmolol, 71
- etomidate, 50, 143
- evoked potentials
- applications in neurosurgical procedures, 350
- brainstem auditory. *see* brainstem auditory evoked potentials (BAEPs)
- latency and amplitude measurements, 351f, 352f
- lesions for monitoring, 350
- motor. *see* motor evoked potentials
- sensory. *see* sensory evoked potentials
- somatosensory. *see* somatosensory evoked potentials (SSEPs)
- visual. *see* visual evoked potentials
- excessive glutamate-mediated injury. *see* excitotoxicity
- excitatory-inhibitory ratio (EIR) model, 280–281
- excitotoxicity, 41, 42f
- extended bifrontal approach, 91
- extended middle fossa approach, 90
- external ventricular drain (EVD), 257, 270
- extracorporeal membrane oxygenation (ECMO), 210
- extradural hematomas (EDHs), 83, 167
- extraoperative electrocorticography, 142
- extrapyramidal organs
- basal ganglia, 10–11
- definition, 10
- functions of, 10
- extubation, 226
- after cervical spine surgery, 183
- FAM. *see* functional assessment measure (FAM)
- far lateral approach, 104
- far lateral suboccipital approach, 96–97
- fetal heart rate (FHR) monitoring, 376
- fibreoptic intubation, cervical spine movement with, 183
- FIM. *see* functional independence measure (FIM)
- Fisher grading system, 117
- flow-directed microcatheters, 196
- flow-metabolism coupling, 23
- flow thresholds for electrophysiologic dysfunction, 41f
- fluid administration, intravenous
- choice of. *see* intravenous fluids, choice of
- excessive, 285
- goals of, 285
- hyperosmolar therapy, 287
- fluid loss management, 209–210
- fluid responsiveness and cardiac output, 285
- fluids and electrolytes, 226
- focal ischemia, 40–41
- fracture dislocation injuries, 182
- free water replacement, 294
- frontotemporal approaches and supine position, 100–101
- functional assessment measure (FAM), 386
- functional independence measure (FIM), 386
- functional neurosurgery
- definition, 153
- goal of, 153
- preoperative assessment, 77

## Index

- functional residual capacity (FRC), 175
- gabapentin, 177
- gag reflex assessment, 226
- gastrointestinal and nutrition, 236
- gastroparesis, 236
- general anesthesia, 188t, 198
- acute stroke, 266
- interventional neuroradiology, 201
- motor mapping, 398
- generalized convulsive status epilepticus (GCSE), 297
- generic preoperative assessment
- goal of, 74
- neurological assessment, 75
- routine history and examination, 74–75
- genitourinary care, SCI management and, 236
- Glasgow Coma Scale (GCS), 219
- head injury
- classification, 166
- score, 117
- gliomas, imaging of, 86–87
- global ischemia, 40
- glucocorticoids, 71
- glucose, 344–345
- pediatric TBI and, 221
- glucose-containing intravenous fluids, 209
- glucose metabolism, 27–30, 28f
- anaerobic glycolysis, 28
- glycolysis, 27
- rate-limiting step in, 27
- tricarboxylic acid cycle (TCA), 27–28
- glycaemic control, head injury and, 243–244
- Guillain-Barré Syndrome (GBS), 310–311t
- causes, 305
- clinical features, 305
- clinical subtypes, 304–305
- definition, 304
- diagnosis, 306f, 306t, 307,
- immune therapy for, 307
- incidence, 304
- prognosis, 307
- supportive care, 306
- haematocrit, 23
- haematological system and spinal surgery, 174
- haemodynamic stability, 174
- hard collar, 182
- head-injured patient, transfer of
- complexity of, 244
- strategies and protocols for, 244
- head injury
- aetiologies of, 166
- classification, 166, 240
- indications for surgical management, 167
- pathophysiology, 166–167
- postoperative management, 171
- primary injury, 240
- secondary injury, 240
- head injury, initial resuscitation and stabilization of
- airway and breathing, 240–241
- circulation and fluid resuscitation, 241–242
- focus of, 240
- glycaemic control, 243–244
- neurological protection, 243
- physiological targets for, 240
- seizure control, 243
- temperature control, 243
- head injury, intraoperative management of
- airway management, 169
- anaesthesia maintenance, 169–170
- blood pressure management, 170
- hyperglycaemia, 170
- hyperosmolar therapy, 170
- hypothermia, 171
- induction, 168–169
- monitoring, 169
- raised intracranial pressure, 171
- thromboprophylaxis, 171
- vascular access and catheters, 169
- ventilation, 170
- head injury, pre-operative assessment of
- history and examination, 168
- investigations, 168
- hemodynamic and metabolic derangements, 208
- hemodynamic control, subarachnoid hemorrhage, 257
- hemodynamic instability, 192
- hemodynamic monitoring, 266
- hemodynamic parameters, optimization of, 228
- hemorrhagic stroke and pregnancy, 374–375
- heparin, intravenous, 201
- high-dose immunoglobulin therapy, 309
- hormonal replacement therapy, 163
- Hunt and Hess scale, 117, 118t
- hydrocephalus, 133, 395
- anaesthetic considerations, 136
- anesthetic management, 210–211
- causes of, 135
- theories relating to development of, 133
- types, 133
- hydrocephalus, surgical procedures for
- cerebrospinal fluid diversion. *see* cerebrospinal fluid diversion
- endoscopy, 135–136
- shunt assessment, 135
- hydrocortisone, 162
- hydrodynamic theory, 133
- hyperaemic complications of cerebral oedema, 122
- hypercapnia, 63
- hypercoagulable state, 276
- hyperglycaemia, 243
- head injury and, 170
- hyperglycemia, 226
- ischaemic brain and, 52
- treatment with insulin, 52
- hyperkalaemia, 294
- hypermetabolism, 236
- hypernatraemia, 260
- hyponatremia, 292–294
- central diabetes insipidus, 293f, 293
- definition, 292
- management, 294
- neurological signs, 292
- postoperative, 292

