Index

Note: Page numbers set **bold** or *italic* indicate headings or figures, respectively.

A

ACA, *see* Anterior cerebral artery (ACA)
AICA, *see* Anteroinferior cerebellar artery (AICA)
Alcohol, facial venous malformation with injection of **243**
– background **243**
– clinical presentation **243**
– diagnosis **243**
– invasive imaging workup **244**
– noninvasive imaging workup **244**
–– computed tomography **244**
–– magnetic resonance imaging **244**
–– physical examination **244**
– possible complications **244**
– published literature on treatment options **245**
– radiologic studies **243**
–– magnetic resonance angiography **243**
–– magnetic resonance imaging **243**
– treatment **243**
–– description **243**
–– equipment **243**
– treatment options **244**
–– percutaneous sclerotherapy **244**
–– surgical treatment **244**
Aneurysm coiling
– periprocedural rupture **53**
–– background **54**
–– clinical presentation **53**
–– diagnosis **53**
–– differential diagnosis **55**
–– digital subtraction angiography (DSA) *53*
–– invasive imaging workup **55**
–– noninvasive imaging workup **55**
–– possible complications **56**
–– published literature on treatment options **56**
–– radiologic studies **53**
–– treatment **53**
–– treatment options **55**
– periprocedural thrombus **57**
–– background **58**
–– clinical presentation **57**
–– diagnosis **57**
–– differential diagnosis **59**
–– digital subtraction angiography (DSA *58*
–– invasive imaging workup **59**
–– noninvasive imaging workup **59**
–– possible complications **60**
–– published literature on treatment options **60**
–– radiologic studies **57**
–– treatment **57**
–– treatment options **59**
– proximal mechanically induced vasospasm **49**
–– background **51**
–– clinical presentation **49**
–– conservative or medical management **51**
–– description **49**
–– diagnosis **49**
–– differential diagnosis **51**
–– digital subtraction angiography *49*
–– endovascular treatment **51**
–– equipment **49**
–– internal carotid artery (ICA) angiogram *50*
–– invasive imaging workup **51**
–– possible complications **51**
–– published literature on treatment options **51**
–– radiologic studies **49**
–– treatment **49**
–– treatment options **51**
Arterial embolization of symptomatic brain arteriovenous malformation **119**
– background **120**
– clinical presentation **119**
– diagnosis **119**
– invasive imaging **121**
– possible complications **122**
– published literature on treatment options **122**
– radiologic studies **119**
–– digital subtraction angiography **119**
–– magnetic resonance imaging *119*
– treatment **119**
–– description **119**
–– equipment **119**
– treatment options **122**
–– conservative or medical treatment **122**
–– endovascular treatment **122**
–– radiosurgery (gamma knife) **122**
–– surgical treatment **122**
– "pressure cooker" technique *121*
Arterial embolization of unruptured pial arteriovenous malformation **109**
– background **110**
– clinical presentation **109**
– diagnosis **109**
– differential diagnoses **111**
– invasive imaging workup **111**
– noninvasive imaging workup **110**
–– computed tomography **111**
–– computed tomography angiography **111**
–– magnetic resonance **111**
–– magnetic resonance angiography **111**
–– physical examination **110**
– possible complications **111**
– radiologic studies **109**
–– computed tomography and magnetic resonance imaging **109**
–– digital subtraction angiography **109**, *110*
– treatment **109**
–– description **109**
–– equipment **109**
– treatment options **111**
–– conservative treatment **111**
–– endovascular treatment **111**
–– radiosurgery **111**
–– surgical treatment **111**
Arteriovenous malformation (AVM), acutely ruptured **140**
– background **140**
– clinical presentation **140**
– diagnosis **140**
– differential diagnosis **142**
– invasive imaging workup **142**
– noninvasive imaging workup **142**
–– CT/CTA and MR/MRA **142**
–– physical examination **142**
– possible complications **143**
– published literature on treatment options **143**
– radiologic studies **140**
–– computed tomography **140**
–– computed tomography angiography **140**
–– digital subtraction angiography **140**, *141*
– treatment **140**
–– description **140**
–– equipment **140**
– treatment options **142**
–– conservative or medical management **142**
–– endovascular treatment **142**
–– radiosurgery **142**
–– surgical treatment **142**
Arteriovenous malformations, staged embolization and hybrid approaches for **127**
– background **128**
– clinical presentation **127**
– diagnosis **127**
– invasive imaging workup **129**
– noninvasive imaging workup **128**
– radiologic studies **127**
–– digital subtraction angiography **127**
–– magnetic resonance imaging **127**
– treatment **127**
–– description **127**
–– equipment **127**
– treatment options **129**
–– embolization **129**
–– medical management **129**
–– microsurgery **129**
–– multimodal treatment **129**
–– stereotactic radiosurgery **129**
Artery aneurysm **28**
– clinical presentation **28**
– diagnosis **28**
– radiologic studies **28**
– treatment **28**
ARUBA trial, *see* A Randomized trial of Unruptured Brain Aneurysms (ARUBA) trial
ASA, *see* Acetylsalicylic acid (ASA), Anterior spinal artery (ASA)
AVF, *see* Arteriovenous fistula (AVF)
AVM, *see* Arteriovenous malformation (AVM)

B

Balloon embolization of traumatic carotid-cavernous fistula **289**
– background **290**
– clinical presentation **289**
– diagnosis **289**
– invasive imaging workup **291**
– noninvasive imaging workup **291**
–– computed tomography **291**
–– computed tomography angiography **291**
–– magnetic resonance angiography **291**
–– magnetic resonance imaging **291**
–– physical examination **291**
– possible complications **291**
– published literature on treatment options **292**
– radiologic studies **289**
–– computed tomography **289**
–– digital subtraction angiography **289**, *290*
– treatment **289**
–– description **289**
–– equipment **289**
– treatment options **291**
–– endovascular treatment **291**
–– surgical treatment **291**
Balloon occlusion test of traumatic internal carotid artery aneurysm **300**
– background **301**
– clinical presentation **300**
– diagnosis **300**
– invasive imaging workup **302**
– noninvasive imaging workup **302**
–– computed tomography **302**
–– computed tomography angiography **302**
–– magnetic resonance angiography **302**
–– magnetic resonance imaging **302**
– possible complications **302**
– published literature on treatment options **303**
– radiologic studies **300**
–– computed tomography **300**
–– digital subtraction angiography **300**, *301*
– treatment **300**
–– description **300**
–– equipment **300**
– treatment options **302**
–– endovascular treatment **302**
–– surgical treatment **302**
Balloon venous sinus protection during dural arteriovenous fistula treatment **184**
– clinical presentation **184**
– decision to treat **187**
– diagnosis **185**
– potential complications **188**
– radiologic studies **184**
–– digital subtraction angiography *184*
–– magnetic resonance angiography **184**
– treatment **185**
–– description **185**
–– equipment **185**
– treatment options **187**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– treatment outcomes **188**
Balloon-assisted embolization of ruptured wide-necked anterior communicating artery aneurysm **24**
– background **24**
– clinical presentation **24**
– diagnosis **24**
– noninvasive imaging workup **25**
–– computed tomography angiography *25*
–– digital subtraction angiography *25*
– published literature on treatment options **26**
– radiologic studies **24**
–– computed tomography **24**
–– computed tomography angiography **24**
– treatment **24**
–– description **24**
–– equipment **24**
– treatment options **26**
–– endovascular treatment **26**
–– possible complications **26**
–– surgical treatment **26**
Balloon-assisted kyphoplasty in osteoporotic vertebral compression fracture **421**
– background **424**
– clinical presentation **421**
– diagnosis **421**
– differential diagnosis **425**
– noninvasive imaging workup **425**
–– computed tomography **425**
–– magnetic resonance imaging **425**
–– physical examination **425**
–– radiography **425**
– possible complications **425**
– published literature on treatment options **425**
– radiologic studies **421**
–– dual-energy X-ray absorption **421**
–– magnetic resonance imaging **421**
–– nuclear medicine **421**
–– plain film **421**
– treatment **421**
–– description **421**
–– equipment **421**
– treatment options **425**
Balloon-mounted intracranial stenting of a high-grade vertebral artery stenosis **342**
– background **343**
– clinical presentation **342**
– diagnosis **342**
– digital subtraction angiography (DSA) *343*, *345*
– invasive imaging workup **344**
– noninvasive imaging workup **344**
–– computed tomography angiography **344**
–– magnetic resonance imaging **344**
–– physical examination **344**
– possible complications **345**
– published literature on treatment options **345**
– radiologic studies **342**
– treatment **343**
–– description **343**
–– equipment **343**
– treatment options **344**
–– endovascular treatment **344**
–– surgical treatment **344**
Balloon-mounted intracranial stenting of high-grade vertebral artery stenosis **347**
– background **347**
– clinical presentation **347**
– diagnosis **347**
– differential diagnosis **348**
– invasive imaging workup **348**
– noninvasive imaging workup **348**
–– imaging findings **348**
–– physical examination **348**
– possible complications **349**
– published literature on treatment options **349**
– radiologic studies **347**
–– computed tomography **347**
–– computed tomography angiography (CTA *347*
–– magnetic resonance imaging **347**
– treatment **347**
–– description **347**
–– equipment **347**
– treatment options **348**
–– conservative or medical management **348**
–– endovascular treatment **348**
–– surgical treatment **348**
Bleomycin, facial venous vascular malformation with injection of **240**
– background **240**
– clinical presentation **240**
– diagnosis **240**
– invasive imaging workup **241**
– noninvasive imaging workup **241**
–– computed tomography **241**
–– computed tomography angiography **241**
–– magnetic resonance angiography **241**
–– magnetic resonance imaging **241**
–– physical examination **241**
– possible complications **241**
– published literature on treatment options **241**
– radiologic studies **240**
–– magnetic resonance imaging **240**
– treatment **240**
–– description **240**
–– equipment **240**
– treatment options **241**
–– percutaneous sclerotherapy **241**
–– surgical treatment **241**
BOLD effect, *see* Blood-oxygenation-level-dependent (BOLD) effect
Braided stent shouldering technique **37**
– clinical presentation **37**
– diagnosis **37**
– effect of aneurysm and vessel characteristics on complete occlusion **38**
– intrasaccular flow disruption, era of **39**
– radiologic studies **37**
–– digital subtraction angiography *37*
– references **39**
– treatment **37**
–– equipment **37**

