

Concurrent Bloodstream Infections Associated with Necrotizing Enterocolitis in Taiwan: Multiple-center study

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Objective

To evaluate the association of bloodstream infections (BSIs) concurrent with necrotizing enterocolitis (NEC).

Study design

This is a multi-center retrospective chart review study. All neonates with NEC admitted to NICU were included. BSI concurrent with NEC was defined if blood stream infection occurred within 72 hours of necrotizing enterocolitis and "post-NEC" defined BSI occurred more than 72 hours after episode. Demographic data, clinical characteristics, morbidities and mortality rate were collected. Microbiologic data of BSI pathogen were analyzed.

Results

During the study period, NEC developed in 85 neonates. The mean gestational age and birth body weight was 28.3 weeks and 1119grams respectively. The median day of onset of symptoms was 13 days after birth. BSIs occurred in 36 infants; 15 (42%) with BSIs concurrent with NEC and 21(58%) with post-NEC BSIs. There were no significant differences of morbidities and mortality between these two groups. Gram-negative bacteria were the most common pathogen in BSIs concurrent with NEC (73%) compared with post-NEC BSIs (29%). Overall mortality rate was higher in NEC associated with BSIs than NEC without BSI.

Conclusion

No significant differences were observed in BSIs concurrent with NEC and post-NEC BSIs. Gram-negative bacteria were the most common infecting pathogens in BSIs concurrent with NEC. Infants with NEC-associated BSIs had higher incidence of retinopathy of prematurity, prolonged hospitalization, death than NEC without BSIs.

Reference

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Table I Characteristics of neonates with necrotizing enterocolitis during 2003 – 2012

	NEC (n= 85)
GA (weeks±SD.)	28.3±2.8
BW (grams±SD.)	1119.5±480.2
Gender (M/F)	46/39
RDS need surfactant, n(%)	45(53)
BPD moderate, n(%)	38(45)
IVH >Grade II, n(%)	3(4)
ROP need therapy, n(%)	10(12)
Ventilator use (days±SD.)	56±40
NEC	
Medical, n(%)	58(68)
Surgical, n(%)	27(32)
DOL NEC (days±SD.)	13.6±11
Late-onset BSI, n(%)	36(42)
NEC associated, n(%)	15(18)
Post-NEC, n(%)	21(25)
Length of stay, (days±SD.)	85.3±43.3
Death, n(%)	14(17)

Table II Comparison of infants with NEC concurrent with BSI or post NEC BSI

	NEC concurrent (n=15)	Post NEC (n= 21)	p-value
GA (wks)	27.7±3.7	27.8±3.5	.957
BW (g)	1039±681	1041±540	.992
Gender (M/F)	6/9	10/11	.650
RDS need surfactant, n(%)	11(73)	13(62)	.473
BPD moderate, n(%)	7(47)	15(71)	.133
IVH >Grade II, n(%)	1(7)	1(5)	.806
ROP, n(%)	5(33)	3(20)	.175
Ventilator use	59.5±38.8	73.1±49.4	.379
NEC			
Medical	8(53)	12(57)	.821
Surgical	7(47)	9(43)	
DOL NEC	13.7±12.5	12.5±8.3	.743
Length of stay	97.2±38.2	106.6±42.1	.500
Death	4(27)	7(33)	.669

Table III Comparison of infants with NEC concurrent BSI, post NEC BSI and NEC without BSI

	NEC concurrent (n=15)	Post NEC (n= 21)	NEC without BSI (n= 49)	p-value(1)	p-value(2)
GA (wks)	27.7±3.7	27.8±3.5	28.8±2.6	.247	.168
BW (g)	1039±681	1041±540	1177±372	.313	.227
Gender (M/F)	6/9	10/11	30/19	.147	.292
RDS need surfactant, n(%)	11(73)	13(62)	21(43)	.039	.144
BPD moderate, n(%)	7(47)	15(71)	16(33)	.322	.003
IVH >Grade II, n(%)	1(7)	1(5)	1(2)	.368	.531
ROP need for treat, n(%)	5(33)	3(20)	2(4)	.001	.129
Ventilator use	59.5±38.8	73.1±49.4	48.2±35.7	.301	.021
NEC					
Medical	8(53)	12(57)	38(78)	.068	.083
Surgical	7(47)	9(43)	11(22)		
DOL NEC	13.7±12.5	12.5±8.3	14.1±12.1	.913	.597
Length of stay	97.2±38.2	106.6±42.1	72.6±41.3	.044	.003
Death	4(27)	7(33)	3(6)	.026	.003

p value(1): compare with NEC-associated and NEC without BSI
p value(2): compare with post NEC and NEC without BSI

Table IV Microbiologic pathogens of NEC concurrent with BSI and post NEC BSI

	NEC-associated (n=15)	Post NEC (n= 21)	P-value
Gram-negative	11(73)	6(29)	.008
Acinetobacter baumannii	6	1	
Pseudomonas aeruginosa	1	1	
Klebsiella pneumonia	1	1	
Klebsiella oxytoca	1	1	
Escherichia coli	2	1	
Citrobacter diversus	1		
Enterobacter cloacae		1	
Gram-positive	4(27)	16(76)	.003
Enterococcus faecalis		4	
CoNS	4	12	
Fungus	4(27)	5(24)	.845
Candida guilliermondii	1	1	
Candida parasilosis	2	1	
Candida glabrata	1	2	
Malassezia		1	

CoNS: coagulase-negative staphylococci