## Index

- hyperosmolar agents, 377
- hyperosmolar solutions, 242
- hyperosmolar therapy, 287
  - elevated ICP and, 287
  - head injury and, 170
  - hypertonic saline, 287
  - mannitol, 287
- hypertension, 112
- hyperthermia, 236
- hyperthyroidism, 162
- hypertonic saline (HTS), 72, 170, 250, 287
- hyperventilation, 252, 377
  - hypocapnia and, 63, 170
- hyperventilation therapy
  - ICP reduction, 332
  - SjvO<sub>2</sub> guiding, 332–333
- hypocapnia, 52
- hypoglycaemia, 30
- hypokalaemia, 294
- hypomagnesemia, 294–295
- hyponatremia, 163, 290–292
  - causes of, 290
  - cerebral salt wasting, 291f, 292t, 292
  - definition, 290
  - diagnosis, 290
  - SIADH, 290, 292t, 292f
  - treatment, 291–292
- hypophosphataemia, 295
- hypotension, 52
  - risk in TBI, 241
  - SCI and, 235
- hypothalamic nuclei in
  - diencephalon, 8f
- hypothalamus, 7
- hypothermia, 171, 236
- hypovolemia, 257
- hypoxemia, 241
- ice-cold crystalloid
  - irrigation, 150
- ICU. *see* intensive care unit (ICU)
- idiopathic intracranial
  - hypertension (IIH), 133
- IgG antibodies, 307
- immunocompromised
  - patients, infections in
  - cryptococcus, 271
  - mycobacterium
    - tuberculosis, 271
  - toxoplasmosis, 271
- immunosuppressive therapy
  - for MG, 308
- induced hypotension, 201
- induced hypothermia, 243, 252
- induction agents and head
  - injury, 168–169
- infants and neonates,
  - neurosurgical procedures. *see* paediatric neurosurgical patient
- inflammation and cerebral
  - ischemia, 43–44
- inflicted traumatic brain injury (tTBI), 217
- information privacy and
  - security, 389–391
- infra-tentorial compartment, 2
  - brain stem, 8–9
  - cerebellum, 9–10
- inhaled anesthetics
  - brain response to, 63
  - cerebral autoregulation and, 64f
  - CMRO<sub>2</sub> and, 63–64
  - effect on CBF, 63
  - MEP and VEP waves and, 64
  - neuroprotective and pre-conditioning properties of, 64
- initial hospital treatment of
  - SE, 300
- inspired oxygen fraction (FiO<sub>2</sub>), increasing, 340
- interhemispheric approach, 91–92
- interhemispheric approaches
  - and supine position, 100–101
- inter-hospital transfers, 244
- internal jugular vein (IJV)
  - anatomy, 329
  - choice of, 329–330
- International 10-20 Electrode Placement Protocol, 358, 359f
- International Classification of Functioning, Disability and Health (ICF), 384
- Internet resources for
  - neurosurgical anesthesiologists, 390t
  - see also* clinical information resources
- interventional
  - neuroradiology, 200
  - anticoagulation, 201
  - deliberate hypertension, 202
  - deliberate hypotension, 201
  - monitoring and vascular access, 200
  - neuroimaging, 196
  - neurological and procedural crises, 202
  - pre-anesthetic considerations, 200
- interventional neuroradiology,
  - anesthetic technique of general anesthesia, 201
  - intravenous sedation, 201
- interventional radiology, 378
- interventional
  - thrombolysis, 278
- intra-arterial blood pressure monitoring, 111
- intra-arterial catheter, 147
- intra-carotid shunt, 190
- intracerebral haemorrhage, 122
- intracerebral hematoma, 167
- intracerebral hemorrhage, 256
- intracranial aneurysm, 202–203
- intracranial compartment, 2
  - neurosurgical approaches by, 97t
- intracranial compartment and, 97t
- intracranial compliance, 33
- intracranial electrodes, 142
- intracranial haematomas, 167
- intracranial hemorrhage
  - definition, 256
- intracranial hypertension, 156, 208
  - causes of, 100, 257
  - hyperosmolar therapy for managing, 287
  - imaging, 85–86
  - interventions to decrease, 257
  - intraoperative treatment of, 171
  - intravenous anaesthetic agents and, 241
  - management for CVST, 278
  - radiological features of, 36–37, 37f
  - subarachnoid hemorrhage, 257
  - symptoms of, 133
  - treatment of, 127t
  - treatment threshold for, 217

