



Standard Treatment Workflow SUSPECTED BRAIN TUMORS

ICD-C71, D33

DEMOGRAPHICS

Brain tumors are seen with equal frequency in males and females

Astrocytoma is the commonest brain tumor in children followed by embryonal tumor

Meningioma is the commonest tumor in adults followed by glioma

CLINICAL PRESENTATION OF BRAIN TUMORS

SYMPTOMS



Recent onset headache, with or without vomiting

Gradual vision loss (unilateral/bilateral)

Seizures

Cranial nerve deficits (eg. hearing loss)

Focal deficit like monoparesis, hemiparesis

Increasing head-size (children with open fontanelle)

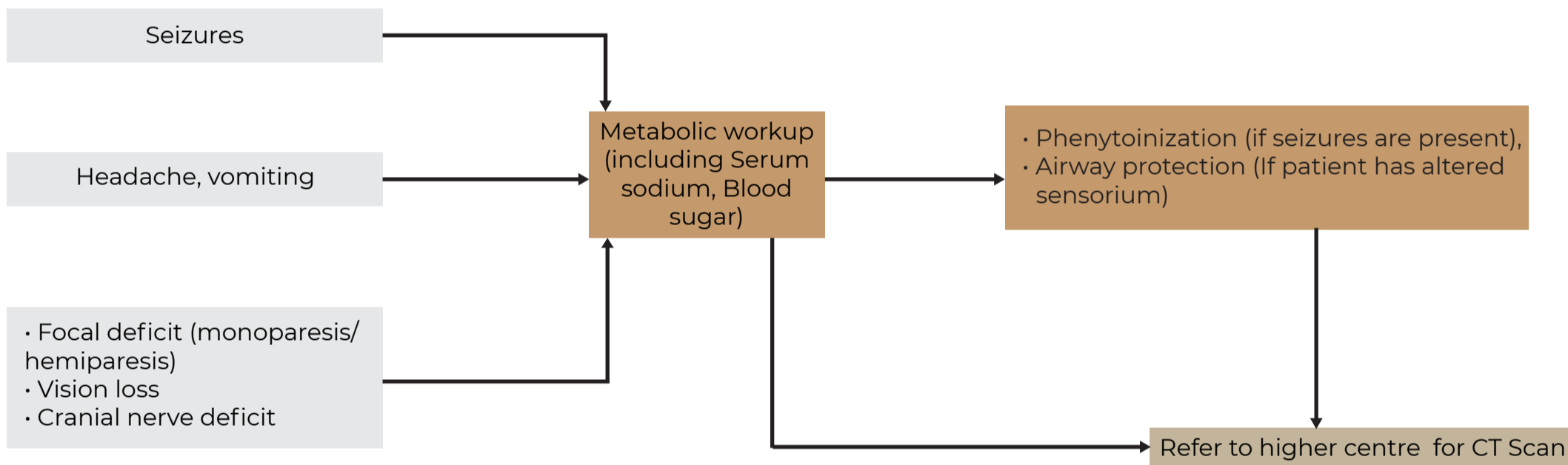
HIGH INDEX OF SUSPICION FOR BRAIN TUMOR WHEN PATIENT HAS:

- Adult onset seizures
- Progressive symptoms
- Focal neurological deficits
- Severe headache
- Recurrent vomitings
- Blurring of vision
- Drowsy or altered sensorium
- Recurrent seizures
- Pupillary asymmetry – Anisocoria
- Abnormal posturing
- Respiratory distress, abnormal breathing patterns
- Bradycardia and hypertension

