

Index

abdomino-pelvic irradiation effects on fertility, 321-322 fertility preservation, 328 pregnancy outcomes after, 327 ABO incompatibility, fetal, 126 ABVD chemotherapy regimen, 311-312, 325, 328 acidosis, massive transfusion, 212 activated partial thromboplastin time (aPTT), 11, 170 obstetric hemorrhage, 217, 223 pre-eclampsia, 275 activated protein C (APC) resistance assay, 10, 132, 194 trophoblast development, 191 active management of third stage of labor, 199, 316 acute chest syndrome (ACS), 58, 62 acute fatty liver of pregnancy (AFLP), 287 - 288differential diagnosis, 278, 283, 287 pathogenesis, 287-288 acute hematological malignancies, 309-316, See also leukemia; lymphoma case study, 317 peripartum management, 316 sepsis in pregnancy, 315 supportive therapies in pregnancy, 315-316 acute lymphoblastic leukemia (ALL) case study, 330 incidence in pregnancy, 313 late effects on fertility, 324 management in pregnancy, 314 acute myeloid leukemia (AML) case study, 317 incidence in pregnancy, 313 late effects on fertility, 324 management in pregnancy, 313-314, 328 peripartum management, 316 septic complications, 315 ADAMTS 13 congenital deficiency, 283, 285 HELLP syndrome, 285 inhibitors/IgG antibodies, 285

TTP pathophysiology, 284 age-related risk, VTE, 140 alpha fetoprotein (AFP), 283 α2-antiplasmin, 9 α2-macroglobulin, 9 α-thalassemias, 66, 67, 78 antenatal screening, 80 case study, 91 deletion mutations (α^0 thalassemia), 85, 87 global distribution, 66, 79 prenatal diagnosis, 79, 85, 87 risk of affected offspring, 69 altitude. Hb concentrations at, 1 amniocentesis hemoglobinopathies, 85, 87 hemophilia, 261-262 RhD isoimmunization, 117-118, 120 amniotic fluid embolism (AFE) hemostatic impairment, 211, 217 salvaged blood, 213 amphotericin B, 315 anagrelide, 302, 303, 304-305 analgesia labor. See labor analgesia painful sickle crises, 62 definition, 1 exchange transfusion, 123-124 fetal. See fetal anemia hereditary spherocytosis, 94 iron deficiency. See iron deficiency myelodysplastic syndrome, 314-315 physiological/dilutional, of pregnancy, 15 thalassemia, 66, 70 transfusion dependent, 94 vitamin B₁₂ deficiency, 30 anesthesia. See also general anesthesia; labor analgesia; regional anesthesia fully anticoagulated women, 171-172 obstetric hemorrhage, 210 women on thromboprophylaxis, 167-169 anesthetists antenatal assessment, 206

management of obstetric

hemorrhage, 206-214

angiotensin receptor II blockers, 60, 272 angiotensin-converting enzyme (ACE) inhibitors, 60, 272 antepartum hemorrhage (APH), 197, See also obstetric hemorrhage anesthetic management, 206-214 anticoagulated women, 170 case study, 12-13 diagnosis, 200 obstetric management, 200 anthracyclines, 313 anti-A antibodies, 126 anti-B antibodies, 126 anti-beta 2 glycoprotein 1 (anti-β2-GP I) antibodies, 178 assay, 181 procoagulant effects, 178-179 antibiotics, 160, 315 anti-c antibodies, 125 anticardiolipin antibodies (aCL), 178, 181 anti-CD20 monoclonal antibodies, 325-326, See also rituximab anticoagulants. See also heparin; warfarin newer, 173 oral. See vitamin K antagonists physiological, 10-11 anticoagulation (therapeutic), 165-174, See also thromboprophylaxis acute VTE in pregnancy, 132-133 anesthetic considerations, 171–172 antiphospholipid syndrome, 183, 185 breast-feeding safety, 134 case studies, 136-137, 174, 186 maintenance antenatal, 133 massive pulmonary embolism, 136 myeloproliferative neoplasms, 302 near patient testing, 173-174 peripartum management, 133-134, 165 - 174postpartum continuation, 134 prosthetic heart valves, 145, 150-160 rapid reversal, 158-159, 171 anti-D antibodies antenatal testing, 119-120 assay methods, 117

333

monitoring during pregnancy, 286

normal pregnancy, 284-285



Index

anti-D immunoglobulin prophylaxis, 114–116
first trimester, 115
hematological malignancies, 316
improving safety, 126
ITP, 47
postpartum, 115 recombinant monoclonal antibodies,
126
refusal, 116
routine antenatal (RAADP),
115–116
anti-E antibodies, 125
anti-embolism stockings (AES). See graduated elastic compression
stockings
antiemetics, 315
antifungal agents, 315
antihypertensive agents, 271–272, 274
anti-Kell antibodies, 125, 127
anti-La antibodies, 182–183
anti-mullerian hormone (AMH), 320–321
antiphospholipid antibodies (aPL), 48,
178–179
case study, 186
isolated, without prior problems, 185
laboratory evaluation, 181–182
pathophysiological mechanisms, 178–179
antiphospholipid syndrome (APS),
177–186
case studies, 186
catastrophic (CAPS), 181
classification criteria, 177
clinical features, 179–181, 283 epidemiology, 178
laboratory evaluation, 181–182
management, 182–186
neonatal, 186
pathophysiology and etiology,
178–179
pre-eclampsia, 180, 271 primary (PAPS), 177
secondary (SAPS), 177
seronegative (SNAPS), 185
thromboprophylaxis, 142, 144
antiplatelet agents. See also aspirin
peripartum period, 166
pre-eclampsia, 272–273 prosthetic heart valves, 156, 157
anti-Ro antibodies, 182–183, 186
antithrombin, 9–11
concentrates, pre-eclampsia, 273
testing in pregnancy, 132, 194
antithrombin deficiency,
189–190
pregnancy loss, 191 thromboprophylaxis, 132,
142, 144

```
antithrombotic therapy
  inherited thrombophilia, 192-193
  myeloproliferative neoplasms,
     303-304
  pre-eclampsia, 272-273
anti-Xa monitoring
  antenatal, 133, 142
  peripartum period, 170
  prosthetic heart valves, 156-157
apixaban, 134, 145, 151, 173
aplastic anemia, 99
argatroban, 173
ARMS (amplification refractory
     mutation system), 85-86
arterial thrombosis
  antiphospholipid syndrome, 179
  previous, 183
ascites, fetal, 113
L-asparaginase, 314
aspirin
  antenatal thromboprophylaxis, 144
  antiphospholipid syndrome, 182, 184
  inherited thrombophilia, 193, 195
  myeloproliferative neoplasms, 297,
     300-301, 303, 304
  peripartum period, 166
  pre-eclampsia, 272-273
  prosthetic heart valves, 152, 156, 157
  sickle cell disease, 61
  thalassemia, 70
assisted reproductive techniques. See
    also preimplantation genetic
     diagnosis
  antiphospholipid syndrome,
     185, 186
  cancer patients, 328-330
asthma, 270
autism spectrum disorder, 270
autoimmune cytopenias, 40-54
autoimmune hemolytic anemia
     (AIHA), 40, 51-54
autoimmune neutropenia (AIN), 40,
     49 - 51
azathioprine, 47, 185
balloon tamponade, uterus, 202
Barker hypothesis, 270
basophil count, 3, 4
bendamustine, 326
Bernard-Soulier syndrome (BSS), 44,
     242 - 243
beta 2 glycoprotein 1 antibodies. See
    anti-beta 2 glycoprotein 1
    antibodies
beta-human chorionic gonadotrophin
     (hCG), 283
β-thalassemias
  antenatal screening, 80
  case studies, 74-75
  global distribution, 66
```