C

CARAT study, *see* Cerebral Aneurysm Rerupture After Treatment (CARAT) study
Carotid artery blowout **297**
– background **298**
– clinical presentation **297**
– diagnosis **297**
– differential diagnosis **298**
– invasive imaging workup **298**
– noninvasive imaging workup **298**
–– clinical and imaging findings **298**
– possible complications **299**
– published literature on treatment options **299**
– radiologic studies **297**
–– digital subtraction angiography *297*
– treatment **297**
–– description **297**
–– equipment **297**
– treatment options **298**
–– conservative or medical management **298**
–– endovascular treatment **299**
–– surgical treatment **298**
Carotid body tumor, preoperative embolization of **258**
– background **260**
– clinical presentation **258**
– diagnosis **258**
– differential diagnosis **261**
– invasive imaging workup **261**
– noninvasive imaging workup **260**
–– clinical findings **260**
–– imaging findings **260**
– possible complications **262**
– published literature on treatment options **262**
– radiologic studies **258**
–– digital subtraction angiography (DSA) *259–260*
–– magnetic resonance imaging *258*
– treatment **258**
–– description **259**
–– equipment **258**
– treatment options **261**
–– endovascular treatment **261**
–– surgical treatment **261**
Carotid-cavernous fistula
– direct superior ophthalmic vein puncture for treatment of **203**
–– background **206**
–– clinical presentation **203**
–– diagnosis **203**
–– equipment **203**
–– imaging workup and investigations **203**
–– outcome **204**
–– postprocedural care **204**
–– technique **204**
–– treatment **203**
– endovascular coil and Onyx treatment of **195**
–– background **198**
–– clinical presentation **195**
–– computed tomography **199**
–– computed tomography angiography **199**
–– conservative or medical management **199**
–– description **197**
–– diagnosis **195**
–– digital subtraction angiography **195**
–– endovascular treatment **200**
–– equipment **197**
–– invasive imaging workup **199**
–– magnetic resonance angiography **195**, **199**
–– magnetic resonance imaging **199**
–– noninvasive imaging workup **199**
–– physical examination **199**
–– possible complications **201**
–– radiologic studies **195**
–– radiosurgery treatment **200**
–– surgical treatment **200**
–– treatment **195**
–– treatment options **199**
CAS, *see* Carotid angioplasty and stenting (CAS)
Cavernous sinus dural arteriovenous fistula, transvenous embolization of **219**
– background **220**
– clinical presentation **219**
– diagnosis **219**
– differential diagnosis **221**
– invasive imaging workup **221**
– noninvasive imaging workup **221**
–– computed tomography **221**
–– computed tomography angiography **221**
–– magnetic resonance angiography **221**
–– magnetic resonance imaging **221**
–– physical examination **221**
– possible complications **222**
– published literature on treatment options **222**
– radiologic studies **219**
–– digital subtraction angiography **219**
–– magnetic resonance angiography **219**
–– magnetic resonance imaging **219**
– treatment **220**
–– description **220**
–– equipment **220**
– treatment options **221**
–– conservative or medical management **221**
–– endovascular treatment **221**
–– surgical treatment **221**
CBF, *see* Cerebral blood flow (CBF)
CBV, *see* Cerebral blood volume (CBV)
CCA, *see* Common carotid artery (CCA)
CCB, *see* Calcium channel blocker (CCB)
CCFs, *see* Carotid cavernous fistulas (CCFs)
Cerebral venous sinus thrombosis, direct thrombolysis of **350**
– background **351**
– clinical presentation **350**
– diagnosis **351**
– invasive imaging workup **352**
– noninvasive imaging workup **352**
–– computed tomography **352**
–– computed tomography venography **352**
–– magnetic resonance imaging **352**
–– magnetic resonance venography **352**
– possible complications **352**
– published literature on treatment options **352**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– radiologic studies **350**
–– computed tomography **350**
–– digital subtraction angiography *351*
–– magnetic resonance imaging **350**
–– magnetic resonance venography **350**
– treatment **351**
–– description **351**
–– equipment **351**
– treatment options **352**
–– conservative or medical management **352**
–– endovascular treatment **352**
–– surgical treatment **352**
Cerebrospinal fluid leak, directed blood patching for **442**
– background **442**
– case presentation **442**
– diagnosis **442**
– differential diagnosis **443**
– noninvasive and invasive imaging workup **443**
– possible complications **445**
– published literature on treatment options **445**
– radiologic studies **442**
–– brain magnetic resonance imaging **442**
–– computed tomography myelogram **442**
–– spine magnetic resonance imaging **442**
– treatment **442**
–– description **442**
–– equipment **442**
–– medications **442**
– treatment options **445**
–– conservative management **445**
–– percutaneous approaches **445**
–– surgical treatment **445**
Choroidal fistulous arteriovenous malformation, partial embolization of **150**
– background **151**
– clinical presentation **150**
– diagnosis **150**
– invasive imaging workup **151**
– noninvasive imaging workup **151**
–– computed tomography/magnetic resonance **151**
– possible complications **152**
– published literature on treatment options **153**
– radiologic studies **150**
–– digital subtraction angiography **150**, *151*
–– magnetic resonance imaging **150**
– treatment **150**
–– description **151**
–– equipment **150**
– treatment options **152**
–– endovascular treatment **152**
–– radiosurgery **152**
–– surgical treatment **152**
Chronic subdural hematoma, middle meningeal embolization for **282**
– background **283**
– clinical presentation **282**
– diagnosis **282**
– noninvasive imaging workup **283**
–– computed tomography **283**
–– magnetic resonance imaging **283**
– published literature on endovascular treatment **284**
– radiologic studies **282**
–– computed tomography **282**
–– magnetic resonance imaging **282**
–– middle meningeal artery (MMA) *283*
– treatment **282**
–– description **282**
–– equipment **282**
– treatment options **284**
–– conservative management **284**
–– endovascular treatment **284**
–– possible complications **284**
–– surgical treatment **284**
CM-AVM, *see* Capillary malformation arteriovenous malformation (CM-AVM)
Condylar confluence dural arteriovenous fistula, transvenous embolization of **215**
– background **215**
– clinical presentation **215**
– diagnosis **215**
– differential diagnosis **217**
– invasive imaging workup **217**
– noninvasive imaging workup **217**
–– computed tomography **217**
–– computed tomography angiography **217**
–– magnetic resonance angiography **217**
–– magnetic resonance imaging **217**
–– physical examination **217**
– possible complications **217**
– published literature on treatment options **217**
– radiologic studies **215**
–– digital subtraction angiography **215**
–– magnetic resonance angiography **215**
–– magnetic resonance imaging **215**
– treatment **215**
–– description **215**
–– equipment **215**
– treatment options **217**
–– conservative or medical management **217**
–– endovascular treatment **217**
–– surgical treatment **217**
COTT, *see* Carotid balloon occlusion tolerance test (COTT)
CSDHs, *see* Chronic subdural hematomas (CSDHs)
CSF analysis, *see* Cerebrospinal fluid (CSF) analysis
CSF circulation, *see* Cerebrospinal fluid (CSF) circulation

D

DAPT, *see* Dual antiplatelet therapy (DAPT)
DAVF, *see* Dural arteriovenous fistula (DAVF)
DEXA, *see* Dual-energy X-ray absorptiometry (DEXA)
Direct superior ophthalmic vein puncture for treatment of carotid-cavernous fistula **203**
– background **206**
– clinical presentation **203**
– diagnosis **203**
– digital subtraction angiography (DSA) *204*
– imaging workup and investigations **203**
– treatment **203**
–– equipment **203**
–– outcome **204**
–– postprocedural care **204**
–– technique **204**
Directed blood patching for cerebrospinal fluid leak **442**
– background **442**
– case presentation **442**
– diagnosis **442**
– differential diagnosis **443**
– noninvasive and invasive imaging workup **443**
– possible complications **445**
– published literature on treatment options **445**
– radiologic studies **442**
–– brain magnetic resonance imaging **442**
–– computed tomography *444*
–– computed tomography myelogram **442**
–– spine magnetic resonance imaging **442**
– treatment **442**
–– description **442**
–– equipment **442**
–– medications **442**
– treatment options **445**
–– conservative management **445**
–– percutaneous approaches **445**
–– surgical treatment **445**
Dissecting distal anterior inferior cerebellar artery aneurysm, embolizations of **85**
– background **86**
– clinical presentation **85**
– diagnosis **85**
– differential diagnosis **87**
– internal carotid artery (ICA) angiogram *88*
– invasive imaging workup **86**
– noninvasive imaging workup **86**
–– computed tomography **86**
–– computed tomography angiography **86**
–– magnetic resonance angiography **86**
–– magnetic resonance imaging **86**
–– physical examination **86**
– possible complications **87**
– published literature on treatment options **87**
– radiologic studies **85**
–– digital subtraction angiography *85*, *86*
– treatment **85**
–– description **85**
–– equipment **85**
– treatment options **87**
–– conservative or medical management **87**
–– endovascular treatment **87**
–– surgical treatment **87**
Dissecting vertebral artery aneurysm, embolization of **72**
– background **73**
– clinical presentation **72**
– diagnosis **72**
– invasive imaging workup **74**
– noninvasive imaging workup **73**
–– computed tomography **73**
–– computed tomography angiography **73**
–– magnetic resonance **73**
–– magnetic resonance angiography **73**
– possible complications **74**
– published literature on treatment options **74**
– radiologic studies **72**
–– computed tomography/computed tomography angiography **72**
–– digital subtraction angiography **72**, *73*
– treatment **72**
–– description **72**
–– equipment **72**
– treatment options **74**
–– conservative or medical management **74**
–– endovascular treatment **74**
–– surgical treatment **74**
Distal radial artery (dRA) *104*
dRA, *see* Distal radial artery (dRA)
DSM, *see* Dural sinus malformation (DSM)
Dural arteriovenous fistula (DAVF) 211–214
– balloon venous sinus protection during treatment of **184**
–– clinical presentation **184**
–– decision to treat **187**
–– description **185**
–– diagnosis **185**
–– digital subtraction angiography **184**
–– equipment **185**
–– magnetic resonance angiography **184**
–– potential complications **188**
–– radiologic studies **184**
–– treatment **185**
–– treatment options **187**
–– treatment outcomes **188**
– lateral epidural type of **161**
–– background **162**
–– clinical presentation **161**
–– computed tomography **161–162**
–– computed tomography angiography **162**
–– description **162**
–– diagnosis **161**
–– differential diagnosis **163**
–– digital subtraction angiography *161*
–– endovascular treatment **163**
–– equipment **162**
–– invasive imaging workup **163**
–– magnetic resonance angiography **162**
–– magnetic resonance imaging **162**
–– noninvasive imaging workup **162**
–– physical examination **162**
–– possible complications **163**
–– published literature on treatment options **163**
–– radiologic studies **161**
–– surgical treatment **163**
–– treatment **162**
–– treatment options **163**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– reversal of dementia symptoms with **175**
–– background **177**
–– clinical presentation **175**
–– description **176**
–– diagnosis **175**
–– equipment **176**
–– imaging workup **177**
–– nonradiologic studies **175**
–– radiologic studies **175**
–– reversible dementia **177**
–– treatment **176**
–– treatment options **178**
– transvenous retrograde pressure cooker embolization of **190**
–– clinical presentation **190**
–– complications of transvenous embolization **193**
–– contraindications to the transarterial approach in this case **193**
–– description **191**
–– diagnosis **190**
–– digital subtraction angiography **190**
–– equipment **190**
–– flow reversal techniques **192**
–– magnetic resonance angiography **190**
–– microsurgical disconnection **193**
–– radiologic studies **190**
–– time-of-flight magnetic resonance angiogram (TOF-MRA) *190*
–– treatment **190**
–– treatment outcomes **193**
Dural sinus malformation, transarterial embolization of **370**
– background **372**
– clinical presentation **370**
– diagnosis **370**
– invasive imaging workup **373**
– noninvasive imaging workup **372**
–– computed tomography **372**
–– magnetic resonance imaging **372**
– possible complications **373**
– published literature on treatment options **373**
– radiologic studies **370**
–– digital subtraction angiography **370**
–– digital subtraction angiography (DSA) *371*
–– magnetic resonance imaging **370**
– treatment **370**
–– description **370**
–– equipment **370**
– treatment options **373**
–– endovascular treatment **373**
–– surgical treatment **373**

