Editorial

Cluster-randomized, crossover trial of head positioning in acute stroke—have we lost our position on this?

Digvijaya Navalkele, Sheryl Martin-Schild

Touro Infirmary and New Orleans East Hospital, New Orleans, Louisiana, French

Correspondence to: Sheryl Martin-Schild, MD, PhD. Touro Infirmary and New Orleans East Hospital, New Orleans, Louisiana, French.
Email: Sheryl.Martin-Schild@lcmchealth.org.

Provenance: This is a Guest Editorial commissioned by the Executive Editor Zhongheng Zhang, MD, MM (Department of Emergency Medicine, Sir Run-Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, China).

Comment on: Anderson CS, Arima H, Lavados P, *et al.* Cluster-Randomized, Crossover Trial of Head Positioning in Acute Stroke. N Engl J Med 2017;376:2437-47.

Received: 16 August 2017; Accepted: 22 August 2017; Published: 13 September 2017.
doi: 10.21037/jeccm.2017.08.07
View this article at: http://dx.doi.org/10.21037/jeccm.2017.08.07

One of the earliest documentation of postural change leading to reversible clinical worsening of neurological symptoms was documented in 1976 in four patients with occlusive cerebral arterial disease (1). Elevation of the head of the bed resulted in deterioration in function, from which patients recovered with resumption of the supine position. Since then, the effect of head positioning on cerebral perfusion pressure, cerebral blood flow, electroencephalography, mean flow velocity in MCAs, and intracranial pressure have been described in small studies of acutely brain injured animals with induced stroke and humans with spontaneous stroke (2-5). Improvement in cerebral blood flow and neurological function has been demonstrated by the simple and zero-cost intervention of placing the head of bed position flat in some series (3,6). In other studies, deterioration after elevation of the head of the bed has been used to guide the decision whether to offer endovascular treatment for a large vessel occlusion with low NIHSS score after assuming supine positioning (7). If there was no potential adverse effect of the supine position in patients with acute stroke, it would be hard to argue against this as a universal practice.

In a survey of physicians providing care to stroke patients, 71% were uncertain about best head position in setting of acute stroke and the most common concern with supine positioning was dysphagia, risking aspiration pneumonia; others included heart failure with resultant hypoxia and intolerance, exacerbation of brain edema, and elevation of ICP in patients with ICH (8). In current clinical practice, if symptom worsening is encountered, patients are left in supine or Trendelenburg position for an undefined period of time until the trial and error method determines resolution of susceptibility to neurological worsening with posture change. The AHA/ASA Guidelines for the Early Management of Acute Ischemic Stroke recommends supine position in nonhypoxic patients who are able to tolerate this position (9); however, we lacked randomized trial data to guide head position in acute stroke setting.

Cluster-Randomized, Crossover Trial of Head Positioning in acute stroke provides new information regarding this conundrum (10). Anderson *et al.* attempted to determine if head flat position could lead to improved outcomes in patients with acute ischemic strokes. This trial successfully screened 22,632 patients and enrolled 11,093 patients of whom 85% had ischemic strokes over an 18-month period. Head positioning was initiated in the emergency department and 87% of patients were able to stay in the assigned position for 24-hrs. Although authors did not find significant difference in disability at 90-days between the two groups, no difference in mortality and rates of adverse events, including pneumonia, was found, thus implying safety of supine position in acute stroke setting, but no clinical advantage.

The primary strengths of the study were its large sample of patients and multicenter (and country) participation. The patients were randomized in clusters. The crossover part of

the trial was that the hospital crossed over from one head positioning to another; the patients were not exposed to the other head positioning. The study included patients with intracerebral hemorrhage and, for patients with ischemic stroke, did not screen with vascular imaging, and, thus, did not select for stroke etiology. The majority of ischemic strokes in this trial were small to moderate size as evidenced by the median NIHSS of 4 (IQR 2 to 9) and the very high proportion of patients with 90 d mRS of 0–1. One could question the applicability of a head positioning protocol to this patient population, as these patients are less likely to experience early neurological deterioration (END) than patients with more severe baseline stroke severity (11). In HeadPoST, END was not a selected outcome variable. The median time to initiation of assigned position was 14 hours after symptom onset for AIS and about 10 hours for ICH; therefore, high-risk period for stroke progression as evidenced by END was missed in more than half of studied patients. Only 25% of patients were treated <5 hours from onset, 50% >14 hours and 25% >35 hours from onset. Subgroup analysis of time to therapy, even in ultra-early (0–3 hours from time of stroke onset), did not demonstrate a significant relationship between HOB position and the primary efficacy outcome of shift in mRS. It must be remembered, however, that this study was not powered to examine the ultra-early, or hyperacute, population of patients with stroke.