prenatal diagnosis, 78, 84, 85, 86 risk of affected offspring, 69 betrixaban, 173 bilirubin amniotic fluid 117 118 hemolytic disease of fetus and newborn, 112, 113 bisphosphonates, 72 bleeding disorders, heritable. See inherited bleeding disorders bleeding/hemorrhage intracranial. See intracranial hemorrhage maternal von Willebrand disease, 237 neonatal hemophilia, 247, 248-249 neonatal thrombocytopenia, 49, 105 neonatal von Willebrand disease, 239 obstetric. See obstetric hemorrhage blood films iron deficiency anemia, 20 ITP, 44 vitamin B₁₂ deficiency, 33 blood loss estimation, obstetric hemorrhage, 209, 210 blood transfusion autoimmune hemolytic anemia, 53 complications of massive, 211-212 fetal, hemolytic disease, 118-119, 122 fixed ratio protocols, severe PPH, 211, 222, 223 hematological malignancies, 316 iron deficiency anemia, 23, 25 neonatal exchange transfusion, 123-124 obstetric hemorrhage, 210-211, 220 - 223sickle cell disease, 61-62 thalassemia, 67-68, 70 blood volume, 1, 15 B-Lynch brace suture, 203 bone disease, thalassemia, 72 bone marrow examination autoimmune neutropenia, 50-51 folate deficiency, 36 idiopathic thrombocytopenic purpura, 44 iron deficiency, 20-21 vitamin B₁₂ deficiency, 33, 34 bone marrow failure syndromes, inherited, 99 breast-feeding anticoagulated women, 134, 160, 167 myeloproliferative neoplasms, 304 - 305Burkitt lymphoma, 310, 312-313 busulfan, 322-324 C4b-binding protein, 10 calreticulin (CALR) gene mutations, 297 carbetocin, 202



Index

carboprost, 201, 210
cardiac disease
pre-eclampsia and, 269-270
thalassemia, 68-69, 71-72
cardiopulmonary bypass, 173
caspofungin, 315
cauda equina syndrome, anticoagulated
women, 172
cell salvage, obstetric hemorrhage,
212–214
central neuraxial blockade (CNB), 165,
See also epidural analgesia;
regional anesthesia
fully anticoagulated women, 172
von Willebrand disease, 239-240
women on thromboprophylaxis,
167–169
cesarean section (CS)
cell salvage, 212-214
fully anticoagulated women, 134,
171–172
hematological malignancies, 316
hemorrhage during, case studies,
214–215
ITP, 48
sickle cell disease, 59
women on thromboprophylaxis, 168
chelation therapy
sickle cell disease, 60
thalassemia, 67, 70, 71
transfusion dependent anemias, 94
chemoradiotherapy, 320-330, See also
chemotherapy; radiotherapy
chemotherapy
acute leukemias, 313–314, 324
agents, classification, 323
effects during pregnancy, 327–328
fertility after, 322–327
fertility preservation, 328-330
Hodgkin's disease, 311-312, 325
non-Hodgkin's lymphoma, 312-313,
325, 326
pregnancy outcomes after, 327
supportive therapies, 315–316
timing of delivery, 316
chest X-ray (CXR), 130-131
chlorambucil, 324
cholelithiasis, thalassemia, 72
chondrodysplasia punctata,
152, 154
CHOP chemotherapy regimen, 312,
326
chorea gravidarum, 185
chorionic villus sampling (CVS)
hemoglobinopathies, 85, 87
hemophilia, 261
chronic idiopathic neutropenia (CIN),
50
chronic myeloid leukemia (CML),

```
CLASP (Collaborative Low-dose
     Aspirin Study in Pregnancy), 272
clopidogrel, 166
coagulation factors
  during PPH, 217, 218
  normal pregnancy, 8, 10, 251
  rare deficiencies, 251-252, 255
coagulation tests
  obstetric hemorrhage, 12-13,
    219-220
  point of care, 11-13
  routine, 11
coagulopathies
  inherited, 246-252
  obstetric hemorrhage, 212, 217-219
cold hemagglutinin disease (CHAD),
     52, 53
colloids, obstetric hemorrhage, 208
combined spinal epidural (CSE), 168
complement activation, hemolytic
    uremic syndrome, 289
compression stockings. See graduated
     elastic compression stockings
computed tomography pulmonary
    angiography (CTPA), 130, 131
congenital dyserythropoietic anemia
     (CDA), 97-98, 100
congenital heart disease, 150, 160
consent, cryopreservation of gametes,
    329-330
contraception
  sickle cell disease, 59-60
  thalassemia, 70-71
controlled cord traction, 199
Coombs test, 117
corticosteroids
  acute TTP, 286
  antiphospholipid syndrome, 182, 184
  autoimmune hemolytic anemia, 53
  complications of maternal, 108
  FNAIT, 107, 108
  HELLP syndrome, 277
  hematological malignancies, 316
  ITP, 45-47, 54
  myelosuppressed women, 315
  systemic lupus erythematosus, 185
cranial irradiation, 321
critical care, obstetric hemorrhage, 214
cryoprecipitate, obstetric hemorrhage,
     221, 222
crystalloids, obstetric hemorrhage, 208
cyanocobalamin, oral, 35
cyclophosphamide, ovarian toxicity,
     322-324
cytarabine (cytosine arabinoside),
     313-314
cytopenias, autoimmune, 40-54
cytoreductive therapy,
```

myeloproliferative neoplasms,

302, 303, 304–305

```
dabigatran, 134, 145, 151, 173
dalteparin
  acute VTE in pregnancy, 133
  inherited thrombophilia, 193
  myeloproliferative neoplasms, 302
  prosthetic heart valves, 157
  thromboprophylaxis, 145
danaparoid, 145
daunorubicin, 313
D-dimers, 9
  sickle cell disease, 63
  suspected VTE, 131-132
deep venous thrombosis (DVT), 129,
     See also venous thromboembolism
  antiphospholipid syndrome, 179
  case studies, 136-137
  diagnosis, 130
  management in pregnancy, 132-133
  sites in pregnancy, 129-130
  symptoms and signs, 129, 130
deferasirox, 71, 94
deferiprone, 71, 94
deferoxamine (desferrioxamine), 60,
     71, 74, 94
delivery, care during. See peripartum
    management
desmopressin (DDAVP)
  hemophilia, 247, 248
  von Willebrand disease, 238, 239
dexamethasone, 277, 316
diabetes mellitus
  gestational, 24
  thalassemia, 72
Diamond-Blackfan anemia (DBA),
    98-99
dietary advice, iron intake, 21
diffuse large B cell lymphoma (DLBCL),
    309-310, 312-313
digital PCR, 89
dinoprostone, 202
disseminated intravascular coagulation
     (DIC), 290
  placental abruption, 277
  postpartum hemorrhage, 218
  pre-eclampsia, 275
  thrombocytopenia, 42
DNA analysis. See genetic testing
drug-induced thrombocytopenia, 42
dysfibrinogenemia, 251-252
dyskeratosis congenita, 99
echinocytes, 96
eclampsia, management, 274-275
ecluzimab, 289
edoxaban, 134, 151
electrolyte imbalance, massive
    transfusion, 212
electrophoresis, hemoglobin, 80
elliptocytosis, hereditary, 95
eltrombopag, ITP, 47
```