E

EBRT, *see* External beam radiotherapy (EBRT)
ECA, *see* External carotid artery (ECA)
Endoluminal flow diversion
– for giant "blowout" aneurysm **45**
–– background **46**
–– clinical presentation **45**
–– computed tomography **45**, **47**
–– computed tomography angiography **45**, **47**
–– description **45**
–– diagnosis **45**
–– endovascular treatment **47**
–– equipment **45**
–– invasive imaging workup **47**
–– magnetic resonance imaging **45**
–– noninvasive imaging workup **47**
–– physical examination **47**
–– possible complications **47**
–– published literature on treatment options **48**
–– radiologic studies **45**
–– surgical treatment **47**
–– treatment **45**
–– treatment options **47**
– for pediatric intracranial aneurysm **375**
–– background **376**
–– cerebral digital subtraction angiography **375**
–– clinical presentation **375**
–– computed tomography angiography **377**
–– conservative management **377**
–– description **375**
–– diagnosis **375**
–– digital subtraction angiography **377**
–– endovascular treatment **378**
–– equipment **375**
–– invasive imaging workup **377**
–– magnetic resonance angiography **377**
–– noninvasive imaging workup **377**
–– possible complications **378**
–– published literature on endovascular treatment **378**
–– radiologic studies **375**
–– surgical treatment **377**
–– treatment **375**
–– treatment options **377**
– for ruptured blister aneurysm **81**
–– background **82**
–– clinical presentation **81**
–– computed tomography **83**
–– computed tomography angiography **81**, **83**
–– conservative or medical management **83**
–– description **81**
–– diagnosis **81**
–– digital subtraction angiography **81**
–– endovascular treatment **83**
–– equipment **81**
–– invasive imaging workup **83**
–– noncontrast computed tomography **81**
–– noninvasive imaging workup **83**
–– physical examination **83**
–– radiologic studies **81**
–– surgical treatment **83**
–– treatment **81**
–– treatment options **83**
– for sidewall aneurysm **41**
–– clinical presentation **41**
–– diagnosis **41**
–– invasive imaging workup **44**
–– noninvasive imaging workup **43**
–– radiologic studies **41**
–– treatment **41**
–– treatment options **44**
– transradial access for **102**
–– background **103**
–– clinical presentation **102**
–– computed tomography **102**
–– computed tomography angiography **102**–**103**
–– conservative management **105**
–– description **102**
–– diagnosis **102**
–– digital subtraction angiography **102**
–– endovascular treatment **105**
–– equipment **102**
–– noninvasive imaging workup **103**
–– possible complications **105**
–– published literature on treatment options **106**
–– radiologic studies **102**
–– suricial treatment **105**
–– treatment **102**
–– treatment options **105**
–– ultrasound/digital subtraction angiography **103**
–– vaso-computed tomography (vaso-CT) *105*
Endovascular coil and Onyx treatment of carotid-cavernous fistula **195**
– background **198**
– clinical presentation **195**
– diagnosis **195**
– invasive imaging workup **199**
– noninvasive imaging workup **199**
–– computed tomography **199**
–– computed tomography angiography **199**
–– magnetic resonance angiography **199**
–– magnetic resonance imaging **199**
–– physical examination **199**
– possible complications **201**
– radiologic studies **195**
–– digital subtraction angiography **195**
–– magnetic resonance angiography **195**
– treatment **195**
–– description **197**
–– equipment **197**
– treatment options **199**
–– conservative or medical management **199**
–– endovascular treatment **200**
–– radiosurgery treatment **200**
–– surgical treatment **200**
Epistaxis, transarterial particle embolization for **308**
– background **308**
– clinical presentation **308**
– diagnosis **308**
– invasive imaging workup **309**
– noninvasive imaging workup **308**
–– computed tomography **309**
–– computed tomography angiography **309**
–– magnetic resonance angiography **309**
–– magnetic resonance imaging **309**
–– physical examination **308**
– possible complications **310**
– published literature on treatment options **310**
– radiologic studies **308**
–– digital subtraction angiography **308**, *309*, *311*
– treatment **308**
–– description **308**
–– equipment **308**
– treatment options **309**
–– conservative and medical management **309**
–– endovascular treatment **310**
–– surgical treatment **309**
Ethmoidal dural arteriovenous fistula, arterial embolization of **164**
– background **165**
– clinical presentation **164**
– diagnosis **164**
– differential diagnosis **166**
– invasive imaging workup **166**
– noninvasive imaging workup **165**
–– computed tomography **165**
–– computed tomography angiography **166**
–– magnetic resonance angiography **166**
–– magnetic resonance imaging **165**
– possible complications **166**
– published literature on treatment options **166**
– radiologic studies **164**
–– computed tomography *164*
–– digital subtraction angiography **164**, *165*
–– magnetic resonance imaging *164*
– treatment **164**
–– description **164**
–– equipment **164**
– treatment options **166**
–– endovascular treatment **166**
–– surgical treatment **166**
EVOH, *see* Ethylene vinyl alcohol copolymer (EVOH)
External beam radiotherapy (EBRT) **383**

F

Facial arteriovenous fistula, transarterial Onyx embolization of **236**
– background **237**
– clinical presentation **236**
– diagnosis **236**
– noninvasive and invasive imaging workup **238**
–– computed tomography **238**
–– computed tomography angiography **238**
–– digital subtraction angiography **238**
–– magnetic resonance angiography **238**
–– magnetic resonance imaging **238**
– possible complications **238**
– published literature on treatment options **238**
– radiologic studies **236**
–– computed tomography **236**
–– computed tomography angiography **236**
–– digital subtraction angiography **236**
– treatment **237**
–– description **237**
–– equipment **237**
– treatment options **238**
–– endovascular treatment **238**
–– surgical treatment **238**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

Facial hemangioma, transarterial particle embolization of **246**
– background **247**
– clinical presentation **246**
– diagnosis **246**
– invasive imaging workup **247**
– noninvasive imaging workup **247**
–– computed tomography **247**
–– computed tomography angiography **247**
–– history and physical examination **247**
–– magnetic resonance angiography **247**
–– magnetic resonance imaging **247**
–– ultrasound with Doppler imaging **247**
– possible complications **248**
– published literature on treatment options **248**
– radiologic studies **246**
–– digital subtraction angiography *246*
–– magnetic resonance angiography **246**
–– magnetic resonance imaging *246*
– treatment **246**
–– description **246**
–– equipment **246**
– treatment options **247**
–– endovascular treatment **248**
–– laser treatment **247**
–– pharmacologic treatment **247**
–– surgical treatment **247**
Facial venous malformation with injection of alcohol **243**
– background **243**
– clinical presentation **243**
– diagnosis **243**
– invasive imaging workup **244**
– noninvasive imaging workup **244**
–– computed tomography **244**
–– magnetic resonance imaging **244**
–– physical examination **244**
– possible complications **244**
– published literature on treatment options **245**
– radiologic studies **243**
–– magnetic resonance angiography **243**
–– magnetic resonance imaging *243*
– treatment **243**
–– description **243**
–– equipment **243**
– treatment options **244**
–– percutaneous sclerotherapy **244**
–– surgical treatment **244**
Facial venous vascular malformation with injection of bleomycin **240**
– background **240**
– clinical presentation **240**
– diagnosis **240**
– invasive imaging workup **241**
– noninvasive imaging workup **241**
–– computed tomography **241**
–– computed tomography angiography **241**
–– magnetic resonance angiography **241**
–– magnetic resonance imaging **241**
–– physical examination **241**
– phlebography *241*
– possible complications **241**
– published literature on treatment options **241**
– radiologic studies **240**
–– magnetic resonance imaging *240*
– treatment **240**
–– description **240**
–– equipment **240**
– treatment options **241**
–– percutaneous sclerotherapy **241**
–– surgical treatment **241**
Falcotentorial dural arteriovenous fistula, pressure cooker technique for **180**
– background **182**
– clinical presentation **180**
– possible complications **183**
– radiologic studies **180**
–– digital subtraction angiography **180**
–– magnetic resonance imaging/magnetic resonance angiography **180**
– treatment **180**
–– description **180**
–– equipment **180**
–– follow-up **181**
– treatment options **183**
–– endovascular treatment **183**
–– radiosurgery **183**
–– surgical treatment **183**
FDA, *see* Food and Drug Administration (FDA)
FLAIR, *see* Fluid-attenuated inversion recovery (FLAIR)
FLAIR imaging, *see* Fluid-attenuated inversion recovery (FLAIR) imaging
Fluid-attenuated inversion recovery (FLAIR) 211
Fluoroscopy-guided percutaneous vertebral biopsy **413**
– background **414**
– biopsy **413**
–– description **413**
–– equipment **413**
– clinical presentation **413**
– differential diagnosis **415**
– noninvasive imaging workup **414**
–– computed tomography **414**
–– laboratory results **414**
–– magnetic resonance imaging **414**
–– physical examination **414**
–– plain film **414**
– possible complications **415**
– procedure options **415**
–– percutaneous procedure **415**
–– surgical procedure **415**
– published literature on treatment options **415**
– radiologic studies **413**
–– computed tomography **413**
FREE trial, *see* Fracture Reduction Evaluation (FREE) trial

G

Galen aneurysmal malformation, transarterial embolization of a vein of **357**
– background **358**
– clinical presentation **357**
– diagnosis **357**
– invasive imaging workup **360**
– noninvasive imaging workup **359**
–– clinical examination **359**
–– computed tomography **359**
–– computed tomography angiography **359**
–– magnetic resonance angiography **359**
–– magnetic resonance imaging **359**
–– prenatal ultrasound **359**
– possible complications **360**
– published literature on treatment options **360**
– radiologic studies **357**
–– digital subtraction angiography **357**, *358*
–– magnetic resonance imaging **357**
– treatment **357**
–– description **357**
–– equipment **357**
– treatment options **360**
–– conservative or medical management **360**
–– endovascular treatment **360**
–– surgical treatment **360**
GETA, *see* General endotracheal anesthesia (GETA)
Giant "partially thrombosed" aneurysms, management of **67**
– background **68**
– clinical presentation **67**
– diagnosis **67**
– differential diagnosis **69**
– internal carotid artery (ICA) angiograms *68*
– invasive imaging workup **69**
– noninvasive imaging workup **69**
–– CT/CTA/MRI/MRA **69**
–– physical examination **69**
– possible complications **70**
– published literature on treatment options **70**
– radiologic studies **67**
–– computed tomography and magnetic resonance imaging **67**
–– digital subtraction angiography (DSA) **67**, *68*
– treatment **67**
–– description **68**
–– equipment **67**
– treatment options **69**
–– conservative or medical management **69**
–– endovascular treatment **69**
–– surgical treatment **69**

