INDEX

Symbols

2-Chloro-1-phenylethanone (Mace) 127
2-Chlorobenzalmalononitrile 127
3-Quinuclidinyl benzilate 127

A

α, agonists 192, 193
Abrasions
conjunctival 139
corneal 90, 94, 98, 140
Acetaminophen
combined with codeine 92
hyphemia treatment 144
Acetazolamide
intraocular pressure and 88, 89
Acetic acid 117
Acetozolamide
hyphemia treatment 145
Acetylcholine
local use of 89
Acids
burns from 116, 308
examples of common acid-containing products 116, 117
glaucoma from 192
Adnexa
anesthetic techniques 82, 93
blast injuries 427
conjunctival lacerations 52
emphysema 52
imaging 62
inferior floor fracture 52
neuroanatomy 82
physical examination 51
Adnexal injuries
canalicular 302
eyebrow injuries 302
lacrimal sac and lacrimal gland injuries 305
lateral canthal injuries 304
Adrenergic antagonists
glaucoma and 192, 193
Advanced Cardiac Life Support 43, 78, 90, 308, 312, 333
Advanced Trauma Life Support
eyelid burns and 308, 312, 333
ocular trauma scales and 98
preoperative assessment and 78
stabilizations of the patient and 42
Afferent pupillary defect. See also Pupil
eyelid burns and 317
penetrating injuries with a retained intraocular foreign body and 232
physical examination and 50
scleral rupture and 151
traumatic optic neuropathy and 397, 399
Age considerations
cataracts 459
computed tomography 345, 377, 397
eyelid lacerations 293, 295
forced duction testing 391
nutritional blindness 465

oculocardiac reflex 366
sympathetic ophthalmia 267
traumatic optic neuropathy 396, 398
Agent Orange 125
Agnew, Dr. D. Hayes 5
Alcaine 293
Alkalis
burns from 116, 308
traits of common alkali products 116
hyphemia and 188
Allen figures 48
Allergies
allergic reactions to local anesthesia 80
anesthesia and 90, 94
patient history 48
Alloderm 324, 326, 328, 330
Aluminum
cause of posterior segment IOFB 248
Aluminum eye shields 28, 102, 104
American Academy of Ophthalmology and Otolaryngology
establishment 5
textbooks in oculopathy 9
American Board of Ophthalmology
written examinations given in Tokyo 13
American Civil War 4, 267, 442, 443, 446
American College of Surgeons
Committee on Trauma 20
American Medical Association
recognition of ophthalmology as a full-time specialty 5
American National Standards Institute
eye protection standard 443
American Ophthalmology Society
establishment 5
American Optical
ballistic and laser protective spectacles 451
American Revolutionary War 2, 445
Amikacin
posttraumatic endophthalmitis and 285
Aminoglycoside
open-globe injuries 216
Ammonia 117
Amphotericin-B
posttraumatic endophthalmitis and 286
Amplitude modulation CT (A-scans) 66
Analgesthetic therapy
preoperative preparation and 58
Anaphylaxis 90
Anderson, Dr. William 15
Anesthesia
complications 90, 94
field blocks 82, 93
forced duction testing 79, 80, 391
full stomach and 78, 86, 87
general 87, 94, 151, 293, 408, 413
local 80, 93, 293
Monitored anesthesia care (MAC) 86, 94
nerve blocks 83, 93, 293
neutralization of gastric acid 79
ocular adnexa anesthetic techniques 82, 93
postoperative pain and nausea management 91, 94
preoperative assessment 78, 93
recommended dosages of selected sedatives and analgesics (exhibit) 87
sharp trauma of the anterior segment and 151
subcutaneous regional infiltration 82, 93
topical 79, 93, 121, 130, 140, 141, 151, 389
Anesthesia and Perioperative Care of the Combat Casualty 78
Anosmia
orbital fractures and 370
Anterior chamber lenses 182
Anterior segment
anterior vitreous 56
blunt injuries 427
blunt trauma 54, 138
chalcosis and 257
complications of penetrating injuries with a retai 228, 236
composition of 138
depth of 54
direct inspection 53
eye lid burns and 314
Hansen’s disease and 467
intraocular foreign bodies 163
intraocular pressure 54
iris 55
laser injuries 438
lens 55
physical examination 53
sharp trauma 150
siderosis findings 252
traumatic optic neuropathy 396
Antibiotics. See also specific agents
antibiotic recommendations for posttraumatic endophthalmitis 286
corneal abrasions 140
corneal foreign bodies 141
corneal lacerations 151, 159, 160, 161
endophthalmitis 219, 241, 416
enucleation or evisceration 416
eye lid adnexal injuries 305
eye lid burns 312, 315, 318, 320
eye lid lacerations 293
laser injuries and 438
methods for obtaining intraocular cultures and delivering intravitreal antibiotics (exhibit) 287
open-globe injuries 216
orbital fractures 377
penetrating injuries with a retained intraocular foreign body 231
posterior segment injuries 216, 219
postoperative management 165
posttraumatic endophthalmitis 284, 285, 287
Antiemetics for nausea and vomiting after ophthalm 92
Antifibrinolytic agents
hyphema treatment 145
Antifungal agents
posttraumatic endophthalmitis 286
APD. See Afferent pupillary defect Apligraf 324, 328
Appleton, Col. Budd 15
Apraclonidine hydrochloride
hyphema treatment 145
Aqueous shunts 193
Aqueous suppressants
glaucoma and 192, 193
Arab-Israeli Six-Day War
associated wounds 112
corneal foreign body injuries 101
fragmentation injuries 101
intraocular foreign body injuries 226
percentage of ocular injuries 78, 442
Arab-Israeli Yom Kippur War
percentage of ocular injuries 442, 443
protective lenses and 138
Army Medical Department
establishment 2
integrating the theater of operations with personnel control of resources 23
Army Medical Museum
development into the Armed Forces Institute of Pathology 9
establishment 5
Registry of Ophthalmic Pathology 9
Army Medical School
establishment 5
Army School of Ophthalmology
establishment 9
Artificial eyes. See also Implants
development of 12
Ash, Lt. Col. James 9
Atkinson method 85
ATLS. See Advanced Trauma Life Support
ATLS Manual 26
Atropine
acetylcholine and 89
hyphema treatment 144
intraocular pressure and 94
local anesthesia and 81
nerve agents and 131
Aviation medicine, development of 7
Azathioprine
sympathetic ophthalmia and 274
Azithromycin
trachoma and 462
β-adrenergic antagonists 192, 193
Bacillus
posttraumatic endophthalmitis and 241
Bacillus cereus
endophthalmitis and 229
posttraumatic endophthalmitis and 282, 288
Bacitracin
eye lid burns 312
eye lid lacerations 294
Bannister, Dr. John M. 6
Battery-powered vitrectomy units 32, 33
Benzodiazepines
monitored anesthesia care and 86, 94
Berman FB locator 12
Beta blockers
corneal lacerations and 161
postoperative management and 165
Bicycle accidents
traumatic optic neuropathy and 396, 397
Biometric microscopes 53
Bitot’s spots
nutritional blindness and 466
Black fly
onchocerciasis and 463
Blast injuries
blast mechanism 423
blast wave 423, 427
blast wind 423, 424, 427
collapse of walls and buildings and 424
glass fragments and 427, 428
ocular injuries associated with explosive blasts 427
primary 424
prognosis 428
relationship between peak pressure and wind velocity (table) 424
secondary 424, 427, 428
sites of terrorist bombings 422
terrorist incidents: morbidity, mortality, and eye injury rates (table) 425
tertiary 424, 428
thermal injuries 424, 428
types of ocular injuries associated with terrorist explosions (exhibit) 427

Blepharoptosis
enucleation and eviceration and 417
Blindness. See also Eneucleation; Eviceration

cataracts and 459
centers established for blind soldiers 11
Hansen’s disease and 468
leading causes of blindness in the Third World 458
nutritional 465
onchocerciasis and 463
retrobulbar hemorrhage and 355
Third World prevalence 458
trachoma and 458, 460, 462
Veterans Administration care for blind soldiers 9
vitamin A and 465

Blink reflex 121
Blister agents. See Vesicants

BLPS. See Ballistic and laser protective spectacle; Ballistic Laser Protective Spectacles

Blunt injury of the posterior segment
fat embolism 206
management principles 209
primary repair of 212
Purtscher’s retinopathy 206
Terson’s syndrome 207, 209
whiplash maculopathy 209
Blunt trauma
computed tomography and 73
coup–contrecoup theory 172, 196
crystalline lens 172
equatorial expansion model 172
glaucoma and 186, 190
magnetic resonance imaging and 73
traumatic optic neuropathy and 396, 402
ultrasonography and 73, 75
Blunt trauma of the anterior segment
associated injuries 138
conjunctiva 138
cornea 139
hyphema 138, 142, 144
iris 142
physical examination findings 54
sequelae of (exhibit) 138
Blunt trauma of the posterior segment
choroidal rupture 202
common sites of 196
mechanism of injury 196
military implications 209
remote trauma effects 206
retinal breaks 199
retinal injury without breaks 197
scleral rupture 205
speed of injury and 197

Body systems list 46
Boiling water, thermal injury and 117
Bone grafts. See also Skin grafts
nasal-orbital-ethmoid fractures 376
Bourke, Dr. James 6
Braille, Louis 266
Brass. See Chalcosis
Bretylium tosylate 81
Brightness modulation CT (B-scans) 66, 67, 215, 219
British anti-Lewisite 130
British chain mail veils 448
Bronson magnets
intraocular foreign body extraction 235
Brown’s syndrome 389
Bruch’s membrane 202, 205, 270
Buccal nerve 83
Bupivacaine 79, 80, 81, 85, 93, 293
Burns. See Chemical injuries; Eyelid burns