324-325, 327



Index

factor VII deficiency, 251 embolization, systemic, 151 embryo cryopreservation, 328-329 factor XI deficiency, 250 Glanzmann's thrombasthenia, 242 embryo loss, maternal thrombophilia, 103-109 obstetric hemorrhage, 211, 223 endoglin (Eng), 268, 271 factor VIII (FVIII) endothelial dysfunction, pre-eclampsia, activity in hemophilia carriers, 257-258 268 deficiency. See hemophilia enoxaparin diagnosis, 104 management, hemophilia, 247-248 acute VTE in pregnancy, 133 normal pregnancy, 7, 237, 246, inherited thrombophilia, 193 $284 - \bar{2}85$ myeloproliferative neoplasms, 302 VWF concentrates, 238-239 prosthetic heart valves, 156, 157 VWF interaction, 234 thromboprophylaxis, 145 function, 242 factor VIII:von Willebrand factor eosinophil count, 3, 4 (FVIII:VWF) ratio, 257-258 epidural analgesia. See also central 110 - 111neuraxial blockade factor IX anticoagulated women, 168-169 activity in hemophilia carriers, antiphospholipid syndrome, 185 causes, 112, 115 deficiency. See hemophilia ITP, 47-48, 54 epidural blood patch, anticoagulated management, hemophilia, 247-248 fibrin clot, 8 women, 172 normal pregnancy, 246 fibrinogen, 8-9 factor X deficiency, 251-252 ergometrine, 201, 209 factor XI erythroblastosis fetalis, 112, 123 218-219, 220 concentrate, 250 erythrocytes. See red cells erythrocytosis, 97, 299-300 deficiency, 249-251 erythroferrone, 18 factor XIII deficiency, 251-252 erythropoiesis, 93-94 erythropoietin, 23, 93-94 normal pregnancy, 9 Fanconi's anemia, 42, 99 essential thrombocythemia (ET), fentanyl, 171 293-305 case studies, 305, 306 ferritin iron storage, 16 fibrinolysis, 9 diagnosis, 299 serum, 2, 19, 20 management, 303-305 FIBTEM®, 11-13 ferroportin, 17, 18 pathogenesis, 297-299 fluconazole, 315 fertility/infertility pregnancy outcomes, 293, 294 acute leukemias, 324 treatment options, 300-303 ethical issues, cryopreservation of chronic myeloid leukemia, 324-325 effects of chemotherapy, 322-324 gametes, 329-330 1), 268, 271 ethnic differences effects of radiotherapy, 321-322 Hb concentrations, 1, 15 lymphomas, 325-326 mechanisms of chemoradiotherapy neutrophil counts, 50 folate RhD status, 113, 124 effects, 320-321 evacuation of retained products of preservation, 328-330 sickle cell disease, 59-60 conception (ERPC), 202 examination under anesthesia (EUA), thalassemia, 70-71 plasma, 2, 36 postpartum hemorrhage, 202 fetal anemia exchange transfusion, 123-124 clinical features, 112, 113 case study, 37 diagnosis of immune-mediated, causes, 35-36 117-118 F8 gene mutations, 258, 259 intrauterine treatment, 118-119 F9 gene mutations, 258 factor II deficiency, 251-252 middle cerebral artery flow, 120-122 factor V deficiency, 251-252 factor V Leiden (FVL), 190 pathogenesis, 112 fetal blood sampling (FBS) case study, 195 FNAIT, 106-109 diagnosis in pregnancy, 132, 194 hemoglobinopathies, 85 pre-eclampsia, 271 RhD isoimmunization, 117 pregnancy loss, 191

fetal growth restriction. See intrauterine

growth restriction

fetal sexing, hemophilia, 260-261

fetal/neonatal alloimmune thrombocytopenia (FNAIT), antenatal management, 106-109, 110 antenatal screening, 105 case reports, 110-111 clinical significance, 104, 105 differential diagnosis, 48, 103 epidemiology, 103-104 information for mother, 106 inherited disorders of platelet postnatal management, 49, 105-106, subsequent pregnancies, 104-105 feto-maternal hemorrhage (FMH), 112 determination of size, 115 as biomarker of PPH progression, as transfusion trigger, 211 during PPH, 217, 221-222 inherited disorders, 251-252 laboratory evaluation, 11, 219-220 pre-eclampsia, 275 fibrinogen concentrate dysfibrinogenemia, 252 obstetric hemorrhage, 211, 221-222 fluid resuscitation, obstetric hemorrhage, 202, 208-209 Fms-like tyrosine kinase, soluble (sFlt-FNAIT. See fetal/neonatal alloimmune thrombocytopenia erythrocyte, 2, 36 food fortification, 37 metabolism, 29, 35 folate deficiency, 35-38 management, 35, 36-38 folic acid supplements autoimmune hemolytic anemia, 53 bioavailability, 35 folate deficiency, 37-38 inherited red cell disorders, 94 peri-conceptual, 36-37 pyruvate kinase deficiency, 96-97 sickle cell disease, 60 thalassemia, 70, 71 vitamin B₁₂ deficiency, 35 follicular lymphoma, 309, 312-313

336

VTE risk, 132, 144

factor VII deficiency, 251-252

factor VIIa, recombinant (rFVIIa)



Index

fondaparinux peripartum therapy, 169, 173, 174 thromboprophylaxis, 145 food fortification, folate, 37 free fetal DNA (ffDNA), maternal plasma fetal sexing in hemophilia carriers, 261 hemoglobinopathies, 88-89 hemophilia mutation detection, 262 RhD status, 120 fresh frozen plasma (FFP) anticoagulant reversal, 158 factor XI deficiency, 250 obstetric hemorrhage, 211, 217, 222-223 rare coagulation factor deficiencies, full blood count, normal pregnancy, 11 Gap-PCR, 86, 87 gemeprost, 202 general anesthesia anticoagulated women, 171-172 obstetric hemorrhage, 210 genetic counseling, 255-260 case studies, 263 hemophilia, 255-260 rare bleeding disorders, 262 genetic testing excluding maternal contamination, female hemophilia carriers, 258-260 fetal sex determination, 261 hemoglobinopathies, 85-87 polycythemia vera, 299 RhD status, 116-117, 120 genital tract trauma, 210-211, 217, 218 gestational diabetes, 24 gestational hypertension, 266 gestational thrombocytopenia, 4, 7-8, 282-283 case study, 5 differential diagnosis, 41, 42 Glanzmann's thrombasthenia (GT), 242-243 glucose 6 phosphate dehydrogenase (G6PD) deficiency, 95-96 graduated elastic compression stockings deep venous thrombosis, 133 myeloproliferative neoplasms, 302, 304 post-thrombotic syndrome prophylaxis, 135 thromboprophylaxis, 144 granulocyte colony-stimulating factor

heart block, complete, 182-183, 186 heart disease. See cardiac disease heart valves defects in antiphospholipid syndrome, 180 prosthetic. See prosthetic heart valves thrombosis, 159-160 HELLP syndrome, 276-277, 288 ADAMTS 13 activity, 285 antiphospholipid syndrome, 180 case study, 279 differential diagnosis, 276, 277-278, thrombocytopenia, 42, 283, 288 hematinic factors, 2 hematocrit, 1, 2 hematological malignancies, 320-330, See also leukemia; lymphoma; myeloproliferative neoplasms acute, management of pregnancy, 309-316 case studies, 330 fertility after treatment, 320-327 fertility preservation, 328-330 pregnancy outcomes after treatment, 327 hematological parameters, normal pregnancy, 1-5 heme oxygenase inhibitors, competitive, 126 HemoCue, 207 hemoglobin (Hb) electrophoresis/HPLC, 80, 84 gene variants, 57, 77 structure, 77 hemoglobin (Hb) concentrations after iron therapy, 22 defining anemia, 1, 15 normal pregnancy, 1, 2, 15 hemoglobin A (HbA), 57 hemoglobin Adana, 84 hemoglobin Bart's hydrops fetalis syndrome, 67, 84 hemoglobin C (HbC), 57 hemoglobin E thalassemia, 89-91 hemoglobin H disease, 67, 70 case study, 91-92 hydrops fetalis, 84-85 hemoglobin S (HbS), 57 hemoglobin SC (HbSC) disease, 58-59, hemoglobin SS (HbSS) disease, 57, 58-59, 62, 77 hemoglobin Sβ0 thalassemia, 77 hemoglobinopathies, 77-89, See also sickle cell disease; thalassemia clinical heterogeneity, 83 global distribution, 78-80 high affinity, 97