H

H-stenting *36*
HHT, *see* Hereditary hemorrhagic telangiectasia (HHT)
High-grade vertebral artery stenosis, balloon-mounted intracranial stenting of **347**
– background **347**
– clinical presentation **347**
– diagnosis **347**
– differential diagnosis **348**
– invasive imaging workup **348**
– noninvasive imaging workup **348**
–– imaging findings **348**
–– physical examination **348**
– possible complications **349**
– published literature on treatment options **349**
– radiologic studies **347**
–– computed tomography/magnetic resonance imaging **347**
– treatment **347**
–– description **347**
–– equipment **347**
– treatment options **348**
–– conservative or medical management **348**
–– endovascular treatment **348**
–– surgical treatment **348**
Hybrid Y-stenting with open- and closed-cell stent *32*
Hydrocephalus, management of **144**
– background **145**
– clinical presentation **144**
– diagnosis **144**
– differential diagnosis **146**
– invasive imaging workup **146**
– noninvasive imaging workup **145**
–– computed tomography/magnetic resonance imaging **145**
–– physical examination **145**
– possible complications **146**
– published literature on treatment options **146**
– radiologic studies **144**
–– computed tomography *144*
–– digital subtraction angiography **144**, *145*
–– magnetic resonance imaging *144*
– treatment **144**
–– description **144**
–– equipment **144**
– treatment options **146**
–– endovascular treatment **146**
–– radiosurgery **146**
–– surgical treatment **146**
Hypervascular vertebral body metastasis, preoperative embolization of **271**
– background **272**
– clinical presentation **271**
– diagnosis **271**
– differential diagnosis **272**
– invasive imaging workup **272**
– noninvasive imaging workup **272**
–– clinical findings **272**
–– imaging findings **272**
– possible complications **273**
– published literature on treatment options **273**
– radiologic studies **271**
–– computed tomography *271*
–– digital subtraction angiography (DSA) *272*
–– inferior petrosal sinus (IPS) *278*
–– magnetic resonance imaging **271**
– treatment **271**
–– description **271**
–– equipment **271**
– treatment options **273**
–– endovascular treatment **273**
–– surgical treatment **273**

I

ICA, *see* Internal carotid artery (ICA)
ICA injection, *see* Internal carotid artery (ICA) injection
Idiopathic intracranial hypertension, venous stenting for **274**
– background **275**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– clinical presentation **274**
– imaging workup **276**
– nonradiologic studies **274**
– radiologic studies **274**
– treatment **274**
–– description **274**
–– equipment **274**
–– postprocedure **275**
– treatment options **276**
IIRC groups, *see* International Intraocular Retinoblastoma Classification (IIRC) groups
IMS III trial, *see* Interventional Management of Stroke (IMS III) trial
Infectious distal middle cerebral artery aneurysm, embolization of **89**
– background **89**
– clinical presentation **89**
– diagnosis **89**
– invasive imaging workup **90**
– noninvasive imaging workup **90**
–– computed tomography **90**
–– computed tomography angiography **90**
–– magnetic resonance angiography **90**
–– magnetic resonance imaging **90**
–– physical examination **90**
– possible complications **91**
– published literature on treatment options **91**
– radiologic studies **89**
–– computed tomography *89*
–– digital subtraction angiography **89**
– treatment **89**
–– description **89**
–– equipment **89**
– treatment options **90**
–– conservative or medical management **90**
–– endovascular treatment **91**
–– surgical treatment **91**
Inferior petrosal sinus sampling technique and considerations **278**
– background **279**
– clinical presentation **278**
– complications **281**
– diagnosis **278**
– radiologic studies **278**
– references **281**
– technical pearls **279**
– test results and implications **281**
– treatment **278**
–– equipment **278**
–– results and outcome **279**
–– technique **278**
Internal carotid artery (ICA) injection 211
Intra-arterial recombinant tissue plasminogen activator thrombolysis **315**
– background **316**
– clinical presentation **315**
– diagnosis **315**
– differential diagnosis **317**
– invasive imaging workup **317**
– noninvasive imaging workup **317**
–– computed tomography **317**
–– magnetic resonance imaging **317**
–– physical examination **317**
– possible complications **318**
– published literature on treatment options **318**
– radiologic studies **315**
–– computed tomography **315**, *320*
–– digital subtraction angiography (DSA) *315–316*
– treatment **315**
–– description **315**
–– equipment **315**
– treatment options **317**
–– conservative or medical management **317**
–– endovascular treatment **317**
Intra-articular facet joint block **439**
– background **439**
– clinical presentation **439**
– diagnosis **439**
– differential diagnosis **440**
– invasive imaging workup **440**
– noninvasive imaging workup **439**
–– physical examination **439**
–– radiography/CT/MRI/nuclear medicine findings **440**
– possible complications **440**
– published literature on treatment options **440**
– radiologic studies **439**
–– computed tomography **439**
– treatment **439**
–– description **439**
–– equipment **439**
– treatment options **440**
–– conservative or medical management **440**
–– percutaneous approaches **440**
–– surgical treatment **440**
Intraprocedural aneurysm rupture approaches and considerations **92**
– background **93**
– clinical presentation and initial radiologic studies **92**
– procedure **92**
–– equipment **92**
–– outcome **93**
–– technique **92**
– technical pearls **93**
Intraprocedural coil migration and snare retrieval **99**
– background **100**
– clinical presentation **99**
– radiologic studies **99**
– treatment **99**
–– equipment **99**
Intraprocedural flow-diverting stent prolapse **95**
– background **95**
– clinical presentation **95**
–– initial course and radiologic studies **95**
– procedure **95**
–– equipment **95**
–– outcome **95**
–– technique **95**
– technical pearls **95**
Intrasaccular flow disruptor for ruptured middle cerebral artery aneurysm **19**
– background **20**
– clinical presentation **19**
– noninvasive imaging workup **20**
–– computed tomography angiography **20**
–– digital subtraction angiography **20**
– radiologic studies **19**
–– computed tomography *19*
–– computed tomography angiography *19*
– treatment **19**
–– description **19**
–– equipment **19**
–– follow-up **20**
– treatment options **21**
–– endovascular treatment **21**
–– possible complications **21**
–– surgical treatment **21**
– WEB **21**
IONM, *see* Intraoperative neuromonitoring (IONM)
IPR, *see* Intraprocedural aneurysm rupture (IPR)
ISAT, *see* International Subarachnoid Aneurysm Trial (ISAT)
Isolated sinus, transvenous embolization of **211**
– background **212**
– clinical presentation **211**
– diagnosis **212**
– invasive imaging workup **213**
– noninvasive imaging workup **213**
–– computed tomography **213**
–– computed tomography angiography **213**
–– magnetic resonance angiography **213**
–– magnetic resonance imaging **213**
– possible complications **214**
– published literature on treatment options **214**
– radiologic studies **211**
–– digital subtraction angiography **211**, *212*
–– magnetic resonance angiography *211*
–– magnetic resonance imaging *211*
– treatment **212**
–– description **212**
–– equipment **212**
– treatment options **213**
–– endovascular treatment **214**
–– surgical treatment **213**
ISUIA, *see* International Study on Unruptured Intracranial Aneurysms (ISUIA)

J

JR-NET, *see* Japanese Registry of Neuroendovascular Therapy (JR-NET)
Juvenile angiofibroma, preoperative transarterial particle embolization of **255**
– background **256**
– clinical presentation **255**
– diagnosis **255**
– invasive imaging workup **256**
– noninvasive imaging workup **256**
–– computed tomography **256**
–– computed tomography angiography **256**
–– magnetic resonance angiography **256**
–– magnetic resonance imaging **256**
– possible complications **257**
– published literature on treatment options **257**
– radiologic studies **255**
–– computed tomography **255**
–– digital subtraction angiography *255*
– treatment **255**
–– description **256**
–– equipment **255**
– treatment options **256**
–– endovascular treatment **256**
–– radiosurgery **256**
–– surgical treatment **256**

M

Mandibular arteriovenous fistula, transarterial glue embolization of **229**
– background **230**
– clinical presentation **229**
– diagnosis **229**
– invasive imaging workup **230**
– noninvasive imaging workup **230**
–– computed tomography **230**
–– computed tomography angiography **230**
–– magnetic resonance angiography **230**
–– magnetic resonance imaging **230**
– possible complications **231**
– published literature on treatment options **231**
– radiologic studies **229**
–– computed tomography/magnetic resonance imaging **229**
–– digital subtraction angiography **229**
– treatment **229**
–– description **229**
–– equipment **229**
– treatment options **230**
–– endovascular treatment **230**
–– surgical treatment **230**
MCA, *see* Middle cerebral artery (MCA)
Mechanical thrombectomy in acute stroke with retrievable stent **324**
– background **326**
– clinical presentation **324**
– diagnosis **325**
– noninvasive imaging workup **326**
–– computed tomography **326**
–– magnetic resonance imaging **326**
–– transcranial Doppler ultrasound **326**
– radiologic studies **324**
–– computed tomography **324**
–– digital subtraction angiography *324*, *326*
– treatment **325**
–– description **325**
–– equipment **325**
– treatment options **326**
–– endovascular treatment **326**
–– possible complications **326**
–– published literature on treatment options **326**
Meningioma, preoperative transarterial particle embolization of **251**
– background **252**
– clinical presentation **251**
– diagnosis **251**
– invasive imaging workup **252**
– noninvasive imaging workup **252**
–– computed tomography **252**
–– computed tomography angiography **252**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