C

C-DCR. See Conjunctivo-dacryocystorhinostomy
Caldwell’s views 62, 63, 355
Callender, Lt. Col. George R. 9
Canalicular injuries
delay of treatment and 292
equipment required for canalicular repair (table) 304
eyelid burns 322, 332
surgical repair 52, 302
timing of repair 305
Canthal injuries 304
Capsular disruption 172
Capsular tears 175
Carbonic anhydrase inhibitors
glaucoma and 192, 193
postoperative management and 165
Cardinal positions of gaze 51
Carotid-cavernous sinus fistula
glaucoma and 189
Carroll-Girard screws
zygomaticomaxillary complex fractures and 374
Carville, Dr. Maud 7
Cataracts
aphakic spectacles 460
“cataract camps” 459, 460
cause of blindness 459
contusion cataracts 172
corneoscleral laceration with 164
extracapsular cataract extraction with posterior chamber intraocular lenses 459
intracapsular cataract extraction 459
intracapsular foreign bodies and 176
lens removal and 182
management 459
penetrating injuries with a retained IOFB and 228
phacoemulsification with insertion of a foldable intraocular lens 459
rehabilitation period 460
screening and assessment 459
Soemmering ring 176
sunflower 176, 257
surgery during the revolutionary 2
sympathetic ophthalmia and 267
traumatic 56, 172, 182, 428
Cefazolin 140
eyelid lacerations and 294
Ceftriaxone 140
axial images 63, 70
blunt trauma and 73
compared with magnetic resonance imaging 65, 352
computed tomography attenuation coefficients for v 63
coronar images 63, 70
crystalline lens injuries 177
description 62
drawbacks to 345, 350
eexorcular muscle trauma 389
foreign bodies and 67, 70, 215, 216, 293, 345, 350, 358
helical scans 63, 70
intradural foreign bodies 29
magnetic resonance imaging and 70
metallosis bulbi 251, 261
optic nerve injuries 71, 73
orbital fractures 29, 70, 73, 377
orbital trauma 344, 356
reformatted views 345
sharp trauma of the anterior segment 151
skilled operating technician requirement 350
slowness of 350
spiral scans 63, 70, 345, 397
three-dimensional reconstruction 345
traumatic optic neuropathy 397
vegetable matter and 359
Concussive endotheliopathy 54
Conformers
chemical injuries and 125
eenucleation and evisceration and 417, 418, 419
Confrontation visual field test 49
Conjunctiva
abrasions 139
description 138
edema 139
eyelid burns and 313
lacerations 52, 139
subconjunctival hemorrhage and emphysema 139
trachoma and 460, 462
Conjunctivo-dacryocystorhinostomy
eyelid burns and 322, 332
lacral sac and lacrimal gland injuries and 305
Contact lenses
bandage 140, 141, 159, 160, 161, 165
corneal abrasion 140
infection and 140
problems related to dust and sand 34
rigid lenses after surgery 165
wearing in the combat zone 25, 31
Continental United States
evacuation to 31
evaluation of eyelid burns 320
treatment of eyelid burns 323, 333
CONUS. See Continental United States
Conventional radiography. See Plain skull films
Copper. See Chalcosis
Cornea
chalcosis and 257
classification of corneal lacerations (exhibit) 150
complex lacerations 150, 161
corneal bloodstaining 144, 145, 177
description 139
findings in siderosis and chalcosis (table) 249
Hansen’s disease and 468
laser injuries and 434, 436
nutritional blindness and 466
onchocerciasis and 463
rupture of 150
siderosis findings 252
simple lacerations 150, 159
stellate lacerations 161, 294
temporary keratoprosthesis 237
trachoma and 462
transplants 166, 238
traumatic keratopathy 140
ultraviolet radiation keratitis 141
Corneal abrasions 90, 94, 98, 140
Corneal edema 139, 177, 216, 220
Corneal lacerations 150, 152, 159, 228, 313
Corneal ulcers 267
Corneoscleral lacerations 163, 164, 172, 428
Corticosteroids
chemical injuries and 124, 125
glaucoma and 189, 192
hemorrhage and 355
laser injuries and 438
orbital trauma and 381
posttraumatic endophthalmitis and 285
Purtscher’s retinopathy and 207
sympathetic ophthalmia 273, 275
traumatic optic neuropathy 399
Coup-contrecoup theory 172, 196
CR-39 plastic lenses 445, 449, 450
Cranial nerves
IV 387, 388
palsy of 387, 390, 391
VI 387
blast injuries and 427
block techniques 83
Hansen’s disease and 467
V1 370, 377
V2 365, 370, 374, 377
Cribriform plate injuries 78, 370, 375
Crimean War
percentage of ocular injuries 442
Crosby, Dr. W.D. 6
Cruise type perforated metal visors 448
Cryotherapy
retinal detachment and 219
Crystalline lens
anterior capsule injuries 175
associated head and facial trauma 177
blunt trauma 172
capsular disruption 172, 175
capsulorrhexis 178, 179
chalcosis and 257
contreuction cataracts 172
dislocation 173, 174, 186, 190, 192
findings in siderosis and chalcosis (table) 249
indications for immediate surgery 178
injury statistics 172
irreversible opacity 172
laser injury 436
lens absorption (involution) 175
lens fixation choices 182
lens removal pros and cons 181
lensectomy 177
lenticular glaucoma 176
manifestations of trauma to the crystalline lens (exhibit) 173
patient history 177
penetrating injuries 172, 175
penetrating injuries with a retained IOFB and 228
physical examination 55, 177
posterior disruption 175
early surgical intervention 221
evisceration and 408, 413
mine-blast debris and 213
organisms most commonly isolated in (exhibit) 283
penetrating injuries and 151, 241
penetrating injuries with a retained intraocular foreign body and 229, 234
postoperative care and 219
warteincidence 213
Endophthalmitis Vitrectomy Study 285, 288
Enflurane 88
Enophthalmos
enucleation and evisceration and 417
orbital fractures and 366, 368
Entropion
eyelid burns and 328
Enucleation
complications 417
description 408
goals 408
history of eye removal and prostheses 406
implants 407, 415
inability to wear a prosthesis 418
indicators for 408
no light perception and 216
oculist role 407, 408, 417
penetrating injuries with a retained intraocular foreign body and 236, 242
Persian Gulf War and 101, 110, 406
preoperative planning 407
process 408
psychological effect of 407, 419
rehabilitation goals 407
surgical goals of enucleation and evisceration (exhibit) 409
sympathetic ophthalmia and 273

Expansile gas
retinal detachment and 241
Expeditionary Medical Support teams xvi
Extracapsular cataract extraction 459
Extraocular muscle trauma
alignment measurement 388
differential diagnosis 387
diplopia and 386
direct trauma 386
etiology 386
evaluation 388
imaging 389
management 390
neurological injury 387
patient history 388
refraction and 388
spontaneous recovery from 390
traumatic strabismus 386

Eye armor. See also Eye shields
absence of a formally approved Army statement of the need for 448
ballistic and laser protective spectacle (BLPS) 451
British chain mail veils 448
causes of nonfatal wounds (table) 444
cellulose acetate eye shields 447, 448
CR-39 plastic lens 445, 449, 450
Cruise type perforated metal visors 448
definition 442, 445
elements in development 444
failure to interest civilian industry 449
Gargoyles 451
goggles for aviators 447
history of 445
incidence of ametropia in three army divisions (table) 450
injection-molded polycarbonate 449
Korean War and the interwar period 448
laser injuries and 450
methacrylate lenses 447, 448
military need for 112, 274
mind-sets of those to be protected and those in leadership positions 444, 445
modern development 449
ocular threats and 444
polycarbonate ballistic protective eyewear 19, 99, 112, 138, 445, 448
pre-Colombian period to World War I 445
prescription polycarbonate lenses 450
protective combat goggles 13
SPECS 452
sun-wind-dust goggles 447, 449
tasks of the infantryman and 444
Vietnam War era 449
World War I and the interwar period 446
World War II and the interwar period 447
protective combat goggles 13

