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Corresponding author:

Sang Hun Lee

slee439@jhmi.edu

Author Affiliation:

Johns Hopkins University.

Comparison of characteristics and surgical outcomes between chin-on-chest deformity and dropped-head syndrome: a comprehensive systematic review and meta-analysis of severe cervical kyphosis

Kim, K; Seo, J; Oh, D; Kim, SE; Muthu, S; Wang, JC; Heller, JG; Lewis, SJ; Smith, JS; Shaffrey, CI; Watanabe, K; K, SW; Jain, A; Martin, CT; Cho, SK; Yoon, ST; Lee, SH.

ADMINISTRATIVE INFORMATION**Support** - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2026100100

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 October 2026 and was last updated on 23 October 2026.

INTRODUCTION

Review question / Objective To compare clinical characteristics and surgical outcomes of chin-on-chest deformity and dropped-head syndrome and to identify key features to form a new, comprehensive entity: cervical kyphosis advanced decompensation (CKAD)..

Rationale Chin-on-chest deformity (COC) and dropped-head syndrome (DHS) are the only terms in the literature that describe severe, disabling cervical kyphosis (CK). However, no study has compared the pathologies, clinical characteristics, treatment strategies, and outcomes of the two entities. In addition, there are no standardized diagnostic terms that include various etiologies of severe cervical kyphotic deformity..

Condition being studied Severe cervical kyphotic deformity, which is called chin-on-chest deformity or dropped-head syndrome in the literature,

without clear definitions or standardized diagnostic terms that include etiologies of, or treatment for, these entities. Symptoms of impaired horizontal gaze and inability to maintain head posture have been mentioned in previous studies..

METHODS

Search strategy We conducted a systematic search of the MEDLINE/PubMed (National Library of Medicine; Washington, D.C.), Embase; (Elsevier B.V., Amsterdam, Netherlands), and the Cochrane Library of Systematic Reviews (Cochrane Collaboration; London, England) databases in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines . Because of the lack of clearly distinguishable definitions for cervical kyphotic deformities of varying severities, we used Medical Subject Headings (MeSH), Emtree terms, and natural language terms, combined via “AND” and “OR,” to encompass a range of keywords (e.g., “Dropped Head Syndrome,” “Chin-On-Chest,”

“Camptocormia”, “Bent spine syndrome”). Similarly, we combined index terms and natural language for the keyword “surgery,” then connected cervical kyphotic deformity and surgery with “AND” to establish the final search strategy. The detailed search strategy will be available as supplementary material in the published article..

Participant or population Articles resulting from the database searches were screened by two reviewers for the following: The inclusion criteria were (1) explicit mention of DHS or COC deformity, (2) patient age ≥ 18 years, (3) a specified etiology of kyphosis, (4) patients’ having undergone surgical treatment, and (5) at least one reported treatment outcome. The exclusion criteria were (1) inappropriate article types (review articles, conference abstracts, cadaveric studies, case reports with fewer than six cases) and (2) the kyphosis etiologies tumor, infection, and post-traumatic CK occurring within 6 months of trauma..

Intervention Data on surgical treatment of 182 patients (13 studies) were analyzed, including surgical approach and type of procedure, which included several types of osteotomy as well as discectomy and fusion. Clinical and radiographic outcomes and postoperative complications were collected..

Comparator Not applicable.

Study designs to be included Systematic review/meta-analysis.

Eligibility criteria Articles resulting from the database searches were screened by two reviewers for the following: The inclusion criteria were (1) explicit mention of DHS or COC deformity, (2) patient age ≥ 18 years, (3) a specified etiology of kyphosis, (4) patients’ having undergone surgical treatment, and (5) at least one reported treatment outcome. The exclusion criteria were (1) inappropriate article types (review articles, conference abstracts, cadaveric studies, case reports with fewer than six cases) and (2) the kyphosis etiologies tumor, infection, and post-traumatic CK occurring within 6 months of trauma..

Information sources Electronic databases..

Main outcome(s) Categorization of COC and DHS by clinical characteristics and surgical outcomes, and identification of key features, to form a new, comprehensive diagnostic entity: cervical kyphosis advanced decompensation. The studies were further categorized based on surgical approach,

underlying etiologies, and CKAD subtype for subgroup analysis..