–– magnetic resonance angiography **252**
–– magnetic resonance imaging **252**
– possible complications **253**
– published literature on treatment options **253**
– radiologic studies **251**
–– digital subtraction angiography *251*
–– magnetic resonance imaging *251*
– treatment **251**
–– description **252**
–– equipment **251**
– treatment options **252**
–– endovascular treatment **252**
–– radiosurgery **252**
–– surgical treatment **252**
MERCI device, *see* Mechanical Embolus Removal in Cerebral Ischemia (MERCI) device
Microshunt embolization into developmental venous anomaly **154**
– background **154**
– clinical presentation **154**
– diagnosis **154**
– differential diagnosis **156**
– invasive imaging workup **156**
– noninvasive imaging
–– CT/CTA and MRI/MRA **156**
–– physical examination **156**
– noninvasive imaging workup **156**
– published literature on treatment options **157**
– radiologic studies **154**
–– computed tomography and magnetic resonance **154**
–– digital subtraction angiography **154**, *155*
– treatment **154**
–– description **154**
–– equipment **154**
– treatment options **156**
–– conservative or medical management **156**
–– endovascular treatment **157**
–– possible complications **157**
–– radiosurgery **156**
–– surgical treatment **157**
MM, *see* Multiple myeloma (MM)
MMA, *see* Middle meningeal artery (MMA)
MTT, *see* Mean transit time (MTT)
Multiple aneurysms in patient with subarachnoid hemorrhage **11**
– background **11**
– clinical presentation **11**
– diagnosis **11**
– noninvasive imaging workup **12**
–– computed tomography/magnetic resonance imaging **12**
–– CTA/MRA or DSA **12**
– possible complications **12**
– published literature on treatment options **12**
– radiologic studies **11**
–– computed tomography *11*, *13*
–– digital subtraction angiography (DSA) **11**, *12*
– treatment **11**
–– description **11**
–– equipment **11**
– treatment options **12**
Multiple dural arteriovenous fistulas **223**
– background **225**
– clinical presentation **223**
– diagnosis **223**
– invasive imaging workup **225**
– noninvasive imaging workup **225**
–– computed tomography **225**
–– computed tomography angiography **225**
–– magnetic resonance angiography **225**
–– magnetic resonance imaging **225**
– possible complications **225**
– published literature on treatment options **225**
– radiologic studies **223**
–– digital subtraction angiography **223**
–– magnetic resonance imaging **223**
– treatment **223**
–– description **223**
–– equipment **223**
– treatment options **225**
–– endovascular treatment **225**
–– surgical treatment **225**
Multiple myeloma (MM), multilevel kyphoplasty in **427**
– background **429**
– clinical presentation **427**
– diagnosis **427**
– noninvasive imaging workup **429**
– possible complications **429**
– published literature on treatment options **429**
– radiologic studies **427**
– treatment **427**
–– description **428**
–– equipment **427**
– treatment options **429**
–– conservative or medical management **429**
–– percutaneous approaches **429**
–– surgical treatment **429**
Multiple myeloma (MM), radiofrequency kyphoplasty in **435**
– background **436**
– clinical presentation **435**
– diagnosis **435**
– noninvasive imaging workup **437**
–– computed tomography **437**
–– magnetic resonance imaging **437**
–– radiography **437**
– published literature on treatment options **437**
– radiologic studies **435**
–– computed tomography **435**
– treatment **435**
–– description **435**
–– equipment **435**
– treatment options **437**
–– conservative or medical management **437**
–– interventional management **437**
–– possible complications **437**
–– radiation therapy **437**
–– surgical treatment **437**

N

National Institutes of Health Stroke Scale (NIHSS) 322
NBCA, *see* N-butyl cyanoacrylate (NBCA)
NGPAVF, *see* Nongalenic pial arteriovenous fistulas (NGPAVF)
NIHSS, *see* National Institutes of Health Stroke Scale (NIHSS)

O

OCT, *see* Optical coherence tomography (OCT)
ONSF, *see* Optic nerve sheath fenestration (ONSF)
Onyx embolization of unruptured arteriovenous malformation **114**
– clinical presentation **114**
– diagnosis **114**
– radiologic studies **114**
–– computed tomography *114*
–– digital subtraction angiography (DSA) **114**
– treatment **114**
–– choice of embolic agent **116**
–– complications **116**
–– description **114**
–– equipment **114**
–– management **115**
–– other techniques **116**
–– transvenous embolization **116**
Osteoporotic vertebral compression fracture
– balloon-assisted kyphoplasty in **421**
–– background **424**
–– clinical presentation **421**
–– computed tomography **425**
–– description **421**
–– diagnosis **421**
–– differential diagnosis **425**
–– dual-energy X-ray absorption **421**
–– equipment **421**
–– magnetic resonance imaging **421**, **425**
–– noninvasive imaging workup **425**
–– nuclear medicine **421**
–– physical examination **425**
–– plain film **421**
–– possible complications **425**
–– published literature on treatment options **425**
–– radiography **425**
–– radiologic studies **421**
–– treatment **421**
–– treatment options **425**
– percutaneous vertebroplasty in **416**
–– background **418**
–– bone mineral densitometry **418**
–– clinical presentation **416**
–– computed tomography **418**
–– conservative or medical management **419**
–– description **416**
–– diagnosis **416**
–– differential diagnoses **419**
–– equipment **416**
–– magnetic resonance imaging **416**, **418**
–– noninvasive imaging workup **418**
–– nuclear medicine studies **419**
–– percutaneous treatment **419**
–– physical examination and laboratory analysis **418**
–– possible complications **419**
–– published literature on treatment options **419**
–– radiography **418**
–– radiologic studies **416**
–– surgical treatment **419**
–– treatment **416**
–– treatment options **419**
– radiofrequency kyphoplasty in **431**
–– background **433**
–– clinical presentation **431**
–– computed tomography **431**, **433**
–– conservative or medical management **433**
–– description **431**
–– diagnosis **431**
–– differential diagnosis **433**
–– equipment **431**
–– interventional management **433**
–– invasiveworkup **433**
–– magnetic resonance imaging **431**, **433**
–– noninvasive imaging workup **433**
–– physical examination **433**
–– possible complications **433**
–– published literature on treatment options **433**
–– radiography **433**
–– radiologic studies **431**
–– surgical treatment **433**
–– treatment **431**
–– treatment options **433**

P

PA fluoroscopy, *see* Posteroanterior (PA) fluoroscopy
Partial targeted embolization of unruptured pial arteriovenous malformation **131**
– background **132**
– clinical presentation **131**
– diagnosis **132**
– invasive imaging workup **133**
– noninvasive imaging workup **132**
–– perfusion imaging **133**
– possible complications **133**
– published literature on treatment options **134**
– radiologic studies **131**
–– computed tomography perfusion **131**
–– digital subtraction angiography *131*
–– magnetic resonance imaging **131**
– treatment **132**
–– description **132**
–– equipment **132**
– treatment options **133**
–– conservative or medical management **133**
–– endovascular treatment **133**
–– radiosurgery **133**
–– surgical treatment **133**
PCA, *see* Posterior cerebral artery (PCA)
Pediatric cerebral aneurysm, management of **367**
– background **367**
– clinical presentation **367**
– diagnosis **367**
– invasive imaging workup **368**
– noninvasive imaging workup **368**
–– computed tomography **368**
–– computed tomography angiography **368**
–– magnetic resonance angiography **368**
–– magnetic resonance imaging **368**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

–– physical examination **368**
– published literature on treatment options **368**
– radiologic studies **367**
–– computed tomography **367**
–– digital subtraction angiography **367**
– treatment **367**
–– description **367**
–– equipment **367**
– treatment options **368**
Pediatric intracranial aneurysm, endoluminal flow diversion for **375**
– background **376**
– clinical presentation **375**
– diagnosis **375**
– invasive imaging workup **377**
–– digital subtraction angiography **377**
– noninvasive imaging workup **377**
–– computed tomography angiography **377**
–– magnetic resonance angiography **377**
– published literature on endovascular treatment **378**
– radiologic studies **375**
–– cerebral digital subtraction angiography **375**
– treatment **375**
–– description **375**
–– equipment **375**
– treatment options **377**
–– conservative management **377**
–– endovascular treatment **378**
–– possible complications **378**
–– surgical treatment **377**
Percutaneous vertebroplasty in osteoporotic vertebral compression fracture **416**
– background **418**
– clinical presentation **416**
– diagnosis **416**
– differential diagnoses **419**
– noninvasive imaging workup **418**
–– bone mineral densitometry **418**
–– computed tomography **418**
–– magnetic resonance imaging **418**
–– nuclear medicine studies **419**
–– physical examination and laboratory analysis **418**
–– radiography **418**
– possible complications **419**
– published literature on treatment options **419**
– radiologic studies **416**
–– magnetic resonance imaging **416**
– treatment **416**
–– description **416**
–– equipment **416**
– treatment options **419**
–– conservative or medical management **419**
–– percutaneous treatment **419**
–– surgical treatment **419**
Periprocedural rupture **53**
– aneurysm rupture
–– clinical presentation **53**
–– diagnosis **53**
–– radiologic studies **53**
–– treatment **53**
– background **54**
– differential diagnosis **55**
– invasive imaging workup **55**
– noninvasive imaging workup **55**
– possible complications **56**
– published literature on treatment options **56**
– treatment options **55**
Periprocedural thrombus **57**
– background **58**
– clinical presentation **57**
– diagnosis **57**
– differential diagnosis **59**
– invasive imaging workup **59**
– noninvasive imaging workup **59**
– possible complications **60**
– published literature on treatment options **60**
– radiologic studies **57**
– treatment **57**
– treatment options **59**
PHIL, *see* Precipitating Hydrophobic Injectable Liquid (PHIL)
Pial arteriovenous fistula, embolization of **362**
– background **363**
– clinical presentation **362**
– diagnosis **362**
– noninvasive imaging workup **364**
–– computed tomography **364**
–– digital subtraction angiography **364**
–– magnetic resonance imaging **364**
–– physical examination **364**
– possible complications **364**
– published literature on treatment options **365**
– radiologic studies **362**
–– computed tomography angiography **362**
–– digital subtraction angiography **362**, *363*
–– magnetic resonance imaging **362**
– treatment **362**
–– description **362**
–– equipment **362**
– treatment options **364**
–– conservative or medical management **364**
–– endovascular treatment **364**
–– radiosurgery **364**
–– surgical treatment **364**
Pial fistulous arteriovenous malformation, embolization of **147**
– background **147**
– clinical presentation **147**
– noninvasive imaging workup **148**
–– computed tomography **148**
–– computed tomography angiography **148**
–– invasive imaging workup **148**
–– magnetic resonance angiography **148**
–– magnetic resonance imaging **148**
–– ultrasonography **148**
– possible complications **149**
– published literature on treatment options **149**
– radiologic studies **147**
–– diagnosis **147**
–– digital subtraction angiography *147*
– treatment **147**
–– description **147**
–– equipment **147**
– treatment options **149**
–– conservative or medical management and radiosurgery **149**
–– endovascular treatment **149**
–– surgical treatment **149**
Posteroanterior (PA) fluoroscopy 416
PREMIER, *see* Prospective Study on Embolization of Intracranial Aneurysms with the Pipeline Device (PREMIER)
Preradiosurgical embolization of unruptured pial arteriovenous malformation **135**
– background **135**
– clinical presentation **135**
– diagnosis **135**
– internal carotid artery (ICA) *139*
– invasive imaging workup **137**
– noninvasive imaging workup **137**
–– computed tomography **137**
–– functional imaging **137**
–– magnetic resonance imaging **137**
– possible complications **138**
– published literature on treatment options **138**
– radiologic studies **135**
–– digital subtraction angiography **135**, *136*, *138*
–– functional magnetic resonance imaging **135**
–– magnetic resonance imaging **135**
–– magnetic resonance perfusion **135**
– treatment **135**
–– description **135**
–– equipment **135**
– treatment options **137**
–– conservative or medical management **137**
–– endovascular treatment **137**
–– radiosurgery **137**
–– surgical treatment **137**
"Pressure cooker" technique *121*
Pressure cooker technique for falcotentorial dural arteriovenous fistula **180**
– background **182**
– clinical presentation **180**
– possible complications **183**
– radiologic studies **180**
–– digital subtraction angiography **180**, *181–182*
–– magnetic resonance angiography **180**
–– magnetic resonance imaging *180*
– treatment **180**
–– description **180**
–– equipment **180**
–– follow-up **181**
– treatment options **183**
–– endovascular treatment **183**
–– radiosurgery **183**
–– surgical treatment **183**
PROACT trials, *see* Prolyse in Acute Cerebral Thromboembolism (PROACT) trials
Proximal mechanically induced vasospasm **49**
– background **51**
– clinical presentation **49**
– diagnosis **49**
– differential diagnosis **51**
– invasive imaging workup **51**
– possible complications **51**
– published literature on treatment options **51**
– radiologic studies **49**
–– digital subtraction angiography **49**
– treatment **49**
–– description **49**
–– equipment **49**
– treatment options **51**
–– conservative or medical management **51**
–– endovascular treatment **51**
PSAs, *see* Posterior spinal arteries (PSAs)
PTFE, *see* Polytetrafluoroethylene (PTFE)
PUFS trial, *see* Pipeline for Uncoilable or Failed Aneurysms (PUFS) trial
PVO, *see* Permanent vessel occlusion (PVO)

