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Short Communication

Current Views on Pediatric Acute Liver Failure

***Corresponding author**
José Colleti Jr., MD
Pediatric ICU
Hospital Santa Catarina
Avenida Paulista, 200
Bela Vista, CEP 01301-000
São Paulo, Brazil
Tel. +5511942683834
E-mail: colleti@gmail.com

José Colleti Jr., MD[1]; Rafael Teixeira Azevedo, MD[1]; Werther Brunow de Carvalho, PhD[2]

[1]Pediatric ICU, Hospital Santa Catarina, São Paulo, Brazil
[2]Children's Institute, Department of pediatrics, University of São Paulo, São Paulo, Brazil

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It is well known that acute liver failure (ALF) in children is rare but potentially a life-threatening disorder. Its true incidence in the pediatric population is undetermined but is responsible for 10-15% of all pediatric liver transplantations.[1] Unlike adults, a specific cause of pediatric ALF is not identified in almost half of the cases,[2] and the etiology is classified as indeterminate in 18-47% of all patients.[1] The etiology is important because the survival rate and need for liver transplantation vary depending on the diagnosis. Spontaneous recovery is better in children with toxic etiology and worst for those with indeterminate or other causes.[1,2] There is no specific treatment for most ALF cases, and the mainstay of medical care is to minimize complications and to limit additional morbidity.[3] ALF can be associated with rapidly progressive multiorgan failure and high mortality rates. One of the leading causes of death is cerebral edema and intracranial hypertension (ICH), responsible for about 20-25% of all deaths.[3] From that perspective, it is desirable to develop new therapies/technologies for diagnostic investigation and interventions.

The use of transcranial Doppler (TCD) is an important component in the assessment of cerebral edema, which should be monitored. Some centers use invasive intracranial pressure (ICP) monitoring; however, non-invasive monitoring of cerebral arterial flow is becoming a useful tool to identify ICH.[1] Two relevant articles[4,5] tried to demonstrate the usefulness of TCD to characterize the cerebral hemodynamics patterns in patients diagnosed with ALF. TCD is becoming an important tool since there is no risk of complications like bleeding or infection, which can occur in the use of invasive ICP monitoring.[4,6] The complication risk is around 20%, and there are limited therapeutic options for ICH,[6] which should be taken into consideration to indicate invasive procedures. Besides that, Aggarwal et al[6] studied whether TCD waveform features could be used to differentiate ALF patients with respect to ICP or cerebral perfusion pressure (CPP) levels. They concluded that TCD could provide information about the dynamic state of the intracranial circulation and perfusion with clinical complications.

Another issue is the use of continuous renal replacement therapy (CRRT) on pediatric ALF.[7] As mentioned before, the pediatric ALF is a dramatic clinical syndrome in which children has rapid deterioration of hepatic function and can evolve to multiorgan failure and cerebral edema. As found by Deep et al[7] patients who benefited most from CRRT were those with toxic cause unlike the patients with metabolic causes. Therefore, clinicians should be careful in the selection of patients who underwent CRRT, as the cause of pediatric ALF is determinant for prognosis. That is important to consider because of the possible complications related to CRRT. Santiago et al[8] found in their study that CRRT-complications are common in children and some are potentially serious, the majority were problems of venous catheterization, hypotension on connection to CRRT, electrolytes disturbances and clinically significant hemorrhage. Probably this can be diminished by ultrasound-guided catheter placement, as well as the choice to use prostacyclin instead of regional citrate anticoagulation, and standardized service practices.[9]

Despite these two useful tools, another relevant resource to be used by intensivists is the ammonia level. It is well known that the ammonia level is an independent risk factor for the development of severe hepatic encephalopathy and ICH. Bernal et al[10] demonstrated that

a level greater than 100 µmol/L predicted the onset of severe hepatic encephalopathy (HE) and ICH developed in 55% of ALF patients with a level higher than 200 µmol/L. That raises 2 important questions: what is more important on the indication of early CRRT, the absolute value of ammonia or the increasing curve? First, it is important to ensure effective control of ammonia levels through a therapeutic strategy focusing on the determinants of ammonia metabolism and neurotoxicity before indication of CRRT. However, a consistent increase in ammonia levels is an indicator of poor prognosis and should be taken into account when indicating CRRT. And how ammonia level can be correlated with TCD? There are no publications that correlate levels of ammonia and TCD directly, although TCD has a good correlation with ICH. TCD can be used serially to follow the response to treatment of ICH.

Almost all the work in the intensivist field is to allow the liver to regenerate or, if it is unlikely, to allow enough time to find a suitable organ for transplantation. Therapeutic possibilities are scarce[11] and, in this context, it is always important to explore new diagnostic and treatment options.

As a future goal, since TCD and CRRT are valuable tools, it is desirable to make them available in specialized centers as we still have a high mortality in ALF, and new therapies could improve survival rates.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest. The authors received no grants for the article

REFERENCES

1. Devictor D, Tissieres P, Afanetti M, Debray D. Acute liver failure in children. *Clin Res Hepatol and Gastroenterol*. 2011; 35(6-7): 430-437. doi: 10.1016/j.clinre.2011.03.005

2. Squires R, Shneider B, Bucuvalas J, et al. Acute liver failure in children: The first 348 patients in the pediatric acute liver failure study group**.** *J Pediatr*. 2006; 148: 652-658.e2. doi: 10.1016/j.jpeds.2005.12.051

3. Bernal W, Auzinger G, Dhawan A, Wendon J. Acute liver failure. The *Lancet*. 2010; 376(9736): 190-201. doi: 10.1016/S0140-6736(10)60274-7

4. Abdo A, Pérez-Bernal J, Hinojosa R, et al. Cerebral hemodynamics patterns by transcranial doppler in patients with acute liver failure. *Transplant Proc*. 2015; 47(9): 2647-2649. doi: 10.1016/j.transproceed.2015.10.006

5. Aggarwal S, Brooks D, Kang Y, Linden P, Patzer J. Noninvasive monitoring of cerebral perfusion pressure in patients with acute liver failure using transcranial doppler ultrasonography. *Liver Transpl*. 2008; 14(7): 1048-1057. doi: 10.1002/lt.21499

6. Vaquero J, Fontana R, Larson A, et al. Complications and use of intracranial pressure monitoring in patients with acute liver failure and severe encephalopathy. *Liver Transpl*. 2005; 11(12): 1581-1589. doi: 10.1002/lt.20625

7. Deep A, Stewart C, Dhawan A, et al. Effect of continuous renal replacement therapy on outcome in pediatric acute liver failure. *Crit Care Med*. 2016; 44(10): 1910–1919. doi: 10.1097/CCM.0000000000001826

8. Santiago M, López-Herce J, Urbano J, et al. Complications of continuous renal replacement therapy in critically ill children: A prospective observational evaluation study. *Crit Care*. 2009; 13: R184. doi: 10.1186/cc8172

9. Akhoundi A, Singh B, Vela M, et al. Incidence of adverse events during continuous renal replacement therapy. *Blood Purif*. 2015; 39: 333-339. doi: 10.1159/000380903

10. Bernal W, Hall C, Karvellas C, et al. Arterial ammonia and clinical risk factors for encephalopathy and intracranial hypertension in acute liver failure. *Hepatology*. 2007; 46: 1844-1852. doi: 10.1002/hep.21838

11. Stadlbauer V, Jalan R. Acute liver failure: Liver support therapies. *Curr Opin Crit Care*. 2007; 13: 215-221. doi: 10.1097/MCC.0b013e328052c4cc