## Index

- intracranial hypertension,
  - clinical features of, 34–35, 75
  - abducens nerve palsy, 36
  - altered level of
    - consciousness, 35
  - brain herniation, 35–36
  - headache, 36
  - neurological deficits, 36
  - papilloedema, 36
  - vomiting, 36
- intracranial hypertension,
  - pathophysiology of
    - brain parenchyma, 33
  - cerebral blood volume, 34
  - cerebrospinal fluid, 34
  - non-physiological
    - volumes, 34
- intracranial monitoring
  - cerebrovascular pressure
    - reactivity, 321–323, 323f
  - events and trends in, 321
  - optimal cerebral perfusion
    - pressure, 324f–325f
- intracranial pressure (ICP), 21
  - changes in, 320
  - component and intracranial
    - hypertension
      - treatment, 320
  - CPP calculation, 32
  - definition, 32
  - following TBI, 217
  - gold standard technique for
    - measuring, 32
  - importance, 320
  - management, 397
  - monitoring, 217, 221, 242, 248, 250t
  - normal ranges, 32
  - pulse waveform analysis of, 324–325, 326f
  - volatile anesthetics effects
    - on, 66t
- intracranial pressure (ICP)
  - measurement
    - CPP estimation, 320
  - epidural probes, 321
  - intraventricular drains, 321
  - microtransducers for, 320–321
  - non-invasive, 321
  - usefulness of, 325–326
- intracranial pressure (ICP),
  - therapies for
    - controlling, 250–252
  - CSF drainage, 252
  - hyperventilation, 252
    - osmotherapy, 250–252
- intracranial pressure-volume
  - relationship, 32f–33f
- intracranial trauma,
  - neuroimaging of
    - diffuse axonal injury, 84
  - extradural hematomas, 83
  - skull fractures, 83
  - subdural hematomas, 84
- intracranial tumors during
  - pregnancy, 375
- intracranial tumors, imaging
  - of, 86–87
    - cerebral lymphoma, 87
    - gliomas, 86–87
    - meningioma, 87
    - metastases, 87
- intracranial venous
  - sinuses, 275
- intraoperative aneurysm
  - rupture, 120–121
- intraoperative cerebral edema,
  - management of, 112
- intraoperative cerebral
  - monitoring, 119
- intraoperative
  - electrocorticography, 143–144
- intraoperative functional
  - mapping, 144
- intraoperative problems, 100
- intraoperative stimulation
  - mapping, 147
- intraparenchymal mass
  - lesions, 222
- intrasellar growth, 161
- intravenous access, 200
  - pediatric TBI and, 221
- intravenous anesthetic agents
  - awake craniotomy, 149
  - pediatric TBI and, 220
- intravenous fluids, choice of
  - albumin solutions, 286
  - crystalloids, 285–286
  - synthetic colloids, 286
  - transfusion of red blood
    - cells, 286
- intravenous fluids, pediatric
  - TBI and, 221
- intravenous fluid therapy, 242
- intravenous immune globulin
  - (IVIG), 307
- intravenous or inhalational
  - techniques, 163
- intravenous
  - phenylephrine, 222
- intravenous thrombolytic
  - therapy, 51
- intraventricular drains, 321
- intubation, 181, 376–377
  - asleep fibreoptic. *see* asleep
    - fibreoptic intubation
  - awake fibreoptic. *see* awake
    - fibreoptic intubation
  - naso-tracheal. *see* naso-tracheal
    - intubation
- invasive arterial blood pressure
  - monitoring, 169, 210
- invasive arterial pressure
  - monitoring, 235
- ionising radiation, exposure
  - to, 196
- ischaemic stroke, 203
- ischemic brain, anesthetic
  - agents for. *see* anesthetic
    - agents and ischemic
      - brain
- ischemic brain, physiologic
  - parameters influence on
    - arterial carbon dioxide
      - tension, 52
    - blood glucose levels, 52
    - cerebral perfusion pressure, 51–52
    - seizure prophylaxis, 53
    - temperature, 51
- ischemic cerebrovascular
  - disease, 263
- ischemic injury. *see* cerebral
  - ischemia
- isoflurane, 65, 301
- jugular bulb, 329
- jugular venous
  - desaturation, 331
- jugular venous oximetry, 329
  - complications and
    - limitations, 333
  - insertion technique, 329
- jugular venous oxygen
  - saturation (SjvO<sub>2</sub>)
    - CBF adequacy monitoring
      - with, 331–332
  - continuous monitoring, 330–331
  - factors affecting, 330
  - guiding hyperventilation
    - therapy, 332–333
  - increase and decrease in, 330t