R

Radiofrequency kyphoplasty
– in multiple myeloma **435**
–– background **436**
–– clinical presentation **435**
–– computed tomography **435**, **437**
–– conservative or medical management **437**
–– description **435**
–– diagnosis **435**
–– equipment **435**
–– interventional management **437**
–– magnetic resonance imaging **437**
–– noninvasive imaging workup **437**
–– possible complications **437**
–– published literature on treatment options **437**
–– radiation therapy **437**
–– radiography **437**
–– radiologic studies **435**
–– surgical treatment **437**
–– treatment **435**
–– treatment options **437**
– in osteoporotic vertebral compression fracture **431**
–– background **433**
–– clinical presentation **431**
–– computed tomography **431**, **433**
–– conservative or medical management **433**
–– description **431**
–– diagnosis **431**
–– differential diagnosis **433**
–– equipment **431**
–– interventional management **433**
–– invasiveworkup **433**
–– magnetic resonance imaging **431**, **433**
–– noninvasive imaging workup **433**
–– physical examination **433**
–– possible complications **433**
–– published literature on treatment options **433**
–– radiography **433**
–– radiologic studies **431**
–– surgical treatment **433**
–– treatment **431**
–– treatment options **433**
RAPD, *see* Relative afferent pupillary defect (RAPD)
Recurrent temporal paraganglioma, preoperative embolization of **263**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– background **264**
– clinical presentation **263**
– common carotid artery (CCA) angiograms *264*
– diagnosis **263**
– differential diagnosis **265**
– invasive imaging workup **265**
– noninvasive imaging workup **265**
–– clinical findings **265**
–– imaging findings **265**
– possible complications **265**
– published literature on treatment options **265**
– radiologic studies **263**
–– computed tomography **263**
–– digital subtraction angiography **263**
–– digital subtraction angiography (DSA) *263*
–– magnetic resonance imaging **263**
– treatment **263**
–– description **264**
–– equipment **263**
– treatment options **265**
–– endovascular treatment **265**
Ruptured anterior communicating artery aneurysm, embolization of **8**
– background **8**
– clinical presentation **8**
– diagnosis **8**
– noninvasive and invasive imaging workup **9**
– possible complications **10**
–– published literature on treatment options **10**
– radiologic studies **8**
–– digital subtraction angiography **8**
– treatment **8**
–– description **8**
–– equipment **8**
– treatment options **9**
–– endovascular treatment **9**
–– surgical treatment **9**
Ruptured basilar tip aneurysm, embolization of **3**
– background **4**
– clinical presentation **3**
– complications **6**
– diagnosis **3**
– differential diagnosis **5**
– invasive imaging workup **5**
– noninvasive imaging workup **4**
–– computed tomography (CT) **5**
–– computed tomography angiography (CTA) **5**
–– magnetic resonance angiography (MRA) **5**
–– magnetic resonance imaging (MRI) **5**
–– physical examination **4**
– radiologic studies **3**
–– computed tomography (CT) *3*
–– digital subtraction angiography (DSA) **3**, *4*
– treatment **3**
–– description **3**
–– equipment **3**
– treatment options **5**
–– conservative or medical management **5**
–– endovascular treatment **5**
–– surgical treatment **5**
– treatment options, published literature on **6**
Ruptured dissecting pseudoaneurysms, flow diversion for **76**
– background **77**
– clinical presentation **76**
– diagnosis **76**
– initial management **76**
– noninvasive imaging workup **78**
– possible complications **78**
– published literature on endovascular treatment **78**
– radiologic studies **76**
–– computed tomography *76*
–– computed tomography angiography *76*
– treatment **76**
–– description **76**
–– equipment **76**
– treatment options **78**
–– conservative management **78**
–– endovascular treatment **78**

S

SAH, *see* Subarachnoid hemorrhage (SAH)
Salvage maneuvers for prolapsed flow diverters 97
SCA, *see* Superior cerebellar artery (SCA)
Scalp arteriovenous malformation, direct puncture and transarterial embolization of **232**
– background **233**
– clinical presentation **232**
– diagnosis **232**
– invasive imaging workup **234**
– noninvasive imaging workup **234**
–– computed tomography **234**
–– computed tomography angiography **234**
–– magnetic resonance angiography **234**
–– magnetic resonance imaging **234**
– possible complications **234**
– published literature on treatment options **234**
– radiologic studies **232**
–– digital subtraction angiography *232*, *233*
– treatment **232**
–– description **233**
–– equipment **232**
– treatment options **234**
–– endovascular treatment **234**
–– surgical treatment **234**
Self-expandable stent, intracranial revascularization with **337**
– background **337**
– clinical presentation **337**
– diagnosis **337**
– differential diagnosis **339**
– invasive imaging workup **338**
– noninvasive imaging workup **338**
–– clinical findings **338**
–– imaging findings **338**
– possible complications **340**
– published literature on treatment options **340**
– radiologic studies **337**
–– computed tomography **337**
–– computed tomography angiography **337**
–– digital subtraction angiography (DSA) *338–339*
– treatment **337**
–– description **337**
–– equipment **337**
– treatment options **339**
–– conservative or medical management **339**
–– endovascular treatment **339**
–– surgical treatment **339**
Short tau inversion recovery (STIR) 416, *416*
Sidewall aneurysm, endoluminal flow diversion for **41**
– clinical presentation **41**
– diagnosis **41**
– invasive imaging workup **44**
– noninvasive imaging workup **43**
– radiologic studies **41**
– treatment **41**
– treatment options **44**
SMA, *see* Supplementary motor area (SMA)
SPACE trial, *see* Stent-Supported Percutaneous Angioplasty of the Carotid Artery versus Endarterectomy (SPACE) trial
Spinal arteriovenous malformation of fistulous type
– treatment with coils **399**
–– background **401**
–– clinical presentation **399**
–– computed tomography **401**
–– computed tomography angiography **401**
–– description **400**
–– diagnosis **399**
–– differential diagnosis **401**
–– digital subtraction angiography **399**
–– endovascular treatment **401**
–– equipment **399**
–– invasive imaging workup **401**
–– magnetic resonance angiography **401**
–– magnetic resonance imaging **399**, **401**
–– noninvasive imaging workup **401**
–– possible complications **401**
–– published literature on treatment options **401**
–– radiologic studies **399**
–– surgical treatment **401**
–– treatment **399**
–– treatment options **401**
– treatment with liquid embolic material **395**
–– background **396**
–– clinical presentation **395**
–– description **395**
–– diagnosis **395**
–– differential diagnosis **397**
–– digital subtraction angiography **395**
–– digital subtraction angiography (DSA) *396–397*, *400*
–– endovascular treatment **398**
–– equipment **395**
–– invasive imaging workup **397**
–– magnetic resonance angiography **397**
–– magnetic resonance imaging **395**, **397**
–– noninvasive imaging workup **397**
–– physical examination **397**
–– possible complications **398**
–– published literature on treatment options **398**
–– radiologic studies **395**
–– surgical treatment **397**
–– treatment **395**
–– treatment options **397**
Spinal arteriovenous malformation of glomerular/nidus type: treatment with liquid embolic material **403**
– background **404**
– clinical presentation **403**
– diagnosis **403**
– differential diagnosis **406**
– invasive imaging workup **406**
– noninvasive imaging workup **405**
–– computed tomography **405**
–– computed tomography angiography **405**
–– magnetic resonance angiography **405**
–– magnetic resonance imaging **405**
–– physical examination **405**
– possible complications **406**
– published literature on treatment options **406**
– radiologic studies **403**
–– digital subtraction angiography **403**, *404*
–– magnetic resonance imaging **403**
– treatment **403**
–– description **403**
–– equipment **403**
– treatment options **406**
–– conservative or medical management **406**
–– endovascular treatment **406**
–– surgical treatment **406**
Spinal dural arteriovenous fistulas
– successful arterial embolization **387**
–– background **388**
–– clinical presentation **387**
–– computed tomography **388**
–– computed tomography angiography **388**
–– description **387**
–– diagnosis **387**
–– differential diagnosis **389**
–– digital subtraction angiography **387**, *388*
–– endovascular treatment **390**
–– equipment **387**
–– invasive imaging workup **389**
–– magnetic resonance angiography **389**
–– magnetic resonance imaging **387**, **389**
–– noninvasive imaging workup **388**
–– physical examination **388**
–– possible complications **390**
–– published literature on treatment options **390**
–– radiologic studies **387**
–– surgical treatment **390**
–– treatment **387**
–– treatment options **390**
– unsuccessful arterial embolization **392**
–– background **392**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

