Fluid resuscitation in acute pancreatitis

Buxbaum JL, Quezada M, Da B, et al. Early aggressive hydration hastens clinical improvement in mild acute pancreatitis. Am J Gastroenterol 2017; 112: 797-803.

Cite this article as: Köksal AŞ, Parlak E. Fluid resuscitation in acute pancreatitis. Turk J Gastroenterol 2017; 28: 322-3.

Acute pancreatitis is one of the most common reasons for hospitalization among adult patients. It is associated with significant morbidity and mortality. In 2012, the revised Atlanta classification divided acute pancreatitis into three categories of severity: mild, moderately severe, and severe acute pancreatitis (1). Patients with mild acute pancreatitis have only pancreatic inflammation without organ failure and local or systemic complications, whereas severe pancreatitis is characterized by persistent organ failure (>48 h). The treatment of acute pancreatitis is mainly supportive and includes fasting, intravenous fluid resuscitation, pain relief medications, and in some cases, antibiotics. In the early course of pancreatitis, systemic inflammatory response causes arteriolar vasoconstriction, capillary leakage, and hypercoagulation, which may lead to intravascular fluid loss and microvascular thrombosis, thus resulting in pancreatic hypoperfusion and necrosis. Therefore, early fluid resuscitation is one of the cornerstones of the treatment, which aims to prevent the development of pancreatic necrosis and organ failure by restoring intravascular compartment, but there is conflicting evidence in the literature about its optimal rate.

Buxbaum et al. (2) recently published an article in the May 2017 issue of the American Journal of Gastroenterology entitled "Early aggressive hydration hastens clinical improvement in mild acute pancreatitis". The authors randomly assigned patients with mild acute pancreatitis within 4 h of diagnosis to standard hydration (10 mL/kg bolus followed by infusion at 1.5 mL/kg/h) and aggressive hydration (20 mL/kg bolus followed by infusion at 3 mL/kg/h) with lactated Ringer's solution. Patients with systemic inflammatory response syndrome (SIRS) and other predictive clinical features of moderate/severe pancreatitis, such as hypotension, renal, and respiratory insufficiency at admission, and those with comorbidities such as ≥class 2 heart failure and decompensated cirrhosis, signs of volume overload, and iatrogenic pancreatitis were excluded from the study. Patients were evaluated every 12 h and the dose of hydration was adjusted according to the laboratory tests (BUN, creatinine, and hematocrit) and development of clinical signs of volume overload. The groups were compared with respect to primary (clinical improvement within 36 h, which was defined as the combination of decrease in the abovementioned laboratory tests, improvement in abdominal pain, and tolerance of oral nutrition) and secondary outcomes (rate of clinical improvement, development of SIRS, persistent SIRS, severe pancreatitis, and volume overload). Clinical improvement within 36 h was more frequent in patients randomized to the aggressive hydration group (n=27) than in the standard hydration group (n=33) (70% vs 42%). There was a greater rate of clinical improvement with aggressive hydration than with standard hydration. Additionally, the odds of developing SIRS (14.8% vs 27.3%) and persistent SIRS (7.4% vs 21.2%) were significantly less in the aggressive hydration group than in the standard hydration group.

Although there is a consensus that early fluid resuscitation has an essential role in avoiding the transition from mild acute pancreatitis to severe pancreatitis, the optimal rate of fluid resuscitation is still a matter of debate. A retrospective study showed that patients with severe acute pancreatitis who received ≥33% of their total 72-h intravenous fluid volume during the first 24 h (early resuscitation group) have significantly decreased mortality than those who did not (3). Later, the benefit of early fluid resuscitation was also confirmed in another retrospective study, which demonstrated a reduced incidence of SIRS and organ failure at 72 h, especially in patients with interstitial pancreatitis (4). Contrary to

