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Comments on "Neonatal infratentorial subdural hematoma contributing to obstructive hydrocephalus in the setting of therapeutic cooling: A case report".

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Abstract

Although Therapeutic Hypothermia (TH) contributes significantly in the treatment of Hypoxic Ischemic Encephalopathy (HIE), it could result in devastating complications such as intracranial hemorrhages. Laboratory examinations for possible coagulation disorders and early brain imaging can detect all these cases that are amenable to aggravation of HIE after the initiation of TH.

TO THE EDITOR

Hypoxic Ischemic Encephalopathy (HIE) is thought to be a significant cause of morbidity and mortality at term and pre-term infants[1,2]. As stated in the literature, HIE is an evolving pathological process which within hours after its initiation promotes neuronal cell death through several biochemical events due to primary and secondary neuronal cell's energy crisis such as hypoperfusion, extracellular concentration of amino-acids, nitric oxide and free radicals and finally membrane depolarization[3]. Based on newborn's neurological status expressed by Sarnat scale, HIE is divided to mild, moderate and severe[4]. Diagnosis and follow up is based on patient's neurological status, laboratory monitoring as well as brain imaging studies such as cranial ultrasound and Magnetic Resonance Imaging (MRI) of the head which is the gold standard imaging modality for intracranial lesions[5].

Therapeutic Hypothermia (TH) is considered the first line treatment of HIE[6]. Several studies in the past revealed that TH can reduce neonatal mortality up to 20% in developed countries[7]. TH is widely used during the last decade for moderate to severe cases of HIE and it can be induced either as whole-body cooling or selective head cooling with a great variation in treatment protocols[8,9]. According to a published case series, hypothermia is limited to 33-34 degrees of Celsius for around 72 h under close medical surveillance and is slowly reinstated at normal body temperatures by patient rewarming with an increase rate of 0.5 Celsius degree per hour[3,5]. TH is applied only 6 h after birth in newborns with low Apgar score and a gestational age above 36 wk with evidence of moderate to severe HIE[5]. The literature describes several side effects of TH with an incidence around 20% of treated cases such as skin burns, electrolyte disturbances, low blood pressure, thrombocytopenia, prolonged prothrombin time (PT), and activated thromboplastin time[3].

We have read with great interest the case reported by Rousslang *et al*[10]. The authors eloquently highlighted the potential association between TH and increased risk of intracranial hemorrhage in neonates with HIE. They described the case of a term neonate that after an emergent C-section delivery required intubation due to cardiopulmonary instability[10]. According to the authors, the neonate fulfilled the criteria for TH which was applied from the day one. It is very interesting that the patient had from his first day of life pathological values of several parameters of coagulation mechanism such prolonged international normalized ration (INR), time of thromboplastin, activated partial thromboplastin time and low number of platelets. Authors tried to restore these pathological findings of coagulation parameters during the next four days. This is a gray zone in the literate regarding contraindications for TH. The question that has to be answered is whether a neonate with pathological laboratory findings of his coagulation mechanism is eligible for TH initiation without prior restoration of these abnormal values. We have to recognize that the time frame for such decisions is short in order to prevent a possible permanent neurological damage. It is strongly supported by the literature that TH can induce abnormalities of coagulation

mechanism and indirectly favor occurrence of intracranial hemorrhages similar to the one that Rousslang *et al* describe in their case report[3,11]. Obviously, this effect can be reinforced in patients with already pathological ratings of coagulation parameters.

In addition, the first screening of the neonate with head ultrasound revealed a left grade I germinal matrix hemorrhage. Although the patient already had a small intracranial hemorrhage authors applied TH. It is well known that around 38% of cases treated with TH can have an intracranial hemorrhage[12]. This is a finding that could be studied more thoroughly with an MRI scan before the application of TH as the MRI is more sensitive for the detection of any other hemorrhagic lesion, rendering it a potential first reference screening study for the neonate. Additionally, a brain MRI could be more valuable in assessing the severity of HIE and thus is a prognostic tool of great significance[12-14]. The coexistence of HIE and intracranial hemorrhages is another gray zone that requires more extensive investigation regarding the final outcome for the neonates receiving TH[13,14]. The current published case series refers to MRI scans performed usually several hours after the initiation of TH. Another issue that should be clarified in the future is whether any type of intracranial hemorrhage constitutes a contraindication for the initiation of any TH protocol.

Finally, it is well presented by the authors that any type of imaging screening combined with laboratory and clinical follow up of the neonates during TH can successfully detect any emergent intracranial hemorrhage. In these cases, prompt neurosurgical consultation can remarkably affect neurological outcome and prognosis for the neonates[15].

ABBREVIATIONS

HIE, Hypoxic Ischemic Encephalopathy; INR, international normalized ration; MRI, Magnetic Resonance Imaging; PT, prothrombin time; TH, Therapeutic Hypothermia

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