–– clinical presentation **392**
–– computed tomography **393**
–– computed tomography angiography **393**
–– description **392**
–– diagnosis **392**
–– differential diagnosis **394**
–– digital subtraction angiography *392*
–– endovascular treatment **394**
–– equipment **392**
–– invasive imaging workup **393**
–– magnetic resonance angiography **393**
–– magnetic resonance imaging **393**
–– noninvasive imaging workup **393**
–– physical examination **393**
–– possible complications **394**
–– published literature on treatment options **394**
–– radiologic studies **392**
–– surgical treatment **394**
–– treatment **392**
–– treatment options **394**
Spinal hemangioblastoma, preoperative transarterial embolization of **267**
– background **268**
– clinical presentation **267**
– diagnosis **267**
– invasive imaging workup **269**
– noninvasive imaging workup **269**
–– computed tomography **269**
–– computed tomography angiography **269**
–– magnetic resonance angiography **269**
–– magnetic resonance imaging **269**
– possible complications **269**
– published literature on treatment options **269**
– radiologic studies **267**
–– digital subtraction angiography **267**, *268*, *270*
–– magnetic resonance imaging *267*
– treatment **267**
–– description **268**
–– equipment **267**
– treatment options **269**
–– endovascular treatment **269**
–– radiosurgery **269**
–– surgical treatment **269**
SRS, *see* Stereotactic radiosurgery (SRS)
SSS, *see* Superior sagittal sinus (SSS)
Staged embolization and hybrid approaches for arteriovenous malformations **127**
– background **128**
– clinical presentation **127**
– diagnosis **127**
– invasive imaging workup **129**
– noninvasive imaging workup **128**
– radiologic studies **127**
–– digital subtraction angiography **127**, *128*
–– magnetic resonance imaging **127**
– treatment **127**
–– description **127**
–– equipment **127**
– treatment options **129**
–– embolization **129**
–– medical management **129**
–– microsurgery **129**
–– multimodal treatment **129**
–– stereotactic radiosurgery **129**
STAs, *see* Superficial temporal arteries (STAs)
STASH study, *see* Simvastatin in Aneurysmal Subarachnoid Hemorrhage (STASH) study
Stent-assisted angioplasty of symptomatic extracranial internal carotid artery stenosis **328**
– background **328**
– clinical presentation **328**
– diagnosis **328**
– invasive imaging workup **329**
– noninvasive imaging workup **328**
–– imaging findings **328**
–– physical examination **328**
– possible complications **330**
– published literature on treatment options **330**
– radiologic studies **328**
–– computed tomography **328**
–– computed tomography angiography **328**
– stent-assisted percutaneous transluminal angioplasty *329*
– treatment **328**
–– description **328**
–– equipment **328**
– treatment options **329**
–– conservative or medical management **329**
–– endovascular treatment **329**
–– surgical treatment **329**
–– transcarotid artery revascularization **330**
Stent-assisted embolization of wide-necked recurrent posterior communicating **28**
– artery aneurysm **28**
–– clinical presentation **28**
–– diagnosis **28**
–– radiologic studies **28**
–– treatment **28**
– background **29**
– invasive imaging workup **30**
– noninvasive imaging workup **29**
– possible complications **30**
– published literature on treatment options **30**
– treatment options **30**
STIR, *see* Short tau inversion recovery (STIR)
Stroke, mechanical thrombolysis in **320**
– background **321**
– clinical presentation **320**
– diagnosis **320**
– invasive imaging workup **322**
– noninvasive imaging workup **321**
–– computed tomography **322**
–– physical examination **321**
– possible complications **323**
– published literature on treatment options **323**
– radiologic studies **320**
–– computed tomography **320**
–– digital subtraction angiography *320*, *321*
– treatment **320**
–– description **320**
–– equipment **320**
– treatment options **323**
–– endovascular treatment **323**
–– medical or surgical treatment **323**
Subarachnoid hemorrhage (SAH), multiple aneurysms in patient with **11**
– background **11**
– clinical presentation **11**
– diagnosis **11**
– noninvasive imaging workup **12**
–– computed tomography/magnetic resonance imaging **12**
–– CTA/MRA or DSA **12**
– possible complications **12**
– published literature on treatment options **12**
– radiologic studies **11**
–– computed tomography **11**
–– digital subtraction angiography **11**
– treatment **11**
–– description **11**
–– equipment **11**
– treatment options **12**
Subarachnoid hemorrhage (SAH)–induced vasospasm, management of **62**
– background **63**
– clinical presentation **62**
– diagnosis **63**
– differential diagnosis **64**
– digital subtraction angiography (DSA) *63*
– invasive imaging workup **64**
– noninvasive imaging workup **64**
–– computed tomography **64**
–– computed tomography angiography **64**
–– magnetic resonance **64**
–– magnetic resonance angiography **64**
–– physical examination **64**
–– transcranial doppler ultrasound **64**
– possible complications **65**
– published literature on treatment options **65**
– radiologic studies **62**
–– computed tomography *62*
–– computed tomography angiography *62*
–– digital subtracted angiography *63*
– subarachnoid hemorrhage (SAH) *66*
– treatment **63**
–– description **63**
–– equipment **63**
– treatment options **64**
–– conservative or medical management **64**
–– endovascular treatment **65**
SWI, *see* Susceptibility weighted imaging (SWI)
Symptomatic brain arteriovenous malformation, arterial embolization of **119**
– background **120**
– clinical presentation **119**
– diagnosis **119**
– invasive imaging **121**
– possible complications **122**
– published literature on treatment options **122**
– radiologic studies **119**
–– digital subtraction angiography **119**
–– magnetic resonance imaging **119**
– treatment **119**
–– description **119**
–– equipment **119**
– treatment options **122**
–– conservative or medical treatment **122**
–– endovascular treatment **122**
–– radiosurgery (gamma knife) **122**
–– surgical treatment **122**
– "pressure cooker" technique *121*
Symptomatic extracranial internal carotid artery stenosis, stent-assisted angioplasty of **328**
– background **328**
– clinical presentation **328**
– diagnosis **328**
– invasive imaging workup **329**
– noninvasive imaging workup **328**
–– imaging findings **328**
–– physical examination **328**
– possible complications **330**
– published literature on treatment options **330**
– radiologic studies **328**
–– computed tomography **328**
–– computed tomography angiography **328**
– stent-assisted percutaneous transluminal angioplasty *329*
– treatment **328**
–– description **328**
–– equipment **328**
– treatment options **329**
–– conservative or medical management **329**
–– endovascular treatment **329**
–– surgical treatment **329**
–– transcarotid artery revascularization **330**
Symptomatic postsurgical internal carotid artery stenosis, stenting of **332**
– background **333**
– clinical presentation **332**
– diagnosis **332**
– invasive imaging workup **335**
– noninvasive imaging workup **335**
–– imaging findings **335**
–– physical examination **335**
– possible complications **335**
– published literature on treatment options **335**
– radiologic studies **332**
–– computed tomography **332**
–– computed tomography angiography **332**
–– digital subtraction angiography (DSA) *333–334*
– treatment **332**
–– description **332**
–– equipment **332**
– treatment options **335**
–– endovascular treatment **335**
–– surgical treatment **335**

T

T-stenting *35*
TAE, *see* Transarterial embolization (TAE)
TCAR, *see* Transcarotid artery revascularization (TCAR)
TCCF, *see* Traumatic carotid-cavernous fistula (TCCF)

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

TIA, *see* Transient ischemic attack (TIA)
tPA, *see* Tissue plasminogen activator (tPA)
Transarterial chemoembolization for retinoblastoma **380**
– background **381**
– clinical presentation **380**
– diagnosis **380**
– ophthalmic imaging workup **382**
–– computed tomography **382**
–– fundoscopic examination during an examination under anesthesia **382**
–– magnetic resonance angiography **382**
–– magnetic resonance imaging **382**
–– ultrasound **382**
– possible complications of intra-arterial chemotherapy **383**
– radiologic studies **380**
–– magnetic resonance imaging **380**
– retinoblastoma, intra-arterial chemotherapy for *381*
– treatment **380**
–– description **380**
–– equipment **380**
– treatment options **382**
–– enucleation **382**
–– external beam radiotherapy (EBRT) **383**
–– focal therapies **383**
–– intra-arterial chemotherapy **383**
–– systemic chemotherapy **382**
Transarterial glue embolization of mandibular arteriovenous fistula **229**
– background **230**
– clinical presentation **229**
– diagnosis **229**
– invasive imaging workup **230**
– noninvasive imaging workup **230**
–– computed tomography **230**
–– computed tomography angiography **230**
–– magnetic resonance angiography **230**
–– magnetic resonance imaging **230**
– possible complications **231**
– published literature on treatment options **231**
– radiologic studies **229**
–– computed tomography/magnetic resonance imaging **229**
–– digital subtraction angiography **229**, *230*
– treatment **229**
–– description **229**
–– equipment **229**
– treatment options **230**
–– endovascular treatment **230**
–– surgical treatment **230**
Transarterial Onyx embolization of facial arteriovenous fistula **236**
– background **237**
– clinical presentation **236**
– diagnosis **236**
– noninvasive and invasive imaging workup **238**
–– computed tomography **238**
–– computed tomography angiography **238**
–– digital subtraction angiography **238**
–– magnetic resonance angiography **238**
–– magnetic resonance imaging **238**
– possible complications **238**
– published literature on treatment options **238**
– radiologic studies **236**
–– computed tomography *236*
–– computed tomography angiography **236**
–– digital subtraction angiography *236*
– treatment **237**
–– description **237**
–– equipment **237**
– treatment options **238**
–– endovascular treatment **238**
–– surgical treatment **238**
Transarterial particle embolization for epistaxis **308**
– background **308**
– clinical presentation **308**
– diagnosis **308**
– invasive imaging workup **309**
– noninvasive imaging workup **308**
–– computed tomography **309**
–– computed tomography angiography **309**
–– magnetic resonance angiography **309**
–– magnetic resonance imaging **309**
–– physical examination **308**
– possible complications **310**
– published literature on treatment options **310**
– radiologic studies **308**
–– digital subtraction angiography **308**, *309*, *311*
– treatment **308**
–– description **308**
–– equipment **308**
– treatment options **309**
–– conservative and medical management **309**
–– endovascular treatment **310**
–– surgical treatment **309**
Transcarotid artery revascularization (TCAR) **330**
Transradial access for endoluminal flow diversion **102**
– background **103**
– clinical presentation **102**
– diagnosis **102**
– noninvasive imaging workup **103**
–– computed tomography angiography **103**
–– ultrasound/digital subtraction angiography **103**
– possible complications **105**
– published literature on treatment options **106**
– radiologic studies **102**
–– computed tomography *102*
–– computed tomography angiography *102*
–– digital subtraction angiography **102**
– treatment **102**
–– description **102**
–– equipment **102**
– treatment options **105**
–– conservative management **105**
–– endovascular treatment **105**
–– suricial treatment **105**
– vaso-computed tomography (vaso-CT) *105*
Transvenous embolization (TVE)
– of cavernous sinus dural arteriovenous fistula **219**
–– background **220**
–– clinical presentation **219**
–– computed tomography **221**
–– computed tomography angiography **221**
–– conservative or medical management **221**
–– description **220**
–– diagnosis **219**
–– differential diagnosis **221**
–– digital subtraction angiography **219**
–– endovascular treatment **221**
–– equipment **220**
–– invasive imaging workup **221**
–– magnetic resonance angiography **219**, **221**
–– magnetic resonance imaging **219**, **221**
–– noninvasive imaging workup **221**
–– physical examination **221**
–– possible complications **222**
–– published literature on treatment options **222**
–– radiologic studies **219**
–– surgical treatment **221**
–– treatment **220**
–– treatment options **221**
– of condylar confluence dural arteriovenous fistula **215**
–– background **215**
–– clinical presentation **215**
–– computed tomography **217**
–– computed tomography angiography **217**
–– conservative or medical management **217**
–– description **215**
–– diagnosis **215**
–– differential diagnosis **217**
–– digital subtraction angiography **215**, *216*
–– endovascular treatment **217**
–– equipment **215**
–– invasive imaging workup **217**
–– magnetic resonance angiography **215**, **217**
–– magnetic resonance imaging **215**, **217**
–– noninvasive imaging workup **217**
–– physical examination **217**
–– possible complications **217**
–– published literature on treatment options **217**
–– radiologic studies **215**
–– surgical treatment **217**
–– treatment **215**
–– treatment options **217**
– of isolated sinus **211**
–– background **212**
–– clinical presentation **211**
–– computed tomography **213**
–– computed tomography angiography **213**
–– description **212**
–– diagnosis **212**
–– digital subtraction angiography **211**
–– endovascular treatment **214**
–– equipment **212**
–– invasive imaging workup **213**
–– magnetic resonance angiography **211**, **213**
–– magnetic resonance imaging **211**, **213**
–– noninvasive imaging workup **213**
–– possible complications **214**
–– published literature on treatment options **214**
–– radiologic studies **211**
–– surgical treatment **213**
–– treatment **212**
–– treatment options **213**
Transvenous retrograde pressure cooker embolization of dural arteriovenous fistula **190**
– clinical presentation **190**
– complications of transvenous embolization **193**
– contraindications to the transarterial approach in this case **193**
– diagnosis **190**
– flow reversal techniques **192**
– microsurgical disconnection **193**
– radiologic studies **190**
–– digital subtraction angiography **190**, *191*
–– magnetic resonance angiography **190**
– time-of-flight magnetic resonance angiogram (TOF-MRA) *190*
– treatment **190**
–– description **191**
–– equipment **190**
– treatment outcomes **193**
Transverse sinus dural arteriovenous fistula
– transarterial glue embolization of **167**
–– background **169**
–– clinical presentation **167**
–– computed tomography *167*, *168*
–– computed tomography angiography **169**
–– description **167**
–– diagnosis **167**
–– digital subtraction angiography **167**
–– endovascular treatment **169**
–– equipment **167**
–– invasive imaging workup **169**
–– magnetic resonance angiography **169**
–– noninvasive imaging workup **169**
–– possible complications **170**
–– published literature on treatment options **170**
–– radiologic studies **167**
–– radiosurgery **169**
–– surgical treatment **169**
–– treatment **167**
–– treatment options **169**
– transarterial Onyx embolization of **171**
–– background and treatment options **172**
–– clinical presentation **171**
–– description **172**
–– diagnosis **171**
–– digital subtraction angiography *171*, *172*

