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Comparing Loop Diuretic Efficacy and Safety in Patients with Acute Myeloid Leukemia and Differentiation Syndrome

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Background: Differentiation syndrome (DS) is a group of life-threatening complications associated with acute myeloid leukemia (AML) treatment. Loop diuretics are used to manage fluid overload and electrolyte imbalances in DS. The optimal choice of loop diuretics is unclear. Previous studies showed bumetanide and furosemide have similar efficacy and safety in patients with congestive heart failure. Recent research suggest torsemide may be non-inferior to furosemide in critically ill patients with acute kidney injury.

Methods: We performed a retrospective analysis of 5,670 patients diagnosed with AML and differentiation syndrome from a large federated network database. Patients were treated with furosemide (n=2,431), bumetanide (n=466), or torsemide (n=206), alongside glucocorticoids and allopurinol. Propensity score matching was utilized to control for confounding variables, including age, sex, and comorbidities such as chronic kidney disease, diabetes mellitus (types 1 and 2) and hypertension. Patients were matched by AML subtype, including acute myeloid leukemia and acute promyelocytic leukemia.

Results: No significant differences were seen in overall mortality or the incidence of acute renal failure among the three cohorts. Mean glomerular filtration rate, serum creatinine, blood urea nitrogen, serum uric acid, and serum potassium, did not differ significantly between the loop diuretic groups. However, a lower risk of hemodialysis utilization was observed in patients receiving furosemide compared to bumetanide (risk ratio 0.584, 95% CI 0.414-0.825).

Conclusion: Our findings suggest that furosemide, bumetanide, and torsemide have comparable efficacy and safety profiles in patients with AML and differentiation syndrome. Notably, furosemide was associated with a lower rate of hemodialysis

utilization compared to bumetanide, with no significant difference in renal function or mortality. This may be due to bumetanide's higher potency, rapid absorption, and shorter half-life, potentially increasing the risk of electrolyte imbalances and acute kidney injury. Conversely, furosemide may facilitate greater cumulative sodium excretion in patients with chronic renal insufficiency.

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