A Comparative Study of Blood Culture Sampling from Umbilical Catheter Line versus Peripheral Site

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Received: 23 Jul. 2009; Received in revised form: 19 Aug. 2009; Accepted: 11 Sep. 2009

Abstract- Neonatal sepsis is an important cause of death and morbidity in newborns and is diagnosed by isolation of organism in blood culture. In several reports,reliablity of blood cultures were done from umbi lical catheters,have been demonstrated. The objective of the present study was to determine,wether an inde welling umbilical catheter, could be an alternative site for blood culture. In a prospective study over 6 months during 2006,141 paired blood cultures from 134 infant,were done simultaneously from peripheral site and umbilical catheter (mostly U. V. C),during the first four days of life. Majority of these infants were preterm and admitted to NICU for special care. these infants had indwelling umbilical line and had indication of sepsis workup. A total of 141 pairs of blood cultures were obtained from 134 infants. In 16 infants blood culture pairs were positive for one organism in both peripheral vein and umbilical site. 71. 6% of total cultures (n=11)pairs were negative in boths site. A total of 22 pairs were positive in one site only,with 5 positive from peripheral vein only and the other 17 from umblical site. Two pairs were positve in boths site with two different organism. In over all 16 infant (11%)of blood were considered to be contaminated. Contamination rate were 2. 4% and 9. 2% for peripheral and umbilical catheter site. Contamination rate increased after 48 hours of age in umbilical catheter. The result showed that after 2 days contamination rate for blood culture taken from catheter line increased and specifity decreased. We recommended that blood culture via umblical catheter in first 2 days in sick neonates with indwelling catheter can be a alternate site of blood culture sampelling.

Acta Medica Iranica 2010; 48(4): 231-233.

Key words: Blood culture; umblicus; indewlling cateter

Introduction

Sepsis is common in low birth weight newborns in neonatal intensive care units (NICU) and is main of catheter use (1). The frequency of bacterimia in newborns and the resultant sepsis have increased (2). The insertion point of catheter is considered the main entry port for sepsis-causing microprganism which grow on the external part of the catheter (3). However invasion from the catheter occures less frequently through the use of contaminated fluids from bacterimia and from central portion of the catheter how birth weight infants with persistant staphylococcus aureus septicemia, possibly associated with percutaneous central venus catheters (4). The aim of this study was to analysis the prevalence of sepsis and the value of peripheral, umbilical catheter cultures.

Patients and Methods

From December,2006 to June , 2007 ,134 newborns with umbilical venus catheters hospitalize NICU of Ghaem Hospial ,Mashad Iran. were recruited. Material collection consisted of the indicated peripheral blood,umbilical catheter cultures. The cultures were sent to the microbiology laboratory that culture technique was perfomed in blood agar medium.

Results

A total of 141 pairs of blood cultures were obtained from 134 infants. In 16 infants blood culture pairs were positive for one organism in both peripheral vein and umbilical site. 71. 6% of total cultures (n=11) pairs were

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Tables 1. Peripheral Vein culture and umbilical vein culture on life days

Days	Total	Peripheral	Umbilical	Peripheral	Umbilical
First day life	72	2	63	3	4
Second day….	20	4	14	0	2
Third day …	25	4	14	1	8
Fourth day …	24	8	10	1	5
Total	141	18	101	5	17

Table 2. Culture contamination in two site

Culture	1 th day %	2 th day %	3th day %	4th day %	Total %
Peripheral vein	2. 7	0	0	4. 1	1. 4
Umbilical catheter	5. 5	0	20	20. 8	9. 2

negative in boths site. A total of 22 pairs were positive in one site only, with 5 positive from peripheral vein only and the other 17 from umblical site. Two pairs were positve in boths site with two different organism. However based on clinical sign and laboratory finding some of these single positive blood culture had true infection. In over all 16 infant (11%)of blood were considered to be contaminated. Contamination rate were 2. 4% and 9. 2% for peripheral and umbilical catheter site. Contamination rate increased after 48 hours of age in umbilical catheter. Sensitivity of blood culture on days1,2,3,4 for peripheral site were 100%,100%,83%,87% and for umblical catheter were 65%,100%,100%,87%. Specifity index for peripheral site in first 3 days were 100% ,and day 4,87% but for umblical catheter were 95%,93%,75%,62% in four first days.

Table 3. Sensitivity and Specifity in peripheral blood culture

Position	1th day %	2th day %	3th day %	4th day %
Sensitivity	100	100	83	87
Specifity	100	100	100	87

Table 4. Sensitivity and Specifity in umbilical blood culture

Position	1th day %	2th day %	3th day %	4th day %
Sensitivity	66	100	100	87
Specifity	95	93	75	62

Table 5. Distribution of microorganism in positive cultures

Microorganism	Peripheral/umbilical	Total
Staph coag. negative	8/16	24
Klebsiella	12/10	22
Psudomonas	1/2	3
Coli Bacillus	1/1	2
Entrobacter	¼	5

Discussion

Many researches have shown that umbilical artery,vein catheters are associated with an increased risk of infection. Therefore, when using these catheters for blood sampling and blood culture, potential infections can impact the results (5). Previous experiments have shown that using umbilical catheter in order to obtain blood samples is not acceptable. Therefore, this method for blood sampling and blood culture is not preffered. In this research, we have made no discremination between infections due to catheter and non catheter related infections. There is no difference between the sensitivity of the results from blood cultures obtained by umbilical catheter and that of peripheral blood, but the specifity of umbilical catheter is remarkably lower than peripheral blood obtained culture probably due to the increased incidence of infection. Cowett reported the bacterial culture of blood obtained from an umbilical artery catheter (6). Indwelling umbilical arterial catheter was evaluated prospectively as an alternative site for blood culture sampeling. Thus in sick neonates the indwelling umbilical arterial line was an alternative and perhaps a preferred site for blood culture sampeling. Contamination rate were 1. 3 % and 0. 9% for peripheral vein and umbilical arteria catheter blood cultures (7). In a male premature infant with sepsis, culture of peripheral intravenous catheter was positive for coagulase negative staphylococcal on the 7^{th} day postnatal. The most common cause of nosocomial infection originating from a peripheral intravenus catheter can lead to gangrene (8).

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