Paediatrica Indonesiana

VOLUME 48 July • 2008 NUMBER 4

Original Article

Diagnostic clues in spontaneous intracranial hemorrhage in babies

Julius July, Eka Julianta Wahjoepramono, Beny Atmadja Wirjomartani

Abstract

Background There has been increasing number of babies detected with SIH. In regard to find diagnostic clues for the first-rate babies who really needs CT scan and referral, simple observation to look at certain clinical and laboratory findings is needed.

Objective To identify diagnostic clues associated with spontaneous intracranial hemorrhage (SIH) in babies.

Methods Retrospective observation was carried out among babies with SIH within the last two and a half years. Patients were excluded if there was an obvious cause of SIH such as trauma or any underlying disease such as hemophilia. Variables that were observed were patient's age, seizure, decreased level of consciousness, tensed fontanel, neurological deficits, vomitting, fever (T > 37.5°C), anemia, jaundice, PT and aPTT. All data were descriptively evaluated.

Results There were 53 babies with SIH (31 baby boys, 22 baby girls), forty eight of which (91%) were less than 3 months old. Of those, 50 patients (94%) had seizure as the leading clinical presentation, 44 patients (83%) had decreased level of consciousness, and 39 patients (74%) had tensed fontanel. PT and aPTT were prolonged in 39 (74%) cases. The most common lesion was subdural hematoma (38 cases/72%). Forty-three babies (81%) required neurosurgical intervention. Overall mortality rate was 22%.

Conclusion Babies with seizure, decreased level of consciousness, tensed fontanel, and prolonged PT and aPTT should be considered to harbor SIH. They need a CT scan and referral, particularly those less than three months old. The prognosis is unfavorable, thus early recognition and treatment is needed **[Paediatr Indones 2008;48:230-4]**.

Keywords: *spontaneous intracranial hemorrhage (SIH), decreased level of conscious, seizure, subdural hematoma.*

Spontaneous intracranial hemorrhage (SIH) in babies, in developing countries such as Indonesia, is still necessary to be recognized and socialized. Recently there has been increasing the number of babies suffering from SIH and significant number of them were delayed for appropriate care. Although there are some essentials pitfall that bring this issue to be considered, many efforts could be done to improve the condition. One of the pitfalls is the limited number of hospital or institution that provides diagnostic imaging such as CT scan. In general, the cost for CT scan examination is still quite expensive. Many patients who might need a CT scan still need to be sent and referred to other town, which may take hours for transportation with extra expenses. On the other hand, over referrals it is also a problem, as most patients were sent for inappropriate indication lead to improper expenses.

From the Department of Neurosurgery, Medical School, Pelita Harapan University, Siloam Lippo Karawaci Hospital, Tangerang, Indonesia (JJ,EW).[1] The Department of Neurosurgery, Medical School, Padjadjaran University, Hasan Sadikin Hospital, Bandung, Indonesia (BW).[2]

Reprint requests to: Julius July, M.D., M.Kes. Department of Neurosurgery, Medical School, Pelita Harapan University, Siloam Lippo Karawaci Hospital. Jl. Siloam 6 Lippo Karawaci 1600, Tangerang 15811, Indonesia. Tel.62-21-5460055 Ext 5731.Fax.62-21-5460921. E-mail: juliusjuly@yahoo.com

CT scan is a very important diagnostic tool for SIH although ultrasound for young baby still could be an option. CT scan provides a huge revolution in neurosurgical practice especially superior for revealing acute hemorrhage. Delayed diagnosis can lead to delayed treatment and bring a huge implication to the outcome of the babies. The real question is which baby really needs CT scan on emergency basis, and potentially needs neurosurgical intervention? In an attempt to find diagnostic clues for first-rate baby who really needs CT scan and potential referral, the authors accomplish simple observation to look at certain clinical and laboratory variables from a numbers of babies with SIH. These clues can also be used in well-developed institution to minimize inappropriate indication for CT scan.

Methods

Simple observation was carried out retrospectively among SIH babies (less than 1 year old) who were referred to neurosurgical services within the last two and a half years. Some of them were referred with CT scan done and some were not. All diagnosis were based on CT scan. Patients were excluded if there was an obvious cause of SIH such as trauma, or there was an underlying disease such as hemophilia. Variables that were observed were patient's age, seizure, decreased level of consciousness, tensed fontanel, neurological deficits, vomiting, fever (T > 37,5 ° C), anemia, jaundice, data of PT and aPTT, with assumption that this simple laboratory examination are available through all district hospital.

Results

There were 53 babies with SIH, consisted of 31 baby boys and 22 baby girls, forty eight of which (91%) were less than 3 months old. The leading clinical presentations were seizure in 50 patients (94%), decreased level of conscious in 44 patients (83%), and tensed fontanel in 39 patients (74%), followed by fever, anemia, vomit, neurological deficits, and jaundice (**Table 1**).