molecular diagnostics, 85-87 preimplantation genetic diagnosis, 88 prenatal diagnosis, 83-87, 89 screening, 80, 81, 82 screening case studies, 89-92 significant, 77-78 UK NHS screening program, 80-83 hemolysis, elevated liver enzymes and low platelets. See HELLP syndrome hemolysis/hemolytic anemia, 51-52 autoimmune (AIHA), 40, 51-54 causes, 52 G6PD deficiency, 95, 96 laboratory features, 53 microangiopathic (MAHA), 42, 277-278 neonatal, 54 red cell alloimmunization, 112 sickle cell disease, 57 treatment, 53 TTP, 283-284 hemolytic disease of (fetus and) newborn (HD(F)N), 112-126 antenatal management, 118-119, 122 - 123determining risk, 117, 119-120 future prospects, 126 other red cell antigens, 125-126 pathogenesis, 112-113 postnatal management, 123-124 prenatal diagnosis, 117-118, 119-122 prevention, 114-116, 122-123 RhD isoimmunization. See Rhesus D isoimmunization hemolytic uremic syndrome (HUS), 289 case study, 290, 291 differential diagnosis, 278, 283 pathophysiology, 289 thrombocytopenia, 42 treatment, 289 hemophilia, 246-249 case studies, 252-253, 263 clinical features, 246 gene mutations, 258 genetic counseling, 255-260 genetic diagnosis of carriers, 258-260 inheritance, 255, 256 laboratory detection of carriers, 257-258 neonatal management, 248-249 neonatal risk, 247 obstetric complications, 246-247 obstetric management, 247-248 pedigree analysis, 256-257 prenatal diagnosis, 260-262 somatic mosaicism, 258-260 hemorrhage. See bleeding/hemorrhage hemosiderin, 16

337

(G-CSF), 51



Index

hemostasis assessment, 11-13 impairments in PPH, 217-219 inherited disorders of primary, monitoring during PPH, 219-220 normal pregnancy, 7-11, 284-285 primary, 7-8 hemostatic agents, obstetric hemorrhage, 211, 223-224 heparin acute VTE in pregnancy, 132-133 antiphospholipid syndrome, 182 breastfeeding safety, 134 inherited thrombophilia, 193 intolerance, 145 low molecular weight. See low molecular weight heparin management of delivery, 133-134 monitoring in pregnancy, 133 pre-eclampsia prevention, 273 prosthetic heart valves, 151, 158 rapid reversal, 170 severe cutaneous allergy, 174 thromboprophylaxis, 144-145 unfractionated. See unfractionated heparin heparin-induced thrombocytopenia (HIT), 42, 144, 145 hepatitis B vaccination, 70 hepatitis C (HCV), thalassemia, 72 hepcidin, 18 hereditary elliptocytosis, 95 hereditary pyropoikilocytosis, 95 hereditary spherocytosis (HS), 94-95 heritable bleeding disorders. See inherited bleeding disorders high-performance liquid chromatography (HPLC), hemoglobin, 80, 84 hirudin, 173 HLA associations, HPA-1a alloimmunization, 103 HLA typing, embryos, 88 Hodgkin's disease/lymphoma (HL) case study, 330 clinical presentation, 310 incidence, 309 late effects on fertility, 325 management in pregnancy, 311-312, 327, 328 holohaptocorrin (holoHC; formerly transcobalamin III), 29-30 holotranscobalamin (holoTC), 29-30 serum, 33 homocysteine, plasma total (tHcy), 33, 36, 194 HPA (human platelet alloantigens), 103 antibody testing, 104, 109 genotyping, 104, 109

HPA-1a alloimmunization, 103, 104 clinical significance, 104 predicting severity of FNAIT, 105 HPA-1a/5b negative-platelets, for transfusion, 49, 106, 111 HPA-5b alloimmunization, 103, 104 hydrops fetalis hemoglobin Barts, 84 hemoglobin H, 84-85 postnatal management, 123-124 red cell alloimmunization, 112, 113 hydroxycarbamide (hydroxyurea) acute myeloid leukemia, 314 myeloproliferative neoplasms, 302, 303, 304–305 sickle cell disease, 60 hydroxychloroquine, 184, 185, 186 hydroxycobalamin, intramuscular, 34 - 35hydroxyurea. See hydroxycarbamide hyperbilirubinemia, neonatal exchange transfusion, 123-124 phototherapy, 123 hypertension chronic, 266, 270 gestational, 266 myelodysplastic syndrome, 314-315 hypertensive disorders of pregnancy, 266, See also pre-eclampsia sickle cell disease, 58 thrombocytopenia, 41-42 hyperuricemia, 271 hypogonadotropic hypogonadism, 68, hypotension, induced by salvaged blood, 213 hypothalamic-pituitary axis, radiationinduced damage, 321 hypothermia, massive transfusion, 211 - 212hypothyroidism, thalassemia, 72 hysterectomy, 203 idiopathic thrombocytopenic purpura (ITP), 40-49, 283 case study, 54-55 diagnosis, 41-44 epidemiology, 41 management, 44-49 pathogenesis, 41 prenatal counseling, 49 imatinib, 314, 324-325, 327 immune thrombocytopenic purpura. See idiopathic thrombocytopenic purpura in vitro fertilization (IVF), antiphospholipid syndrome, 185, 186 induction of labor anticoagulated women, 166-167, 170

hematological malignancies, 316 infections. See also sepsis as cause of thrombocytopenia, 42-43 sickle cell disease, 62 transfusion transmitted, 241 infertility. See fertility/infertility inherited bleeding disorders coagulopathies, 246-252 disorders of primary hemostasis, 233-243 genetic counseling and prenatal diagnosis, 255-262 inheritance patterns, 255 inherited red cell disorders. See red cell disorders, inherited inherited thrombophilias, 132 case studies, 195 diagnostic testing, 193-194 epidemiology, 189-190 fetal carriers, 192 further research, 194-195 management, 192-193 pre-eclampsia, 271 pregnancy loss associations, 190-191 thromboprophylaxis, 142, 144 very early pregnancy loss, 192 VTE risk, 140 instrumental delivery, ITP, 48 interferon α (IFN-α) breastfeeding and, 304-305 myeloproliferative neoplasms, 302, 303 internal iliac arteries ligation, 203 prophylactic balloon occlusion, 228 international normalized ratio (INR), interventional radiology (IR), postpartum hemorrhage, 227-229 case studies, 229-231 outcomes, 229 prophylactic internal iliac artery occlusion, 228 technical aspects, 227-228 intracranial hemorrhage (ICH), fetal/ neonatal FNAIT, 103-104, 105 hemophilia, 247, 248-249 maternal ITP, 48, 49 von Willebrand disease, 239 intrahepatic cholestasis of pregnancy (ICP), 286-287 intramuscular injections, anticoagulated women, 167, 171 intraosseous access, obstetric hemorrhage, 207 intrapartum management. See peripartum management intraperitoneal transfusion (IPT), intrauterine, 118