Eye lane
after surgery 30
Eye shields. See also Eye armor
corneal lacerations and 160
cellulose acetate eye shield 447
eyelid lacerations and 293
foreign body injuries and 212, 221, 231
Fox (aluminum) shields 28, 102, 104, 313, 438
globe protectors 82, 141
laser injuries and 438
metal 58, 78, 141, 144
postoperative management and 165
preoperative 216
Wilmer’s eye shield 446
Eyebrows
Hansen’s disease and 467
injuries to 302
Eyelashes
Eyelid burns
causal malpositions 329
cancers 308
cellophane occlusion 315, 318
electrical 308
etiology 308
Evacuation needs 312
evaluation and treatment of 312
extent and degree of 321
eyelid malposition 328
eyelid protraction disorders 330
eyelid retraction and 322
eyelid retraction disorders 330
first degree 310, 311, 318
first echelon treatment and evaluation 312, 333
flow chart for acute management of 309
healing process 312
history of injury and 308
long-term management 333
lubricating ophthalmic ointments and 315
moisture chambers and 315, 318
mucosal covering status 323
mucosal lining disorders 331
normal lid comparison 323
organisms most commonly implicated in infection 314
posterior lamella repair 332
radiation 308, 309
reconstructive surgery 323
second degree 310, 311, 315, 318
second echelon treatment and evaluation 313
shape of the eye and 314
signs of possible complications (table) 314
skin grafts for restoration of lost eyelid tissue (exhibit) 324
status of remaining eyelids 321
tear drainage system abnormalities 332
tear film status and 323
temporary tarsorrhaphy and 315
thermal 308
third degree 310, 315, 318
third echelon treatment and evaluation 316
transposition flaps 324, 325
types and degrees of 308
upper-lid gold weights for eyelid closure 331
zone of coagulation 311
zone of hyperemia 311
zone of stasis 311
Eyelid lacerations
anesthesia 293
blow injuries and 428
Cutler-Beard technique 300
delay of treatment and 292
eyelid-margin involvement 295
globe examination and 51
history, examination, and ancillary testing 292
inadequate repair 292
lid-sharing techniques 298, 300, 305
options for repair (exhibit) 300
orbital trauma and 339, 341
postoperative wound care 305
preoperative preparation 293
pressure patches 300
skin grafts for 301, 305
superficial 294
surgical management 293
Tenzel flaps 298
timing of repair 292, 305
types 293
Eyelids
blast injuries 427
canalicular system injuries 52, 292, 293, 302, 305
complex injuries 300
canals 312
levator injuries 51, 300
lower-eyelid malposition and laxity 417
motor nerve supply 83
risk of eyelids that cannot close 312
total avulsion 302
trachoma and 459, 462
Eyewall
definition 100
Facial nerve 83
Far-near-far suture technique 301
Farnsworth panel D-15 hue test
laser injuries and 436
Farnsworth-Munsell 100 hue test
laser injuries and 436
Fascia lata 378
Fat embolism 206
Fat-suppression MRI protocols 65
Federal Bureau of Investigation
criminal bombing statistics 422
Fentanyl
monitored anesthesia care and 86
Field blocks 82, 93
First-degree burns
causal 311
description 310, 311
treatment 318
Flap (horseshoe) or operculated retinal breaks 200
Flash blindness
lasers and 432, 434
Fluconazole
posttraumatic endophthalmitis and 286
Flumazenil
monitored anesthesia care and 86
Fluorescein angiography
retinal injury 197, 199, 206
sympathetic ophthalmia 269
Fluorescein dyes 53, 122, 140, 141, 292, 303, 323
Fluoroquinolone antibiotics 140
Foerster, Dr. Helen Campbell 9
Force generation testing
extracocular muscle trauma 390

Forced duction testing
extracocular muscle trauma 386, 387, 389
topical anesthesia and 79, 80

Foreign bodies. See also Fragment injuries; Intraocular foreign bodies; Intraorbital foreign bodies
computed tomography and 67, 70, 215, 216
computed tomography attenuation coefficients for various foreign bodies (table)
concussive endotheliopathy 54
corneal 141
eyelid burns and 317
eyelid injuries and 292
magnetic resonance imaging and 351
microbial contamination 164
orbital 339, 341
orbital trauma and 338, 344
patient history and 45
plain skull film localization 62, 67, 215
posterior segment 56, 215
size considerations 212
toxicity of metallic foreign bodies 164, 176, 192, 248
ultrasoundography localization 67, 215, 216
vegetable matter and 164, 213, 229, 357, 358, 359
Fox (aluminum) shields 28, 102, 104, 313, 438

Fractures
inferior floor 52
orbital 29, 30, 70, 336

Fragment injuries. See also Blast injuries; Foreign bodies; Intraocu-
lar foreign bodies; Penetrating injuries
as the principal cause of severe eye injuries in m 101
causes of nonfatal wounds (table) 444
eye armor and 444
mechanism of injury and 110
mortality of close-proximity shell injuries 212
most common weapons responsible for 212
Persian Gulf War and 98, 112
predominance in nonfatal ocular trauma in wartime 101
Franco-Prussian War 267, 442
Frequency-doubled neodymium:yttrium-aluminum-garnet 432
Freund’s adjuvant
sympathetic ophthalmia and 271, 272
Friedenwald, Jonas 9
Frontal nerve 83
Frost or reverse-Frost sutures 294, 297, 304, 305, 318, 319

Fungal species
posttraumatic endophthalmitis and 283

G
Gargoyles 451
Gas hysteria 129
Gastrointestinal tract
blast injuries and 424
Gelfilm 378

General anesthesia
emergence from 89
enucleation and 408
evisceration and 413
eyelid lacerations 293
induction 87
inhalational agents 88, 94
maintaining 87
monitored anesthesia care and 86
nausea and vomiting and 89
oculocardiac reflex 89
ramifications of ophthalmic interventions 88
rapid-sequence induction technique 87
sharp trauma of the anterior segment and 151
shivering and 89
uses 87

Gentamycin
corneal abrasions 140
eyelid burns 312
Geographical ophthalmology
cataracts 459
description 458
Hansen’s disease 467
medical care in the Third World 458
nutritional blindness 465
onchocerciasis 463
trachoma 460
Georgia, Olympic Games bombing 422
Gibson, Dr. William 2
Glabellar flap
eyelid burns 327, 329
Glands of Krause and Wolfring 312, 313, 323
Glasgow Coma Scale xvi, 98, 112
Glass fragments
blast injuries and 427, 428
Glaucoma
angle-closure 176, 186, 189, 468
chemical injuries 188
description 186
eyearly occurrence following trauma 186
ephisphate treatment 89
episcleral venous pressure 188
ghost cell 190
hyphema and 187
inflammation and 186, 237
intraocular pressure and 186
late occurrence following trauma 189
lens removal and 181
lenticular 176
nonocular stucture trauma and 189
phacoanaphylactic 188
posttraumatic angle deformity (angle recession) 190, 192
pupillary-block 176, 186, 189, 192
return to duty 193
siderosis and 192, 253
steroid-induced 189
treatment 192
Glucose
blunt posterior globe rupture 215
clinical signs of globe rupture (table) 214
common sites for blunt rupture 214
deforation before rupture 214
delayed closure of a ruptured globe 216
echography after repair of 233
immediate globe closure with primary removal of IOFB 234
immediate globe closure without primary removal of IOFB 234
lacerations 214
large projectiles and 215
MEOTS and 103
minute projectiles and 215
penetrating injuries with a retained intraocular foreign body and 231
rupture from sharp laceration, blunt contusion, and secondary shock wave injury 221
Globe protectors 82
Glue
eyelid lacerations and 292, 295
posterior segment injuries 218
sharp trauma of the anterior segment and 158, 161
Goggles. See Eye armor
Gold weights for eyelid closure 331
Goldwaite, Col. Ralph H. 10
Gonioscopy
    anterior segment 54, 164
cornea 141
    glaucoma 190
    siderosis 253
Gonococcal conjunctivitis 31
Greenwood, Col. Allan 7
Greenwood, Dr. Allen
description of hospital conditions in France in 1918 18
H
Haab giant magnets 8
Haemophilus influenza
    orbital emphysema and 366
    orbital trauma and 381
Halloran, Dr. P.S. 6
Halogenated hydrocarbons 88
Halothane 88
Hansen’s disease
    cause of 467
    classification 467
    description 467
    lepromatous form 467
    management 468
    ocular leprosy 467
    tuberculoid pattern 467
Hard palate grafts
eyelid burns and 325, 326, 330, 331
Hemianopsia 50
Hemorrhage
    as a sensitive indicator of deep orbital injury 358
    laser injuries and 435, 436
    locations for 355
    orbital 337, 335, 368
    penetrating injuries with a retained IOFB and 228
    subconjunctival 139
    subperiosteal 355
    surgery for 355
    treatment 355
    vitreous 228, 229
Hemorrhagic chemoab
    scleral rupture and 151
Hemorrhagic retinopathy 91, 94
Herbert’s pits
trabuchal and 462
Hewes flap
eyelid burns 325, 326
Hewson, Dr. Addinell 5
Hirschberg hand-held electromagnets 260
Historical background
    American Civil War 4
    aviation medicine development 7
    civilian trauma 138
    eye armor 445
    eye removal and prostheses 406
    incidence of wartime eye injuries 18, 138, 150, 406
    incidence of wartime eye injuries (table) 79
Korean War 12
    lessons learned from wars 18
    ocular injuries seen in wartime vs. in a peacetime emergency
department (table) 25
ophthalmology established as a full-time specialty 5
period between World Wars I and II 9
prevalence of ocular trauma 42
Revolutionary War 2
Spanish-American War 6
Vietnam War 13
War of 1812 2
World War I 6
World War II 11
HLA. See Human leukocyte antigen
Hoefle, Dr. F.B. 15
Holmium lasers
eyelid burns 325
Hornbliss, Dr. Albert 15
Horner, Dr. William E. 2
Horner’s syndrome 80
Horseshoe retinal breaks 200
Hughes flaps
eyelid burns 325
Hughes's classification of ocular chemical injury (table) 118, 120
Hull, Col. Forrest E. 12
Human fibrinogen
    laceration repair 161
    Human leukocyte antigen
        sympathetic ophthalmia and 272
Hungarian Eye Injury Registry 110
Hunt, Dr. William 5
Hyaluronidase 79, 81, 293
Hydrochloric acid 117
Hydrofluoric acid 117
Hydrogen cyanide 127
Hydrogen peroxide 305
Hydroxyapatite implants 415, 417
Hydroxyzine 89
Hypertonic solutions 88
Hypertropia
    extraocular muscle trauma 386
Hyphema
    as most common injury 138
    blast injuries and 428
    characteristics 142
    clot removal 145
    complications 144
    corneal bloodstaining 144, 145
    deprivation amblyopia risk 144
    “eight-ball” 187
    glaucoma and 187, 190
    intraocular pressure and 144
    management 144
    penetrating injuries with a retained IOFB and 228
    pharmacological therapy 144
    postoperative care and 219
    postoperative complications 182
    rebleeding and 144
    surgical evacuation 220
    surgical intervention 145
Hypo-ophthalmos
    orbital fractures and 366, 371
Hypothermia
    intraocular pressure and 88
Hypotropia
    orbital fractures and 386
    ICCE. See Intracapsular cataract extraction
    Ice-cold compresses for pain management 91
Imaging of ocular and adnexal trauma