these findings, some studies reported increased rate of complications due to aggressive fluid resuscitation in patients with severe pancreatitis. Eckerwall et al. (5) showed that patients with severe acute pancreatitis developed more respiratory complications if they received >4000 mL of intravenous hydration during the first 24 h. These findings were eventually confirmed in a study by Mao et al. (6), which showed higher rates of mechanical ventilation, abdominal compartment syndrome, sepsis, and mortality in patients with severe pancreatitis receiving aggressive hydration (10-15 mL/kg/h). Additionally, a multicenter Japanese study revealed that a high average fluid volume administered per day within the first 48 h was correlated with decreased mortality in patients with mild to moderate acute pancreatitis but increased mortality in patients with severe pancreatitis (7). However, the complications may not be due to amount of fluid resuscitation, but due to the disease severity itself, necessitating a higher amount of fluid. Accordingly, de-Madaria et al. (8) showed that patients with acute pancreatitis who received more than 4 l of fluid during the initial 24 h developed persistent organ failure, but remarkably, these patients had more hemoconcentration and SIRS, reflecting the severity of pancreatitis. Taking all these into account, one can conclude that the benefit of aggressive hydration depends on the severity of acute pancreatitis. But the time that elapsed between the start of the abdominal pain and admission to the hospital could not be evaluated in most of these studies. Therefore, increased complications and mortality in patients with severe pancreatitis, who received aggressive hydration, may be due to delay in hospital admission, and hence the loss of opportunity to prevent development of severe pancreatitis by an effective fluid resuscitation protocol before reaching the point of no return. The reduced incidence and severity of post-ERCP pancreatitis after periprocedural aggressive intravenous hydration in a double-blind randomized controlled trial also supports this theory (9). In summary, the efficacy of aggressive hydration depends on the severity of acute pancreatitis and the time of intervention.

Fluid resuscitation is a sine qua non of acute pancreatitis. It is a dynamic process and the amount of fluid to be given should be individualized according to the clinical parameters such as comorbidities, admission time, presence of local complications, and resuscitation goals such as heart rate, mean arterial pressure, urine output, hematocrit, and BUN levels. International Association of Pancreatology and American Pancreatic Association recommend fluid resuscitation at a rate of 5-10 mL/kg/h until the resuscitation goals are reached (10). However, further well-designed randomized controlled trials are still needed to determine the rate and end points of aggressive hydration in patients with mild and severe pancreatitis.

Aydın Şeref Köksal, Erkan Parlak
Department of Gastroenterology, Sakarya University School of Medicine, Sakarya, Turkey

REFERENCES

1. Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis-2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102-11.
2. Buxbaum JL, Quezada M, Da B, et al. Early aggressive hydration hastens clinical improvement in mild acute pancreatitis. Am J Gastroenterol 2017; 112: 797-803.
3. Gardner TB, Vege SS, Chari ST, et al. Faster rate of initial fluid resuscitation in severe acute pancreatitis diminishes in-hospital mortality. Pancreatology 2009; 9: 770-6.
4. Warndorf MG, Kurtzman JT, Bartel MJ, et al. Early fluid resuscitation reduces morbidity among patients with acute pancreatitis. Clin Gastroenterol Hepatol 2011; 9: 705-9.
5. Eckerwall G, Olin H, Andersson B, Andersson R. Fluid resuscitation and nutritional support during severe acute pancreatitis in the past: What have we learned and how can we do better? Clin Nutr 2006; 25: 497-504.
6. Mao EQ, Tang YQ, Fei J, et al. Fluid therapy for severe acute pancreatitis in acute response stage. Chin Med J (Engl) 2009; 122: 169-73.
7. Kuwabara K, Matsuda S, Fushimi K, Ishikawa KB, Horiguchi H, Fujimori K. Early crystalloid fluid volume management in acute pancreatitis: Association with mortality and organ failure. Pancreatology 2011; 11: 351-61.
8. de-Madaria E, Soler-Sala G, Sánchez-Payá J, et al. Influence of fluid therapy on the prognosis of acute pancreatitis: A prospective cohort study. Am J Gastroenterol 2011; 106: 1843-50.
9. Choi JH, Kim HJ, Lee BU, Kim TH, Song IH. Vigorous periprocedural hydration with lactated ringer solution reduces the risk of pancreatitis after retrograde cholangiopancreatography in hospitalized patients. Clin Gastroenterol Hepatol 2016; 15: 86-92.
10. Working Group IAP/APA acute pancreatitis guidelines. IAP/APA evidence-based guidelines for the management of acute pancreatitis. Pancreatology 2013; 13: e-1-15.

Address for Correspondence: Aydın Şeref Köksal
E-mail: aydinserefkoksal@gmail.com
DOI: 10.5152/tjg.2017.17324