Index

intrauterine growth restriction (IUGR),		sickle cell disease, 63
265	265–279	thalassemia, 70
relationship with pre-eclampsia, 269, 270	ITP. See idiopathic thrombocytopenic purpura	thromboprophylaxis, 142–143, 144–145
risk factors, 265	itraconazole, 315	lupus anticoagulant (LAC), 178, 181
sickle cell disease, 59, 61	111401142010, 010	lymphocyte count, 3–4
thalassemia, 70	<i>JAK2</i> gene mutations, 297, 298, 299	lymphoma
uterine artery Doppler, 271, 283	, 8	clinical presentation, 310
intravascular transfusion (IVT),	Kell isoimmunization, 125, 127	diagnosis and staging, 310-311
intrauterine, 118	kernicterus, 112–113	late effects on fertility, 325-326
intravenous immunoglobulin (IVIG)	Kleihauer test, 115	management in pregnancy, 311-313
antiphospholipid syndrome, 185	·	thrombocytopenia, 42
autoimmune hemolytic anemia, 53	labetalol, 274	
complications of maternal therapy,	labor analgesia	macrocytosis, 32, 33
108	fully anticoagulated women, 171	magnesium sulfate, 274, 316
FNAIT, 106, 107-109	hematological malignancies, 316	malaria, 24, 78-80
hemolytic disease of newborn, 124	hemophilia, 248	maternal mortality
ITP, 45–47, 49, 54	sickle cell disease, 61	anemia, 19-20
RhD isoimmunization, 122-123	von Willebrand disease, 239-240	obstetric hemorrhage, 197, 206
intrinsic factor (IF), 30, 34	women on thromboprophylaxis, 167,	sickle cell disease, 58
iron	168–169	venous thromboembolism, 129, 139
absorption, 16	labor, care during. See peripartum	May Hegglin anomaly, 42
bone marrow, 20–21	management	mean cell hemoglobin (MCH), 2
cardiac, thalassemia, 71–72	leukemia	mean cell hemoglobin concentration
depletion, 15	effects of therapy on fertility,	(MCHC), 2
homeostasis, 16, 17	324–325	mean cell volume (MCV), 1, 2
liver, thalassemia, 72	management in pregnancy, 313–314,	folate deficiency, 36
maternal-fetal transfer, 17-18	327–328	megaloblastic anemia
requirements, 16, 17	thrombocytopenia, 42	folate deficiency, 36
serum, 21	Libman-Sacks endocarditis, 180	vitamin B ₁₂ deficiency, 33, 34
stores, 2, 16, 20	liver disease	metamyelocytes, 4
iron deficiency (anemia), 15–25	pregnancy associated, 286–289	methotrexate
case studies, 25	thalassemia, 72	hematological malignancies, 312, 314, 324
causes, 18 clinical features, 18–19	liver function, normal pregnancy, 286	placenta accreta, 202
definition, 15	long chain 3-hydroxyacyl-CoA	methyldopa, 272
diagnosis, 20–21	dehydrogenase (LCHAD), 287–288	methylenetetrahydofolate reductase
epidemiology, 15	low birth weight	(MTHFR) gene polymorphisms, 35
management, 21–23, 35	folic acid supplements and, 36	methylmalonic acid (MMA), plasma, 33
pathophysiology, 15–18	maternal anemia and, 19	methylprednisolone, 45–46
postpartum, 24–25	sickle cell disease, 59	microangiopathic hemolytic anemia
pregnancy outcome, 19–20	low-molecular-weight heparin (LMWH)	(MAHA), 42, 277–278
prevention, 23–24	acute VTE in pregnancy, 132–133	microangiopathies, thrombotic (TMA),
screening, 24	antenatal maintenance therapy, 133	180, 282–290
iron dextran, 22	antiphospholipid syndrome, 183, 184	microcytes, hypochromic, 20
iron overload	breastfeeding safety, 134, 160	middle cerebral artery flow, fetal,
congenital dyserythropoietic anemia,	case studies, 136–137	120-122
98	elective cesarean section, 134, 168	miscarriage
sickle cell disease, 60	inherited thrombophilia, 193, 195	anti-D prophylaxis, 115
thalassemia, 67, 68-69, 71-72	monitoring in pregnancy, 133,	defined, 189
iron supplementation, 1, 23–24	156–157	rare coagulation factor deficiencies, 252
risks, 24	myeloproliferative neoplasms, 302,	recurrent. See recurrent miscarriage
sickle cell disease, 60, 61	304	misoprostol, 201, 210
thalassemia, 70	peripartum period, 133–134,	mitochondrial trifunctional protein
iron therapy, 21–22	166–169, 170	(MTP), 287–288
intramuscular, 22	postpartum continuation, 134, 167	mode of delivery. See also cesarean
oral, 21–22	pre-eclampsia prevention, 273	section
parenteral, 22	prosthetic heart valves, 152, 156–157,	anticoagulated women, 157, 159
postpartum, 25	158	hematological malignancies, 316
therapeutic trial of oral, 21	rapid reversal, 158	ITP, 48



Index

Modified Early Obstetric Warning Score (MEOWS), 200 molecular diagnostics. See genetic testing monoclonal antibody-specific immobilization of platelet antigens (MAIPA) assay, 104 monocyte count, 3, 4 multiplex ligation-dependent probe amplification (MLPA), 86, 87, 258, myelocytes, 4 myelodysplastic syndrome (MDS), case study, 306 diagnosis, 300 management, 303-305 pathogenesis, 297-299 pregnancy outcomes, 293, 296 treatment options, 300-303 myeloma, 326 myeloproliferative neoplasms (MPN), 293-305 case studies, 305 diagnosis, 299-300 epidemiology, 293 high risk pregnancy criteria, 303 management, 301, 303-305 pathogenesis, 297-299 postpartum assessment, 304-305 pregnancy outcomes, 293-297 treatment options, 300-303 myocardial infarction, acute antiphospholipid syndrome, 179 thrombolytic therapy, 172-173 nadroparin, 193

NAIT. See fetal/neonatal alloimmune thrombocytopenia near patient testing. See point of care testing neonatal alloimmune neutropenia (NAIN), 51 neonatal thrombocytopenia alloimmune (NAIT). See fetal/ neonatal alloimmune thrombocytopenia case study, 54 causes, 103 maternal ITP, 41, 48, 49 antiphospholipid antibodies, 186 autoimmune hemolytic anemia, 54 Bernard-Soulier syndrome, 242

rare coagulation factor deficiencies, von Willebrand disease, 241 neural tube defects (NTDs), 35, 36-37 neurological features, antiphospholipid syndrome, 180, 185 neutropenia autoimmune (AIN), 40, 49-51 chronic idiopathic (CIN), 50 defined 49 differential diagnosis, 50 grading of severity, 50 neonatal alloimmune (NAIN), 51 neutrophil count, 2-3 myelofibrosis, primary (PMF), 293-305 new oral anticoagulants (NOACs), 173 antenatal therapy, 134, 145 prosthetic heart valves, 151 next generation sequencing (NGS), 89 non-transfusion dependent thalassemia (NTDT), 66-67 complications during pregnancy, 68, obstetric care, 70, 71, 73, 74 non-Hodgkin's lymphoma (NHL) clinical presentation, 310 incidence, 309-310 late effects on fertility, 325-326 management in pregnancy, 312-313 non-invasive prenatal diagnosis (NIPD), 88-89 fetal RhD status, 120, 126 fetal sex determination, 260-261 hemoglobinopathies, 88-89 hemophilia, 262 other red cell antigens, 125-126 non-steroidal anti-inflammatory drugs

> obesity, VTE risk, 140 obstetric hemorrhage, 197-203, See also antepartum hemorrhage; postpartum hemorrhage anesthesia during, 210 anesthetic management, 206-214 antenatal assessment, 206 blood/blood component therapy, 210-211, 220-223 case studies, 214-215, 224 cell salvage, 212-214 communication, 206-207 complications of massive, 211-212 diagnosis, 200, 206 estimated times to death, 197 factor XI deficiency, 249 fluids for resuscitation, 208-209 hemostatic agents, 211, 223-224 hemostatic management, 217-224 initial resuscitation, 202, 207 investigations, 207-208 monitoring, 208, 209

