

Study of Umbilical Cord Blood Culture in diagnosis of early-onset sepsis among newborns with high-risk factors.

*Dr. N. R. Akolkar, *Dr. R. B. Kothari,
Dr. Sunil Natha Mhaske *Dr. Ninza Rawal,
Dr. Bipin Rathod

*Asso Prof, **Prof & Head, ***Resident

Corresponding Author : Dr. R. B. Kothari,

Mail id : rameshkothari13@gmail.com

Mobile No.: 9767705059

Address : Department of Paediatrics, DVVPF's
Medical College & Hospital, Vilad ghat ,
Ahmednagar, Maharashtra-414111

Abstract

Introduction: Blood culture is gold standard for diagnosis of neonatal sepsis. Low sensitivity of blood culture is usually due to small volume of blood sample, intrapartum antibiotics, and antibiotics given to newborn before sampling.

Aim: We evaluated use of Umbilical cord blood culture (UCBC) in diagnosis of neonatal sepsis as compared to peripheral venous blood culture.

Settings and Design: This study was done in tertiary care teaching hospital during March 2016-December 2016. A total of 55 newborns with presence of two or more risk factors of sepsis were included.

Subjects and Methods: Blood sample from placental end of umbilical cord was collected and cultured. Primary outcome was diagnosis of neonatal sepsis by use of umbilical cord blood sample as compared with venous blood sample. Secondary outcome was to compare organisms identified by UCBC and venous blood culture.

Statistical Analysis: Sensitivity, specificity, positive and negative predictive values of UCBC were calculated. **Results :** A total of 38.1% (21 out of 55) high-risk newborns had positive UCBC. A total of 32.7% (18 out of 55) newborns had positive blood culture report. Organisms grown in UCBC were Pseudomonas (45%, 9 out of 21), Acinetobacter (27.27%, 6 out of 21), Escherichia

coli (18.18%, 4 out of 21), and Klebsiella (9%, 2 out of 21). **Conclusion :** UCBC is a good method for diagnosis of neonatal sepsis among high-risk newborns as compared to venous blood culture with a sensitivity of 80% and specificity of 91.43%. Organisms grown are comparable to blood culture samples.

Key words: Blood culture, neonatal sepsis, umbilical cord blood culture (PUBC).

Introduction : Growth of microorganism in a blood sample is the gold standard for diagnosis of neonatal sepsis⁽¹⁾. Volume of blood sample collected is important factor in blood culture positivity. A major problem of PVBC is difficulty in collecting adequate volume of blood. Antibiotics administration before collecting blood sample is a common reason for no growth in PVBC. Skilled health care providers are needed to perform venipuncture of a neonate, and these highly skilled providers must spare enough time to obtain a newborn blood sample⁽²⁾.

Aim and objectives:

- 1) To evaluate the use of Umbilical cord blood culture (UCBC) in diagnosis of neonatal sepsis as compared to peripheral venous blood culture.
- 2) To compare organisms identified by Umbilical cord blood culture and venous blood culture.

Methodology : The study was done at our hospital with approval of institutional review board.

Study patients were 55 newborns delivered (normal vaginal delivery and cesarean section) during March 2016 - December 2016.

Inclusion criteria : Newborns who were attended by paediatric resident at the time of delivery at risk of developing sepsis based on presence of two or more risk.

Exclusion criteria : Mother's who didn't give consent.

Normal newborns.

Methodology :

Newborns delivered at our hospital were assessed at the time of birth for presence of risk factors of developing neonatal sepsis.

The risk factors were :⁽³⁾

- Prematurity
- Premature rupture of membranes
- Prolonged rupture of membranes (>18 h)
- Foul smelling liquor
- Maternal fever
- Frequent vaginal examinations (>3)
- Prolonged labor
- Low-birth weight

Results :

UCBC were collected from 55 (n) newborns.

Table 1: shows baseline characteristics of the patients.

Parameters	Inference
Sex	32:23 (F:M)
Weight (kg)	2.25 (0.685)
Maturity (weeks)	34.5 (2.6)
Presence of 2 or more risk factors (high risk babies)	55
Umbilical cord blood culture sent	55

A total of 38.1% (21 out of 55) high-risk newborns had positive UCBC and 32.7% (18 out of 55) newborns had positive PVBC (Table 2).

All positive culture reports were from the patient having clinical diagnosis of sepsis and septic screen was positive in all these newborns.

Table 2 : UCBC has a sensitivity of 80% [95% confidence interval (CI):

Culture result	UCBC	PCBC
Positive	21 (38.1%)	18 (32.7%)
Negative	34 (61.8%)	37 (67.27)
TOTAL	55 (100%)	55 (100%)

44.43-96.89%], specificity of 91.43% in diagnosis of neonatal sepsis in present study.

Table 3: shows comparison of organism growth in UCBC and PVBC.

Organism (UCBC)	Percentage
Pseudomonas	42.8
Acinetobacter	28.5
Escherichia Coli	19
Klebsiella	9.5

Organism (PVBC)	Percentage
Pseudomonas	50
Acinetobacter	12.5
Escherichia Coli	25
Klebsiella	12.5

Discussion : Gold standard for the diagnosis of neonatal sepsis is blood culture collected from peripheral veins Identification of organism responsible for neonatal sepsis is important as decisions on antibiotics selection and duration of treatment are dependent on it . Variable sensitivity of blood culture is mainly due to inadequate sample volume, intrapartum antibiotics, and administration of antibiotics prior to sample collection. Other sites of blood collection for blood culture are heel prick collection, blood from arterial and central venous lines, and umbilical (neonatal end) vein.⁽⁴⁾ Umbilical cord (placental end) is a less commonly used site for collection of blood culture. There are some studies on umbilical cord blood culture (UCBC) for diagnosis of neonatal sepsis, which suggest umbilical cord blood can be collected for blood culture safely and without contamination.⁽⁵⁾ This study also yielded positive results for the same.

Conclusion : Blood culture obtained from an umbilical cord sample is a good way to increase etiological diagnosis of bacterial sepsis in high-risk neonates as compared with PVBC. It is a safe, less cumbersome, not requiring a highly skilled clinician for the blood collection, and an accurate way of diagnosing sepsis in high risk neonates. Organisms grown in umbilical cord blood samples are comparable with venous blood culture. It has

certainly an additional value for diagnosis of neonatal sepsis.⁽⁶⁾

References

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