## Index

- jugular venous oxygen (cont.)
  - intermittent monitoring, 330
  - intraoperative monitoring with, 333
  - measurement, rationale of, 331
- ketamine, 50, 177, 220, 301
- ketone bodies, 30
- labetalol, 71
- lactate, 30, 344–345
- Lambert Eaton Syndrome (LES), 310–311t
- large-bore intravenous access, 210
- laryngeal mask airway (LMA), 148, 183
- laryngoscopy, cervical spine movement with, 182
- lateral frontotemporal approach, 89
- lateral position, 102
- lidocaine, 220
- local anesthesia, 198
  - acute stroke, 266
  - awake craniotomy, 149
- lorazepam, 300
- lumbar intrathecal catheter, 162
- lumbar puncture, 270
- Macintosh and Miller laryngoscope blades, 182
- macroadenomas, 160
- macroglossia, 100, 227
- magnetic resonance imaging neuroimaging, 195–196
  - safety, 197
- magnetic resonance imaging (MRI), 82
- maintenance fluids, 111–112
- mannitol, 23, 72, 170, 242, 287, 377
- manual in-line stabilisation (MILS), 182
- maximal allowable blood loss (MABL), 210
- McCoy blade, 182
- MDConsult. *see* ClinicalKey
- mean arterial pressure (MAP), 21–22, 40
  - maintenance, 241
- mechanical endovascular therapy, 51
- medial subfrontal approach, 89
- medical resources, smartphone applications for, 391
- medication management of neurosurgery, 75–76
  - anticoagulant and antiplatelet drugs, 76
  - antiepileptic drugs, 76
  - antiparkinson drugs, 76
  - corticosteroids, 76
- meninges, 2
- meningioma, imaging of, 87
- MEPs, 175
- metastases, imaging of, 87
- microadenomas, 160
- microdialysis
  - clinical application of, 344
  - clinical applications, 346–347
  - definition, 343
  - intraoperative use of, 347
  - limitations, 348
  - principle, 343–344
  - research applications, 348
- microdialysis catheters, 343
  - location, 345–346, 346f
- microdialysis markers, 344, 346t
  - energy metabolism in cell and, 345f
  - glucose, lactate, and pyruvate, 344–345
  - glutamate, 345
  - glycerol, 345
  - value in normal brain, 346
- microinfusion pump, 343
- microtransducers, 320–321
- midazolam, 208, 301
- middle cerebral artery (MCA), 13t
- midline suboccipital approach, 93–95
- Miller Fisher Syndrome (MFS), 305
- minimally invasive neurosurgery, 212
- minimally invasive surgical techniques, 176
- monitored anaesthesia care (MAC), 148
- Monroe-Kellie doctrine, 33
- motor evoked potentials (MEPs), 144, 355
- anesthetic agents effects on, 354
  - EMG and, 350t
  - stimulation of motor cortex, 351
- motor mapping, general anesthesia for, 398
- muscle relaxants, pediatric TBI and, 221
- myasthenia gravis (MG), 310–311t
  - acetylcholinesterase inhibitors for, 308
- anesthetic considerations, 309–312
  - clinical features, 308
  - definition, 307
  - diagnosis, 308
  - high-dose immunoglobulin therapy for, 309
  - immunosuppressive therapy for, 308
  - myasthenic crisis, 309f
  - pathophysiology, 307–308
  - plasma exchange for, 309
  - prevalence, 307
  - prognosis, 312
  - thymectomy for, 309
  - triggering medications, 309f
- myasthenic crisis (MC), 309f
- mycobacterium tuberculosis, 271
- myelomeningoceles, 210
- naloxone, 69–70
- nasopharyngeal airway, 148, 227
- naso-tracheal intubations, 220
- near-infrared spectroscopy (NIRS), 250, 336–338
- necrosis, cerebral ischemia and, 43
- neocerebellum, 9
- neocortices, cerebrum and, 5–7
- neonates and infants, neurosurgical procedures. *see* paediatric neurosurgical patient
- neurocardiogenic injury, 257
- neurogenic control of cerebrovascular tone, 23
- neurogenic inflammation, 43–44

## Index

- neurogenic shock, SCI
  - management and, 235–236
- neurogenic stress
  - cardiomyopathy, 257
- neuroimaging
  - anaesthesia and sedation, 198
  - computed tomography (CT), 195. *see* computed tomography (CT)
  - development of, 195
  - interventional
    - neuroradiology, 196
  - intracranial hypertension, 85–86
  - magnetic resonance
    - imaging, 82, 195–196
  - objectives of, 81
  - positive emission tomography, 196
  - safety concerns within
    - contrast agents, 197–198
    - MRI safety, 197
    - radiation, 196
  - single-photon emission CT, 196
  - spinal trauma. *see* spinal trauma
  - subarachnoid haemorrhage. *see* subarachnoid haemorrhage (SAH)
- neuroimaging of intracranial tumors, 86–87
  - cerebral lymphoma, 87
  - gliomas, 86–87
  - meningioma, 87
  - metastases, 87
- neurointerventional
  - procedures, 378
- neurological and procedural
  - crises, management of, 202
- neurological deterioration,
  - interventions for, 250
- neurological disease during
  - pregnancy, 374
  - hemorrhagic stroke, 374–375
  - impact on surgical timing and delivery, 375–376
  - intracranial tumors, 375
  - optimal management, 374
  - post-operative
    - considerations, 378
  - traumatic brain injury, 375
- neurological disease during
  - pregnancy, anesthetic management of
    - anaesthetic technique, 377
    - hyperosmolar agents, 377
  - induction, 376–377
  - intubation, 376–377
  - monitoring, 376
  - neurointerventional
    - procedures, 378
  - patient positioning, 376–377
  - preoperative assessment, 376
  - vasopressor agents, 377–378
  - ventilation, 377
- neurological protection and
  - head injury, 243
- neurological state,
  - deterioration in, 228
- neurological system and spinal
  - surgery, 174
- neurological weakness, causes
  - of, 310
- neuromonitoring, 111
- neuromuscular blocking agents
  - (NMBAs), 70, 209
- neuromuscular blocking drugs
  - (NMBDs), 312
- neuromuscular diseases, 174
- neuronal function, energy
  - production for, 20
- neuronal necrosis, 52
- neurophysiological
  - monitoring, 175
- neuropsychological testing, 141
- neurosurgical interventions, 78
- neurosurgical operative
  - approaches
    - bifrontal approach, 91
    - choice of, 88
    - exposure gained with, factors influencing, 89
    - extended bifrontal approach, 91
    - far lateral suboccipital approach, 96–97
    - goal of, 89
    - interhemispheric approach, 91–92
    - intracranial compartment and, 97t
    - midline suboccipital approach, 93–95
    - retrolabyrinthine-middle fossa approach, 93
    - retrosigmoid suboccipital approach, 95–96
    - transsphenoidal approach, 92–93
    - unilateral frontotemporal approaches, 89–90
  - neurosurgical pathology,
    - medical conditions associated with, 75t
  - neurovascular surgery, 77
  - neurovascular unit, 45f, 46f
  - nicardipine, 71
  - nimodipine, 259
  - nitric oxide, cerebral ischemia and, 43
  - nitroglycerin, 377
  - nitrous oxide, 64–65
  - non-aneurysmal subarachnoid haemorrhage, 116
  - non-communicating
    - hydrocephalus, 133
  - non-convulsive SE, 297
  - non-invasive positive pressure ventilation
    - (NIPPV), 309
  - non-pharmacologic treatment
    - of SE, 302
  - non-physiological volumes, 34
  - normal pressure
    - hydrocephalus (NPH)
      - clinical features of, 133
      - management, 133
- OAA movement, 182
- obstructive hydrocephalus, 34
- obstructive sleep apnea
  - (OSA), 227
- opioid analgesics, 177, 209, 220, 228
  - cardiovascular effects, 68
  - cerebral electrical activity and, 69
  - cerebral hemodynamics and, 69
  - hypnotic-sparing effect, 68
  - nausea and vomiting after, 69
  - postoperative analgesia, 69
  - remifentanyl, 68
  - respiratory effects, 68
  - sufentanyl, 68
- orbitozygomatic approach, 90
- osmotherapy, 250–252
- osmotic agents, 72
- oxygenation and
  - ventilation, 240

