



Eastern Association for the Surgery of Trauma
Advancing Science, Fostering Relationships, and Building Careers

EAST MULTICENTER STUDY DATA COLLECTION TOOL

Brain vs. Bone: Does fracture fixation technique influence outcomes in patients with traumatic brain injury (TBI)?

1. Patient Number:

The following sheets are for annotation. All data will be entered electronically at each site into the AAST data collection tool for secure/encrypted electronic sharing with the coordinating site.

Facility Characteristics (2-6):

2. Name:

3. Location:

4. Yearly trauma volume:

5. Urban Environment: YES NO

6. Academic Affiliation: Teaching Non-teaching

Demographics and Injury Characteristics (7-35):

Age_____ Sex_____

Race: White Black Asian Hispanic or Latino Native Hawaiian Other

10-24. Past Medical History (Circle all that apply)

| | | |
|---|---------------------------|-----------------------------|
| Diabetes Mellitus | Liver disease | AIDS |
| Chronic Kidney Disease | Atrial Fibrillation | Congestive Heart Failure |
| Myocardial Infarction | Chronic Pulmonary Disease | Peripheral Vascular disease |
| Stroke | Dementia | Hemiplegia |
| Rheumatic or Connective tissue disorder | Peptic Ulcer Disease | Cancer/Chemotherapy |

25. Mechanism of injury:

| | | | |
|-------|-------------|-------|-------|
| Blunt | Penetrating | Crush | Other |
|-------|-------------|-------|-------|

26. Mechanism of injury description:

| | | | |
|-------------------|-------------|-------------|---------------|
| MVC | MCC | Peds Struck | GSW |
| Stab | Assault | Found down | Sports Injury |
| Industrial Injury | Fall <10 ft | Fall >10 ft | Other |

27. Injury Severity Score (ISS):

28-35: AIS Values

| | | | |
|--------|---------|-----------------|-----------------|
| HEAD | FACE | NECK | SPINE |
| THORAX | ABDOMEN | LOWER EXTREMITY | UPPER EXTREMITY |

Initial Evaluation in the Trauma Bay (36-63):

36-41. Vitals and GCS:

| | | | | |
|------------|-------------------------|--------------------------|------------------|----------------|
| Heart Rate | Systolic Blood Pressure | Diastolic Blood Pressure | Respiratory Rate | Temperature °C |
| GCS | E-Score | V-Score | M-Score | |

42. Intubated Prior to Admission: YES NO

42. Intubated in the Trauma bay: YES NO

43. TBI Classification: (Select one)

| | | |
|--------------|-----------------|--------------|
| Mild (13-15) | Moderate (9-12) | Severe (≤ 8) |
|--------------|-----------------|--------------|

44-53. Lab values:

| | | | |
|----------------------------------|--------------|-----------|----------------------------------|
| WBC _____x10 ³ /μL | Hgb_____g/dL | Hct_____% | Platelet_____10 ³ /μL |
| PT_____ | PTT_____ | INR_____ | Creatinine_____mg/dL |
| Lactate _____mmol/L | BAC (mg/dl) | | |

55.Toxicology Screening: (circle all the apply)

| | | | |
|---------------|--------------|----------------|------------|
| Amphetamine | Barbiturates | Cannabinoid | Cocaine |
| Methadone | Opiate | PCP | Tricyclics |
| Acetaminophen | Salicylate | Benzodiazepine | |

Fracture Characteristics (55-62):

| | | |
|--|---|--|
| Femur Fracture: YES NO | | |
| Laterality: R L B Type: Open Closed Morphology: Comminuted Oblique Pilon Segmental Spiral Transverse Linear Other | Alignment Displaced Non-displaced Open Fracture Classification Type I Type II Type III | Location: Head Neck Trochanteric Shaft (proximal or distal) Medial malleolus Other |

| | | |
|--|---|--|
| Tibia Fracture: YES NO | | |
| Laterality: R L B Type: Open Closed Morphology: Comminuted Oblique Pilon Segmental Spiral Transverse Linear Other | Alignment Displaced Non-displaced Open Fracture Classification Type I Type II Type III | Location: Head Neck Trochanteric Shaft (proximal or distal) Medial malleolus Other |