(NSAIDs), 166

obstetric management, 200-203 pharmacological control, 209-210 post hemorrhage care, 214 radiological management, 227-229 thromboprophylaxis after, 214, 224 von Willebrand disease, 237 ofatumumab, 326 oocyte cryopreservation, 329 operative delivery. See cesarean section opioid analgesia labor in anticoagulated women, 171 painful sickle crises, 62 oral anticoagulants. See new oral anticoagulants; vitamin K antagonists oral contraceptive pill, sickle cell disease, 59-60 osteoporosis, thalassemia, 72 ovarian failure acute leukemias, 324 chemotherapy-induced, 320-321, 322, 323 lymphomas, 325-326 radiation-induced, 320-321, 322 single-agent chemotherapy, 322-324 ovarian tissue, cryopreservation, 329 oxytocin (Syntocinon), 201, 209, 316

defining erythrocytosis, 299 myeloproliferative neoplasms, 300, 302-303 pagophagia, 18-19 pain management acute sickle crises, 62 during labor. See labor analgesia parietal cell antibodies, 34 parvovirus B19, 99, 241 pedigree analysis, hemophilia, 256-257 pelvic irradiation. See abdomino-pelvic irradiation penicillin, 60 Perinatal Antiplatelet Review of International Studies (PARIS), 272 - 273

packed cell volume (PCV)

peripartum management

anticoagulants, 165-174 factor XI deficiency, 250 full anticoagulation, 133-134, 169-172 hematological malignancies, 316 hemophilia, 247-248 iron deficiency anemia, 23 ITP, 47-49 myeloproliferative neoplasms, 304 pre-eclampsia, 273-274 prosthetic heart valves, 157-159 sickle cell disease, 63 thalassemia, 74 thromboprophylaxis, 165-169

von Willebrand disease, 239-240

340

factor XI deficiency, 251

hemophilia, 247, 248-249

ITP, 48, 49

Glanzmann's thrombasthenia, 242

hemoglobinopathy screening, 80-83



Index

pernicious anemia, 34, 37 Philadelphia positive acute lymphoblastic leukemia (Ph+ ALL), 314 phototherapy, 123 phytomenadione, 96 pituitary dysfunction, thalassemia, 68 placenta manual removal, 202 retained, 217, 218 placenta accreta, 199, 202, 227 placenta previa antepartum hemorrhage, 197 postpartum hemorrhage, 199, 217, placental abruption, 265-266 antepartum hemorrhage, 197 case studies, 12-13, 224 hemostatic changes, 211, 217, 218 management, 277 placental disease antiphospholipid syndrome, 179 high risk pregnancies, 283 ischemic (IPD), 265-279 pre-eclampsia, 267-269 pregnancy loss, 190 placental infarction, myeloproliferative neoplasms, 297-299 placental protein 13 (PP-13), 283 placentation abnormal, 199, 217, 218, 227 normal, 190 plasma exchange (PEX) antiphospholipid syndrome, 185 hemolytic uremic syndrome, 289, 290, 291 RhD isoimmunization, 122 TTP, 285-286 plasma volume, 1, 15 plasmapheresis. See plasma exchange plasmin, 9 plasminogen activator inhibitor (PAI), 9 platelet counts, 41, See also thrombocytopenia case study, 5 fetal, 48 heparinized pregnant women, 133 ITP intervention thresholds, 44, 45 myeloproliferative neoplasms, 300, 302, 303 neonatal, 49 normal pregnancy, 4, 7-8 platelet function analysis (PFA), 4-5 anticoagulated parturients, 173 von Willebrand disease, 237 platelet transfusion Glanzmann's thrombasthenia, 242 HELLP syndrome, 277 intrauterine, FNAIT, 106-107, 108 ITP, 45-47

neonates with FNAIT, 105-106, 111 obstetric hemorrhage, 211, 217, 223 platelets, 4-5 inherited disorders of function, 241, 242-243 ITP-related changes, 44 primary hemostasis, 7 size/volume, 4 Plummer-Vinson syndrome, 19 point of care testing (POCT), 11-13 anticoagulated women, 173-174 obstetric hemorrhage, 207-208, 220, polycythemia vera (PV), 293-305 case study, 305-306 diagnosis, 299-300 management, 303-305 pathogenesis, 297-299 pregnancy outcomes, 293, 295 treatment options, 300-303 posaconazole, 315 post-dural puncture headache, anticoagulated women, 172 postpartum hemorrhage (PPH), 197, See also obstetric hemorrhage anesthetic management, 206-214 blood/blood product transfusion, 220 - 223case studies, 224, 229-231 diagnosis, 200 drug management, 201-202, 209-210 factor XI deficiency, 250-251 fibrinogen as biomarker, 218-219, hematological malignancies, 316 hemostatic agents, 211, 223-224 hemostatic impairment, 217–219 hemostatic management, 220-224 immediate management, 200-202 ITP, 47 monitoring hemostasis, 219-220 obstetric management, 202-203 pathogenesis, 199 prevention, 197-199 prosthetic heart valves, 157 radiological management, 227-229 risk factors, 198, 227, 228 sickle cell disease, 59 thromboprophylaxis after, 214, 224 volume maintenance, 202 von Willebrand disease, 237, 240 post-thrombotic syndrome (PTS), 134-135 PPH. See postpartum hemorrhage pravastatin, 273 prednisolone

antiphospholipid syndrome, 184

FNAIT, 107, 108

ITP, 45-46, 54

pre-eclampsia (PET), 265, 266-279 antiphospholipid syndrome, 180, 271 case studies, 278-279 complications, 267 diagnosis, 267 differential diagnosis, 277-278, 283 epidemiology, 266-267 hematological complications, 275-278 liver involvement, 288-289 long-term consequences, 269-270 management guidelines, 274 pathogenesis, 267-269, 270 pharmacological therapy, 274 prediction, 271, 283 prevention, 271-273 relationship with IUGR, 269, 270 risk factors, 266 sickle cell disease, 58, 61 thrombocytopenia, 41-42, 275, 283 thrombophilia and, 271 timing of delivery, 273-274 uterine artery Doppler, 271, 283 pregnancy normal cellular changes, 1-5 normal coagulation changes, 7-13 pregnancy loss, 189, See also miscarriage; stillbirths antiphospholipid syndrome, 180 case studies, 195, 290 dilemmas, 194 epidemiology, 189 fetal thrombophilia, 192 further research, 194-195 inherited thrombophilia association, 190-191 intrahepatic cholestasis of pregnancy, 287 management, 192-193 pathogenesis, 190-192 placental pathology, 190 terminology, 189 thrombophilia testing, 194 pregnancy-associated placental protein A (PAPP-A), 283 preimplantation genetic diagnosis (PGD) hemoglobinopathies, 88 hemophilia, 262 thalassemia, 69, 88 prenatal diagnosis hemoglobinopathies, 83-87 hemophilia, 260-262 heritable bleeding disorders, 255 non-invasive. See non-invasive prenatal diagnosis rare bleeding disorders, 262

