MARK H. ZORNOW, M.D.
Associate Clinical Professor

Department of Anesthesiology and Neuroanesthesia Research, 0629

*University of California, San Diego
9500 Gilman Drive
La Jolla, California 92093-0629*

REFERENCE

1. Zacher AN, Zornow MH: Drug contamination from opening glass ampules. ANESTHESIOLOGY 75:893–895, 1991

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Effects of Resuscitation Using Hypertonic Saline

To the Editor:—The report by Prough *et al.* on the use of hypertonic saline (HS) for resuscitation from hemorrhagic shock in the presence of increased intracranial pressure[1] seems a worthwhile contribution to a growing literature regarding the use of HS, and points once more to the potential clinical usefulness of this particular therapy. However, in reviewing their data, I noted that resuscitation with HS did not significantly increase cardiac output and in fact appeared inferior to resuscitation with normal saline in restoring cardiac output to baseline levels. This finding is not in keeping with multiple previous studies,[2–4] which have consistently shown HS to be quite effective in restoring cardiac output to normal or supernormal levels after hemorrhage and in many cases to be more effective than normal saline in this regard. Given that cardiac output indirectly affects cerebral perfusion pressure and cerebral blood flow, how might this anomalous finding affect the validity of Prough *et al.*'s conclusions?

In addition, I was surprised by the authors' assertion that HS can increase mycocardial contractility. The studies that are widely quoted to show such an effect actually looked at the effects of serum hyperosmolality induced by sucrose or urea on the heart[5] and the effects of hyperosmotic sucrose on mycocardial contractility.[6] Later reports have shown that HS is, as opposed to other hyperosmotic agents, a direct mycordial depressant.[7,8] Other authors have proposed a pulmonary/vagally mediated reflex resulting in systemic circulatory changes and increased cardiac contractility in response to HS[9,10]; recent studies have cast doubt on that assertion.[11,12] From the available data, I think it is safe to conclude that the improvement in cardiac output seen after resuscitation with HS is secondary to changes in preload alone and is not related to improved cardiac contractility.

STEVEN DEEM, M.D.
Fellow, Critical Care Medicine
Department of Anesthesiology
Stanford University Medical Center
Stanford, California 94305

REFERENCES

1. Prough DS, Whitley JM, Taylor CL, Deal DD, DeWitt DS: Regional cerebral blood flow following resuscitation from hemorrhagic shock with hypertonic saline: Influence of a subdural mass. ANESTHESIOLOGY 75:319–327, 1991
2. Velasco IT, Pontieri V, Rocha E Silva M, Lopes OU: Hyperosmotic NaCl and severe hemorrhagic shock. Am J Physiol 239:H664–H673, 1980
3. Nerlich M, Gunther R, Durling RH: Resuscitation from hemorrhagic shock with hypertonic saline or lactated Ringer's (effect on the pulmonary and systemic microcirculation). Circ Shock 10:179–188, 1983
4. Traverso WL, Bellamy RF, Hollenbach SJ, Witcher LD: Hypertonic sodium chloride solutions: Effect on hemodynamics and survival after hemorrhagic in swine. J Trauma 27:32–39, 1987
5. Wildenthal K, Mierzwiak DS, Mitchell JH: Acute effects of increased serum osmolality on left ventricular performance. Am J Physiol 216:898–904, 1969
6. Wildenthal K, Skelton CL, Coleman HN: Cardiac muscle mechanics in hyperosmotic solutions. Am J Physiol 217:302–306, 1969
7. Newel JD, Higgins CB, Kelley MJ, Green CE, Schmidt WS, Haigler P: The influence of hyperosmolality on left ventricular contractile state: Disparate effects of nonionic and ionic solutions. Invest Radiol 15:363–370, 1980
8. Brown JM, Grosso MA, Moore EE: Hypertonic saline and dextran: Impact on cardiac function in the isolated rat heart. J Trauma 30:646–651, 1990
9. Lopes OU, Pontieri V, Rocha E Silva M, Velasco IT: Hyperosmotic NaCl and severe hemorrhagic shock: Role of the innervated lung. Am J Physiol 241:H883–H890, 1981
10. Rocha E Silva M, Negraes GA, Soares AM, Pontieri V, Loppnow L: Hypertonic resuscitation from severe hemorrhagic shock: Patterns of regional circulation. Circ Shock 19:165–175, 1986
11. Hands RD, Hoscraft JW, Perron PR, Kramer GC: Comparison of peripheral and central infusions of 7.5% NaCl/6% dextran-70. Surgery 103:684–689, 1988
12. Schertel ER, Valentine AK, Rademakers AM, Muir WW: Influence of 7% NaCl on the mechanical properties of the systemic circulation in the hypovolemic dog. Circ Shock 31:203–214, 1990

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