63. Head CT findings:

| | | | | |
|-----|--------------|-----|----------------|-------|
| SDH | EDH | IVH | Cerebral Edema | Other |
| SAH | IP contusion | DAI | Skull Fracture | |

Hospital Course/Operative Intervention (64-77)

64. Transfusion requirement in the first 24 hours:

| | | |
|----------------|---------------|---------------------|
| PRBC ____units | FFP ____units | Platelets ____packs |
| Cryo ____units | | |

65. ICP monitor placed: YES NO

66. Type of ICP monitor placed:

| | | |
|-------|---------------------------|-----|
| Bolt: | Intraparenchymal Catheter | IVC |
|-------|---------------------------|-----|

67. Time to operative intervention (external fixation vs. definitive repair) from admission day (hours):

68. GCS preoperative and perioperative period:

| | | |
|---------------------|-----------------------------|------------------------------|
| Preoperative | 6-hrs post-operative | 24-hrs post-operative |
|---------------------|-----------------------------|------------------------------|

69. Motor Score:

| | | |
|---------------------|-----------------------------|------------------------------|
| Preoperative | 6-hrs post-operative | 24-hrs post-operative |
|---------------------|-----------------------------|------------------------------|

70. Fracture Fixation Method:

| | | |
|---------------|------------|-------------|
| Ex-Fix | IMN | ORIF |
|---------------|------------|-------------|

71.Length of procedure (minutes):

72.EBL(ml):

73. Intraoperative resuscitation/transfusion:

| | | |
|----------------|----------------------------|--------------------|
| PRBC ____units | FFP____units | Platelets____packs |
| Cryo____units | Non-blood Colloid____mL | Crystalloid____mL |

74.Intraoperative hypotension:

75.Intraoperative hypoxia:

76. Other operative interventions:

Neurosurgical intervention:

| | | | | |
|-------------------|--------------------|---------------------------|-----------------|-------------------------------|
| Craniotomy | Craniectomy | Subdural drain | Bur hole | Skull fx elevation |
|-------------------|--------------------|---------------------------|-----------------|-------------------------------|

Tracheostomy:

PEG/Gastrostomy:

Other operations:

Outcomes and Disposition (77-83):

| | | | | |
|-------------------------|--------------------|----------------------------|-----------------------|------------------------------|
| Hospital LOS (days): | ICU LOS (days): | Ventilator days (days): | RLAS at discharge: | Motor Score at discharge: |
|-------------------------|--------------------|----------------------------|-----------------------|------------------------------|

Mortality (in hospital):

| | | | | | | |
|-----|------------|---------|-------------|----|-------------|---------|
| TBI | Hemorrhage | Cardiac | Respiratory | PE | Sepsis/MODs | Unknown |
|-----|------------|---------|-------------|----|-------------|---------|

Disposition (Circle one):

| | | | |
|------------------------|-------------|--------------------------|---------|
| Home | Acute Rehab | Skilled nursing facility | Hospice |
| Against medical advice | Morgue | | |



EAST MULTICENTER STUDY
DATA DICTIONARY

Brain vs. Bone: *Does fracture fixation technique influence outcomes in patients with traumatic brain injury (TBI)?*

Data Entry Points and appropriate definitions/clarifications:

| | |
|-------------------|---|
| 1. Patient number | A de-identifying number assigned by each site to each patient |
|-------------------|---|

Facility Characteristics:

| | |
|----------------------------------|--|
| 2. Hospital Name | Name at the hospital at which patient care occurred. |
| 3. Hospital geographic location | Location of the hospital enrolling patients |
| 4. Hospital trauma yearly volume | Trauma patient visits per year in the enrolling hospital |
| 5. Hospital urban environment | Urban: ≥50,000 people in city of the enrolling hospital Non-urban: <50,000 people in city of the enrolling hospital |
| 6. Hospital academic affiliation | Teaching: has residents on the trauma service at the enrolling hospital Non-teaching: does not have residents on the trauma service at the enrolling hospital |