PT and aPTT were prolonged in 39 (74%) cases. The most common lesion was subdural hematoma in 38 (72%) cases, followed by intracerebral, intraserebellar, and intraventricular hemorrhage. Forty-three babies (81%) required neurosurgical intervention. Overall mortality rate is quite high (22%).

Discussion

In Indonesia with huge population, several challenges include identifying risk factors, finding clues to help recognition, optimal treatment, and prevention. An attempt to pointing up clinical features and simple assessments is needed as guiding factors for front line health practitioners to decide which baby need CT evaluation and probable neurosurgical intervention.

For better understanding, the etiology of intracranial hemorrhage in babies as well as in adult can be divided into three groups. First, abnormality of intracranial blood vessels;[1] second, abnormality or disorder of blood; third, abnormality or disorder

Table 1. Patient's characteristics and variables

Variables	Number of patients	Percentage
Sex : M	31	59
F	22	41
Age : < 3 mo	48	91
3-6 mo	3	6
6-9 mo	2	3
9-12 mo	-	-
Decreased level of conscious	44	83
Seizure	50	94
Tense Fontanel	39	74
Neurologic deficits	15	28
Vomiting	21	39
Fever (>37ºC)	33	62
Anemia	27	51
Jaundice	11	21
Prolong PT & aPTT	39 (11 icteric)	74
Lesions:		
• Subdural hemorrhage	38 (9+ ICH)	72
• Intracerebral hemorrhage	9	17
• Intracerebellar hemorrhage	2	4
• Intraventricular H.	4	8
Treatment:		
• Mass Evacuation	30	57
• Burr hole	2	4
• EVD	4	8
• Without surgical intervention	10	19
• Refused admission	7	13
Mortality	10 of 46	22

of hemodynamic. In real setting, there is always an overlap between those groups. Abnormality of blood and hemodynamic can be ruled out by physical examination and laboratory test, but abnormality of intracranial blood vessel needs special investigations such as CT angiography, MR angiography or conventional angiography. Such investigations are even more expensive and more limited numbers of hospital that can provide it.

Spontaneous intracranial hemorrhage in previously healthy babies was already mentioned.[2-5] Majority of SIH in babies are emergency cases and require immediate surgical intervention. Furthermore, lack of resources makes further investigation to find the cause is nearly impossible. Ideally, the actual diagnosis of SIH can only be determined if all probable causes were already ruled out, but it is interesting that most babies presenting with isolated intraparenchymal hemorrhages are healthy, and no specific cause for the bleeding ever identified.[2-4,6] Detail discussion on this topic is beyond the scope of this paper.

Several clinical and laboratory variables are surprisingly high. In this observation, two third of the babies with SIH were presented with seizure, decreased level of consciousness, tensed fontanel, and also prolonged PT and aPTT. Another interesting result from this observation is that most of the cases (91%) happened in the first three months, especially between six to twelfth weeks. This is dissimilar with the intracranial hemorrhage caused by birth injury, which is most likely to happen in the first couple days and more prone to premature or low birth weight babies. Coagulopathy *per se* as a major determinant of the development of intracerebral hematoma in babies was already mentioned.[5] The question is how specific the coagulopathy *per se*? Other variables such as anemia, neurological deficits, and jaundice although presented in a smaller number of patients, could be more specific for SIH.

The most common intracranial lesion from this observation were subdural hemorrhage in 38 (72%) cases (**Figure 1**), followed by intracerebral, intracerebellar, and intraventricular hemorrhage.

Forty-three babies (81%) required neurosurgical intervention, most of them underwent hematoma evacuation, some only needed burr hole drainage or syringe taps, and others needed extra-ventricular drainage (**Figure 2**).

Overall mortality rate was quite high (22%). Some patients came at delayed fashion, and although appropriate interventions were done the patients were doing poor. It may be due to the brain ischemia that caused by prolonged compression from the hematoma (**Figure 3**). Ignorance, financial issues, or even missed diagnosis could cause the delay for appropriate treatment.

Listing major and minor clinical and laboratory variable that correlate with SIH in babies can help to strengthen the attention and awareness of front line health care practitioner. This will lead to early recog-

Figure 1(a) Plain CT scan, there was a huge subdural hematoma at left side extending from frontal to occipital region. It produced significant mass effect, compressing left lateral ventricle with midline deviation to the right. **(b)** It showed the incision line. (c) After surgical evacuation of the blood clot. The CT showed no residual blood, a symmetry ventricular system, and no midline deviation.

