

## “Balanced Hyperosmolar Therapy” using 3% Hypertonic Saline - 20% Mannitol Versus an Equiosmolar Volume of either 3% Hypertonic Saline or Mannitol 20% in Supratentorial Tumor Resection: A New Approach to Achieve Hemodynamic Stability

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### ABSTRACT

Adequate brain dehydration is supposed to be the most critical factor which facilitates supratentorial brain tumors resection. Perioperatively, the active management of brain water content is one of the fundamental roles of anesthetists. Assuming the blood brain barrier (BBB) is intact, using of Mannitol 20% (in different doses) and 3% hypertonic saline (3%HTS) was introduced to shift brain water to the intravascular compartment leading to brain dehydration and hence a significant decrease in brain volume. With large supratentorial tumors, mass bulk is usually a contributing cause of a firm dura which is usually disappointed by neurosurgeons.

Many doses of mannitol 20% (0.5-0.7-1.0-1.4 gm/kg) were described, where it was evidenced that larger doses had a more brain dehydrating effect.

Unfortunately, higher doses were accompanied by a lot of side effects, as pulmonary congestion and/or edema, hypotension, venous thrombophlebitis, acidosis and even convulsions. HTS also was introduced to decrease intracranial pressure (ICP) during supratentorial brain tumor resection with an evidenced superiority over mannitol, but some adverse reactions were reported such as; venous thrombotic, hypervolemic and hypernatremia effects when used in higher concentrations (> 3%). Both agents have a different behavior, mannitol depletes intravascular volume through its diuretic effect while HTS expands intravascular space through its hygroscopic action. Subsequently, both agents reduce brain bulk.

Owing to their different behaviors regarding the effect on intravascular volume; care must be given while tailoring a hyperosmolar regimen. Maintaining of mean arterial blood pressure (MAP) between 55-65 mmHg to ensure an optimal blood perfusion to the brain is a cornerstone in a better surgical outcome; this can be achieved better when using HTS.

We hypothesized that: administration of a balanced regimen of both agents can minimize the undesired effects on the patient's hemodynamics specially MAP which is usual when each one is administered solely, with the achievement of a satisfactory brain dehydration. This hypothesis was evidenced in our study which concluded that the tailoring of a consecutive doses of both agents equivalent to the osmolar load of 3 ml/kg 3% HTS resulted in a satisfactory brain relaxation with a more stable and steady hemodynamic status and hence a better surgical comfort than using 3% HTS or 20% Mannitol alone during supratentorial tumor resection.

**Keywords:** Balanced hyperosmolar therapy-3% NaCl-20% mannitol, Supratentorial brain tumors

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