red cell alloimmunization, 117-118,

von Willebrand disease, 238

119-122



Index

pre-pregnancy counseling antiphospholipid syndrome, 182 - 183hemophilia, 247 ITP, 49 myeloproliferative neoplasms, 303 preterm delivery antiphospholipid syndrome, 180 hematological malignancies, 313, 316 maternal anemia and, 19 pre-eclampsia, 273-274 sickle cell disease, 59 preterm premature rupture of membranes (PPROM), 315 primary thrombocythemia. See essential thrombocythemia prosthetic heart valves, 150-160 antenatal anticoagulation, 145, 151-157, 159 biological vs mechanical, 150 case studies, 160-161 indications, 150 need for thromboprophylaxis, 151 peripartum management, 157-159 valve thrombosis, 159-160 protamine, 158, 170 protein C, 9-11 activated. See activated protein C testing in pregnancy, 132, 194 protein C deficiency, 189-190 pregnancy loss, 191 VTE risk, 132, 144 protein S, 9-11 case study, 12 testing in pregnancy, 132, 194 protein S deficiency, 189-190 pregnancy loss, 191 VTE risk, 132, 144 protein/creatinine (P/C) ratio, urinary, prothrombin (factor II) deficiency, 251-252 prothrombin antibodies, 182 prothrombin complex concentrates (PCC), 158-159 factor II or X deficiencies, 251 obstetric hemorrhage, 223-224 prothrombin G20210A mutation, 190 case studies, 195 pregnancy loss, 191 VTE risk, 132, 144 prothrombin time (PT), 11 obstetric hemorrhage, 217, 223 pre-eclampsia, 275 pseudothrombocytopenia, 42, 43, 44 puerperium, normal cellular changes, pulmonary embolism (PE), 129, See also venous thromboembolism

diagnosis in pregnancy, 130-132 diagnostic radiation exposure, 131 massive life-threatening, 135-136, 172-173 pyropoikilocytosis, hereditary, 95 pyrosequencing, 85-86 pyruvate kinase deficiency, 96-97, 100 racial differences. See ethnic differences radiation exposure, 131 radiology, interventional. See interventional radiology radiotherapy effects during pregnancy, 327-328 fertility preservation, 328-330 Hodgkin's disease, 312 infertility after, 321-322 pregnancy outcomes after, 327 recurrent miscarriage antiphospholipid syndrome, 180 case studies, 195 defined, 189 further research, 194-195 inherited thrombophilia, 191 management, 192-193 pathogenesis, 191 thrombophilia testing, 194 red cell alloimmunization, 112-126 case studies, 127 cell salvage, 213-214 other red cell antigens, 125-126 pathogenesis, 112-113 RhD. See Rhesus D isoimmunization sensitizing events, 112, 115 sickle cell disease, 62 thalassemia, 68, 72 red cell antibodies maternal testing, 119-120 pathophysiology, 112-113 red cell count, 1, 2 red cell disorders, inherited, 93-99, See rituximab also hemoglobinopathies case studies, 100 congenital dyserythropoietic anemia, 97-98 enzymopathies, 95-97 membrane disorders, 94-95 red cell indices iron deficiency anemia, 20 normal pregnancy, 1, 2 red cell mass, 1, 15 red cells development, 93-94 normal pregnancy, 1-2 regional anesthesia. See also central neuraxial blockade; epidural analgesia factor XI deficiency, 250 fully anticoagulated women, 134, 172 hemophilia, 248

obstetric hemorrhage, 210 sickle cell disease, 61 women on thromboprophylaxis, 145, 167-169 remifentanil, 171 renal disease antiphospholipid syndrome, 180 hemolytic uremic syndrome, 289 restless legs syndrome, 19 reticulocytes, 93, 94 hemoglobin content, 20 RHCE gene, 113-114 RHD gene, 113-114 DNA testing, 116-117 variants, 114, 124-125 RHD pseudogene, 124 RHD/CE hybrids, 124-125 Rhesus c isoimmunization, 125-126 Rhesus D blood group determination, 116-117, 119-120 genotypes and phenotypes, 113-114 Rhesus D isoimmunization, 113-125 case study, 127 cell salvage, 214 current management, 119-123 future prospects, 126 hemolytic disease. See hemolytic disease of newborn pediatric management, 123-124 postnatal management, 123-124 prevention, 114-116 sensitizing events, 112, 115 thalassemia, 68, 72 traditional management, 116-119 Rhesus E isoimmunization, 125-126 rheumatic heart disease, 150, 160 ristocetin cofactor assay (VWF RCo), 236 ristocetin induced platelet agglutination (RIPA), 236 autoimmune hemolytic anemia, 53 ITP, 47 lymphoma, 312, 325-326 rivaroxaban, 134, 145, 151, 173 romiplostim, ITP, 47 rotational elastometry (ROTEM®), 11 - 13anticoagulated women, 173-174 obstetric hemorrhage, 220, 221 Sanger sequencing, 85, 86 Schwachman-Diamond syndrome, 99 sepsis chemotherapy associated, 315

maternal neutropenia, 51

sickle cell anemia, 57, 58-59

case study, 63-64

short tandem repeats (STRs), 87, 88

antenatal blood transfusion, 62

case study, 174



Index

sickle cell disease (SCD), 57-63 antenatal care, 61-63 case studies, 63-64 clinical features, 57-58 delivery, 63 detection methods, 80, 85 epidemiology, 57 fertility and contraception, 59-60 fetal complications and outcomes, 59 geographical distribution, 80 maternal complications, 58-59 molecular basis, 84 molecular diagnostics, 86 postnatal management, 63 preconception care, 60 pregnancy and, 58 preimplantation genetic diagnosis, 88 prenatal diagnosis, 78, 83-87, 89 screening, 80 UK NHS screening program, 80-83 sickle crises, painful, 57, 58, 61, 62 sickle solubility test, 80 somatic mosaicism, hemophilia carriers, 258-260 spherocytosis, hereditary (HS), 94-95 spinal blocks fully anticoagulated women, 172 von Willebrand disease, 239-240 women on thromboprophylaxis, 167-168, 169 splenectomy, 99 pyruvate kinase deficiency, 100 thalassemia, 67, 70 statins, 273 stem cell transplantation (SCT) fertility after, 322-324 pregnancy outcomes after, 327 stillbirths RhD isoimmunization, 117 sickle cell disease, 59 streptokinase, 136 subacute combined degeneration of the cord, 31 sulproston, 202 Swiss-cheese heterochromatin, 98 Syntocinon. See oxytocin systemic lupus erythematosus (SLE) acute exacerbation, 289-290 antiphospholipid syndrome, 177, 178 differential diagnosis, 283 management in pregnancy, 185 pre-pregnancy management, 182-183

T cell lymphoma, 309, 312–313 thalassemia, 66–74 α. See α thalassemias β. See β thalassemias

blood transfusion, 67-68, 70 carriers, 69-70 case studies, 74-75, 89-92 classification, 66-67 detection methods, 80, 85 global distribution, 66, 78-80 iron overload, 67, 68-69, 71-72 labor and delivery, 74 molecular basis, 77 molecular diagnostics, 85-87 non-transfusion dependent. See nontransfusion dependent thalassemia postpartum care, 74 preconception and antenatal care, 69-73 preimplantation genetic diagnosis, 69,88 prenatal diagnosis, 78, 79, 83-87, 89 screening, 69, 80-89 UK NHS screening program, 80-83 thalassemia intermedia. See non-transfusion dependent thalassemia thalassemia major (TM), 67 case studies, 74-75 complications during pregnancy, 67 - 69obstetric care, 69, 70-74 rationale for screening, 80 thalassemia minor, 69-70 thalassemia trait, 67, 69-70 third stage of labor, active management, thrombosis 199, 316 thrombin activatable inhibitor of fibrinolysis (TAFI), 9 thrombin, generation, 8 thrombocythemia, primary/essential. See essential thrombocythemia thrombocytopenia antiphospholipid syndrome, 180, 185 case studies, 54-55 causes in pregnancy, 41-43 fetal/neonatal alloimmune. See fetal/ neonatal alloimmune thrombocytopenia gestational. See gestational thrombocytopenia HELLP syndrome, 42, 283, 288 hereditary (constitutional), 42 idiopathic/immune. See idiopathic thrombocytopenic purpura moderate to severe, in pregnancy, 282-283 neonatal. See neonatal thrombocytopenia obstetric hemorrhage, 211, 217, 218

