Editorial

Computed Tomography Evaluation of Craniovertebral Junction

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The CT scan-based morphometric study of the craniovertebral junction (CVJ) conducted by Gupta et al is a study that highlights an important, unique and complex region in the spine and skull base.[1] The CVJ is located deep below the skull base and surrounded with the most critical neurovascular structures in the body. This location made the approaches to the anterior CVJ and odontoid process to be one of the most challenging issues in the practice of neurosurgery.[2] The CVJ represents the transition between the brain and cervical spine. The majority of the spine's rotation, flexion, and extension occur in this region. It is important to understand the unique and complex CVJ anatomy, biomechanics, and various pathological processes that may affect this region. The craniovertebral can be involved in numerous intradural and extradural pathologies, including congenital abnormalities, trauma, inflammatory diseases and tumors.[2] Recent extensive studies about the CVJ influenced the marked development of the surgical approaches and instruments used for this region, with improved clinical outcome after surgery.[3]

Morphometric studies analyzing the morphology and angulations of the spinal vertebrae were extensively performed.[4] However, research works on the angular craniometry in CVJ, studying the relations between the cranial and spinal angles, are rarely reported and were historically based on measurements taken from plain radiographs.[5,6] The angular craniometric parameters of the CVJ are important to understand and select proper treatment option for the different diseases that affect this region. For example, basilar invagination (BI) is a radiological finding diagnosed on the basis of craniometric criteria of the CVJ such as Chamberlain's line, McRae's line, McGregor's line, Clark station, Redlund–Johnell criterion, and Ranawat criterion.[2] Also, anterior atlantodental interval (AADI) is an important criteria for diagnosis of instability.[2]

It is important to remember as well that many studies, as the authors' study, showed these differences between races.[1,4-8] Therefore, the reliance on studies from specific regions to be the anatomic reference for the surgical treatment for different races may not give the ideal results documented in the original studies. For this reason, I believe that anatomic and morphometric studies on different races and populations must be encouraged. An important point to be highlighted is the occupational effect on the morphology of the CVJ in the selected population, which is well known and documented.[9-12] For example, studies found different morphologic changes in the spine of groups belonging to the same race, gender and age groups but different occupations such as professional sportsmen, office workers, heavy labor workers, etc.[9-12] I believe that it is very important for physicians working with populations with similar occupation, as they are facing more cases with the same pathomechanism and therefore possess more specific knowledge required to manage these specific populations.

Conflict of Interest
None declared.

References

1 Gupta PP, Dhok AM, Shaikh ST, Patil AS, Gupta D, Jagdhane NN. Computed tomography evaluation of craniovertebral junction in asymptomatic central rural Indian population. J Neurosci Rural Pract 2020;11(3): 442–447
2 Abuzayed B, Gazioglu N, The surgical technique of endonasal endoscopic approach to the craniovertebral junction. In: Hathiram T, Khattar V, eds. Atlas of Operative Otorhinolaryngology and Head and Neck Surgery. New Delhi: Jaypee Brothers Medical Pub; 2013;756–767
3 Lopez AJ, Scheer JK, Leibl KE, Smith ZA, Dlouhy BJ, Dahdaleh NS. Anatomy and biomechanics of the craniovertebral junction. Neurosurg Focus 2015;38(4):E2
4 Abuzayed B, Tutunculer B, Kucukyuruk B, Tuzgen S. Anatomic basis of anterior and posterior instrumentation of the spine: morphometric study. Surg Radiol Anat 2010;32(1):75–85
5 Botelho RV, Ferreira ED. Angular craniometry in craniocervical junction malformation. Neurosurg Rev 2013;36(4):603–610, discussion 610
6 Batista UC, Joaquim AF, Fernandes YB, Mathias RN, Ghizoni E, Tedeschi H. Computed tomography evaluation of the normal craniocervical junction craniometry in 100 asymptomatic patients. Neurosurg Focus 2015;38(4):E5

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7 Dash C, Singla R, Agarwal M, et al. Craniovertebral junction evaluation by computed tomography in asymptomatic individuals in the Indian population. Neurol India 2018;66(3):797–803
8 Degno S, Abrha M, Asmare Y, Muche A. Anatomical variation in morphometry and morphology of the foramen magnum and occipital condyle in dried adult skulls. J Craniofac Surg 2019;30(1):256–259
9 Brinjikji W, Luetmer PH, Comstock B, et al. Systematic literature review of imaging features of spinal degeneration in asymptomatic populations. AJNR Am J Neuroradiol 2015;36(4):811–816
10 Dudli S, Fields AJ, Samartzis D, Karppinen J, Lotz JC. Pathobiology of Modic changes. Eur Spine J 2016;25(11):3723–3734
11 Macedo LG, Battié MC. The association between occupational loading and spine degeneration on imaging - a systematic review and meta-analysis. BMC Musculoskelet Disord 2019;20(1):489
12 Buraimoh MA, Massie LW, Montgomery DM. Lateral atlantoaxial osteoarthritis: a narrative literature review. Clin Spine Surg 2017;30(10):433–438