Hypocalcemia

Hypocalcemia correlates with the extent of bleeding in patients with intracerebral hemorrhage (ICH). A low calcium level may be associated with a subtle coagulopathy predisposing to increased bleeding and might therefore be a promising therapeutic target for acute ICH treatment trials¹⁾.

Elevated admission serum calcium level but not phosphate level is positively associated with excellent outcome at discharge or 3 months in acute intracerebral hemorrhage patients².

Data have suggested that hypocalcemia correlates with hematoma volume in ICH and hematoma expansion after intravenous tissue plasminogen activator for ischemic stroke.

"However, systematic studies on the topic are currently lacking, and the underlying mechanisms are poorly understood," the authors, led by Andrea Morotti, MD, of Massachusetts General Hospital in Boston, wrote.

To examine the role of serum calcium levels in ICH, the researchers enrolled 2103 patients with ICH and measured total calcium level on admission. Patients were considered to have hypocalcemia if serum calcium level was <8.4 mg/dL. ICH volumes were measured using computed tomography (CT), and hematoma expansion occurred if hematoma volume increased by 30% or 6 mL from baseline. A total of 229 (10.9%) patients had low serum calcium levels at the time of admission. Hypocalcemia was associated with higher median baseline hematoma volume (37 mL vs 16 mL in normocalcemic patients; P < .001) and was an independent predictor for higher baseline ICH volume (P < .001).

A stronger correlation between hypocalcemia and baseline ICH volume was observed among patients not taking oral anticoagulation agents (P <.001) than among those using anticoagulant agents at the time of admission (P = .04). Among a subgroup of 1393 patients who had a follow-up CT, those with higher serum calcium levels had lower rates of ICH expansion (odds ratio, 0.55; 95% confidence interval, 0.35 to 0.86; P = .01).

Hypocalcemic patients were also more likely to die within 30 days of admission than normocalcemic patients (30-day mortality rate, 59.8% vs 44.2%; P < .001).

Because serum calcium may lower systemic blood pressure via arterial relaxation, "hypocalcemia could therefore lead to higher BP because of increased arterial vascular tone," the authors wrote. "However, in this cohort, we did not observe any significant association between calcium level and BP on admission."

"Conversely, our findings indirectly support the hypothesis that a low serum calcium level contributes to a larger ICH volume and an increased risk of hematoma expansion through impaired coagulation," they noted. The stronger correlation between hypocalcemia and higher initial hematoma volume in oral anticoagulation non-users "may reflect the fact that patients with [oral anticoagulation]associated ICH already have important alterations in coagulation physiology."

"Hypocalcemia correlates with the extent of bleeding in patients with ICH," the authors concluded. "A low calcium level may be associated with a subtle coagulopathy predisposing to increased bleeding and might therefore be a promising therapeutic target for acute ICH treatment trials." ³⁾

References

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