Crystalloid Fluids

While normal saline (0.9% NaCl solution) is the most frequently used crystalloid fluid, many other formulations can provide improved clinical outcomes in specific patient populations.

Other commercially available crystalloid fluids include:

Lactated Ringer's/Hartman's solution (lactate buffered solution)

Acetate buffered solution

Acetate and lactate buffered solution

Acetate and gluconate buffered solution

0.45% NaCl (hypotonic solution)

3% NaCl (hypertonic solution)

5% Dextrose in water

10% Dextrose in water

Despite numerous studies on perioperative intravenous fluid therapy, there is insufficient evidence to draw definitive conclusions regarding fluid management in neurosurgical patients. Although evidence is still lacking, isotonic balanced crystalloid solutions should be considered the first-choice fluid, while hypotonic solutions should be avoided. Furthermore, colloid solutions should be used with caution, and their potential risks and benefits should be considered. To achieve an optimal fluid volume status while avoiding overhydration and excessive restriction, the amount and duration of fluid administration should be considered, and an individualized fluid strategy is recommended using Goal-directed fluid therapy based on dynamic fluid parameters [1].

Hypotonic solutions, such as the LR solution, are avoided in neurosurgical patients to minimize cerebral fluid accumulation. In contrast, NS, an isotonic crystalloid, has been widely used in neurosurgery because it is thought to reduce the risk of cerebral edema [2]. However, since NS has equal amounts of sodium and chloride (154 mEq/L), hyperchloremic metabolic acidosis occurs when a large amount of NS is administered because its chloride concentration is higher than the normal plasma chloride concentration (96-106 mEq/L).

Numerous laboratory and clinical studies have reported a dose-dependent association between hyperchloremia and the use of NS [3] [4] [5]

1)
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2)
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3)
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4)
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5)
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