- blunt trauma 73
- computed tomography 62, 67, 70, 73, 151, 232, 284, 293, 344, 356, 358, 359, 377, 389, 397
- fluorescein angiography 197, 199, 206, 269
- foreign bodies 67
- magnetic resonance imaging 64, 70, 73, 151, 232, 293, 351, 356, 359, 389, 398, 417
- orbital fractures 70
- penetrating injuries with a retained intraocular foreign body 232
- plain skull films 62, 70, 151, 215, 232, 251, 261, 284, 293, 353
- sharp trauma of the anterior segment 151
- specific traumatic injuries 67
- ultrasonography 66, 67, 73, 75, 151, 215, 219, 233, 251, 261, 284, 293, 359
- vitreous fluorophotometry 197, 199

Immunosuppressive therapy

- posttraumatic endophthalmitis and 288
- sympathetic ophthalmia and 273

Implants

- appropriate volume of 407
- dermis fat grafts 418, 415
- donor sclera-covering techniques 407, 415
- exposure and 418
- history of development 415
- implant pegging 408, 417
- materials for 407, 415, 419
- options 415
- orbital trauma and 378
- porous 407, 412, 415, 419
- sizing spheres 412, 419
- solid spherical 415
- In-the-bag lens fixation 182
- Indian-American War 446
- Indirect ophthalmoscopy
- posterior segment examination 56
- Infection risk. See also specific bacteria
- preoperative preparation and 58
- Informed consent
- analgesic therapy and 58
- Infraorbital nerve 83, 91, 94
- Infratrochlear nerve 83, 94
- Inhalational agents
- general anesthesia 88, 94
- Inhalational burn injuries 308, 424, 428
- International Optic Nerve Trauma Study 399, 401
- Interstitial retinoid binding protein
- sympathetic ophthalmia and 271
- Intracapsular cataract extraction 459
- Intracapsular fixation rings 179

Intraocular foreign bodies. See also Foreign bodies; Intrafobital foreign bodies

- anterior segment 163
- cataracts and 176
- composition of (exhibit) 230
- composition of intraocular foreign bodies 213, 227
- computed tomography for 29, 284
- delayed removal of 234
- early intervention to limit toxicity 220, 221
- endophthalmitis and 229, 234, 284
- enucleation and 229
- external magnet extraction 235
- factor influencing damage from 248, 250
- final resting location of 248, 250
- findings in siderosis and chalcosis (table) 249

Haab giant magnets 8
- injury definition 100
- intraocular foreign bodies in war (table) 226
- location and frequency of 213
- management of penetrating injuries with a retained 226
- metalurgy of intraocular foreign bodies (table) 250
- posttraumatic endophthalmitis and 284, 285
- primary removal of 234
- reactive and nonreactive components of intraocular foreign bodies (table) 251
- size and shape considerations 227, 228
- ultrasonography and 29, 67, 284
- vegetable matter and 164, 213, 229, 235
- velocity and 248
- war-induced versus occupational and accidental 227
- X-ray localization 8

Intraocular lenses 165, 181, 459

Intraocular pressure

- chemical injuries and 122
- crystalline lens injuries and 172, 176, 177, 178, 182
- determination of 54
- emergence from anesthesia and 89
- eyelid burns and 317
- general anesthesia and 87, 88
- glaucoma and 186
- hyphema and 144
- hypothermia and 88
- inhalational anesthetics and 94
- scleral rupture and 151
- succinylcholine and 94
- topical anesthesia and 93
- ventilation status and 88
- vomiting and 93

Intraorbital foreign bodies

- as cause of orbital trauma 357
- combined traumas and 357
- globe rupture and 358
- imaging of 338, 344
- metal-on-metal contact and 357
- vegetable matter 357, 358, 359

IOFBs. See Intraocular foreign bodies; intraorbital foreign bodies

Ionizing radiation injury. See Radiation burns

IOP. See Intraocular pressure

Ir anger-War

- chemical agent use 126
- intraocular foreign bodies and 213, 226, 235
- IRBP. See Interstitial retinoid binding protein
- Iridectomy
- Hansen’s disease and 468
- sympathetic ophthalmia and 267
- Iridocyclitis
- glaucoma and 186
- syphilis as the cause of 8
- Iridodialysis 142
- Iridecotomy 192
- Iris
- blunt trauma 142
- chalcosis and 257
- findings in siderosis and chalcosis (table) 249
- Hansen’s disease and 468
- penetrating injuries with a retained IOFB and 228
- physical examination of 55
- postoperative complications 182
- siderosis findings 252
- tears in the region of the 175
- Iron. See Siderosis
Lidocaine 79, 80, 85, 89, 93, 293, 408

Life support
stabilization of the patient 42
the four phases of advanced trauma life support evaluation and care (exhibit) 42

Light perception
physical examination and 48
scleral rupture and 151
Limbal approach to surgery 178
Limbal stem cell transplantation
chemical injuries and 125

Lime 117

Line of von Arlt 460, 461

Local anesthesia
adjuvant agents 81
adverse reactions to 81
agents for 80
allergic reactions and 80
amide group 80, 90
description 80
effects 80
ester group 80
eyelid lacerations and 293
monitored anesthesia care and 86
Lorazepam
monitored anesthesia care and 87
Lowrey, Col. Austin, Jr. 13

Lubricating ophthalmic ointment
eyelid burns 315, 318

Lungs
blast injuries and 424

Lye 117

Lyster, Dr. Theodore C. 6

M

MAC. See Monitored anesthesia care
Mace 127

Macular holes 201

Madigan Eye and Orbit Trauma Scale
as a readiness-training tool 104
categories 98, 99
motility 103
national and international support for 104
triage training module 102, 104, 112

Magnesium hydroxide 117

Magnetic resonance imaging
advantages of 351
blunt trauma and 73
compared with computed tomography 65, 352
dry wood and 351, 359
dynamic imaging 390
extraocular muscle trauma 389
fat suppression 65, 390
foreign bodies and 70, 293, 351
gaps between images 351
implants and 417
intraocular foreign bodies and 30
limitations of 351
metallosis bulbi and 251
“open” scanners 353
orbital fractures 377
orbital trauma 351, 356
penetrating injuries with a retained intraocular foreign body and 232
physical size of the magnet and the strength of the magnetic field and 352
principles of 64
proton density–weighted images 65
sharp trauma of the anterior segment and 151
T1-weighted images 65
T2-weighted images 65
time required for scans 353
vegetable matter and 359
Magnet
intraocular foreign body extraction 235, 239, 260
Malignancies
enucleation and 408
sympathetic ophthalmia and 267
Malignant hyperthermia 90, 94
Malingering 25, 48
Malocclusion
orbital fractures and 374, 377
Mandibular nerve 83
Mannitol
hemorrhage and 355
intraocular pressure and 88, 89
Marcus-Gunn pupil 49, 317
Mass casualty scenarios 43, 48
Maxillary nerve 83
Mazzotti reaction
onchocerciasis and 463, 465
MEDCAP. See Medical Civil Action Program
Medical and Surgical History of the War of the Rebellion 5
Medical Aspects of Chemical and Biological Warfare 116

Medical Civil Action Program 14
Medical history 47
Medical Mobilization Augmentation Readiness Team xvi
Medication history 47
Medpor
eyelid burns and 330
orbital trauma and 379
Membrane peeling 220
MEMOTS. See Madigan Eye and Orbit Trauma Scale
Meperidine
postoperative pain management 91, 94
recommended dosage 87
shivering after anesthesia and 89
Mepivacaine 79, 80, 81

