ARTICLE OF THE MONTH

Albumin Use in Brain-injured and Neurosurgical Patients: Concepts, Indications, and Controversies

Ma, Heung Kan MD; Bebawy, John F. MD

We are happy to welcome you all back to the SNACC Article of the Month just in time for Spring.

This month's commentary combines the "new" with a reflection on the "old". Perhaps fitting during the change from one year to the next. This commentary about the use of albumin in neurosurgery is provided by Dr. Michael Hof.

Dr. Michael Hof is an associate professor at Vanderbilt University with a special interest in Neuroanesthesia. Originally from Germany, Dr. Hof has a truly globetrotting medical career ranging from his home country to Switzerland, the United Kingdom, the US, the Falkland Islands and Saint Helena in the South Atlantic Ocean. (The latter was where Napoleon was exiled. Truly to the middle of nowhere). He has received several awards for advancing medical care and was even recognized for his outstanding services by the Queen of England!

As always, we encourage our readers' input on this topic on the SNACC Twitter feed, or on Facebook.

Nina Schlömerkemper, MD, Shilpa Rao, MD; Amie Hoefnagel, MD; and Oana Maties, MD

Commentary:

Dr. Michael Hof
Vanderbilt University

In this review article, the authors provide us with a well-researched review of the concepts, indications, and some controversies of albumin use in brain injured and neurosurgical patients. Relevant physiological properties of albumin are explored, and a short overview of the available commercial preparations of albumin-solutions is given. The thoroughly referenced section covering clinical indications and usage, includes the areas of acute ischemic stroke, aneurysmal subarachnoid hemorrhage, intracerebral hemorrhage, traumatic brain injury, spinal surgery and intracranial tumor resection.

The author's conclusions are balanced, acknowledging the lack of high-quality evidence to support or reject the administration of albumin solutions across the spectrum of neurological diseases and in the perioperative period of neurosurgical procedures.

To me, as an anesthesiologist of the older generation, the article reminded me powerfully of the very fierce but now almost forgotten "great fluid debate" between the proponents of colloid versus crystalloid based infusion regimes in the operating rooms. This controversial debate raged on throughout the earlier decades of my practice both in Europe and in America. Albumin was always a topic in these debates. However, I remember albumin more often being criticized, in my perception even vilified, rather than promoted within the "colloidal community". There seemed to be an ongoing and rather successful attempt to replace it with different artificial colloids, not least because of albumin's high cost, compared with other, cheaper alternatives such as dextran or gelatin solutions. We abandoned dextran for gelatin until the advent of the hydroxyethyl (heta) starches. Hetastarches were promoted and actually seen by many as rendering all other colloidal fluid replacement regimes obsolete. That is, if one was inclined to believe the data supporting these huge developments.

Well within the "reign" of the starches, albumin seemed to make a little comeback, with the presentation of the marvelously conducted SAFE study at the Royal College of Anaesthetists in London in 2004. I had the pleasure and privilege to be present during this great presentation. I remember vividly, the distraught protestations during the discussion, of some of the disappointed true hetastarch believers, when they were presented with the irrefutable proof that albumin is actually quite SAFE. At this time, there was widespread belief amongst my colleagues, that the administration of albumin is not only very costly, but dangerous, or rather precisely, not nearly as safe as relying on the hetastarches. The starch solutions at that time were being heavily promoted by their manufacturers in large and often quite impressive advertising campaigns.

No-one expected the "great fluid debate" to come to a sudden and grinding halt. But it did. Large scale falsification and massive fraud in much of the data backing the clinical use of hetastarch were discovered. A huge and highly embarrassing medical scandal ensued, its consequences felt particularly badly throughout the anesthetic community in Germany, my home country.

Hetastarches were removed from our shelves quasi overnight, while the investigations began. Suddenly all we had available were crystalloids (and a little albumin). Old gelatin was hastily resurrected here and there. I personally don't know of anybody starting to use dextran again.

The "great fluid debate" suddenly became much quieter and was definitely not nearly as "great" as before.

To end my reminiscing: to me, what was true then remains true today; each one, and all of our patients in neuro-anesthesia deserve a conscientious and knowledgeable anesthesia team, who have the time and resources to develop

an individualized treatment plan, taking into account this specific patients individual needs, according to the specific situation.

Albumin is a colloid made by nature with hundreds of millions of years of product development time. It is always in circulation in our patients, whether we choose to give it or not. In most settings it is probably safe to administer, if only to bring the plasma levels up to normal, physiological levels.

1) A Comparison of Albumin and Saline for Fluid Resuscitation in the Intensive Care Unit; A comparison of albumin and saline for fluid resuscitation in the intensive care unit; SAFE Study Investigators, N Engl J Med 2004; 350:2247-2256.
2) Choice of fluid type: physiological concepts and perioperative indications; C Boer, SM Bossers,   N J Koning, Br J Anaesth. 2018 Feb;120(2):384-396.
3) Joachim Boldt - Wikipedia; accessed 31st December 2021