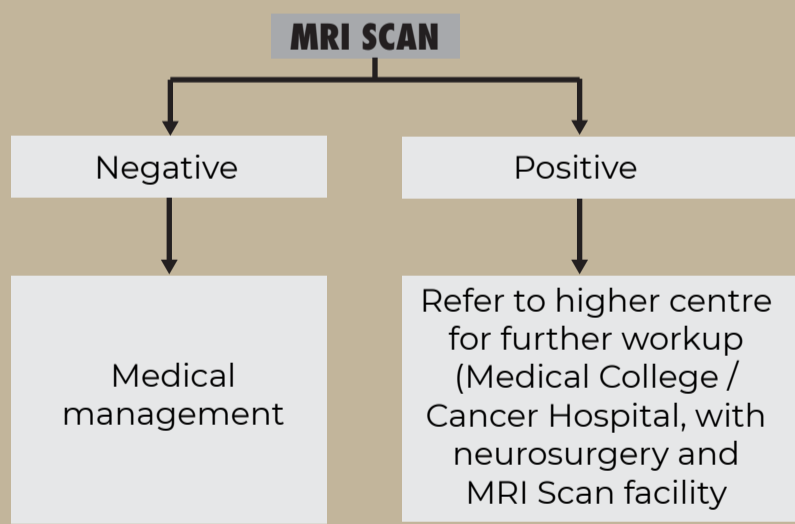
IF RED FLAG SIGNS PRESENT

- Give Inj Dexa 4mg IV
- Loading dose of antiepileptic to prevent seizure
- 200ml (to adult patients or as per weight to children) 20% mannitol IV over 30 minutes (only if systolic BP > 90 mmHg) and refer to higher centre immediately after stabilisation of ABC

AT PHC LEVEL



AT CENTRE WITH MRI SCAN FACILITY & NEUROSURGERY

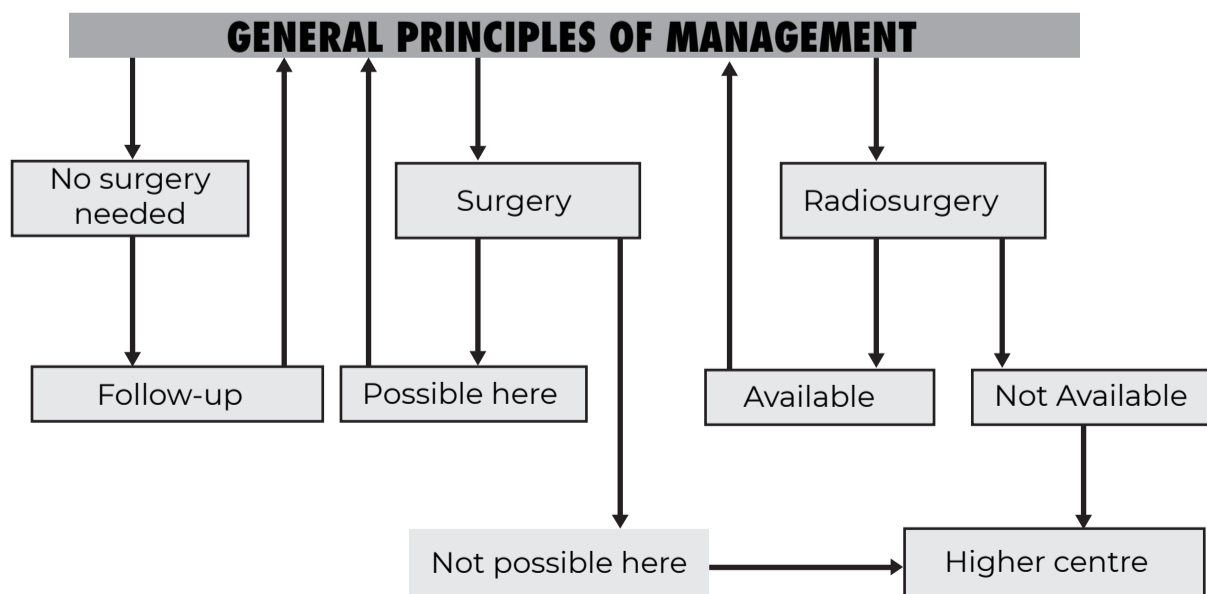


MRI image of Meningioma



MRI image of Glioblastoma

MEDICAL COLLEGE/CANCER HOSPITAL WITH NEUROSURGERY AND MRI SCAN FACILITY



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KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