Inclusion of a mixed population of ischemic stroke etiology does allow generalization to an overall stroke population. The study was more feasible without required acute vascular imaging and exclusion of patients without LVO, since the cost of the trial was limited and the hospitals without this emergent capability could participate. However, the potential benefit in the highest risk population (LVO without completed territorial infarction at initial imaging) was limited, since the trial wasn't powered for this prespecified subgroup analysis. Caution is advised; therefore, regarding applicability of these results to large arterial occlusive strokes as only 30% of studied patients had this etiology and only 1% of patients underwent endovascular thrombectomy.

HeadPoST confirms safety of head positioning in small to moderate size strokes. However, which position is beneficial still remains a question. Nonetheless this fast and free intervention can offer benefit to a high-risk population with vulnerable collateral supply. Future trials focusing on large artery occlusive disease and larger stroke in the first few hours—when these patients are most vulnerable to loss of collateral flow and, thus, penumbra—could find the answer. In the meantime, enforcing head of bed flat positioning may be harder to argue, if challenged, without understanding the limitations of HeadPoST after publication of this trial in the high profile NEJM.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Caplan LR, Sergay S. Positional cerebral ischaemia. J Neurol Neurosurg Psychiatry 1976;39:385-91.
2. Schwarz S, Georgiadis D, Aschoff A, et al. Effects of body position on intracranial pressure and cerebral perfusion in patients with large hemispheric stroke. Stroke 2002;33:497-501.
3. Wojner-Alexander AW, Garami Z, Chernyshev OY, et al. Heads down: flat positioning improves blood flow velocity in acute ischemic stroke. Neurology 2005;64:1354-7.
4. Favilla CG, Mesquita RC, Mullen M, et al. Optical bedside monitoring of cerebral blood flow in acute ischemic stroke patients during head-of-bed manipulation. Stroke 2014;45:1269-74.
5. Meyer JS, Leiderman H, Denny-Brown D. Electroencephalographic testing of insufficiency of the basilar and carotid arteries in man by use of the tilt-table. Trans Am Neurol Assoc 1956:86-90.
6. Olavarria VV, Arima H, Anderson CS, et al. Head position and cerebral blood flow velocity in acute ischemic stroke: a systematic review and meta-analysis. Cerebrovasc Dis 2014;37:401-8.
7. Ali LK, Weng JK, Starkman S, et al. Heads Up! A Novel Provocative Maneuver to Guide Acute Ischemic Stroke Management. Interv Neurol 2017;6:8-15.
8. Munoz Venturelli P, Olavarria V, Gonzalez F, et al. Head Position in the Early Phase of Acute Ischemic Stroke: An International Survey of Current Practice. J Stroke Cerebrovasc Dis 2015;24:1564-9.
9. Jauch EC, Saver JL, Adams HP, Jr., et al. Guidelines for

the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2013;44:870-947.
10. Anderson CS, Arima H, Lavados P, et al. Cluster-Randomized, Crossover Trial of Head Positioning in Acute Stroke. N Engl J Med 2017;376:2437-47.
11. Siegler JE, Boehme AK, Kumar AD, et al. Identification of modifiable and nonmodifiable risk factors for neurologic deterioration after acute ischemic stroke. J Stroke Cerebrovasc Dis 2013;22:e207-13.

doi: 10.21037/jeccm.2017.08.07
Cite this article as: Navalkele D, Martin-Schild S. Cluster-randomized, crossover trial of head positioning in acute stroke—have we lost our position on this? J Emerg Crit Care Med 2017;1:21.