pre-eclampsia, 41-42, 275, 283

spurious (pseudo-), 42, 43, 44

thromboelastography (TEG), 11-13

anticoagulated women, 173-174

thrombocytosis, 299

obstetric hemorrhage, 208 thromboembolic disease. See venous thromboembolism thrombolytic therapy, 136, 172-173 thrombomodulin, 10 thrombophilia. See also antiphospholipid syndrome epidemiology, 189-190 heritable. See inherited thrombophilias pre-eclampsia risk, 271 testing, 132, 193-194 thromboprophylaxis, 142, 144 VTE risk, 140 thrombopoeitin agonists, ITP, 47 thromboprophylaxis, 139-146 after obstetric hemorrhage, 214, 224 autoimmune hemolytic anemia, 53 case study, 174-175 efficacy and safety in pregnancy, 139 management strategies, 140-143 myeloproliferative neoplasms, 300-302, 303-304 non-pharmacological, 144 peripartum period, 165-169 pharmacological, 144-146 risk factor assessment, 140, 141, 142, 143 sickle cell disease, 62-63 von Willebrand disease, 240 antiphospholipid syndrome, 179 management in pregnancy, 183 myeloproliferative neoplasms, 297-299 previous, antiphospholipid syndrome, 183 rare coagulation factor deficiencies, 252 TTP, 284 venous. See venous thromboembolism thrombotic endocarditis, non-bacterial, 180 thrombotic microangiopathies (TMA), 180, 282-290 thrombotic thrombocytopenic purpura (TTP), 283-286 acquired, 285, 286 case study, 290, 291 congenital, 285, 286 differential diagnosis, 277, 282, 283 pathophysiology, 284 presentation in pregnancy, 285 previous acquired idiopathic, 285 subsequent pregnancies, 286 thrombocytopenia, 42 treatment of acute, 285-286 thyroid function, thalassemia, 72

ticlopidine, 166



Index

pre-eclampsia and IUGR, 271, 283 tin-mesoporphyrin, 126 viscoelastomeric hemostatic assays tinzaparin, 133, 145 uterine artery embolization (UAE), 203, (VHA), 220 227-229 vitamin B₁₂, 29-30 tissue factor, 11 case study, 231 tissue factor pathway inhibitor (TFPI), serum, 2, 32-33 outcomes, 229 therapy, 34-35 technical aspects, 227-228 vitamin B₁₂ deficiency tissue plasminogen activator (tPA), 9 uterine atony, 197, 199, 227 total body irradiation (TBI), 322 case study, 37 hemostatic changes, 217, 218 total iron binding capacity (TIBC), 21 causes, 30, 31 management, 201-202, 209-210 clinical features, 30-31, 32 tranexamic acid, 9 uterotonic agents, 201, 202, 209-210 hemophilia, 248 diagnosis, 31-34 management, 34-35 inherited disorders of platelet function, 242 balloon tamponade, 202 pregnancy outcomes, 31 bimanual compression, 202 vitamin D supplements, thalassemia, 72 ITP, 47 obstetric hemorrhage, 202, 211, 223 massage, 201 vitamin K packing with surgical gauze, 202-203 rare coagulation factor deficiencies, newborn infants, 96, 241, 248 radiation-induced damage, 321-322 rare coagulation factor deficiencies, von Willebrand disease, 239, 240 rupture, 217 251 transarterial embolization (TAE), reversal of anticoagulation, 158 postpartum hemorrhage, 227-229 vaccinations vitamin K antagonists (VKA), 152-155, sickle cell disease, 60 transcobalamin, 29-30 See also warfarin transferrin (Tf), 16, 17-18 splenectomized patients, 99 adverse fetal effects, 152-154, 155 vardenafil, 273 saturation, 21 dose and fetal complications, vascular endothelial growth factor transferrin receptors (TfR), 17-18 154-155 (VEGF), 268 soluble (sTfR), 21 peripartum management, 158 transfusion dependent anemias, 94 vaso-occlusive crises, sickle cell disease, prosthetic heart valves, 150, 151, transfusion related acute lung injury 57, 58 152-155 vasopressin, 202 reversal, 158-159, 171 (TRALI), 212, 222 venesection, therapeutic, 302-303 von Willebrand disease (VWD), 7, transfusion transmitted infections, venous thromboembolism (VTE), VWF concentrates, 241 233 - 241129-136 TTP. See thrombotic thrombocytopenic antenatal management, 237-239 antiphospholipid syndrome, 179 case studies, 243-244 purpura tyrosine kinase inhibitors, 324-325, assessment and diagnosis of acute, classification, 234-235 327, See also imatinib 130 - 132clinical features, 234 case studies, 136-137 diagnostic algorithm, 236 initial treatment in pregnancy, ultrasound inheritance, 255 antiphospholipid syndrome, 184 132 - 133intrapartum management, 239-240 deep venous thrombosis, 130 maintenance antenatal treatment, laboratory evaluation, 235-237 fetal middle cerebral artery, 120-122 neonatal management, 241 fetal sex determination, 260 maternal mortality, 129, 139 obstetric complications, 237 guiding femoral artery access, 228 pathogenesis, 129-130, 139-140 postpartum management, 240 hydrops fetalis, 113 peripartum management, 133-134 pre-pregnancy management, 237, sickle cell disease, 61 postpartum anticoagulation, 134 thalassemia, 70 post-thrombotic syndrome, 134-135 thrombocytopenia, 42 previous, 140, 142, 144, 183 umbilical cord, delayed clamping, 23 von Willebrand factor (VWF), 7, unfractionated heparin (UFH) prophylaxis. See thromboprophylaxis 233-234 concentrates, 238-239, 240, 241 acute VTE in pregnancy, 132-133 risk factor assessment, 140, 141, 142, massive pulmonary embolism, 136 143 factors affecting plasma levels, 234 sickle cell disease, 62-63 monitoring in pregnancy, 133 laboratory tests, 236 symptoms and signs, 129, 130 peripartum period, 134, 166-167, multimers, 233, 236-237 thalassemia, 70 169, 170 normal pregnancy, 7, 237, 284-285 prosthetic heart valves, 152, 156, 158 thrombophilia testing, 132 TTP, 284 rapid reversal, 170 ventilation perfusion (V/Q) scanning, VTE. See venous thromboembolism VWF. See von Willebrand factor thromboprophylaxis, 144, 145 131 urinary tract infections, sickle cell vertebral canal hematoma, 165, 167 disease, 58 warfarin vinblastine, 311 ursodeoxycholic acid (UDCA), 287 adverse fetal effects, 145, 152-154, viral infections, thrombocytopenia, uterine artery Doppler

Virchow's triad, 129, 140

344

antiphospholipid syndrome, 184

myeloproliferative neoplasms, 304

antenatal thromboprophylaxis, 143,

145-146



Index

antiphospholipid syndrome, 185 dose and fetal complications, 154–155 peripartum period, 170, 171 postpartum period, 134, 143, 145, 160 prosthetic heart valves, 145, 152, 153 reversal, 158–159, 171

warfarin embryopathy, 145, 152–154, 155 effects of dose, 155 warfarin fetopathy, 154 dose dependence, 154–155 warm antibody autoimmune hemolytic anemia, 52 Well's score, 131–132

white cell counts (WCC)
case study, 5
differential, 2–4
total, 2, 3
white cells, 2–4
zinc protoporphyrin
(ZPP), 21