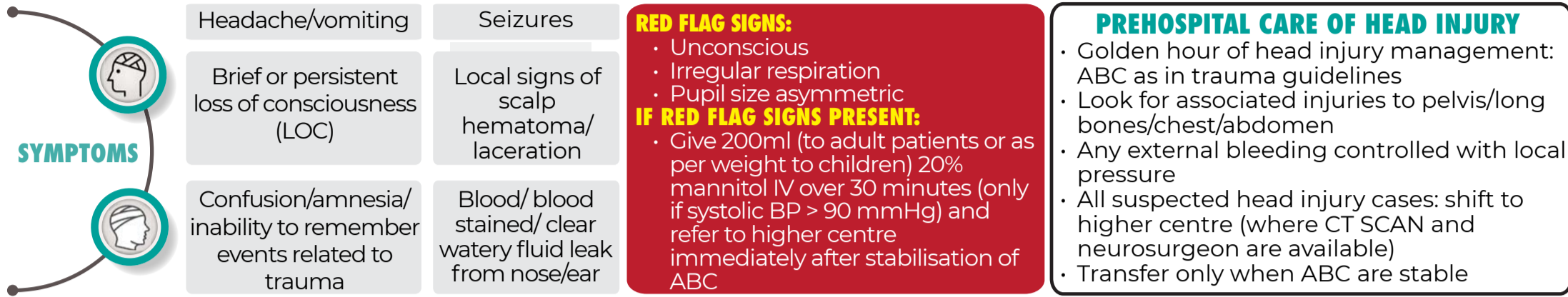


Standard Treatment Workflow

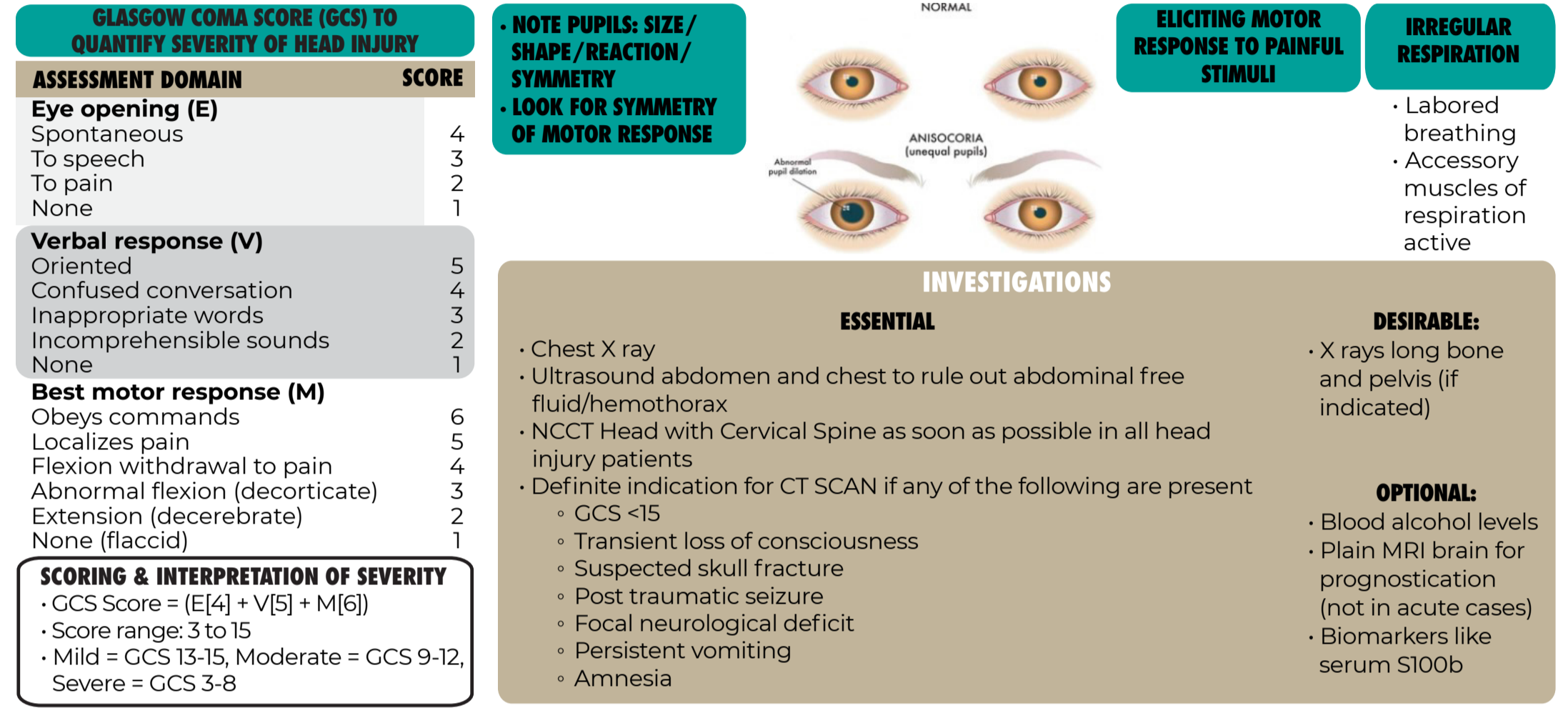
HEAD INJURY

ICD-S09.90XA

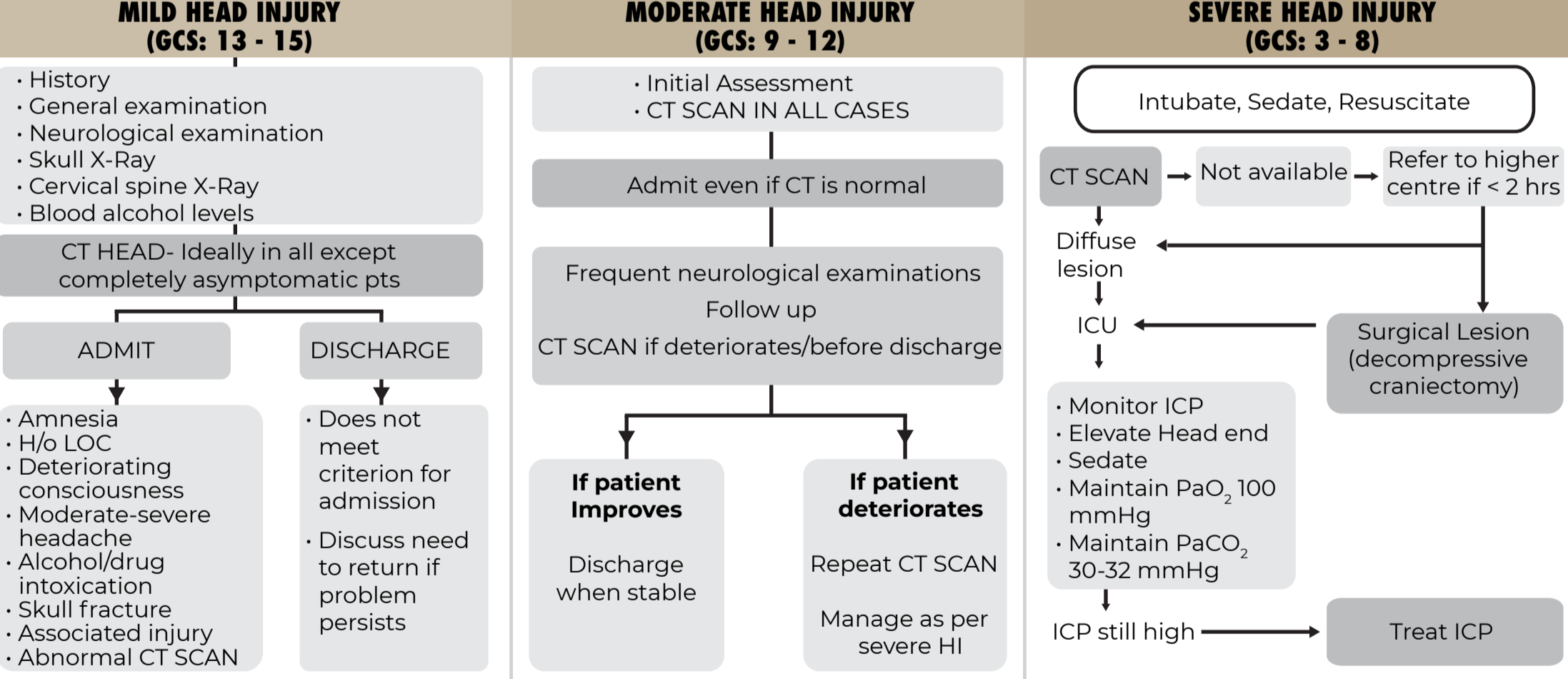
CLINICAL PRESENTATION



NEUROLOGICAL ASSESSMENT



MANAGEMENT AT HIGHER CENTRE WITH CT SCAN & NEUROSURGEON



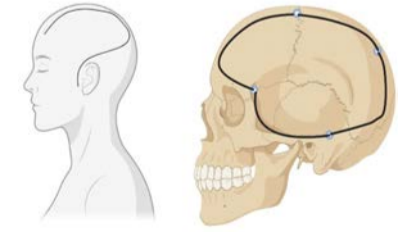
MEDICAL MANAGEMENT

- Treatment of high intracranial pressure**
 - Sedation, analgesia and mild to moderate hyperventilation (PaCO₂ 30-35 mmHg)
 - Osmotic therapy: mannitol: 0.25 - 1.00 g/kg IV bolus or 3ml/kg 3% hypertonic saline 8 hourly
- Antiepileptic drugs**
 - Phenytoin (20mg/kg over 30 min IV, followed by 5mg/kg in 2-3 divided doses)
 - Levetiracetam (500 mg BD, continue for 1-3 months)
 - Prophylaxis - if seizure free for 6 months
 - Therapeutic - if seizure free for 2 years after receiving drug therapy, consider tapering/discontinue antiepileptic
 - Consult neurosurgeon/neurologist before stopping
- Steroids NOT useful in Head Injury**

SURGICAL MANAGEMENT IN HEAD INJURY IF

- Extradural hematoma > 30cc in volume
- Subdural hematoma > 10mm thick with midline shift > 5 mm and evidence of deterioration in clinical neurology/change in pupillary size
- Most common operation done is decompressive craniotomy with hematoma evacuation and/or removal of large bone flap (15x12cm). To be done by neurosurgeon only

REMOVAL OF LARGE BONE FLAP (15CM X 12 CM) BY A NEUROSURGEON (DECOMPRESSIVE CRANIECTOMY) IS THE MOST COMMON SURGICAL PROCEDURE DONE



COMPLICATIONS TO WATCH FOR

