[11] Yost DA, Gonzales L, Lick CJ, Satterlee P, Levy M, Barger J, et al, Niskanen RA. North American LUCAS evaluation: prehospital use of a mechanical chest compression system; 2010.
[12] Physio-Control. LUCAS® 3 chest compression system: instructions-for-use. Available from https://www.physio-control.com/uploadedFiles/Physio85/Contents/Workplace_and_Community/Products/100925-01%20Rev%20E%20LUCAS%203%20IFU%20EN_lowres.pdf; 2017.
[13] Perkins GD, Lall R, Quinn T, Deakin CD, Cooke MW, Horton J, et al, Smyth M. Mechanical versus manual chest compression for out-of-hospital cardiac arrest (PARAMEDIC): a pragmatic, cluster randomised controlled trial. Lancet 2015;385(9972):947–55.
[14] Rubertsson S, Lindgren E, Smekal D, Östlund O, Silfverstolpe J, Lichtveld RA, et al, Halliwell D. Mechanical chest compressions and simultaneous defibrillation vs conventional cardiopulmonary resuscitation in out-of-hospital cardiac arrest: the LINC randomized trial. JAMA 2014;311(1):53–61.
[15] Ogden CL, Fryar CD, Carroll MD, Flegal KM. Mean body weight, height, and body mass index: United States 1960–2002. Washington, DC: Department of Health and Human Services, Center for Disease Control and Prevention, National Center for Health Statistics; 2004; 1–17 Available from https://www.cdc.gov/nchs/data/ad/ad347.pdf.
[16] World Health Organization. Global Health Observatory. Available from http://www.who.int/gho/ncd/risk_factors/overweight/en/; 2017.
[17] Trust for America's Health and Robert Wood Johnson Foundation. Available from https://stateofobesity.org/rates/; 2018.
[18] Rural Healthcare. Available from https://helmsleytrust.org/programs/health-rural-healthcare; 2016.
[19] Axelsson C, Karlsson T, Axelsson ÅB, Herlitz J. Mechanical active compression–decompression cardiopulmonary resuscitation (ACD-CPR) versus manual CPR according to pressure of end tidal carbon dioxide ($PETCO_2$) during CPR in out-of-hospital cardiac arrest (OHCA). Resuscitation 2009;80(10):1099–103.
[20] Bonnemeier H, Olivecrona G, Simonis G, Götberg M, Weitz G, Iblher P, ... Schunkert H. Automated continuous chest compression for in-hospital cardiopulmonary resuscitation of patients with pulseless electrical activity: a report of five cases. Int J Cardiol 2009;136(2):e39–50.

Aggressive fluid therapy for pain control in pediatric acute pancreatitis: A topic for future research

Dear Editor,

It has been estimated that the incidence of emergency department visits due to acute pancreatitis (AP) in children is roughly 16 per 100,000 [1]. Nearly all of these patients suffer from a severe abdominal pain, which almost always requires prompt intervention. Several pharmacological and non-pharmacological interventions have been developed for diminishing or alleviating acute pain associated with AP. However, most of these interventions are tailored for adult patients and there is a paucity of information regarding the optimal analgesic intervention for pediatric patients suffering from AP in the emergency department. There is a lack of clinical practice guideline for the treatment of pain in this cluster of patients [2,3]. Opioids have an important role in pain control; however, their usage in children is controversial and is associated with major adverse events such as dysfunction of the sphincter of Oddi. Additionally, nonsteroidal anti-inflammatory drugs could not produce long-lasting analgesic effects [4]. Therefore, new effective interventions need to be developed to improve pain control in children.

Intravenous fluid therapy by crystalloid is the foundation of the initial management of AP [5]. Recently, clinical guidelines on AP in adult have focused on aggressive fluid therapy using either lactated Ringer's solution (LRS) or normal saline solution (NSS) in order to both maintain the adequate arterial pressure to prevent organ hypoperfusion and lower the level of inflammatory mediators, which are supposed to be as a main trigger of systemic inflammatory response syndrome [5,6]. A recent systematic review has shown that LRS may have more anti-inflammatory effects than those of NSS [6]; nevertheless, in the latest American Gastroenterological Association guideline on initial management of acute pancreatitis, the superiority between the use of normal saline and Ringer's lactate has not been determined that one of the reasons for this is due to the lack of reliable evidence [5].

The aggressive fluid therapy for acute pancreatitis in pediatric patients in the emergency department has many challenges. There is no specialized clinical guideline for usage of aggressive fluid therapy in pediatric patients, and most of the current treatments are based on the adult population. In addition, potential clinical advantages of aggressive fluid therapy with LRS over NSS in pediatric patients are unclear and in need of further research [3]. Moreover, different definitions have been used for the rate of aggressive fluid infusion in studies. Conventionally, it is defined as a rate of 1.5–2 times the maintenance rate [2,3], but it ranges from 1.5 to 3 mL/kg/h along with 20-mL/kg bolus [7]. Furthermore, regarding the pediatric patients, no studies compare the initial resuscitation volumes and currently, the ideal rate of fluid administration is unclear [3].

Based on the available evidence in adult patients, it can be assumed that aggressive fluid therapy with or without pharmacological therapy may be helpful to lower the severity of abdominal pain in pediatric patients who suffer from AP, referring to the emergency department. However, at least, three questions remain to be answered regarding pediatric patients. What is the best solution for aggressive infusion? What is the ideal volume for initial fluid resuscitation? Moreover, what is the ideal rate of fluid administration that is defined as aggressive? Further prospective clinical trials are needed to test this assumption and to answer these questions.

Touraj Assadi M.D.
Department of Emergency Medicine, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
E-mail address: t.asadi@mazums.ac.ir.

4 July 2018

https://doi.org/10.1016/j.ajem.2018.07.013

References

[1] Pant C, Deshpande A, Sferra TJ, Gilroy R, Olyaee M. Emergency department visits for acute pancreatitis in children. Results from the nationwide emergency department sample 2006–2011. 2015;63(4):646–8.
[2] Abu-El-Haija M, Lin TK, Nathan JD. Management of acute pancreatitis in children. Curr Opin Pediatr 2017;29(5):592–7.
[3] Abu-El-Haija M, Kumar S, Quiros JA, Balakrishnan K, Barth B, Bitton S, et al. Management of acute pancreatitis in the pediatric population: a clinical report from the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition Pancreas Committee. J Pediatr Gastroenterol Nutr 2018;66(1):159–76.
[4] Grover AS, Mitchell PD, Manzi SF, Fox VL. Initial pain management in pediatric acute pancreatitis: opioid versus non-opioid. J Pediatr Gastroenterol Nutr 2018;66(2):295–8.
[5] Crockett SD, Wani S, Gardner TB, Falck-Ytter Y, Barkun AN, Crockett S, et al. American Gastroenterological Association Institute guideline on initial management of acute pancreatitis. Gastroenterology 2018;154(4):1096–101.
[6] Umair I, Hafsa A, Melissa S. Ringer's lactate versus normal saline in acute pancreatitis: a systematic review and meta-analysis. J Dig Dis 07 May 2018. https://doi.org/10.1111/1751-2980.12606 [Epub ahead of print].
[7] Park C-H, Paik WH, Park ET, Shim CS, Lee TY, Kang C, et al. Aggressive intravenous hydration with lactated Ringer's solution for prevention of post-ERCP pancreatitis: a prospective randomized multicenter clinical trial. Endoscopy 2018;50(04):378–85.