Data management Data were maintained by coauthors responsible for data collection & analysis using spreadsheet applications on secured laptop computers..

Quality assessment / Risk of bias analysis The methodological quality of the included studies was assessed based on the methodological index for non-randomized studies (MINORS) criteria. Depending on the study design—specifically, whether a comparison group was present—each study was evaluated across eight or 12 items. Each item was scored as 0 (not reported), 1 (reported but inadequate), or 2 (reported and adequate)..

Strategy of data synthesis 1) Single-arm meta-analysis to assess mean differences with 95% confidence intervals (CIs) in radiographic measures and visual analogue scale (VAS) pain score, as well as the odds ratio (OR) with 95% CI for horizontal gaze improvement between preoperative and postoperative status.

2) Random-effects meta-analysis model used for data synthesis for high-heterogeneity studies ($I^2 > 50\%$ and $P < .10$) or when double-arm meta-analysis was not possible, or when the nature of the included studies varied..

Subgroup analysis Sensitivity and subgroup analysis if heterogeneity was noted among the reported results. The studies were further categorized based on surgical approach, underlying etiologies, and CKAD subtype for subgroup analysis..

Sensitivity analysis Sensitivity and subgroup analysis if heterogeneity was noted among the reported results. The studies were further categorized based on surgical approach, underlying etiologies, and CKAD subtype for subgroup analysis..

Language restriction English.

Country(ies) involved United States, Korea, India, Canada.

Keywords chin-on-chest; dropped-head syndrome; cervical kyphosis; cervical kyphosis advanced decompensation; cervical osteotomy; T1 slope.

Dissemination plans Publication in a spine surgery-focused journal with article available via subscription or institutional access..

Contributions of each author

Author 1 - Kanghyun Kim - Acquisition and data
Analysis and interpretation of data
Drafting of the manuscript
Critical revision of the manuscript for important intellectual content
Statistical analysis.
Email: kevin kim1709@gmail.com

Author 2 - Jinew Seo - Acquisition and data
Analysis and interpretation of data
Drafting of the manuscript
Critical revision of the manuscript for important intellectual content
Statistical analysis.
Email: inewseo@gmail.com

Author 3 - Donghyup Oh - Acquisition and data
Analysis and interpretation of data
Drafting of the manuscript.
Email: dhehdguq0530@gmail.com

Author 4 - Seo Eun Kim - Acquisition and data
Analysis and interpretation of data
Drafting of the manuscript
Statistical analysis.
Email: sunnyisms1@gmail.com

Author 5 - Sathish Muthu - Category 1
Conception and design
Acquisition and data
Analysis and interpretation of data
Drafting of the manuscript
Critical revision of the manuscript for important intellectual content
Statistical analysis.
Email: drsathishmuthu@gmail.com

Author 6 - Jeffrey C. Wang - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: jcwspine@gmail.com

Author 7 - John G. Heller - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: hell02@emory.edu

Author 8 - Stephen J. Lewis - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: stephen.lewis@uhn.ca

Author 9 - Justin S. Smith - Conception and design

Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: jss7f@uvahealth.org

Author 10 - Christopher I. Shaffrey - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: christopher.shaffrey@duke.edu

Author 11 - Kota Watanabe - Critical revision of the manuscript for important intellectual content
Administrative, technical or material support.
Email: watakota@gmail.com

Author 12 - Seok Woo K - Critical revision of the manuscript for important intellectual content
Administrative, technical or material support.
Email: spinedrk@gmail.com

Author 13 - Amit Jain - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support.
Email: amitjain@jhmi.edu

Author 14 - Christopher T. Martin - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support.
Email: mart1865@umn.edu

Author 15 - Samuel K. Cho - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: samuel.cho@mountsinai.org

Author 16 - S. Tim Yoon - Conception and design
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: styoon@emory.edu

Author 17 - Sang Hun Lee - Conception and design
Analysis and interpretation of data
Drafting of the manuscript
Critical revision of the manuscript for important intellectual content
Administrative, technical or material support
Supervision.
Email: slee439@jhmi.edu