- Deterioration of GCS score
- New onset or worsening focal neurological deficit
- Persistent headache, vomiting, or restlessness
- Bradycardia, hypertension
- Abnormal initial CT SCAN (repeat at 24 hours or earlier if indicated)

ABBREVIATIONS

CT : Computed Tomography
ICP : Intracranial Pressure

ICU : Intensive Care Unit
MRI : Magnetic Resonance Imaging

NCCT : Non-contrast Computerized Tomography

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KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of ICMR for more information: (icmr.gov.in) for more information. ©Indian Council of Medical Research, Ministry of Health & Family Welfare, Government of India.



Standard Treatment Workflow

SPINAL INJURY

ICD-S14.109A

DEFINITION

- **Injury to any of the following**
 - Vertebral Column and it's adnexae (disc, ligaments, facets etc)
 - Spinal cord (Partial/ Complete)
 - Cauda Equina and nerve roots
- **Acute <3 weeks**
- **Subacute 3 weeks - 3 months**
- **Chronic >3 months**

WHEN TO SUSPECT

- Always rule out spine injury in patients with poly-trauma, especially if unconscious
- Ascertain pain in the neck, back or limbs
- Rapid sensorimotor examination- ability to move fingers, hands, elbows, shoulders, hips, knees, ankles, toes
- Priapism (in unconscious/unresponsive)

CLINICAL PRESENTATION

SYMPTOMS:

- Pain (neck or back)
- Inability to move the limbs
- Numbness
- Breathing difficulty
- Inability to void and defecate

Local-

- Deformity (swelling, gibbus)
- Bruising
