Periventricular-Intraventricular Hemorrhage in Twin Neonates at Dr. Cipto Mangunkusumo Hospital, Jakarta

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Abstrak

Telah dilakukan penelitian prospektif mengenai Perdarahan Periventrikular-Intraventrikular (PPV-PIV) pada neonatus kembar di Rumah Sakit Dr. Cipto Mangunkusumo Jakarta, selama periode Februari-Agustus 1989. Penelitian ini bertujuan untuk mencari hubungan antara PPV-PIV dan faktor risiko ante-intra-pasca natal. Sampel terdiri dari 30 pasang neonatus kembar dan 30 neonatus tunggal sebagai kontrol yang mempunyai cara lahir, masa gestasi dan nilai Apgar yang sama serta jarak lahir terdekat dengan bayi kembar pasangannya. Pada sampel dilakukan pemeriksaan ultrasonografi kepala pada hari pertama, ketiga dan keempat pasca lahir. Hasil penelitian menunjukkan bahwa perawatan antenatal, paritas dan umur ibu tidak mempengaruhi terjadinya PPV-PIV. Masa gestasi kurang dari 37 minggu, berat lahir rendah, asfiksia dan cara lahir menimbulkan efek yang sama untuk terjadinya PPV-PIV antara kedua kelompok. Angka kejadian PPV-PIV pada neonatus kembar pertama, kedua dan tunggal masing-masing 26,7 %, 20 % dan 6,7 %. Risiko relatif untuk terjadinya PPV-PIV pada neonatus kembar pertama dan kedua masing-masing 4 dan 3,5 kali dibandingkan tunggal. Risiko terjadinya PPV-PIV pada neonatus kembar pertama dengan masa gestasi 37-42 minggu dan berat lahir lebih besar atau sama dengan 2500 gram lebih tinggi dibandingkan tunggal. Tidak ditemukan perbedaan untuk terjadinya PPV-PIV berdasarkan urutan kelahiran, masa gestasi dan asfiksia antara kedua kelompok. Kesimpulan : Risiko PPV-PIV pada neonatus kembar terutama kembar pertama lebih tinggi dibandingkan dengan tunggal.

Abstract

A prospective study of periventricular-intraventricular haemorrhage (PIH) in twin newborn babies was carried out in Dr. Cipto Mangunkusumo Hospital, Jakarta from February 1989-August 1989. The purpose of this study was to look for the correlation between PIH and ante-intra-post natal risk factors. The study group consisted of 30 pair of twins and 30 singleton newborn babies who had the nearest time of birth, who underwent the same type of delivery, gestational age as well as the same Apgar score. The ultrasonography of the head was done on the first, third and forth days of life. The result of this study showed no significant influence of antenatal care, parity, the age of the mother, low birth weight and type of delivery in the occurence of PIH on both groups. The occurence of PIH in the first twin, second twin and the singleton were 26,7 %, 20 % and 6,7 %. The relative risk of the occurence of PIH in the first and second twins was 4 and 3,5 times the singleton newborn babies. The occurence of the PIH which was due to the influence of prematurity and asphyxia were the same in both groups. The risk of PIH in the first twin at 37-42 weeks gestation and birth weight more or equal to 2500 grams was higher than in the singleton. There were no differences in the occurrence of PIH in consecutive birth, gestational age and asphyxia in both groups. Conclusion: The risk of PIH in the first twin group is higher than in the singleton newborn babies.

Keywords : *Risk, First twin, Second twin, Singleton.*

INTRODUCTION

Periventricular-Intraventricular Hemorrhage (PIH) is a serious problem in newborn infants because of the high mortality, morbidity and neurological impairment associated with it in later life.[1] In general the PIH in fullterm neonates originates from veins of the highly vascularized choroid plexus.[2] PIH of premature infants usually originates in the germinal matrix and can be serious enough to be fatal. The reported incidence of

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PIH in preterm infants is 40-43 %[3], and in this hospital the incidence is 39,47%.[4] Many factors have been implicated in PIH and its etiology is most probably multifactorial,[1] such as degree of prematurity, hypoxia, asphyxia, birth trauma;[2] hypercarbia and acidosis.[5]

Newborn twin babies have a high-risk for PIH because of the following factors :

- The incidence of prematurity is higher in twins than in singletons, with between 20% and 30% of twins being born before the 37th week gestation.[6]
- Neonatal asphyxia, occurs most often in multiple deliveries.[7]
- The second twin is prone to require operative intervention resulting in a longer period of hypoxia.[8]
- Respiratory distress syndrome is particularly common in twins because of the frequency of prematurity. It is especially common in the second twin.[9]
- Twin transfusion syndrome may occur either acutely or chronically. For feto-fetal transfusion to occur, there must be some fetal vascular communication; and this condition is seen in monozygotic-monochorionic twins. In the acute form, the transfusion occurs during labour.[10]

In our unit 21,39% low birth weight newborn babies including twins were born in 1981.[11] Although twin pregnancy occurs 2 in 100 births (1,98%) in our unit, the contribution made to perinatal mortality and morbidity is considerable.[12] Many studies on PIH in premature as well as in fullterm newborn babies have been done, but no special studies have been conducted on the occurrence in twins.