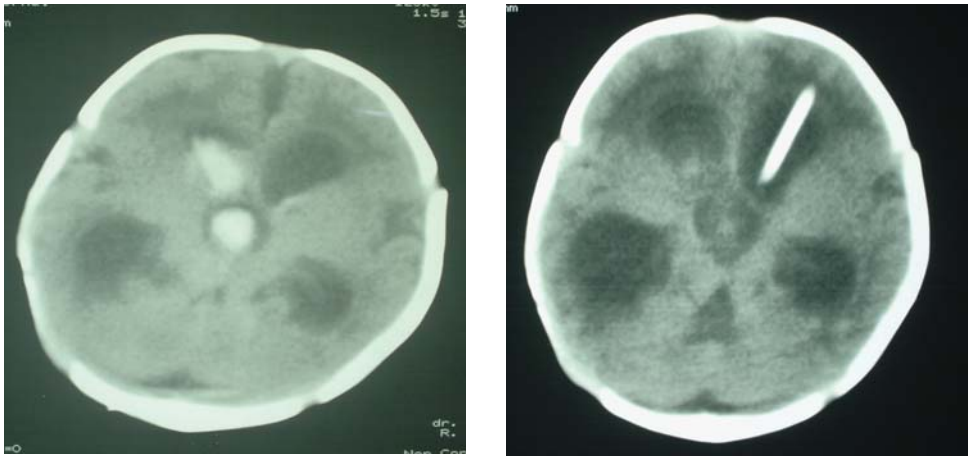

Figure 2. (a) Plain CT scan showed blood in the right lateral and third ventricles with signs of hydrocephalus. (b) After ventricular drain insertion, the ventricular catheter tip in left lateral ventricle was noted and the blood was resolved

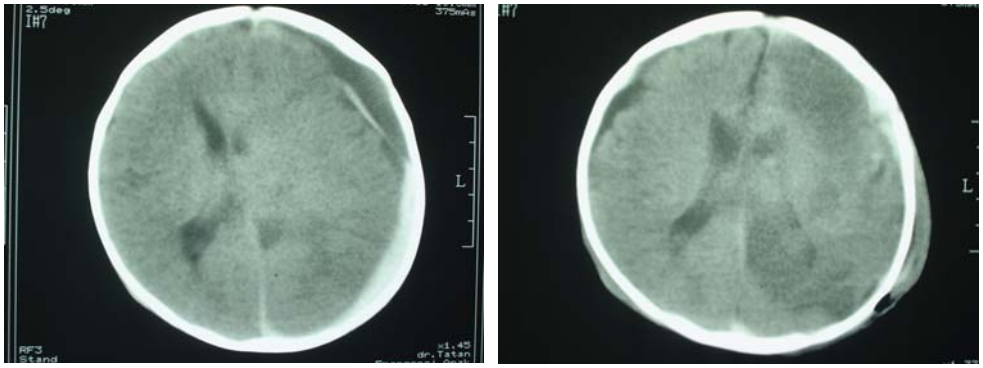

Figure 3 (a). Plain CT scan showed subdural blood and fluid collection at left side, extending from frontal to occipital region. It compressed left lateral ventricle and produced midline deviation to the right side. **(b)** After surgical evacuation of blood clot, note the hypodensity area at left hemisphere. It represent brain injury due to prolong compression.

nition of SIH in babies then provide early treatment. Hopefully this will bring a better outcome, appropriate cost expenses and of course great implication on human resource.

We concluded that babies with seizure, decreased level of consciousness, and tensed fontanel, with prolonged PT and aPTT should be considered to harbor spontaneous intracranial hemorrhage, particularly in the first three months of life. These babies are definitively need a CT scan and potential referral. The mortality rate is still unfavorable but early recognition and treatment may overcome the problem.

References

1. Tekkok IH, Ventureyra EC. Spontaneous intracranial hemorrhage of structural origin during the first year of life. Childs Nerv Syst 1997;13 Suppl 3:154-65.
2. Sandberg DI, Lamberti-Pasculli M, Drake JM, Humphreys RP, Rutka JT. Spontaneous intraparenchymal hemorrhage in full-term neonates. Neurosurgery 2001;48:1042–49
3. Looney CB, Smith JK, Merck LH, Wolfe HM, Chescheir NC, Hamer RM, Gilmore JH. Intracranial Hemorrhage in Asymptomatic Neonates: Prevalence on MR Images and Relationship to Obstetric and Neonatal Risk Factors. Radiol-

ogy 2006;242:535
4. Huang AH, Robertson RL. Spontaneous Superficial Parenchymal and Leptomeningeal Hemorrhage in Term Neonates. AJNR 2004;25:469-75.
5. Hanigan WC, Powell FC, Miller TC, Wright RM. Symptomatic intracranial hemorrhage in full-term infants. Childs Nerv Syst 1995;11:698-707
6. Looney CB, Smith JK, Merck LH, Wolfe HM, Chescheir NC, Hamer RM, *et al*. Intracranial hemorrhage in asymptomatic neonates. Radiology 2007;242:535-41.

Editor's note:
In this interesting series the authors did not mention about the possibility of lack of vitamin K administration at birth. Vitamin K deficiency associated bleeding disorder should be looked for by careful history taking in every infant with SIH