Metallosis bulbi
ancillary studies 251
chalcosis 257, 261
description 248, 261
diagnosis and location 250
factors influencing damage from 248, 250
findings in siderosis and chalcosis (table) 249
management 260
metallurgy of intraocular foreign bodies (table) 250
most common metals causing 248, 261
process of 248
reactive and nonreactive components of intraocular foreign bodies (exhibit) 251
siderosis 251, 260
Methazolamide
hyphema treatment 145
Methohexital 87
Methotrexate
sympathetic ophthalmia and 274
Methylene blue 303
Methylprednisolone
traumatic optic neuropathy and 400
Metoclopramide 79, 92, 93, 94
Midazolam
monitored anesthesia care and 86
Military Dermatology 116
Minocycline
- Hansen’s disease and 468
Miotics
- glaucoma and 192
Mitchell, Dr. S. Weir 5
MMARTS. Srr Medical Mobilization Augmentation Readiness Team
Moisture chamber
- eyelid burns 315, 318
Monitored anesthesia care
- description 86, 94
- general anesthesia and 86
- local anesthesia and 86
- recommended dosages of selected sedatives and analgesics (exhibit) 87
Monoamine oxidase inhibitors
- cocaine and 80
- epinephrine and 81
Monocanalicular stents 303
Mooren’s ulcer 150
Morphine 87, 91, 94
Motility
- extraocular muscle trauma and 392
- eyelid burns and 317
- MEOTS and 103
- penetrating injuries with a retained intraocular foreign body and 232
- physical examination and 50
- zygomaticomaxillary complex fractures and 362
MRI. See Magnetic resonance imaging
Munich Clinic
- intraocular foreign body injuries 227
Mustard Gas
- as a type of vesicant 127
- example order sheet for a patient with ocular mustard injuries (exhibit) 131
- facts to keep in mind when working with casualties of mustard agent (exhibit) 131
- first use of 125
- risk to medical personnel from 129
- ocular effects of 129
- ocular morbidity from 102
- odor of 128
- prolonged recovery from 9
Mustarde flaps
- eyelid burns 325, 326, 327
- eyelid lacerations 300
Mycobacterium leprae
- Hansen’s disease and 467
Mycotoxins
- action of 132
- ocular effects of 129
Mydriasis 142
N
- Nadbath nerve block method 84
- Naloxone
- monitored anesthesia care and 86
- Napalm
- burns from 12
- Narcotics 86, 91, 94
- Naso-orbital-ethmoid fractures
- bilateral nature of 375
- Le Fort levels 375
- open reduction with internal fixation 375
- signs and symptoms 376
- soft-tissue reconstruction 375
- sources 375
- surgical management 376
- telecanthus and 375
- vision monitoring 375
Nasociliary nerve 83
National Eye Trauma System Registry
- peacetime operational injuries 212
- retained intraocular foreign bodies 227
- traumatic cataract occurrence 172
Nausea and vomiting
- general anesthesia and 89
- postoperative management 92
Nd:YAG lasers 432
- neodymium:yttrium-aluminum-garnet lasers 432
Nerve agents
- action of 129, 131
- treatment 131
- types 127, 129, 131
Nerve blocks 83, 93, 293
NETS. See National Eye Trauma System Registry
Neuralization kits for chemical injuries 121
Night blindness 465
Nitrogen mustard 127, 128
Nitrous oxide 88
NLP. See No light perception
- aggressive management of 48
- enucleation and 216, 236
- traumatic optic neuropathy 396, 397, 398
NOE fractures. See Naso-orbital-ethmoid fractures
Norris, Dr. William 5
Nose blowing
- orbital fractures and 365, 366, 377
Nutritional blindness
- causes 465
- clinical course 465
- diagnosis 466
- management 466
- ocular manifestations 465
- World Health Organization classification of xerophthalmia (table) 465
O
- o-Ethyl S-[2-(diisopropylamino)ethyl] methylphosphonothiolate 127, 131
- O’Brien’s nerve block method 84
- Occlusive filters
- traumatic strabismus and 390
Occupational Health: The Soldier and the Industrial Base 116
O’Connor, Dr. Roderic P. 9
Octafluoropropane 88
Ocular system review 46
Ocular toxoplasmosis 13
Ocular trauma. See also Orbital trauma; specific types of trauma, i.e., Blast injuries
- as a result of facial burns 308
- bilateral penetration injuries 221
- causes of nonfatal wounds (table) 444
- cost to society of eye injuries 443
- history and examination sequence (exhibit) 44
- imaging 62
- increase in wartime eye-related injuries 226, 274
- mass casualty scenarios 43, 48
- mechanisms of injury 212, 213
military perspective 227
need for prompt treatment 42
occupational eye injuries 226
ocular war injuries as a percentage of total war injuries (table) 442
patient history 44, 150, 214, 230, 250, 388, 392, 435
patient stabilization 42, 214
peacetime injuries 443
peacetime operational settings 212
percentage of intraocular foreign body injuries 226
physical examination 48, 231, 250, 388, 392, 396, 435
preoperative preparation 58, 150, 407
pressure to treat soldiers and return them to the field 43
prevalence 42, 78, 212, 226
risk to infantrymen 442, 444
the four phases of advanced trauma life support evaluation and care (exhibit) 42
types of trauma 42, 212
visual prognosis 150, 221
Ocular Trauma Classification Group 98, 103, 110
Ocular Trauma Score 110, 111
Oculocardiac reflex anesthesia and 89
orbital fractures and 366
Oculogastric reflex 92, 94
Ofloxacin Hansen's disease and 468
Oklahoma, Oklahoma City bombing 422, 427
Onchocerca volvulus onchocerciasis 463
Onchocerciasis blindness and 463
clinical course 463
dermatological manifestations 464
description 463
management 465
Mazzotti reaction and 463, 465
route of ocular entry 463
Onchocerciasis Control Programme 465
Ondansetron 92, 93
Open globe antibiotic therapy 216
bandaging of eyelid burns and 313
eyelid lacerations and 292
general anesthesia and 87, 93, 94
importance of early closure 166
injury definition 100
lens dislocation and 174
MEOTS and 103
retrobulbar block and 85
shields for 313, 314
zones of injury 110
Open reduction with internal fixation naso-orbital-ethmoid fractures 375
zygomaticomaxillary complex fractures 374
Occluded retinal breaks 200
Ophthalmia. See also Sympathetic ophthalmia silver nitrate treatment
Ophthalmic artery 83
silver nitrate treatment. See also Sympathetic ophthalmia
Ophthalmic Pathology: An Atlas and Textbook 9
Ophthalmoscope as best imaging modality for initial evaluation 62
invention of 4
Optic nerve injuries avulsion from the sclera 205
blast injuries 428
computed tomography and 71, 73
Orbit anatomy of 62, 337
blast injuries 427
vascular supply 337
Orbital fractures blast injuries and 428
blowouts 360, 362, 366, 386
computed tomography and 29, 70
craniofacial dysfunction 360
“dirty” 377
dysesthesia of cranial nerve V1 374
enophthalmos 366, 368
epistaxis, cerebrospinal fluid rhinorrhea, and anosmia 370
extracocular muscle rounding 365
globe integrity and 377
hemorrhage and 337, 355, 368
horizontal diplopia 368
hypoplasia of cranial nerve V1 370
hypoplasia of infraorbital cranial nerve V2 365
hypo-ophthalmos 366
hypo-ophthalmos and pulsatile exophthalmos 371
hypotropia and 386
inferior or lateral rim step-off 374
lateral canthal dystopia 374
Le Fort midface fractures 397, 360, 375
low transverse maxillary fractures 360
malar flattening and increased facial width 373
management of 377
medial wall 368, 386
naso-orbital-ethmoid 375
noose blowing and 365, 366, 377
oculocardiac reflex 366
orbital emphysema 365, 368
orbital floor 360
orbital roof 369
plain skull films and 70
point tenderness and ecchymosis 373
pupillary abnormalities 366
pyramidal fractures 360
restricted up-gaze and ptosis 369
signs and symptoms 362
supraorbital rim depression 370
surgery for 30
surgical management 366, 371
traumatic optic neuropathy and 396, 397, 402
trismus and malocclusion 374, 377
vertical diplopia 362
white-eyed blowout 366
zygomatico-maxillary complex 362, 371
Orbital trauma hemorrhage 337, 355, 358
imaging 344
medial wall and 341
midfacial buttresses 341
midfacial buttresses (table) 342
multidisciplinary team management 336
ocular trauma and 336
orbital anatomy 337
orbital floor and 341, 342, 360
return to duty and 381
surgical techniques 378
typical head-and-neck trauma teams 336
zygomatic arch and 342
ORIF. See Open reduction with internal fixation
Otitis media
neurological damage and 387
OTS. See Ocular Trauma Score
Oxycodone
postoperative pain and nausea management 91, 94

P

Pancoast, Dr. William Henry 5
Parabulbar anesthesia 85
Paracentesis
sympathetic ophthalmia and 267
Pars plana approach to surgery 180, 238, 438
Pars planitis
sympathetic ophthalmia and 272
Passmore, Col. Jack W. 15
Patch graft
laceration repair 161
The Pathology of the Eye 3
Patient history
age of the patient 45
allergies 48
bypassing 45
chief complaint 44
crystalline lens injuries 177
extraocular muscle trauma and 388, 392
laser injuries 435
legal issues 46, 435
mechanism and time course of the ocular injury 214
medical history 47
traumatic event details 45, 177
Patient stabilization 42
Pellucid marginal degeneration 150
Penetrating injuries. See also Sharp trauma of the anterior segment
anterior segment management 236
BBs 242
crystalline lens 172, 175
definition 100
glaucoma and 192
intraocular foreign bodies and 227
mortality of close-proximity shell injuries 212
phacoanaphylactic glaucoma and 188
primary repair of 212
sympathetic ophthalmia and 266
Penetrating injuries with a retained intraocular foreign body
anterior segment management 236
diagnostic imaging 232
drawing of the retina to document the location and size of the IOFBs 232
enucleation and 236, 242
external magnet extraction 235
immediate globe closure with primary removal of IOFB 234
immediate globe closure without primary removal of IOFB 234
indications for removal 229
inflammatory changes and physiological effects 229
intraocular complication management 240
management 234
medical evacuation and 227
metallosis bulbi 250
multisystem trauma association 227
no light perception and 236
occupational and domestic perspective 227
pars plana vitrectomy and 227, 238
patient history and physical examination 230
postoperative management 241
potential complications 228
prognosis 241
sources 227
vitreoretinal surgery and 236, 242, 243
watchful waiting and 236
decision tree 237
Perfluorocarbon liquids 241
Perforating injuries
definition 100
primary repair of 212
Peribulbar anesthesia 85
Periorbital nerve compression 91, 94
Perphenazine 92
Persian Gulf War
“borrowed” equipment 32
corneal foreign bodies requiring slitlamp removal 101
evisceration as a result of fragment injuries 101, 110, 406
equipment problems 32
facilities problems 32
fragmentation injuries 36, 98, 101, 112, 406
frequency and severity of eye injuries 34, 406
hospital construction 32, 34
insights from 36
intraocular foreign body injuries 226
Iraqi medical evacuation and treatment systems 36
medical evacuation system 35
number of ophthalmologists 31, 34
percentage of ocular injuries 442, 443
plastic landmine injuries 36
rarity of isolated ocular injuries 36
sand injuries 34
SCUD missile injuries 35
suturing with inappropriate sutures 33
sympathetic ophthalmia and 267
US mail for supplies 34
Phacoanaphylactic endophthalmitis
sympathetic ophthalmia and 270
Phacoantigenic uveitis
sympathetic ophthalmia 270
Phenylephrine 89
Phosgene 125, 127, 128
Physical examination
adnexa 51
anterior segment 53
chemical injuries and 122
crystalline lens 177
eye trauma 313, 317
laser injuries 435
metallosis bulbi 250
mortality 50, 232, 317
penetrating injuries with a retained intraocular foreign body and 231
pupil 49, 103, 122, 317, 388
traumatic optic neuropathy 396
visual acuity 48, 103, 122, 177, 231, 292, 396
visual field 49
Pigtail probes 303
Plain, Concise, Practical Remarks on the Treatment of Wounds and Fractures 2
Plain skull films
appropriate plain film roentgenograms for eye imaging (table) 63