Demographics:

| | |
|---------|---|
| 7. Age | Age of the patient enrolled in the study |
| 8. Sex | Sex of the patient enrolled in the study |
| 9. Race | Race of the patient enrolled in the study |

Past Medical History: (*Select all that apply*)

| | |
|-----------------------|---|
| 10. Diabetes Mellitus | Includes all patients with diabetes treated with insulin or oral hypoglycemic agents, but not diet alone. End organ-damage includes retinopathy, neuropathy, nephropathy, or brittle diabetes |
| 11. Liver disease | This includes chronic hepatitis (B or C), cirrhosis with or without portal hypertension, ascites, |

| | |
|--|--|
| | chronic jaundice, a history of variceal bleeding, or those with prior liver transplant |
| 12. AIDS | Acquired immune deficiency syndrome includes patients with definite or probable AIDS. Does not include those who are HIV positive, asymptomatic, and well-managed with medical therapy |
| 13. Chronic kidney disease | Baseline elevation of serum creatinine ≥ 3.0 mg/dL, need for outpatient hemodialysis, or prior renal transplant |
| 14. Atrial fibrillation | An abnormal, irregular heart rhythm in which electrical signals are generated chaotically throughout the atria |
| 15. Congestive heart failure | Heart failure in which the heart is unable to maintain adequate circulation of blood in the bodily tissues or to pump out the venous blood returned. This includes patients who have had exertional or paroxysmal nocturnal dyspnea and who have responded symptomatically (or on physical examination) to digitalis, diuretics, or afterload reducing agents. Additionally, chest x-ray showing pulmonary vascular redistribution would qualify |
| 16. Myocardial infarction | Documented history of a myocardial infarction. Should not be based solely on EKG changes |
| 17. Chronic pulmonary disease | Chronic pulmonary disease includes patients with asthma, chronic bronchitis, emphysema, and other chronic lung disease who have ongoing symptoms such as dyspnea or cough with mild or moderate activity. This includes patients who are dyspneic with slight activity, with or without treatment and those who are dyspneic with moderate activity despite treatment, as well as patients who are dyspneic at rest, despite treatment, those who require constant oxygen, those with CO ₂ retention, and those with a baseline PO ₂ below 50 Torr |
| 18. Peripheral vascular disease | Peripheral vascular disease includes patients with intermittent claudication or those who had a bypass for arterial insufficiency, those with gangrene or acute arterial insufficiency, and those with a treated or untreated aortic aneurysm (6 cm or larger) |
| 19. Stroke | Stroke includes patients with a documented history of an intracerebral hemorrhage or |

| | |
|---|---|
| | thrombus. Transient ischemia attacks should be included in this population |
| 20. Dementia | Dementia includes patients with moderate to severe chronic cognitive deficit resulting in impaired function from any cause |
| 21. Hemiplegia | Hemiplegia includes patients who have documented weakness or paralysis after stroke or transient ischemic attack |
| 22. Rheumatic or Connective tissue disorder | Rheumatologic disease includes patients with systemic lupus erythematosus, polymyositis, mixed connective tissue disease, rheumatoid arthritis, polymyositis, polymyalgia rheumatic, vasculitis, sarcoidosis, Sjögrens syndrome, or any other systemic vasculitis |
| 23. Peptic ulcer disease | Peptic ulcer disease includes patients who have required treatment for ulcer disease, including those who have bled from peptic ulcers |
| 24. Cancer/Chemotherapy | Lymphoma includes patients with Hodgkins, lymphosarcoma, Waldenstrom's macroglobulinemia, myeloma, and other lymphomas. Leukemia includes patients with acute and chronic myelogenous leukemia, acute and chronic lymphocytic leukemia, and polycythemia vera. Solid tumor consists of patients with solid tumors including breast, colon, lung, prostate, melanoma, stomach, etc. Specify which solid tumor the patient had. Indicate whether the patient had a metastatic solid tumor. Patients enrolled while receiving chemotherapy |