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

–– endovascular treatment **172**
–– equipment **171**
–– magnetic resonance imaging *171*
–– possible complications **173**
–– published literature on treatment options **173**
–– radiologic studies **171**
–– transarterial embolization **172**
–– treatment **171**
– transvenous embolization of **207**
–– background **208**
–– clinical presentation **207**
–– computed tomography **207–208**
–– computed tomography angiography **207**, **209**
–– description **208**
–– diagnosis **207**
–– digital subtraction angiography **207**, *208*
–– endovascular treatment **209**
–– equipment **207**
–– invasive imaging workup **209**
–– magnetic resonance angiography **209**
–– magnetic resonance imaging **208**
–– noninvasive imaging workup **208**
–– possible complications **210**
–– published literature on treatment options **210**
–– radiologic studies **207**
–– radiosurgery **209**
–– surgical treatment **209**
–– treatment **207**
–– treatment options **209**
Traumatic and postradiation carotid blowouts, covered stenting for **304**
– background **305**
– clinical presentation **304**
– diagnosis **304**
– digital subtraction angiography (DSA) *305*
– radiologic studies **304**
– treatment **304**
–– equipment **304**
–– outcome **305**
–– postprocedural care **304**
–– technique **304**
– treatment options **305**
Traumatic carotid-cavernous fistula (TCCF)
– balloon embolization of **289**
–– background **290**
–– clinical presentation **289**
–– computed tomography **289**, **291**
–– computed tomography angiography **291**
–– description **289**
–– diagnosis **289**
–– digital subtraction angiography **289**
–– endovascular treatment **291**
–– equipment **289**
–– invasive imaging workup **291**
–– magnetic resonance angiography **291**
–– magnetic resonance imaging **291**
–– noninvasive imaging workup **291**
–– physical examination **291**
–– possible complications **291**
–– published literature on treatment options **292**
–– radiologic studies **289**
–– surgical treatment **291**
–– treatment **289**
–– treatment options **291**
– coil embolization of **293**
–– background **294**
–– clinical presentation **293**
–– computed tomography **295**
–– computed tomography angiography **295**
–– computed tomography/magnetic resonance imaging **293**
–– description **294**
–– diagnosis **294**
–– differential diagnosis **295**
–– digital subtraction angiography **293**, *294*
–– endovascular treatment **295**
–– equipment **294**
–– invasive imaging workup **295**
–– magnetic resonance angiography **295**
–– magnetic resonance imaging **295**
–– noninvasive imaging workup **295**
–– physical examination **295**
–– possible complications **295**
–– published literature on treatment options **295**
–– radiologic studies **293**
–– surgical treatment **295**
–– treatment **294**
–– treatment options **295**
Traumatic internal carotid artery aneurysm, balloon occlusion test of **300**
– background **301**
– clinical presentation **300**
– diagnosis **300**
– invasive imaging workup **302**
– noninvasive imaging workup **302**
–– computed tomography **302**
–– computed tomography angiography **302**
–– magnetic resonance angiography **302**
–– magnetic resonance imaging **302**
– possible complications **302**
– published literature on treatment options **303**
– radiologic studies **300**
–– computed tomography **300**
–– digital subtraction angiography **300**
– treatment **300**
–– description **300**
–– equipment **300**
– treatment options **302**
–– endovascular treatment **302**
–– surgical treatment **302**
TTP, *see* Time to peak (TTP)
TVE, *see* Transvenous embolization (TVE)

U

Unruptured arteriovenous malformation
– Onyx embolization of **114**
–– choice of embolic agent **116**
–– clinical presentation **114**
–– complications **116**
–– computed tomography **114**
–– description **114**
–– diagnosis **114**
–– digital subtraction angiography **114**
–– equipment **114**
–– management **115**
–– other techniques **116**
–– radiologic studies **114**
–– transvenous embolization **116**
–– treatment **114**
– transvenous approach for **123**
–– clinical presentation **123**
–– description **124**
–– diagnosis **124**
–– diagnostic cerebral angiogram **123**
–– endovascular treatment **125**
–– equipment **124**
–– microsurgery **125**
–– radiologic studies **123**
–– radiosurgery **125**
–– treatment **124**
–– treatment options **125**
Unruptured internal carotid artery aneurysm, management of **15**
– background **15**
– clinical presentation **15**
– diagnosis **15**
– invasive imaging workup **17**
– noninvasive imaging workup **17**
–– computed tomography/computed tomography angiography **17**
–– magnetic resonance imaging/magnetic resonance angiography **17**
–– physical examination **17**
– possible complications **17**
– published literature on treatment options **18**
– radiologic studies **15**
–– digital subtraction angiography (DSA) *15*, *16*
– treatment **15**
–– description **15**
–– equipment **15**
– treatment options **17**
–– conservative or medical management **17**
–– endovascular treatment **17**
–– surgical treatment **17**
Unruptured pial arteriovenous malformation
– arterial embolization of **109**
–– background **110**
–– clinical presentation **109**
–– computed tomography **111**
–– computed tomography and magnetic resonance imaging **109**
–– computed tomography angiography **111**
–– conservative treatment **111**
–– description **109**
–– diagnosis **109**
–– differential diagnoses **111**
–– digital subtraction angiography **109**
–– endovascular treatment **111**
–– equipment **109**
–– invasive imaging workup **111**
–– magnetic resonance **111**
–– magnetic resonance angiography **111**
–– noninvasive imaging workup **110**
–– physical examination **110**
–– possible complications **111**
–– radiologic studies **109**
–– radiosurgery **111**
–– surgical treatment **111**
–– treatment **109**
–– treatment options **111**
– partial targeted embolization of **131**
–– background **132**
–– clinical presentation **131**
–– computed tomography perfusion **131**
–– conservative or medical management **133**
–– description **132**
–– diagnosis **132**
–– digital subtraction angiography **131**
–– endovascular treatment **133**
–– equipment **132**
–– invasive imaging workup **133**
–– magnetic resonance imaging **131**
–– noninvasive imaging workup **132**
–– perfusion imaging **133**
–– possible complications **133**
–– published literature on treatment options **134**
–– radiologic studies **131**
–– radiosurgery **133**
–– surgical treatment **133**
–– treatment **132**
–– treatment options **133**
– preradiosurgical embolization of **135**
–– background **135**
–– clinical presentation **135**
–– computed tomography **137**
–– conservative or medical management **137**
–– description **135**
–– diagnosis **135**
–– digital subtraction angiography **135**
–– endovascular treatment **137**
–– equipment **135**
–– functional imaging **137**
–– functional magnetic resonance imaging **135**
–– invasive imaging workup **137**
–– magnetic resonance imaging **135**, **137**
–– magnetic resonance perfusion **135**
–– noninvasive imaging workup **137**
–– possible complications **138**
–– published literature on treatment options **138**
–– radiologic studies **135**
–– radiosurgery **137**
–– surgical treatment **137**
–– treatment **135**
–– treatment options **137**

V

VA, *see* Vertebral artery (VA)
VCF, *see* Vertebral compression fracture (VCF)
Vertebral artery (VA) 211
Vertebral compression fracture (VCF) 416, *416*, 418–419
Vertebrovertebral fistula, balloon embolization of **408**
– background **408**
– clinical presentation **408**
– diagnosis **408**
– invasive imaging workup **409**

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.

– noninvasive imaging workup **408**
–– computed tomography **408**
–– computed tomography angiography **409**
–– magnetic resonance angiography **409**
–– magnetic resonance imaging **408**
– possible complications **410**
– published literature on treatment options **410**
– radiologic studies **408**
–– digital subtraction angiography *408*
– treatment **408**
–– description **408**
–– equipment **408**
– treatment options **409**
–– endovascular treatment **410**
–– surgical treatment **409**
VSS, *see* Venous sinus stenting (VSS)

W

WALT maneuver, *see* Wire anchor loop traction" (WALT) maneuver
WASID trial, *see* Warfarin-Aspirin Symptomatic Intracranial Disease (WASID) trial
WEB **21**
– *See also* Woven EndoBridge (WEB)

X

X, Y, T, and H stents **32**
– background **33**
– clinical presentation **32**
– diagnosis **32**
– noninvasive imaging workup **33**
–– computed tomography angiography **33**
–– digital subtraction angiography **33**
–– magnetic resonance angiography **33**
– published literature on treatment options **34**
– radiologic studies **32**
–– digital subtraction angiography **32**
– treatment **32**
–– description **32**
–– equipment **32**
– treatment options **33**
–– endovascular treatment **33**
–– possible complications **33**
–– surgical treatment **33**
X-stenting *35*

Y

Y-stenting *34*

from: Krings et al, Case-Based Interventional Neuroradiology (9781684200702)
© 2026. Thieme. All rights reserved.