crystalline lens injuries 177
drawbacks of 353
foreign body localization 67, 215, 293, 353
metallosis bulbi 251, 261
orbital fractures and 70
orbital trauma 353
penetrating injuries with a retained intraocular foreign body 232
posttraumatic endophthalmitis 284
sharp trauma of the anterior segment 151
uses of 62

POE. See Postoperative endophthalmitis

Polycarbonate ballistic protective eyewear
99, 112, 138, 445, 448, 449

Polyglactin mesh 378

Porous polyethylene implants and 407, 412, 417, 419
orbital trauma and 379

Portable operating microscopes 28, 29, 32, 33

Posterior segment
blast injuries 427
blunt trauma 196
chalcosis and 257
choroidal rupture 57
complications of penetrating injuries with a retained intraocular foreign body 228
dilating regimen 56
eyelid burns and 317
Hansen’s disease and 468
immediacy of treatment and 21
laser injuries 436
nutritional blindness findings 466
onchocerciasis findings 464
primary repair of penetrating, performing, and blunt rupture injuries 212
scleral rupture 57
siderosis findings 254
traumatic optic neuropathy 396

Postoperative endophthalmitis
organisms most commonly isolated in (exhibit) 283
posttraumatic endophthalmitis 282

Postoperative Eye Guard 449

Postoperative pain and nausea management
antinausea and antiemetic agents 92, 94
evisceration and 416
ice-cold compresses 91
narcotics 91
orbital trauma and 381
sharp trauma of the anterior segment 165

Posttraumatic endophthalmitis
ancillary testing 284
antibiotic recommendations for (exhibit) 286
antifungal treatment 286
antiinflammatory and immunosuppressant therapy 288
associated injuries 288
course after treatment 288
cultures and stains 285
delay in diagnosis and 282, 284, 288
diagnosing 284
dirt and organic material contamination and 282, 286
management after initial repair 285
management during the primary repair 285
medical considerations 285
methods for obtaining intraocular cultures and delivering intravitreal antibiotics (exhibit) 287
microbiology 282
mixed infections and 284
organisms most commonly isolated in (exhibit) 283
penetrating injuries and 151
percentage of endophthalmitis cases 282
postoperative endophthalmitis and 282, 284
prognosis 282
signs and symptoms 284
surgical considerations 288

Potassium hydroxide 117

Pralidoxime chloride 131
Prednisolone acetate
hyphema treatment 145
postoperative management 165
posttraumatic endophthalmitis and 288
traumatic iritis treatment 142

Prednisone
posttraumatic endophthalmitis and 288
sympathetic ophthalmia and 273

Preoperative preparation
evisceration and 407
laser injuries 438
skin grafts 305

Prisms
diplopia and 390
Procainamide 90
Procaine 80
Processed human pericardium
laceration repair 161

Prochlorperazine 92, 93
Promethazine 92, 93
Proparacaine 79, 93
Propofol
monitored anesthesia care and 86, 87, 94

Ptosis
MEOTS and 103
Prostaglandin analogues
glaucoma and 193

Prostheses. See Implants; Keratoprostheses

Proteus
eyelid burns and 314
Proton density-weighted MRI 65
Pseudomonas
eyelid burns and 314

PTE. See Posttraumatic endophthalmitis

Ptosis
eyelid burns and 315, 318, 321, 330
Hansen’s disease and 467
levator injury and 300
orbital fractures and 369

Pulsatile exophthalmos
orbital fractures and 371

Punctal stenosis 332

Punctate keratitis
Hansen’s disease and 468
nutritional blindness and 466
onchocerciasis and 463

Pupil. See also Afferent pupillary defect
extraocular muscle trauma and 388
eyelid lacerations and 292
management of a miotic pupil 238
MEOTS and 103
orbital fracture abnormalities 366
physical examination and 49
transpupillary fibrin membrane dissolution 238
Purtscher's retinopathy 206

Quickert-Rathburn sutures
eyelid burns and 328
Quinolone
posttraumatic endophthalmitis and 285

R
Radiation burns
exposure sources 308
long-term effects from 308
second to therapeutic exposure 309
Ralph's classification of ocular chemical injury (exhibit) 118, 119
Randolph, Lt. Col. M. Elliott 11
Random Es 48
Ranitidine
gastric acid neutralization and 79
Rapid-sequence anesthesia induction technique 87
Rare earth magnets 239
Rebleeding
hyphema and 144
subperiosteal hemorrhage and 356
Red saturation
traumatic optic neuropathy and 396, 402
Reepithelialization
chemical injuries 118, 120, 121, 124, 125
eyelid burns 312
Refraction
extraocular muscle trauma and 388
Retina
breaks due to vitreous traction 199, 228
breaks without apparent vitreous traction 201
chalcosis and 257
drawing of the retina to document the location and size of the
IOFBs 232
epigreatinal membrane cause 229
findings in siderosis and chalcosis (table) 249
flap (horseshoe) or operculated breaks 200
Hansen's disease and 468
incarcerated 228
injury without breaks 197
laser injuries and 434, 436
macular holes 201
membrane peeling and 220
onchocerciasis and 464
postoperative care and 219
Purtscher's retinopathy 206
siderosis and 254
vitrectomy and 220
Retinal detachment
expansile gases and 241
immediacy of treatment and 21
laser injuries and 438
neurosensorry 202
pathophysiology of posttraumatic retinal detachment 219
penetrating injuries and 221, 228
posterior segment examination and 56
postoperative care and 219
rhegmatogenous 228
scleral buckles and 241
silicon oils and 241
sympathetic ophthalmia and 266
ultrasonography for 29
Retinal dialysis 197, 199
Retinal infarction 91
Retinal ischemia 91, 94
Retinal pigment epithelium
contusion injury 199
laser injuries and 433, 434, 437
siderosis and 256
sympathetic ophthalmia and 270
Retinopexy
penetrating injuries with a retained intraocular foreign body
and 240
Retinoscope, invention of 4
Retinoscopy
crystalline lens injuries and 177
Retrobulbar blocks 84, 89, 151, 408, 413
Retrobulbar hemorrhage 355
Rhegmatogenous retinal detachments 228
Rich, Dr. Hosea 2
Rifampin
Hansen's disease and 468
Riot control agents 129
River blindness. See Onchocerciasis
Robertson, Dr. Charles 5
Roentgenography. See Plain skull films
RPE. See Retinal pigment epithelium
Rupture
definition 100
Russo-Japanese War 267, 442
Rust rings 141, 176

S
S-antigen
sympathetic ophthalmia and 271
Sarcoidosis
sympathetic ophthalmia and 268, 272
Sarin 127, 131
Saudi Arabia, U.S. Air Force barracks bombing 422
Scalds 311
Scales for ocular trauma
benefits 98
characteristics of wartime ophthalmic injuries 101
command perspective 110, 112
common trauma terms 98, 100
definitions of ocular traumatology terms (table) 100
exclusions 101
extent of injury and 110
functions 99
initial vision and 110
injury patterns 101
international classification system 101
laminated card for pocket reference 104
mechanism of injury and 110
prognostic applications 99, 110
prognostic factors of visual outcome (table) 111
rationale for using 98
readiness improvement and 103, 110
soldiers' ability to fight and 110, 112
triage applications 102
Scarring
chemical injuries 124
corneal abrasions 140
Schirmer’s test

- eyelid burns 323

Sclera

- donor sclera for implants 407, 415
- Hansen’s disease and 468

Scleral buckles 241

Scleral lacerations

- corneoscleral 163, 164, 172
- extraocular muscle trauma and 386
- eyelid burns and 313
- factors associated with poor visual outcome 219
- successful repair requirements 212

Scleral ruptures

- optic nerve avulsion from the sclera 205
- physical examination and 57
- predictive findings 151
- presenting features 205