## Index

- oxygen extraction fraction (OEF), 29  
 oxygen extraction ratio (OER), 29  
 oxygen tension (PaO<sub>2</sub>), 22–23  
 “O-Z” approaches. *see* orbitozygomatic approach
- paediatric neurosurgical patient  
   age impact on management of, 206  
   postoperative care, 213  
   preoperative evaluation and optimization, 206–208
- paediatric neurosurgical patient, anesthetic management of  
   cerebrovascular disease, 212  
   coexisting conditions influencing, 207t  
   encephaloceles, 210  
   epilepsy, 211–212  
   hydrocephalus, 210–211  
   minimally invasive neurosurgery, 212  
   myelomeningoceles, 210  
   posterior fossa tumors, 211  
   supratentorial tumors, 211
- paediatric neurosurgical patient, intraoperative management of  
   anesthesia maintenance, 209  
   blood loss, management of, 209–210  
   fluid loss, management of, 209–210  
   induction of anesthesia, 208  
   vascular access and positioning, 208–209
- pain management  
   SCI and, 237  
   spinal surgery, 176–177  
   subarachnoid hemorrhage, 258
- paleocerebellum, 9  
 paradoxical air embolism, 129  
 paralytic ileus and constipation, 236  
 parasympathetic dominance, 236  
 parkbench or three-quarters prone position, 104
- paroxysmal sympathetic hyperactivity (PSH), 279  
   diagnosis, 281  
   etiology, 280  
   management, 281–283, 282t–283t  
   pathophysiology, 280–281  
   risk factors for, 280
- patent foramen ovale (PFO), 129
- patient controlled analgesia (PCA), 228
- patient positioning, 376–377  
   cerebrospinal fluid diversion, 137  
   general principles, 100  
   importance of, 100  
   lateral position, 102  
   paediatric neurosurgical patient, 208–209  
   parkbench or three-quarters prone position, 104  
   physiologic effects of, 207t  
   posterior fossa surgery, 127  
   prone position, 104  
   semilateral position, 102f, 147f, 148f  
   sitting position, 102  
   supine position, 100–101, 102f  
   supratentorial neoplasms, 111
- pediatric neurotrauma, 215
- pediatric TBI. *see* traumatic brain injury (TBI)
- penumbra, 235
- perfusion fluid, 343  
   constant exchange of, 344  
   recovery, 344
- perioperative fluid, 226
- perioperative steroid supplementation, 162
- peripherally inserted central catheters (PICC), 209
- peripheral nerve injuries, 100, 175
- peripheral venous cannulae, 208
- petrosal approaches  
   semilateral position, 102f  
   supine position, 102f
- pharmacological neuroprotective agents, 237
- phenytoin and fosphenytoin, 300–301
- physiological control, 22–23
- pituitary adenomas, 160  
   classification, 160  
   clinical manifestations, 161
- pituitary gland  
   anatomy, 159  
   hormones secreted by, 160, physiology, 159
- pituitary hypofunction, 161
- pituitary tumours, 160  
   anaesthetic management, 162–163  
   pituitary adenomas. *see* pituitary adenomas  
   postoperative care and complications, 163  
   surgical approach and intraoperative considerations, 162
- pituitary tumours, pre-operative assessment of, 161  
   acromegaly, 161  
   Cushing's disease, 162  
   preoperative control of thyroid function, 162  
   preoperative hormonal optimization, 162
- plasma exchange (PLEX)  
   for GBS, 307  
   for MG, 309
- positive emission tomography, 196
- positive end-expiratory pressure (PEEP), 100, 241
- post-anesthetic care unit (PACU), 225  
   airway and ventilation, 226  
   discharge criteria for, 230  
   fluids and electrolytes, 226  
   imaging, 227  
   laboratory parameters, 226–227  
   monitoring, 225–226  
   neurological monitoring, 226  
   normothermia, 227  
   patient positioning, 227  
   post-craniotomy pain, 228  
   posterior cranial fossa, 125  
   posterior fossa lesions  
     acoustic neuroma, 125  
     Chiari malformations, 125–126

