

Dear ladies and gentlemen, dear ADVOS users and interested parties,

we are pleased to present you another issue of our ADVOS Literature Service. We regularly select one or more papers from international journals which might be of interest to you in connection with our ADVOS procedure. This month we have selected the following:

SAFETY AND EFFICACY OF REGIONAL CITRATE ANTICOAGULATION FOR CONTINUOUS RENAL REPLACEMENT THERAPY IN LIVER FAILURE PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Zhang et al.

Key Message

Citrate anticoagulation can be used in patients with liver failure with a low complication rate. For this purpose, however, a regular control of total calcium, ionized calcium before and after the dialyzer and the quotient of total calcium and ionized calcium is needed to then adjust the therapy with modified calcium or citrate accordingly. In addition, the acid-base balance must be controlled to avoid alkalosis.

Background

There is controversy on the use of regional citrate anticoagulation during continuous renal replacement therapy in patients with liver failure. This systematic review summarizes the current evidence regarding safety and effectiveness.

Methods

In this systematic review studies with adult patients (> 18 years) with various levels of liver dysfunction who underwent continuous renal replacement therapy with a regional citrate anticoagulation strategy were included.

Results

10 observational studies with 1241 liver dysfunction patients were included. The pooled rate of citrate accumulation and bleeding was 12 % [3 %, 22 %] and 5 % [2 %, 8 %], respectively. The median filter lifespan was 55.9 h, with a range from 22.7 to 72 h.

Compared with the baseline data the following parameters changes resulted after treatment:

- ▲ Increased significantly: serum pH, serum bicarbonate, base excess, rate of metabolic alkalosis, serum ionized calcium and total calcium level and ratio of total calcium/ ionized calcium
- ▲ Did not change significantly: serum citrate, serum lactate and total bilirubin

However, compared with non-liver failure patients, the liver failure patients showed no significant difference in the pH, serum lactate level and ratio of total calcium/ ionized calcium during continuous renal replacement therapy.

The authors conclude:

- 📍 Regional citrate anticoagulation during continuous renal replacement therapy did not significantly increase the risk of citrate accumulation in patients with liver dysfunction compared with the patients without liver dysfunction.
- 📍 The acid-base status time trend was from the acidotic range towards alkaline.
- 📍 Serum calcium increased slightly.
- 📍 The liver failure patients had comparable pH, serum lactate, and total calcium/ ionized calcium ratio, compared with non-liver failure patients.
- 📍 In liver failure patients, the filter lifespan was prolonged significantly. These findings could provide clinicians helpful information on the use of regional citrate anticoagulation in liver failure patients requiring renal replacement therapy.
- 📍 Intensive monitor of the acid base status and calcium parameters may be more necessary during renal replacement therapy with regional citrate anticoagulation in patients with liver failure.

We think that:

This review of the literature shows that citrate anticoagulation is a safe option even for patients with liver failure. However, there are, of course, patients in whom liver function is too poor and citrate is not metabolized. Here, the citrate intake must be reduced until no more citrate accumulation occurs or citrate is not possible. This happens very rarely. In addition, the clearance for bicarbonate or citrate may change significantly during, for example, 72 hours of treatment. For these patients, a system change must then be carried out earlier.

It is also important that the calcium levels between individual blood gas devices can fluctuate greatly, especially in the lower range. Here it is important to define hospital-specific limit values adapted to this device based on empirical values. Effects on blood pressure may even occur with ionized calcium levels below 1.1 mmol / l. Of course, citrate also removes magnesium. Unfortunately, ionized magnesium can only be measured in a few clinics. To avoid hypomagnesemia, total magnesium levels should be in the mid to upper range.

The ADVOS process offers the advantage of lowering the dialysate pH even in the acidotic range, thus being able to prevent alkalosis.

If you have further questions or suggestions - please contact us at marketing@advitos.com.