- Open wound over spine
- Tenderness over spine

SIGNS:

Systemic-

- Bradycardia with hypotension
- Sensorimotor deficit in arms, legs
- Labored breathing
- Priapism

PRIMARY CARE

GOALS

- Identify/suspect
- Immobilise
- Refer to higher center

SECONDARY CARE

GOALS

- Where General/Orthopaedic surgeon or Neuro surgeon (trained in spine) available
- Imaging: X ray/ CT SCAN
- Determine neurological status
- Develop treatment plan

TERTIARY CARE

GOALS

- Imaging: x-ray/CT SCAN/MRI
- Surgery/ Conservative management
- Rehabilitation

MANAGEMENT

- ATLS protocol (Airway-breathing-circulation-disability-exposure)
- Intubate/ventilate with C spine control
- IV Line Ringer Lactate; collect blood for grouping and cross matching; catheterise
- Log roll and inspect neck and back for bruise, deformity, tenderness
- Immobilise with ambulance man's collar/philadelphia collar/spine board/sand bags
- Manage pain with morphine/pethidine or unless contraindicated
- Transfer to higher centre

MANAGEMENT

- Secondary survey as per ATLS protocol
- Conscious/ unconscious
- Log roll and examine cervical, thoracic, lumbar, sacral spine
- Detailed neurological examination (Frankel scale) and document (Appendix I)
- Associated injuries
- Imaging (appropriate X rays, CT whole spine scans/MRI if available)
- TLICS/SLIC scoring (Appendix II/ III) –
 - surgery: indicated/doubtful – refer;
 - conservative: brace
- MPSS in selected cases (Appendix IV)
- Apply collar/skull traction/halo vest, brace or spine board to transfer