Injury Characteristics:

| | |
|-------------------------------------|--|
| 25. Mechanism of Injury | Select the appropriate mechanism of injury: blunt, penetrating, crush or other |
| 26. Mechanism of Injury description | <p><u>MVC:</u> Motor Vehicle Collision <u>MCC:</u> Motor Cycle Collision <u>Ped Struck:</u> Pedestrian Struck <u>GSW:</u> Gun Shot wound <u>Stab wound:</u> Penetrating Wound <u>Assault:</u> Physical Assault <u>Found down:</u> Patient found down by family or first responders. <u>Sports injury:</u> Trauma Related to Athletic Activity <u>Industrial Injury:</u> Trauma Related to Injury at an Industrial Company</p> |

| | |
|---------------------------------|--|
| | <p>Fall <10ft.: Fall from Height that is less than 10ft</p> <p>Fall > 10ft: Fall from Height that is greater than 10 ft</p> <p>Other: Injury mechanism that does not fall into the above categories</p> |
| 27. Injury Severity Score (ISS) | Numerical value for abbreviated injury severity score (ISS) face |
| 28. AIS Head | Numerical value for abbreviated injury score (AIS) head |
| 29. AIS Face | Numerical value for abbreviated injury score (AIS) face |
| 30. AIS Neck | Numerical value for abbreviated injury score (AIS) neck |
| 31. AIS Spine | Numerical value for abbreviated injury score (AIS) spine |
| 32. AIS Thorax | Numerical value for abbreviated injury score (AIS) thorax |
| 33. AIS Abdomen | Numerical value for abbreviated injury score (AIS) abdomen |
| 34. AIS Lower Extremity | Numerical value for abbreviated injury score (AIS) lower extremity |
| 35. AIS Upper Extremity | Numerical value for abbreviated injury score (AIS) upper extremity |

Initial Evaluation in the Trauma Bay:

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|--|--|
| 36. Vital signs | Indicate heart rate (HR; beats/minute), systolic blood pressure (SBP; mmHg), diastolic blood pressure (DBP, mmHg), respiratory rate (RR; respirations/minute) and maximum temperature (°C) |
| 37. Glasgow coma scale | Numerical value for best post resuscitation Glasgow Coma Scale (3-15) |
| 38. E-Score | Best post resuscitation Eye Glasgow Coma Scale Numerical Score |
| 39. V-Score | Best post resuscitation Verbal Glasgow Coma Scale Numerical Score |
| 40. M-Score | Best post resuscitation Motor Glasgow Coma Scale Numerical Score |
| 41. Intubated prior to admission | Select Yes if patient was intubated at the scene, during transport, or transferring facility prior to arrival to treating trauma center. If patient is not intubated prior to arrival, select No |
| 42. Intubated in the trauma bay | Select Yes if patient is intubated during evaluation in the trauma bay, otherwise select No |
| 43. Traumatic Brain Injury Classification (based on GCS) | <p>Mild: Glasgow Coma Scale Score 13-15</p> <p>Moderate: Glasgow Coma Scale Score 9-12</p> |

| | |
|--|---|
| | Severe: Glasgow Coma Scale Score ≤ 8 |
| FOR ALL LAB VALUES ENTER 999 if value | NOT available. Do Not enter Zero |
| 44. WBC | Numerical value for white blood cell count (10 ³ / μ L) |
| 45. Hgb | Numerical value for hemoglobin (g/dL) |
| 46. Hct | Numerical value for hematocrit (%) |
| 47. Platelet count | Numerical value for platelet count (x10 ³ / μ L). |
| 48. PT | Numerical value for prothrombin time |
| 49. PTT | Numerical value for partial thromboplastin time |
| 50. INR | Numerical value for International Normalized Ratio (INR) |
| 51. Creatinine | Numerical value for creatinine (mg/dL); |
| 52. Lactate | Numerical value for lactate (mmol/L). |
| 53. Blood Alcohol level | Numerical value for blood alcohol level (mg/dl) on admission |
| 54. Toxicology Screen | <p>Amphetamine: select if patient is positive for amphetamines on screening. If not tested or unknown select N/A</p> <p>Barbiturates: select if patient is positive for barbiturates on screening. If not tested or unknown select N/A</p> <p>Cannabinoids: select if patient is positive for cannabinoids on screening. If not tested or unknown select N/A</p> <p>Cocaine: select if patient is positive for cocaine on screening. If not tested or unknown select N/A</p> <p>Methadone: select if patient is positive for methadone on screening. If not tested or unknown select N/A</p> <p>Opiates: select if patient is positive for opiates on screening. If not tested or unknown select N/A</p> <p>PCP: select if patient is positive for phencyclidine on screening. If not tested or unknown select N/A</p> <p>Tricyclics: select if patient is positive for tricyclics on screening. If not tested or unknown select N/A</p> <p>Acetaminophen: select if patient is positive for acetaminophen on screening. If not tested or unknown select N/A</p> <p>Salicylate: select if patient is positive for salicylate on screening. If not tested or unknown select N/A</p> <p>Benzodiazepines: select if patient is positive for benzodiazepines on screening. If not tested or unknown select N/A</p> |

