



Critical appraisal of bibliometric study on most influential publications of upper cervical spine instability

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We must congratulate authors while embarking on complex pathologies of the cervical spine. More so axial cervical spine instability has been highlighted (1). Authors mark the introduction along the spectrum of three conditions which include occipitocervical instability, atlantoaxial instability and atlantoaxial rotatory displacement. Need for the literature review has been highlighted for better understanding of pathologies and to tailor treatment strategies. Authors discuss need for the citation analysis on topic. Therefore, need for a bibliometric study has been suggested to formulate a comprehensive review of the most cited publications on the topic word. Authors sought Clarivate Web of Science Database as their primary search engine. Defined variables were frequency of the citation, year of publication, country of origin, journal of publication, level of scientific evidence and in particular the article type. Total 287 papers met the inclusion criteria. Most productive decade was from 2000 to 2009 with 45 publications. Traumatic Anterior Atlanto-Occipital Dislocation by Powers *et al.* in 1979 was observed to be the most cited paper (2). Interestingly, all decades demonstrated a progressive increase in the number of published papers except for the decade of 2010 to 2019. Authors also observed which country cited the most on the topic. United States of America with a total of 61 publications contributed the most to the topic. Towards the conclusion authors emphasize a need for citation analysis which appeared to

be the main focus of the study. Major inference which dictates the diagnosis trends was the use of newer diagnostic modalities such as computerized tomography (CT) and magnetic resonance imaging (MRI) scans.

In a critical appraisal of this study, authors have tried to discuss two separate entities under one topic of upper cervical instability. Given the fact that these are two separate pathologies and their mechanism of injury and/or progression are different and therefore need to be further subdivided into dissociation/distraction injuries which are more catastrophic. Authors appear to lack the understanding of anatomic differences as well as the causes of progression of these benign disease processes. Under discussion authors did divide these pathologies into two separate conditions however, focus remains the pediatric spine and mode of injuries leading to each specific pathology is lacking (3). When highlighting atlantoaxial instability need for the dynamic imaging has not been discussed (4). Lateral radiographs of cervical spine cannot assess this pathology. Common conditions (Down's Syndrome, Morquio syndrome, Rheumatoid arthritis, Grisel syndrome) leading to atlantoaxial instability in pediatric spine have been highlighted (4). More importantly, atlas and axial fractures, especially the odontoid fractures have not been mentioned, which are a major subset of the upper cervical trauma in adult population (5-7). The diagnosis and treatment rationales

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are important to understand especially in the neurotrauma setting (8). Nonetheless, occipital condyle fractures and the classification system have not been discussed. Under the realm of atlanto-occipital dissociation/distractor injuries the diagnosis scheme has not been emphasized (5-7). Moreover, current and commonly used classification system especially the Traynelis classification is of paramount importance (9). This classification better defines the results of injury patterns. Atlantoaxial rotatory subluxation/fixation has been discussed, the diagnosis details are lacking, however, the treatment rationale is relatively better defined. Authors discuss the need for bibliometric/citation analysis to devise a treatment rationale which appeared to be lacking in the study. Gallie-Sonntag, and Brooks techniques have been mentioned but have not been described (9). Additionally, these techniques are only used as salvaged techniques. Main workforce is the Harms Construct technique which has been consistently used these days (10). Furthermore, translamina fixation is a supplemental technique revolutionized by Dr. Neill Wright (10). For atlanto-occipital instability—occipitocervical fusion is utilized which negates the need for Halo application and its use has significantly been reduced due to poor patient compliance. The true understanding of these pathologies is of paramount importance and remains main core of the cervical trauma.

We recommend need of a thorough literature review to discuss various emergent and non-emergent pathologies of this complex region. Additionally, adult and pediatric pathologies maybe discussed, separately. Management options are diverse and current surgical approaches need to be discussed to help guide surgeons in training. Although described bibliometric/citation analysis could assess the current trends but more specific review of each pathology would provide substantial evidence to enhance clinical impact of the study. This would help tailor treatment strategies while highlighting more specific areas for future research.

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