Sclerosing keratitis

- onchocerciasis and 463

Second-degree burns

- causes 311
- description 310, 311
- second echelon treatment 315
- treatment 318

Seidel test 53, 159

Sevoflurane 88

Sexually transmitted diseases

- trachoma and 460

Sharp trauma of the anterior segment

- ancillary tests 151
- complex lacerations 150
- corneal lacerations with uveal prolapse 161
- corneoscleral lacerations 163
- corneoscleral lacerations with cataracts 164
- example instrument set for surgery of anterior segment trauma (exhibit) 153
- lacerations with tissue loss 161
- management of simple corneal lacerations 159
- partial-thickness corneal lacerations 159
- patient evaluation and preoperative management 150
- postoperative management 165
- primary repair of complex corneal lacerations 161
- prophylactic antibiotics 151
- reconstruction after trauma 165
- simple full-thickness lacerations 159
- simple lacerations 150, 159
- surgical principles 152

Sheppard, Dr. John L. 6

Shippen, Dr. William, Jr. 2

Sick cell anemia

- subperiosteal hemorrhage and 355

Sickle cell disease

- hyphema and 144, 145

Sickle cell trait

- hyphema and 144, 145

Siderosis

- clinical course 257
- description 251
- electrophysiology findings 254
- findings in siderosis and chalcosis (table) 249
- glaucoma 192
- management 260
- metallic intraocular foreign bodies and 229
- ocular findings 252, 261
- pathophysiology 285

Silicone oils

- retinal detachment and 241
- Silicone plastic sheets 379

Skin grafts

- allografts 324
- alloplastic 324
- autologous 324
- buccal mucosal 331
- eyelid burns 312, 324, 328, 331
- eyelid laceration 301, 305
- pressure patching 305
- skin grafts for restoration of lost eyelid tissue (exhibit) 324

Skin-snip test

- onchocerciasis and 464

Slitlamps

- anterior segment examination 53, 54, 56, 163
- corneal abrasions 140
- corneal foreign bodies 141, 163
- difficulty of obtaining 33
- eyelid burns and 317
- penetrating injuries with a retained intraocular foreign body and 232

Small Portable Expeditionary Aeromedical Rapid Response teams xvi

Snellen visual acuity chart 48, 122

SO. See Sympathetic ophthalmia

Socket conformers

- enucleation and evisceration and 417, 418, 419

Socket contracture

- enucleation and evisceration and 418

Sodium bicarbonate 79, 81

Sodium citrate 79, 124, 125

Solar maculopathy 25

Soman 127, 131

Sonography. See Ultrasonography

SOOF lifts

- eyelid burns 328, 330

Sorbitol 88

Sowdah 464

Spaeth, Col. Edward B. 10

Spanish–American War 6, 446

Spastic entropion 328

SPEARR teams. See Small Portable Expeditionary Aeromedical Rapid Response teams

Special Protective Eyewear Cylindrical Surface 19

SPECS. See Special Protective Eyewear Cylindrical Surface

Spectacles

- aphakic 460
- ballistic and laser protective 451
- laser injuries and 439
- muscle trauma and 390

SPH. See Subperiosteal hemorrhage

Spivey, Dr. Bruce E. 15

Staphylococcus

- eyelid burns and 314
- orbital emphysema and 366
- orbital trauma and 381
- posttraumatic endophthalmitis and 241, 282, 283

Stellate lacerations 161, 294

Sterile endophthalmitis

- chalcosis and 248, 257

Sternberg, Gen. George M.

- establishment of the Army Medical School 5

Steroids. See Corticosteroids

Stevens-Johnson syndrome 462

Streptococcus

- eyelid burns and 314
- orbital emphysema and 366
orbital trauma and 381
posttraumatic endophthalmitis and 241
Subcutaneous regional infiltration 82, 93
Suborbicularis oculi fat lifts
eyelid burns 328, 330
Subperiosteal hemorrhage 355
Subperiosteal midface elevation
eyelid burns 328
Sucnylcholine
disadvantages of 87
general anesthesia and 87
intraocular pressure and 94
local anesthesia and 81
malignant hyperthermia and 90
Sulcus-fixed lenses 182
Sulfa-based medications
trachoma and 462
Sulfur hexafluoride 88
Sulfuric acid 117
Sulfurous acid 117
Sun-wind-dust goggles 447, 449
Superficial burns. See First degree burns
Supraorbital nerve 83, 91, 93
Supratrochlear nerve 83, 91, 93
Suramin
onchocerciasis and 465
Surgical history 47
Surgical management. See also Postoperative pain and nausea
management; Preoperative preparation; Theater of
operations eye care
anterior approach (limbal incision) 178
aqueous shunts 193
argon laser trabeculoplasty 193
canicular injuries 52, 302
chalcosis 261
choroidal ruptures 202
crystalling lens injuries 178
enucleation 408
evisceration 413
example instrument set for surgery of anterior segment trauma
(exhibit) 153
extraocular muscle trauma 391
eyelid lacerations 293
forceps types 153
glaucoma 192
goals 216
Hansen's disease and 468
hemorrhage 355
implants 378
injury history and evaluation 214
intracapsular fixation ring 179
metallosis bulbi 260
naso-orbital-ethmoid fractures 376
open reduction with internal fixation 374
orbital fractures 366, 371, 374, 377
orbital trauma 378
posterior approach (pars plana incision) 180, 238, 438
posterior segment penetrating, perforating, and blunt rupture
injuries 212
postoperative care 219, 380
postoperative complications 182, 240
postsurgical considerations 219
posttraumatic endophthalmitis 288
primary intraocular lens placement 181
sharp trauma of the anterior segment 152
siderosis 260
step-by-step repair of penetrating, perforating, and blunt
rupture injuries of the posterior segment 216
surgical goals of enucleation and evisceration (exhibit) 409
suture placement 153, 157
suture removal 157
suture selection 152
suturing instruments 152
sympathetic ophthalmia and 267
timing of secondary surgical intervention 220
tissue adhesives 158, 218, 292, 295
traumatic optic neuropathy 402
viscoelastic agents 152, 160, 161, 164, 165, 179
visual prognosis 221
Sutures
eyelid lacerations and 294, 297
far-near–near-far technique 301
Frost or reverse-Frost 294, 297, 304, 305, 318
instruments for 152
length of 155
mattress suture technique 161
“no-touch” passes 153
orbital trauma and 380
placement of 153
reapproimation of anatomical landmarks 157
recommended sutures for the repair of various orbital and
adnexal injuries (exhibit) 30
removal of 157
selecting 152
spacing of 155
suture placement principles (exhibit) 157
suture recommendations (table) 297
sutures for corneal laceration repair (table) 152
through-and-through 153
Swinging flashlight test
traumatic optic neuropathy and 396
Symblepharon rings 125, 332
Sympathetic ophthalmia
age considerations 267
associated disorders 268
autoimmunity role 271, 275
bacterial antigens and 272
clinical course and 269
clinical features 267
complications 269
Dalen-Fuchs nodules and 268, 269, 270
description 266, 275
differential diagnosis 272
enucleation and 236, 266, 267, 272, 408
epidemiology 266
evisceration and 273
histopathology 269
history of 266
human leukocyte antigen and 272
hypersensitivity reaction theories 271
identification of IOFBs and 228
immunosuppressive therapy 273
implications for military medicine 274
inducing suppurative inflammation in an injured eye and
latent period following ocular trauma 266, 267
“mutton fat” keratic precipitates 268
pathogenesis 271
penetrating injuries and 229
penetration injuries and 221
postoperative care and 219
time limit for enucleation 273, 275
treatment 272
Syphilis
as the cause of iritis or iridocyclitis 8
T

