EAST Multi-Center Trial Proposal

1. **Use this area to briefly (1-2 paragraphs only) outline the burden of the problem to be examined**

Penetrating brain injuries are a common occurrence at major trauma centers across the country. The incidence of secondary infection or penetrating brain injury infections (PBII) after a penetrating brain injury however, is scarcely reported with only one study in the literature recording a 25 % incidence in combat casualties with factors predictive of PBII scarcely noted in the literature. In our initial analysis at a single institution the incidence of PBII was significantly lower in a civilian population at eight percent. However due to the limited number of patients with PBII it is difficult to extrapolate meaningful recommendations.

The purpose of this study is to determine the incidence of penetrating brain injury infections (PPBI) and to determine if there are any factors predictive of PBII after penetrating brain injury.

2. **Specific Aims of Multicenter Study**

Primary aim: To define the incidence of penetrating brain injury infections

Secondary aim: To determine if there are any factors predictive of the occurrence of penetrating brain injury infections.

3. Inclusion Criteria:

Age >18
Survival >72 hours
Evidence of Dural penetration (either by CT scan or Operative findings)

4. Exclusion criteria:

Failure to identify dural penetration
Death before 72 hours

5. Theraputic interventions: There is no therapeutic intervention as this is a retrospective study

6. Primary outcome:

1. In patients who sustain a penetrating brain injury can we identify factors that predict brain infections (noted as CNS infections in the data collection)?

2. Does the presence of antibiotics or duration of antibiotics impact the incidence of CNS infection?

7. Secondary outcome:

1. Is hospital length of stay prolonged in patients with CNS infection after penetrating brain injury
2. Is the disposition different in patients with brain infection than those without infection

8. Specific variables to be collected and analyzed

Standardized data will be collected for each patient:

Sex
Race
Brain AIS (abbreviated injury severity score)
Face AIS
Motor GCS
Mechanism of injury
Extent of Dural penetration
Retained foreign body
Primary operative intervention (none vs. craniotomy vs. craniectomy)
ICP monitor (intercerebral pressure monitor)
Antibiotics
Length of Antibiotics
CNS infection
Hospital Length of Stay
ICU length of stay
Disposition

9. Succinctly outline a risk/benefit analysis:

Descriptive statistics will be calculated for all variables of interest. Mantel-Hansel Chi square test is used to compare the distribution of categorical variables between patients with resultant brain infection and patients without brain infection. The Wilcoxon's rank-sum statistic test is used to compare the distribution of non-parametric variables between the populations. A multivariate logistic regression will be used to assess the influence of development of PBII. Specifically, those variables associated with PBII at a p-value of 0.2 or less, will be included in the regression model.

10. Risk/Benefit Analysis

The incidence of penetrating brain injury infections is largely unknown with scant literature citing the occurrence between 8-25%. Factors predictive of PBII are currently unknown. Identifying both the incidence and predictive factors may significantly benefit future patient outcomes.

11. References

1. Weisbrod AB et al. Long term ooutcomes of combat casualties sustaining penetrating traumatic brain injury. J Trauma Acute Care Surg 2012. Dec; 73(6):1525-1530
2. Jimenez CM et al. Risk factors for intracranial infection secondary to penetrating craniocerebral gunshot wounds in civilian practice. World Neurosurg. 2013. May-Jun; 79(5-6):749-755.
3. Petridis AK., et al. Outcome of craniocerebral gunshot injuries in civilian population. Prognostic factors and treatment options. Cent Eur Neurosurg. 2011 Feb; 72(1):5-14.