## Index

- pathology, 125–126
- preoperative evaluation, 126
- trigeminal neuralgia, 126
- posterior fossa lesions,
  - intraoperative management of
- dysrhythmias, 127–128
- emergence, 128
- induction and maintenance
  - of anesthesia, 127
- routine monitoring, 127
- posterior fossa surgery
  - patient positioning, 127
  - VAE in. *see* venous air embolism
- posterior fossa tumors, 211
- posterior parietal or occipital craniotomies, 102
- posterior pituitary hormones, 160t
- postoperative analgesia, 69
- postoperative anesthetic care,
  - SAH, 120
- postoperative hypernatremia (PH), 292
- postoperative
  - hypertension, 192
- postoperative nausea and vomiting (PONV), 228–229
- postoperative neuroendocrine abnormalities, 163
- postoperative pain, 228
- postoperative ventilation,
  - indications for, 226t
- post-traumatic seizures (PTS), 243
- potassium disorders, 294
- pregabalin, 177
- pregnancy, 374
- pre-hospital tracheal intubation, 220
- pre-hospital treatment of SE, 299–300
- premature neonates, 210
- pre-operative assessment, 161, 376
  - acromegaly, 161
  - cervical spine disease. *see* cervical spine disease, pre-operative assessment of
  - clinic, 74
  - Cushing's disease, 162
  - deep brain stimulation (DBS), 154–155
  - generic. *see* generic preoperative assessment
  - head injury. *see* head injury, pre-operative assessment of
  - importance, 74
  - integrated approach, 74
  - posterior fossa lesions, 126
  - preoperative control of thyroid function, 162
  - preoperative hormonal optimization, 162
  - procedure specific. *See* procedure specific preoperative assessment
  - spinal surgery. *see* spinal surgery, preoperative assessment of
  - subarachnoid hemorrhage (SAH), 118–119
- preoperative interview, 146
- preoperative management of
  - supratentorial neoplasms, 110
- preoperative risk
  - assessment, 78
- preoperative tests, 76
- preoperative transthoracic echocardiography, 161
- pressure points, 100
- pressure ulcers, 237
- primary brain injury, 166
- primary motor cortex, 6
- procedure specific preoperative assessment
  - functional neurosurgery, 77
  - neurovascular surgery, 77
  - spinal surgery, 77
  - surgery for traumatic brain injury, 77
  - tumour surgery, 76–77
- programmed cell death. *see* apoptosis
- prolactinoma, 161
- prone positioning, 104, 175
- propofol, 50, 57, 168, 301
- protamine administration
  - complications, 202
- pseudoseizures, 57
- psychological support, SCI management and, 237
- PubMed, 388
- pulse oximeter probe, 200
- pulse oximetry and cerebral oximetry, 336f, 338
- pulse waveform analysis of intracranial pressure, 324–325, 326f
- pyrexia, 23, 243
- pyruvate, 344–345
- raised intracranial pressure (ICP). *see* intracranial hypertension
- rebleeding, 257, 395
- recombinant tissue plasminogen activator (r-tPa), 264
  - contraindications to, 264
- red blood cell (RBC)
  - mannitol effect on, 23
  - transfusion of, 286
- refractory intracranial hypertension,
  - therapies for
- barbiturates, 252–253
- decompressive
  - craniectomy, 253
  - temperature control, 252
- regional anesthesia, 188t, 190
- remifentanyl infusion, 149
- respiratory function and SCI management, 234
- respiratory system and spinal surgery, 173
- resuscitation fluids, 111
- retrolabyrinthine-middle fossa approach, 93
- retrosigmoid approaches
  - semilateral position, 102f
  - supine position, 102f
- retrosigmoid suboccipital approach, 95–96
- rheology, 23
- rocuronium, 169
- RP. *see* rehabilitation prescription (RP)
- SCIWORA (spinal cord injury without radiological abnormalities), 218
- scoliosis, 173
- secondary brain injury, 166
  - factors causing, 167t
- second-line treatment of SE, 300–301
- sedative regimen, 149
  - DBS procedures, 155–156