| | |
|--|---|
| 55. Femur Fracture | Select Yes if patient has a femur fracture. Otherwise select No |
| 56. Tibia fracture | Select Yes if patient has a tibia fracture. Otherwise select No |
| If patient has both femur and tibia fractures, please | complete both sections in the data collection sheet |
| 57. Laterality | R: Right sided fracture L: Left sided fracture B: Bilateral fractures |
| 58. Type | Open: fracture where there is an open wound or break in the skin near the site of the fracture Closed: fracture in the absence of open wound or break in the skin near the site of the fracture |
| 59. Fracture Morphology | Select the appropriate fracture morphology based on X-ray and CT scan results: Comminuted, oblique, pilon, segmental, spiral, transverse, linear or other. If other is selected, specify the type of fracture |
| 60. Fracture Alignment | Select whether the fracture is displaced or non-displaced based on X-ray or CT scan results |
| 61. Open fracture classification | <u>Gustilo Classification for Open Fractures:</u> <u>Type I:</u> wound less than 1 cm with minimal soft tissue injury. Wound bed is clean and bone injury is simple with minimal comminution <u>Type II:</u> wound is greater than 1 cm with moderate soft tissue injury. Wound bed is moderately contaminated, and fracture contains moderate comminution <u>Type III:</u> segmental fracture with displacement. Fracture with diaphyseal segmental loss. Fracture with associated vascular injury requiring repair. Farmyard injuries or highly contaminated wounds. High velocity gunshot wound. Fracture caused by crushing force from fast moving vehicle <u>IIIA:</u> wound less than 10 cm with crushed tissue and contamination and soft tissue coverage of bone is usually possible |

| | |
|-----------------------------|--|
| | <p><u>IIIB:</u> wound greater than 10 cm with crushed tissue and contamination, and soft tissue is inadequate and requires regional or free flap</p> <p><u>IIIC:</u> wound greater than 10 cm with crushed tissue and contamination, and soft tissue is inadequate and requires regional or free flap</p> |
| 62. Location | Select the appropriate fracture location based on X-ray and CT scan result: head, neck, proximal shaft, distal shaft, trochanteric, medial malleolus and other. If other is selected, indicate the fracture location. |
| 63. CT of the head findings | <p><u>SDH:</u> Subdural hematoma documented in the CT scan read</p> <p><u>EDH:</u> Epidural hematoma documented in the CT scan read</p> <p><u>IVH:</u> Intraventricular hemorrhage documented in the CT scan read</p> <p><u>Cerebral Edema:</u> documented in the CT scan read</p> <p><u>SAH:</u> Subarachnoid hemorrhage documented in the CT scan read</p> <p><u>IP contusion:</u> Intraparenchymal contusion/hemorrhage documented in the CT scan read</p> <p><u>DAI:</u> Diffuse Axonal Injury documented in the CT scan read</p> <p><u>Skull fractures:</u> documented in the CT scan read</p> <p><u>Other:</u> Any other type of intracranial hemorrhage not included above</p> |