Due to the relative frequency of twins and the numerous risk factors associated with PIH, we wanted to find out the incidence of PIH and its characteristics in correlation with ante-intra-postnatal risk factors. In addition we also wanted to test the hypothesis that the incidence of PIH in twin neonates was higher than in singletons risk and that the second twin babies were at the highest risk.

MATERIALS AND METHODS

The method was an observational prospective study conducted at Perinatology Subdivision of the Child Health Department, Dr Cipto Mangunkusumo Hospital to observe the relation of twin deliveries to PIH. Enrollment of samples began in 19 February 1989 and were terminated in 21 August 1989.

Patient enrollment

Twin neonates as a study group and singletons as a control group who were born at approximately the same time and with similar gestational age, Apgar score and mode of delivery were studied.

Thirty pairs of twin and 30 singleton neonates were subjected to the study. Cerebral Ultrasonography was performed once a day within 0-23, 48-71 and 72-95 hours of birth in both groups.

Inclusion criteria

Only live-birth infants without congenital central nervous system anomaly were accepted as subjects.

Exclusion criteria

Early neonatal death at the first 24 hours of life.

Data collection

The records of the mothers and their babies were kept on special forms from admitance. Information was recorded on each mother's identity, medical and obstetric history and also their infant's identity, birth weight, presentation and mode of delivery, Apgar score, placentation, chorion, amnion and infant morbidity. Sonographic results were recorded in order to show the incidence of PIH due to independent variables.

Data analysis

Statistical analysis such as Chi-Square test, Fisher test, Kolmogorov-Smirnov test and Mc Nemar test were performed. All of these tests were used to determine the significancy of correlation between PIH and parity, age, ante natal care of the mother including their illness during pregnancy. Relative risks or the proportion of the incidence of PIH in exposed to unexposed groups were also calculated.

RESULTS

Comparability of both groups

During the six months study period, there were 30 pairs of twin and 30 singleton neonates from mothers who were comparable in parity, age and ante natal care. These 3 factors had no influence on PIH in twins and

singletons (Table 1,2,3). Mothers' illnesses such as pre-eclampsia and anemia were found more significant in the twin group rather than in the singleton group (Table 4).

Table 1. The correlation between neonatal characteristics and mother's parity

Mother's parity	Twins		Singletons		Total	
1	13	43,3 %	18	60,0 %	31	51,6 %
2	6	20,0 %	4	13,3 %	10	16,6 %
3	6	20,0 %	2	6,7 %	8	13,3 %
≥/ 4	5	16,7 %	6	20,0 %	11	18,3 %
Total	30	100,0 %	30	100,0 %	60	100,0 %

Kolmogorov-Smirnov : $p > 0,05$

Table 2. The correlation between neonatal characteristics and mother's age

Mother's age (years)	Type of twins: Monochorionic	Dichorionic	Singletons	Total
< 20	0	1	3	4
20 - 24	3	8	16	27
25 - 29	0	11	6	17
30 - 34	1	5	4	10
35 - 39	0	1	1	2
Total	4	26	30	60

Kolmogorov-Smirnov : $p > 0,05$

Table 3. The correlation between neonatal characteristics and mother's ante-natal care

Ante-natal care	Twins		Singletons		Total	
regular	22	73,3 %	24	80,0 %	46	76,6 %
irregular	8	26,7 %	6	20,0 %	14	23,3 %
Total	30	100,0 %	30	100,0 %	60	100,0 %

Chi-Square : $p > 0,05$

Table 4. Mother's illness during ante-natal period in both groups

Mother's illness	Twins n = 30		Singletons n = 30		p
Preeclampsia (+)					
- severe	6	20,0 %	3	10,0 %	
- mild	7	23,3 %	2	6,7 %	< 0,05
Preeclampsia (-)	17	56,7 %	25	83,3 %	
Anemia					
- HB < 11 g/dl	12	40,0 %	1	3,3 %	
- HB > 11 g/dl	18	60,0 %	29	96,7 %	< 0,05

Periventricular-Intraventricular haemorrhage (PIH)

The incidence of PIH in twins was 25 % and the risk to the first twin was 26,7 % which was significantly higher than that to singletons with their incidence of PIH 6,7 % (Table 5). The probability of PIH in second twins was 20 %, which was not significantly different with singletons, and the same result was shown between the first and second twin groups (Table 6,7). Relative risk analysis indicated that the risk of PIH to the first and second twins were respectively 4 and 3,5 times the risk to singletons (Table 8).

Mothers' illnesses such as preeclampsia and anemia were confounding factors in PIH (Table 9, 10). Prematurity and asphyxia had a similar influence in PIH to the both groups (Table 11,12). Other risk factors such as mode of delivery and low birth weight had no influence in PIH in both groups (Table 13,14).