## Index

- sedative regimen (cont.)  
 interventional  
   neuroradiology, 201  
 neuroradiological  
   procedures, 198  
 subarachnoid  
   hemorrhage, 258  
 seizure, 202  
   focus localization and  
   surgery by EEG,  
   362–363  
   treatment of, 243  
 seizure prophylaxis  
   impact on ischemic brain, 53  
   subarachnoid hemorrhage  
   (SAH), 260  
 semilateral position, 102f, 147f,  
   148f  
 sensory evoked potentials, 350f  
   sensory input, 351  
 sevoflurane, 65, 221  
 shivering treatment, 229  
 shunt  
   assessment and  
   hydrocephalus, 135  
   during CEA, 190  
   insertion procedure, 137  
 single-photon emission  
   CT, 196  
 sitting position, 102  
 skin ulceration and SCI, 236  
 skilled nursing, 386  
 skull fractures, 83  
 smartphone applications for  
   medical resources, 391  
 Society of Neurosurgical  
   Anesthesia & Critical  
   Care, 389  
 sodium nitroprusside, 377  
 sodium thiopental, 252  
 soft tissue injury, 180  
 somatosensory cortex, 6  
 somatosensory evoked  
   potentials (SSEPs), 175,  
   353–355  
   anesthetic agents effects  
   on, 354  
 spastic paralysis, 233  
 spinal cord, 2f, 4f  
   blood supply to, 5  
   functions of, 4–5  
   monitoring, 175–176  
 spinal cord injury (SCI), 215  
   causes of, 217  
   cervical spine clearing, 234  
   classification, 232, 233t  
   definition, 232  
   evaluation and imaging,  
   233–234  
   incidence of, 217, 232  
   pathophysiology, 233  
   pharmacological  
   neuroprotective agents  
   for, 237  
   steroid therapy for, 399  
 spinal cord injury (SCI)  
   management, 234  
   cardiovascular function, 235  
   gastrointestinal and  
   nutrition, 236  
   genitourinary care, 236  
   neurogenic shock, 235–236  
   pain, 237  
   psychological support, 237  
   respiratory function, 234  
   skin ulceration, 236  
   thermoregulation, 236  
   thromboembolic  
   complications, 236  
 spinal immobilisation, 234  
 spinal shock, 233  
 spinal surgery  
   patients present for, 173  
   postoperative pain after, 228  
   spondylolisthesis, 173  
   spondylosis, 173  
 spinal surgery, intraoperative  
   management of  
   airway management, 174  
   cardiopulmonary  
   resuscitation, 176  
   haemodynamic stability, 174  
   prone positioning, 175  
   spinal cord monitoring,  
   175–176  
   temperature monitoring, 174  
   visual loss, 175  
 spinal surgery, postoperative  
   management of  
   pain management, 176–177  
   tracheal extubation, 176  
 spinal surgery, preoperative  
   assessment of, 77, 173  
   airway management, 173  
   cardiovascular system, 174  
   haematological system, 174  
   neurological system, 174  
   respiratory system, 173  
 spinal trauma  
   CT for, 82, 83  
   incidence of, 82  
   MRI for, 83  
 spinal white matter, 5f  
 spine, 4f  
 spondylolisthesis, 173  
 spondylosis, 173  
 status epilepticus (SE)  
   clinical presentation, 297  
   complications, 298  
   definition, 297  
   diagnostic workup, 298  
   epidemiology, 298  
 status epilepticus (SE)  
   treatment, 298  
   algorithm, 299f  
   initial hospital, 300  
   isoflurane, 301  
   ketamine, 301  
   non-pharmacologic, 302  
   pre-hospital, 299–300  
   second-line, 300–301  
   third-line, 301  
   verapamil, 301  
 stereotactic neurosurgery  
   definition, 153  
   frame-based, 153  
   frameless, 153  
 steroid replacement  
   therapy, 163  
 steroid therapy for spinal cord  
   injury, 399  
 stress ulcer prophylaxis, 260  
 stroke. *see* focal ischemia  
 stroke volume, 209  
 subarachnoid haemorrhage  
   (SAH), 167  
   case study, 393–395  
   causes of, 84–85  
   CTA and DSA of, 85  
   CT of, 85f  
   definitive treatment of, 258  
   microdialysis applications  
   in, 347  
   non-aneurysmal, causes of,  
   116t  
 subarachnoid  
   hemorrhage (SAH)  
   anaemia after, 259  
   blood glucose levels and, 259  
   cerebral aneurysm. *see*  
   cerebral aneurysm  
   clinical features of, 256  
   clinical manifestations,  
   117  
   complications, 258–259  
   definition, 256  
   diagnosis, 117, 256  
   DVTs in, 260

## Index

- electrolyte  
   abnormalities, 260  
 epidemiology, 115–116  
 extracranial complications, 119t  
 intracranial complications, 119t  
 investigations, 117  
 mortality and morbidity, 115–116  
 pathophysiology of  
   aneurysms, 116–117  
 pyrexia in, 260  
 recovery timeline, 260  
 regional CBF reductions  
   in, 52  
 seizure prophylaxis, 260  
 stress ulcer prophylaxis, 260  
 temperature management  
   in, 260  
 subarachnoid hemorrhage  
   (SAH) anesthetic  
   management  
   cerebral aneurysm  
   surgery, 120  
   goals, 118  
   induction of anesthesia,  
   119–120  
   intraoperative aneurysm  
   rupture, 120–121  
   maintenance and  
   emergence, 120  
   monitoring, 119  
   postoperative anesthetic  
   care, 120  
   preoperative assessment,  
   118–119  
 subarachnoid hemorrhage  
   (SAH) intensive care  
   management  
   airway and ventilation  
   management, 258  
   elevated intracranial  
   pressure, 257  
   hemodynamic control, 257  
   neurocardiogenic injury, 257  
   pain and sedation  
   management, 258  
   volume status, 257  
 subarachnoid space, 2  
 subdural grid electrodes, 142,  
   143f  
 subdural hematomas (SDHs),  
   84, 167, 222  
 suboccipital approach and  
   prone position, 104  
 succinylcholine, 70, 208, 221  
 superficial cervical plexus  
   block, 188  
 supine position, 100–101, 102f  
 supplemental sedation, 190  
 supracerebellar infratentorial  
   approach and sitting  
   position, 102  
 supraglottic devices, cervical  
   spine movement  
   with, 183  
 supranormal systolic blood  
   pressure, 222  
 supra-tentorial  
   compartment, 2  
   cerebrum and  
   neocortices, 5–7  
   diencephalon, 7  
 supratentorial neoplasms  
   clinical presentation,  
   109–110  
   glial tumors, 109  
   gliomas, 109  
   incidence of, 109  
   indications for surgery  
   in, 109  
   meningiomas, 109  
   pituitary adenomas, 109  
   postoperative management,  
   112–113  
   preoperative  
   management, 110  
   surgical approaches, 110  
 supratentorial neoplasms,  
   intraoperative  
   management of,  
   110–112  
   complications, 112  
   fluid management, 111–112  
   induction of anesthesia, 111  
   maintenance of  
   anesthesia, 111  
   patient positioning, 111  
 supratentorial tumors  
   anesthetic management, 211  
   case study, 397–398  
 surgical positioning. *see* patient  
   positioning  
 surgical timing and delivery,  
   375–376  
 sympathetic cardiac  
   afferents, 235  
 sympathetic excess, clinical  
   features of, 281t  
 syndrome of inappropriate  
   antidiuretic hormone  
   secretion (SIADH), 290,  
   292t, 292t,  
 synthetic colloids, 286  
 systemic antibiotics, 137  
 systemic blood pressure, 202  
 systemic hypotension, 235  
 systemic traumatic injuries, 233  
 systolic hypertension  
   treatment, 52  
 temperature management, 252  
   acute stroke and, 265  
   head injury and, 243  
   subarachnoid hemorrhage  
   and, 260  
 temperature monitoring, 174  
 thalamus, 7  
 thermoregulation and SCI, 236  
 thiopentone, 168, 252  
 third-line treatment of SE, 301  
 thromboembolic  
   complications,  
   prevention of, 236  
 thromboembolism, 229  
 thrombolytic drugs, 264  
 thromboprophylaxis, 171  
 thymectomy and MG, 309  
 tic douloureux, *see* trigeminal  
   neuralgia  
 tissue acidosis, 43  
 tonsillar herniation, 36  
 total intravenous anaesthesia  
   (TIVA), 59, 137, 170  
 toxoplasmosis, 271  
 tracheal intubation, 265  
 tramadol, 228  
 transcranial Doppler (TCD)  
   ultrasonography, 24,  
   129, 316  
   aSAH monitoring with, 369  
   basic principles, 366  
   brain death  
   confirmation, 370  
   cerebrovascular  
   autoregulation, 366–368  
   interpretation and pitfalls,  
   368–369  
   intraoperative monitoring  
   with, 369  
   TBI monitoring with, 369  
   technique, 366  
 transnasal transsphenoidal  
   approach, 93f  
 transsphenoidal approach,  
   92–93  
 transtentorial herniation, 35