T1-weighted MRI 65
T2-weighted MRI 65
Tabun 127, 131
Tanzania, U.S. embassy bombing 422
Tarsorrhaphy
  non-margin-sharing 320
  temporary tarsorrhaphy for eyelid burns 315, 318, 320, 330
Tear drainage system abnormalities 332
Tear gas 116, 127
Temporal nerve 83
Temporary keratoprosthesis 237
Tenon’s capsule
  enucleation and evisceration and
    407, 408, 409, 412, 413, 415, 418, 419
  muscle lacerations and 392
Tenzel flaps
  eyelid lacerations and 298, 300
  Terrien’s degeneration 150
  Terson’s syndrome 207
Tetanus status
  eyelid burns and 308
  eyelid lacerations and 292
Tetracaine 79, 80, 93, 293
Tetracycline
  trachoma and 462
The Pathology of the Eye 9
Theater of operations eye care
  need for trained ophthalmologists 274, 275
  assertiveness of ophthalmologists 25
  complexity of injuries 25
  Consultant in Ophthalmology role 24
  contact lenses 25, 31
  continuing education for ophthalmologists 26
  evacuation to CONUS 31, 320
  expertise of the ophthalmologist 19
  eye clinic set 29
  eyelid burns 309
  first and second echelon care 26
  general principles 19
  immediacy of treatment 20
  maximizing the number of casualties who can return to active duty 22
  medical resources and 23
  military occupation specialty 31
  number of ophthalmologists needed 29, 31
  ocular injuries seen in wartime vs. in a peacetime emergency department (table) 25
  ophthalmic surgeon as a member of a head and maxillofacial trauma team 21, 99, 112
  outpatient clinic evaluation 30
  “patch and ship” policy 26
  reassessing, updating, and integrating with other plans 26
  recommendations for initial care of ocular and adrenal injuries at the 1st and 2nd echelons (exhibit) 27
  registry of eye diseases and injury 25
  specialist cooperation 26
  specific principles 26
  subspecialization and 19, 20
  support personnel needed 19
  third and fourth echelon care 28
  treating members of allied forces and indigenous peoples 31
  watertight closure of the penetrated globe 28, 216
Thermal burns
  airway injuries and 308
  as most common ocular burns 308
  blast injuries and 424, 428
  chemical agents and 117
  patient history and 45
  sources 308, 309
Third World
  blindness prevalence 458
  first level of medical care 458, 459
  leading causes of blindness 458
  medical care delivery 458
  second level of medical care 458
  third level of medical care 459
Third-degree burns
  causes 311
  description 310, 312
  second echelon treatment 315
  treatment 318
Thoft’s classification of ocular chemical injury (table) 120
Thurber, James 266
Timolol maleate
  hyphema treatment 145
Tissue adhesives
  eyelid lacerations and 292, 295
  posterior segment injuries 218
  sharp trauma of the anterior segment and 158
Tissue glues
  eyelid lacerations and 292, 295
  posterior segment injuries 218
  sharp trauma of the anterior segment and 158, 161
Tissue patches 218
Tissue plasminogen activator
  choroidal ruptures and 202
  postoperative care and 219
  transpupillary fibrin membrane dissolution 238
Tissue thromboplastin activator
  laser injuries and 438
Titanium mesh orbital floor plates
  orbital trauma and 379
TO. See Theatre of operations eye care
Tobramycin 140
Topical anesthesia
  agents 79
  chemical injuries and 121, 130
  corneal abrasions 140
  corneal foreign bodies 141
  extraocular muscle trauma 389
  sharp trauma of the anterior segment and 151
  uses 79
TPA. See Tissue thromboplastin activator
tPA. See Tissue plasminogen activator
Trabecular meshwork
  siderosis findings 253
Trachoma
  blindness and 458, 460, 462
  classification scheme for 460
  clinical course 460, 462
  description 460
  diagnosis 462
  eyelid repairs 459
  management 462
  prevalence 460
  reinfections and 460
  scarring patterns 460
  World Health Organization’s simplified trachoma grading system (table) 461
Transposition flaps
  eyelid burns and 324, 325
  Traumatic cyclodialysis 142
Traumatic iritis 142
Traumatic keratopathy 140
Traumatic mydriasis 142
Traumatic optic neuropathy
  anterior lesions 396
  clinical features 397
  criteria governing surgical intervention in patients with (exhibit) 400
  degree of trauma and 397
  etiology 396
  natural history 398
  natural history of traumatic optic neuropathy (table) 398
  neuroophthalmic evaluation 396
  orbital fractures and 397
  pathology 396
  posterior lesions 396
  prognosis 398
  reported outcomes using corticosteroids (table) 400
  spontaneous improvement 398, 399
  surgical management 400
  treatment 399
Traumatic strabismus 386
Tri-Service Ocular Trauma Course 26
Trichiiasis 331
Trichothecone mycotoxins 132
Tricyclic antidepressants
cocaine and 80
epinephrine and 81
Trigeminal nerve 82
Trimalar fractures. See Zygomaticomaxillary complex fractures
Tripod fractures. See Zygomaticomaxillary complex fractures
Trismus
  orbital fractures and 374, 377
Tuberculosis
  sympathetic ophthalmia and 268

U

Ultrasonography
  amplitude modulation (A-scans) 66
  blunt trauma and 73, 75
  brightness modulation (B-scans) 66, 67, 215, 219
  crystalline lens injuries 177
  description 66
  foreign body localization 67, 215, 216, 293
  intraocular foreign bodies 29
  intraorbital foreign bodies 358
  metallosis bulbi 261
  penetrating injuries with a retained intraocular foreign body 233
  posterior capsule status 182
  postoperative care and 219
  posttraumatic endophthalmitis 284
  retinal detachments 29
  sharp trauma of the anterior segment 151
  vitreous hemorrhages 438
Ultraviolet radiation keratitis 141
Uniformed Services University of the Health Sciences 26
United States Eye Injury Registry 103, 110
Urea 88
USS Cole, terrorist ramming 423
Uveitis
  Hansen’s disease and 468
  lens-induced 272
  phacoantigenic 270
UVEX
  SPECS development 452

V

Vail, Col. Derrick T., Jr. 11
Valsalva retinopathy 91, 206
Valsalva’s maneuver 58, 206, 337, 356
Van Herick’s technique 54
van Lint nerve block method 83
Vancomycin
  corneal abrasions and 140
  open-globe injuries 216
  posttraumatic endophthalmitis and 285, 286
Vascular pannus
  trachoma and 462
Vesicants
  activity of 102, 129
  effects of 127, 129
  mechanisms of injury 129
  symptoms 129
  treatment 130
  types 127, 129
  use of 125, 127
Veterans Administration
  blinded soldiers care 9
Veterinarians
  sympathetic ophthalmia and 266, 273
Vicryl mesh 378
Vietnam War
  Agent Orange 125
  Consultant in Ophthalmology role 24
  endophthalmitis and mine-blast debris 213
  enucleation 103, 275, 406
  fragmentation injuries 101
  general medicine doctors given on-the-job training in ophthalmology 13
  Medical Civil Action Program 14
  mycotoxins and 132
  percentage of ocular injuries 103, 442
  percentage of soldiers suffering from ocular injuries who were unable to return to duty 212
  sympathetic ophthalmia and 267
  “yellow rain” 132
Viscoelastic agents
  crystalline lens surgery 179
  sharp trauma of the anterior segment and 152, 160, 161, 164, 165
VISION 2020: Global Elimination of Avoidable Blindness 2020 463
Visual acuity
  eyelid burns and 313, 317
  eyelid lacerations and 292
  laser injuries and 435
  MEOTS and 103
  penetrating injuries with a retained intraocular foreign body and 231
  physical examination and 48, 177
  traumatic optic neuropathy and 396
Visual field examination 49
Vitamin A
  blindness and 465
  World Health Organization recommendations for vitamin A prophylaxis (table) 467
Vitamin C
  chemical injuries and 124
Vitrectomy
  cut rates 218
  indications for 220
intraocular foreign bodies and 227
posttraumatic endophthalmitis and 285, 288
reducing the risk of intraocular membrane formation and 220
Vitreoretinal surgery
categories of patients requiring 30
in the general hospital 19
metallosis bulbi and 260, 262
pars plana approach 238
penetrating injuries with a retained intraocular foreign body and 236, 242, 243
sympathetic ophthalmia and 267
Vitreous
chalcosis and 258
findings in siderosis and chalcosis (table) 249
siderosis and 254
Vitreous fluorophotometry
retinal injury 197
Vitreous hemorrhage
laser injuries and 436, 438, 439
Vogt-Koyanagi-Harada syndrome
sympathetic ophthalmia and 268, 272
Volkman’s contractures
orbital fractures and 366
Vomiting. See Nausea and vomiting
Vomiting gas 127
Vossius ring 142, 173

W
Walter Reed Army Medical Center
research unit established 13
Walter Reed General Hospital
Department of Ophthalmology establishment 10
War of 1812 2
Warren, Dr. John 2
Washington, Gen. George
recommendation for the establishment of a hospital service 2
Waters’s views 62, 63, 355
Whiplash maculopathy 209
White-eyed blowout 366
WHO. See World Health Organization
Wilmer, Col. William Holland 7
Wilmer’s eye shield 446
Wood’s lamp
corneal abrasions 140
World Health Organization
classification of xerophthalmia (table) 465
estimates of blindness worldwide 458
Hansen’s disease treatment recommendations 468
promotion of awareness of Third World ophthalmology 468
recommendations for vitamin A prophylaxis (table) 467
SAFE strategy 463
simplified trachoma grading system (table) 461
World Trade Center
1993 bombing 422, 427
September 11, 2001, bombing 422
World War I
Army School of Ophthalmology established 9
chemical agents 8, 125
Civilian Consultant Service established 7
development of aviation medicine 7
Dr. Allen Greenwood’s description of hospital conditions in France in 1918 18
enucleation 20
eye armor and 446
fragmentation injuries 101
intraocular foreign body injuries 226
ophthalmologists called up 6
percentage of ocular injuries 442
X-ray localization of intraocular foreign bodies 8
World War II
artificial eye development 12
centers for blind soldiers 11
chemical agents and 125
Consultant in Ophthalmology role 24
decrease in the percentage of wounded dying from their wounds 443
enucleation 103, 229
fragmentation injuries 101
intraocular foreign body injuries 226
Ophthalmology Branch of the Surgical Consultants Division activation 11
percentage of ocular injuries 103, 442, 443
role of civilian specialists 11
Worth four-dot test
extraocular muscle trauma and 388
Wound Data and Munitions Effectiveness in Vietnam 443

X
Xerophthalmia. See Nutritional blindness

Y
"Yellow rain" 132

Z
Z-plastics
eyelid burns 328, 331
Zimmerman, Lt. Col. Lorenz E. 9, 10
ZMC fractures. See Zygomaticomaxillary complex fractures
Zygomatic arch
key orbital structure 342
reduction of 375
zygomaticomaxillary complex fractures and 371, 373, 374
Zygomatic nerve 83
Zygodomaticofrontal suture
zygomaticomaxillary complex fractures and 371, 373, 374
Zygomaticomaxillary complex fractures
commonality of 371
signs and symptoms 371, 373
sources 371
surgical management 374
vertical diplopia and 362, 365
Zygomaticotemporal suture
zygomaticomaxillary complex fractures and 371