MANAGEMENT

- Detailed neurological evaluation (ASIA scale)
- Imaging (X Ray, CT, MRI)
- Classify spinal injury and score
- TLICS/SLIC <4 conservative management; >5 surgery; 4-case based
- MPSS as indicated
- DVT prophylaxis as indicated (Appendix V)
- Surgery as indicated (decompression/stabilisation)
- Conservative care-skull traction, halo vest, SOMI brace, TLSO brace
- Rehabilitation

APPENDIX I: FRANKEL SCALE

- Grade A: Complete neurological injury - No motor or sensory function detected below level of lesion
- Grade B: Preserved sensation only - No motor function detected below level of lesion, some sensory function below level of lesion preserved
- Grade C: Preserved motor, nonfunctional - Some voluntary motor function preserved below level of lesion but too weak to serve any useful purpose
- Grade D: Preserved motor, Functionally useful voluntary motor function below level of injury
- Grade E: Normal motor function - Normal motor and sensory function below level of lesion, abnormal reflexes may persist

APPENDIX II: TLICS SCORE

Table 1

The TLICS with its subcategories and scoring

Injury Category	Point Value
Injury Morphology	
Compression fracture	1
Burst fracture	2
Translation or rotation	3
Distraction	4
PLC Status posterior ligamentous complex	
Intact	0
Injury suspected or indeterminate	2
Injured	3
Neurological Status	
Intact	0
Nerve root involvement	2
Spinal cord or conus medullaris injury	3
Incomplete cord injury	3
Complete cord injury	2
Cauda equina syndrome	3
Non operative	<4
Equivocal	4
Operative	>4

APPENDIX III: SLIC SCORE

Characteristics	Points
Injury Morphology	
No abnormality	0
Compression fracture	1
Burst fracture	2
Distraction	3
Translation/rotation	4
Integrity of the disco-ligamentous complex	
Intact	0
Indeterminate	1
Disrupted	2
Neurological Status	
Intact	0
Nerve root injury	1
Complete cord injury	2
Incomplete cord injury	3
Persistent cord compression	+1
Non operative	<4
Equivocal	4
Operative	>4

APPENDIX IV: MPSS GUIDELINES (MODERATE EVIDENCE AND WEAK RECOMMENDATION)

- Methyl Prednisolone Sodium Succinate: 30mg/kg bolus and 5.4mg/Kg/hr x 23 hours
- **Role of MPSS:**
 - May consider but be aware of the complications of high dose of steroids
 - Acute spinal cord injury less than 8 hours, incomplete neurology: consider
 - Acute spinal cord injury more than 8 hours, incomplete/complete cord injury neurology : no role
 - Acute spinal cord injury less than 8 hours, complete neurology: no role
 - Acute spinal cord injury with thoracic/abdominal visceral injury: contraindicated

APPENDIX V: DVT PROPHYLAXIS

- All neurologically compromised (non-ambulatory) patients within 72 hours must receive DVT prophylaxis.
- Subcutaneous LMW Heparin/ fixed low dose unfractionated heparin
- No adjusted dose unfractionated heparin
- Duration 8-12 weeks depending on risk factors

ANCILLARY PROCEDURES

• Goal MAP ≥ 85 mmHg for blunt/incomplete penetrating injury	• Goal MAP ≥ 65 mmHg for complete penetrating injury	• Nor-epinephrine IV infusion (0.1- 0.5 mcg/kg/min)	• Early neurosurgical decompression of acute spinal cord compression (< 72 hours) is recommended	• Consider early tracheostomy (< 7 days) in high cervical injury (C1-C5) patients
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ABBREVIATIONS

ATLS : Advanced Trauma Life Support
CT : Computed Tomography
DVT : Deep Vein Thrombosis
LMW : Low Molecular Weight Heparin
MAP : Mean Arterial Pressure

MRI : Magnetic Resonance Imaging
SLIC : Subaxial Injury Classification
SOMI : Sternal Occipital Mandibular Immobilizer
TLICS : Thoracolumbar Injury Classification and Severity
TLSO : Thoracic-Lumbar-Sacral Orthosis

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