## Index

- traumatic brain injury  
 surgery for, 77
- traumatic brain injury (TBI), 215  
 case study, 395–397  
 causes of, 247  
 cerebral edema, 248  
 clinical features of, 247  
 diagnosis, 216  
 economic burden of, 247  
 epidemiology, 216, 247  
 indications for surgical management of, 222  
 inflicted. *see* inflicted traumatic brain injury (iTBI)  
 microdialysis applications in, 346–347  
 pathophysiology, 217  
 patterns of injury, 216  
 physiology, 217  
 predictors of poor outcome after, 216  
 during pregnancy, 375  
 severity, 247  
 therapies for refractory intracranial hypertension. *see* refractory intracranial hypertension, therapies for  
 transcranial Doppler monitoring, 369
- traumatic brain injury (TBI), anesthetic technique for, 220  
 cerebral hemodynamics, 222  
 glucose, 221  
 intravenous access, 221  
 intravenous agents, 220  
 intravenous fluids, 221  
 monitoring, 221–222  
 muscle relaxants, 221  
 volatile agents, 221
- traumatic brain injury (TBI), clinical management of  
 airway management, 220  
 cervical spine immobilization, 219–220  
 guidelines for, 219t
- initial assessment, 219
- traumatic brain injury (TBI), intensive care management of, 248  
 brain tissue oxygenation, 248  
 cerebral microdialysis, 250  
 general issues relating to, 254  
 ICP monitoring, 248, 250t  
 initial measures, 248, 249t  
 intracranial pressure, therapies for controlling, 250–252
- traumatic brain injury (TBI), systemic non-trauma effects of  
 cardiovascular effects, 253  
 metabolic effects, 253–254  
 respiratory effects, 253
- trigeminal neuralgia, 126
- “Triple-H” therapy, 259
- tumour surgery preoperative assessment, 76–77
- Uniform Determination of Death Act and brain death, 313–314
- unilateral frontotemporal approaches, 89–90  
 semilateral position, 102f  
 supine position, 102f
- unstable injuries, 181
- urapidil, 71
- urinary catheterization, 174
- urinary retention, 229
- vagal hypersensitivity, 235
- valsalva manoeuvre, 163
- vascular access  
 catheters and, 169  
 paediatric neurosurgical patient, 208–209  
 traumatized child, 221
- vasoactive mediators, 23
- vasodilation, 22
- vasoparalysis, 63
- vasopressin, 7f
- vasopressor agents, 242, 377–378
- vasospasm, 259
- venous air embolism (VAE), 209, 210
- incidence in posterior fossa surgery, 128  
 monitoring, 129  
 pathophysiology of, 128  
 PFO and, 129  
 preoperative considerations, 129–130  
 prevention of, 129–130  
 risk factors, 128  
 treatment, 130
- venous circulation, 196
- venous congestion, 100
- venous flow congestion, 100
- venous system, 14–15  
 basal ganglia, 14  
 clinical implications, 17f, 17t  
 sinus network and, 14  
 venous anastomoses, 14
- ventilation management, 170, 377  
 adult TBI patient, 396  
 cerebral venous sinus thrombosis, 277  
 controlled, 241  
 secondary brain injury, 240  
 subarachnoid hemorrhage, 258
- ventilation-perfusion (VQ) mismatch, 241
- ventriculitis, 270–271
- ventriculo-pleural shunts, 137
- vertebral column, 181
- videolaryngoscopy, 182
- visual evoked potentials, 351
- visual loss, 175
- volatile anaesthetics, 50, 143, 176  
 desflurane, 65  
 effects on CBF, CMRO<sub>2</sub>, and ICP, 66t  
 isoflurane, 65  
 nitrous oxide, 64–65  
 pediatric TBI and, 221  
 sevoflurane, 65  
 xenon, 65
- volume status of subarachnoid hemorrhage, 257
- xenon, 65