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Predictive Cervical Spine Fracture (CSF) Patterns for Blunt Cerebrovascular Injuries (BCVI): A Systematic Literature Review

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Background: Cervical spine fractures (CSF) are associated with blunt cerebrovascular injuries (BCVI) due to arterial proximity, impacting screening criteria. Undetected BCVI leads to high mortality (up to 40%) and morbidity (up to 80%). Motor vehicle accidents predominantly cause CSF, with reported BCVI incidence ranging from 30.4 - 78%

Objective: This literature review aims to identify CSF patterns predictive of BCVI, improving screening accuracy to prevent severe neurological deficits or fatalities

Study Design: A systematic review (SR) (2000-23) on PubMed, Embase with Prisma Guidelines was done to gather English articles addressing CSF patterns associated with BCVI. Fig. 1

Methods: Inclusion criteria adults (>16 years) with blunt cervical trauma and specific CSF patterns linked to BCVI. Exclusions was pediatric cases, penetrating traumas, unavailable full-text, and non-English articles. PRISMA guidelines, EpiBasic and STATA17 were used

Results: Among 197 eligible articles, 8 met the criteria. Associated CSF patterns include isolated C1, C2, C3 fractures, any C1-C3, C4-C7 fractures, two-level fractures, subluxation/dislocations, occipital condyle (OC), and transverse foramen (TF) fractures. Pooled OR (95% CI) for BCVI and specific fractures: C1: 1.4 (0.99-2.1); C2: 1.2 (0.8-1.6); C3: 1.8 (0.9-3.6); C1-C3: 4.8 (2.9-7.99); C4-C7: 2.2 (1.4-3.4); TF: 5.7 (4.1-7.9); OC: 2.3 (1.0-5.0); Subluxation/dislocations: 1.4 (1.2-1.7); Two-level: 3.0 (1.9-4.7)

Discussion: Our SR shows significant associations between BCVI and specific CSF patterns. Combined CSF C1-C3, C4-C7, OC type III, two-level, facet subluxations/dislocations, and TF fractures exhibit notable predictive value for BCVI. However narrowing screening criteria solely to these high-risk patterns might potentially miss BCVI cases, leading to severe neurological complications. Balancing sensitivity and specificity in screening protocols remains crucial for effective BCVI detection and prevention of adverse neurological outcomes

Fig. 1