FEMUR

TIBIA

Hospital Course/Operative Intervention:

| | |
|--|--|
| 64. Transfusion requirement in the first 24 hrs of admission | Number of units of Red blood cells (RBC), Fresh frozen plasma (FFP), cryoprecipitate and packs of platelets given with in the first 24 hours and prior to operative intervention |
| 65. Intracranial pressure monitor (ICP) | Intracranial pressure monitor placed by neurosurgery on initial evaluation |
| 66. Type of intracranial monitor placed | <p><u>Bolt:</u> subdural placement of intracranial pressure monitor as documented/confirmed by neurosurgery and imaging.</p> <p><u>Intraparenchymal catheter:</u> intraparenchymal placement of intracranial pressure monitor as documented/confirmed by neurosurgery and imaging.</p> |

| | |
|---|--|
| | <u>Intraventricular catheter:</u> intraventricular placement of intracranial pressure monitor as documented/confirmed by neurosurgery and imaging. |
| 67. Time to operative intervention | Time in hours to fracture stabilization or definitive fixation from admission date |
| 68. Glasgow coma scale pre and perioperatively | Highest/Best documented GCS numerical value prior to fracture stabilization/fixation, 6 hours and 24 hours after fracture stabilization/fixation |
| 69. Motor Score | Highest/Best documented Motor numerical value prior to fracture fixation/stabilization, 6 hours and 24 hours after fracture fixation/stabilization |
| 70. Fracture Fixation | <u>Ex-Fix:</u> Placement of external fixation device for stabilization <u>IMN:</u> intramedullary nailing for fracture fixation <u>ORIF:</u> open reduction internal fixation for fracture fixation |
| 71. Length of procedure | Duration of operative intervention in minutes |
| 72. EBL | Estimated intraoperative blood loss (ml) |
| 73. Intraoperative transfusion/fluid resuscitation | Number of units of Red blood cells, Fresh frozen plasma, cryoprecipitate and packs of platelets given intraoperatively. Volume of colloid (Albumin) and Crystalloid (normal saline, lactated ringer, and/or plasmalyte) given intraoperatively in (ml) |
| 74. Intraoperative hypotension | Include any episodes of systolic blood pressure <90 recorded intraoperatively |
| 75. Intraoperative hypoxia | Include any episodes of oxygen saturation < 90 recorded intraoperatively |
| 76. Other operative interventions | Select all surgical interventions/procedures that apply: Craniotomy, craniectomy, subdural drain, bur hole, skull fracture elevation, tracheostomy or peg/gastrostomy. Record any other operative intervention not included in the list of procedures above |

Outcomes and disposition:

| | |
|---|---|
| Discharge parameters: Note: for calculation of | days refer to day of admission as hospital day number 1 |
| 77. Hospital LOS | Free text entry for number of consecutive hospitalized days |
| 78. ICU LOS | Free text entry of number of consecutive days spent in ICU |
| 79. Ventilator days | Free text entry of number of days mechanically ventilated |

| | |
|--|--|
| <p>80. RLAS at discharge</p> | <p>Rancho Los Amigos Score/Scale: is a level of cognitive functioning scale that is performed by speech/cognitive evaluation therapist Free text entry of the score given to the patient on last evaluation prior to discharge Scale from I-VIII I No response II Generalized response III Localized response IV Confused, agitated response V Confused, inappropriate, non-agitated response VI Confused, appropriate response VII Automatic appropriate response VIII Purposeful, appropriate response</p> |
| <p>81. Motor Score at discharge</p> | <p>Best/highest recorded Motor Glasgow Coma Scale Numerical Score at day of discharge</p> |
| <p>82. Discharge Disposition</p> | <p>Select from the following: home, acute care facility, skilled nursing facility, other healthcare facility, hospice, left against medical advice, deceased.</p> |
| <p>83. Mortality</p> | <p>Select all that apply. Indicate if in hospital mortality is due to the traumatic brain injury (TBI), hemorrhage, cardiac etiology, respiratory etiology, sepsis or multiorgan system failure, pulmonary embolism or unknown</p> |