Table 5. PIH in first twin and singleton neonates

		Singleton: PIH (+)	PIH (-)	Total
First twin	PIH (+)	2	6	8 (26,7 %)
	PIH (-)	0	22	22
Total		2 (6,7%)	28	30

Mc Nemar : $p < 0.05$

Table 6. PIH in second twin and singleton neonates

		Singleton: PIH (+)	PIH (-)	Total
Second twin	PIH (+)	1	6	7 (23,3 %)
	PIH (-)	1	22	23
Total		2 (6,7%)	28	30

Mc Nemar : $p > 0.05$

Table 7. PIH in first and second twin neonates

		First twin: PIH (+)	PIH (-)	Total
Second twin	PIH (+)	6	1	7
	PIH (-)	2	21	23
Total		8	22	30

Mc Nemar : $p > 0.05$

Table 8. Incidence of PIH due to consecutive birth

No. of birth	Sample	PIH	Incidence	R.R.	C.I. 95 %
Singleton*	30	2	6,7 %	1	
First twin	30	8	26,7 %	4	1,1-14,8
Second twin	30	7	23,3 %	3,5	0,9-13,6

Note : * comparation standard
C.I. : confidence interval
R.R. : relative risk

Table 9. The correlation between PIH and preeclamptic mothers in twin and singleton neonates

	PIH (+)	PIH (-)	Total	p
Preeclampsia (+)				
Singleton*	0	4	4	
First twin	2	8	10	> 0,05
Second twin	3	7	10	> 0,05
Preeclampsia (-)				
Singleton*	2	24	26	
First twin**	6	14	20	< 0,05
Second twin	4	16	20	> 0,05

Note : * = standard
** = significant

Table 10. The correlation between PIH and anemic mothers in twin and singleton neonates

	PIH (+)	PIH (-)	Total	p
Anemia (+)				
Singleton*	1	0	1	
First twin	3	9	12	> 0,05
Second twin	2	10	12	> 0,05
Anemia (-)				
Singleton*	1	28	29	
First twin	5	13	18	> 0,05
Second twin	5	13	18	> 0,05

Note : * = standard

Table 11. The correlation between PIH and gestational age in both groups

Gestational age	PIH (+)	PIH (-)	Total	p
< 37 weeks				
Singleton*	1	6	7	
First twin	2	5	7	> 0,05
Second twin	2	5	7	> 0,05
37 - 42 weeks				
Singletons*	1	22	23	
First twin**	6	17	23	< 0,05
Second twin	5	18	23	> 0,05

Note : * standard ** significant

Table 12. The correlation between PIH and asphyxia in both groups

Asphyxia	PIH (+)	PIH (-)	Total	p
Severe/moderate				
Singleton*	0	5	5	
First twin	1	3	4	> 0,05
Second twin	3	5	8	> 0,05
Without asphyxia				
Singleton*	2	23	25	
First twin	7	19	26	> 0,05
Second twin	4	18	22	> 0,05

Note : * standard

Table 13. The correlation between PIH and mode of delivery in both groups

Mode of delivery	PIH (+)	PIH (-)	Total	p
Spontaneus				
Singleton*	2	20	22	
First twin	5	16	21	> 0,05
Second twin	4	13	17	> 0,05
Operative				
Singletons*	0	8	8	
First twin	3	6	9	> 0,05
Second twin	3	10	13	> 0,05

Note : * standard

Table 14. The correlation between PIH and birth weight in both groups

Birth weight	PIH (+)	PIH (-)	Total	p
< 2500 grams				
Singleton*	2	8	10	
First twin	5	14	19	> 0,05
Second twin	5	14	19	> 0,05
> 2500 grams				
Singleton*	0	20	20	
First twin**	3	8	11	< 0,05
Second twin	2	9	11	> 0,05

Note : * standard ** significant

DISCUSSION

Our study, carried out at the Cipto Mangunkusumo General Hospital, Jakarta, on twins and singletons showed that the frequency of preeclampsia and anemia was higher in the twin pregnancy (Table 4), but its relation to the occurence of PIH was not clear.

In this study we have been able to show the significant difference between PIH in the first twin and the singletons (Table 5), as well as between the second twin and the singletons (Table 6), but not between the first and the second twins (Table 7). This might be

because first and second twins have due to the same risk factors to PIH.

The relative risk in the first twin was 4 times and in the second twin 3.5 times higher than in the singleton (Table 8). Several clinical studies have been reported on perinatal factors found to antecede to PIH in the newborn baby.[4,5,6,8]

The risk factors to PIH in twin neonates in this study were not specific; PIH was found to occur in premature or low birth weight as well as full term neonates, with or without asphyxia as well as with or without assisted labour (Table 11,12,13,14).

As for the cause of PIH, no distinct conclusions can be drawn from the results of this study, a multifactorial cause should be considered.

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