Blood Culture From The Umbilical Vein In The Diagnosis Of Neonatal Sepsis.

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Abstract

Background: Sepsis is a significant cause of mortality and morbidity in Neonatology Departments. Frequently neonatologists use the presence of a positive blood culture to confirm diagnosis and then they undergo lumbar puncture. Positive blood cultures are the gold standard and are used to predict neonatal outcome and determine type of antibiotics combination and length of treatment. Objective: The aim of this study was to obtain blood culture from umbilical vein in newborns with infection risk factors and seeing if its culture is more sensible for isolating micro-organisms. Design: A prospective study of 784 deliveries with 45 infection risk factors newborns. Patients: We select a cohort of newborns with perinatal infection risk factors during 3 months. Clinical data for these neonates were recorded prospectively and in the delivery room a blood sample from the umbilical vein was culture. These neonates were followed during almost the firsts 72 hours of live and clinical and laboratory test was made. Results. We obtained a total sample size in this study of 30 blood cultures. From this sample blood culture was positive in 13 (43%) and negative in 17 (57%). Of the 13 positive blood cultures 7 (54%) neonates presents clinical and laboratory findings and sepsis diagnosis was made, 3 (23%) were considered contaminants and 3 (23%) were bacteraemias. In all neonates serial RBC, leukocyte counts and CRP were made and in newborns with positive blood culture a new blood sample for culture and CSF culture was performed. Conclusions: Diagnosis of neonatal sepsis by positive blood culture in clinical practice is difficulted by maternal antibiotic prophylaxis and blood sample size. Various diagnostics approaches are necessary to make diagnosis and to determine the length of therapy. Umbilical vein samples represented a new and more sensible way to diagnostics early neonatal sepsis.

INTRODUCTION

Neonatal sepsis is high-risk disease with a low incidence(1,2). The early identification of septic neonates is difficulted because subtle initial signs no ever are seen or are not presents. Many approaches are described to detect newborns with initial risk of sepsis, and there are various guidelines(3,4,7) trying to give an accuracy definition of sepsis and only are defined like true sepsis when then blood culture is positive.

The isolation of an organism in a blood culture confers the possibility of an optimal choice and length of antibiotics.

Many known factors(5,6,8) influence the sensibility of blood cultures like maternal antibiotic prophylaxis or time for sample collection. One of the most important risk factor is volume sample (11). To improve this problem is recommended more than one sample recollection, and take almost 1ml, and that’s not ever possible.

For theses reasons, a new strategy for obtained blood culture was developed in our centre. The objective of this study was improving the global percentage of positive blood cultures in neonatal sepsis risk newborns obtaining umbilical chord blood samples.

MATERIAL AND METHODS

Previously we designed a new protocol of data collection to include patients with perinatal risk factors (table 1)

Clinical data were registered prospectively and retrospectively analyzed for this article.

Newborns included were born in Clínica Virgen de la Vega hospital from January 2006 to May 2007.
784 neonates were born in this time period with gestational ages between 33 and 42 weeks.

We found infection risk factors in 45 newborns; obtaining 30 umbilical chord vein blood samples. Were recorded data on birth weight, EGA, gender, APGAR score, maternal age, type of delivery, characteristics of amniotic fluid, time of amniotic membrane rupture, maternal temperature, newborns temperature, screening of SGB, blood culture results, clinical evolution and diagnosis when it was made. Were made serial peripheral complete blood counts and peripheral blood culture on newborns.

We obtained an ethics committee approval of our center previously with a write assent of parents.

RESULTS
A total of 30 blood samples were analyzed. Of the newborns mean EGA was 38+4 weeks (range 2670-4020). 60% were male infants and 40% were female.

Median APGAR score were 8,6 and 9,9 at 1 and five minutes.

Of 30 samples 13 were positive, in 10 of blood culture grew a potential bacterial pathogen and included gram positive organism (50%) and gram negative (50%)

Clinical and analitic checking were made at 12, 24 and 48 life hours. (Table 2)

In 7 newborns blood cultures were positive showing clinical and analitic data characteristics of sepsis and was decided to start with antibiotic treatment in 6 patients in his first 24h of life and in one patient before 48h with a satisfactory progress after treatment’s start. In 3 patients blood culture result was considered a contamination (1 St viridans and 2 Staph coag neg) and they have not clinical or laboratory pathological data. 3 cases diagnosis was bacteriemia (1 E.Coli, 1 Citrobacter k y 1 Enterococo)

In our center the umbilical blood culture had a sensibility of 100% (we did not had, in this period, any patient whith sepsis out of the study) and a specificity of 74% with a predictive positive value of 54%

DISCUSSION
Diagnosis of newborn sepsis is based on presence of clinical signs and sintoms that usually can be subtle or not founds with analitical alterations (2,3)

Our study focuses on the near term and term in whom diagnosis represents a challege because in normal circumstances this patient are under parents observation.

Another fact is the each more frecuently short stay at the hospital that in our center is normally between 36-48 hours being checked by pediatrician 1 or 2 times

The acquisition of venous blood samples for blood cultures in newborns can be difficult (11,14). The finding of a negative blood culture frequently influences management (13).

We have reviewed medical literature and we could not found
any similar observation except one report of 1967 (12) in
which an umbilical blood sample was obtained previous to a
umbilical venous canilization for a blood exchange but with a
different study objective

Bacterial spectrum: The first item to see is the actual
bacterial espectrum involves in neonatal sepsis (6) . The
pathogens we report are similar to those of reviewed
literature with significative number of pathogens not
sensible to IAP for GBS. That has been seen in previous
reports and give us to review the actual protocols for control
of vertical sepsis that has been though to control the
infections for GBS (8,9)

Volume sample: The volume sample for a correct blood
culture recomended is almost of 0,5ml to 1ml. More volume
is necessary to increase the sensibility of blood culture as
shown Connell et cols.(11). In this study was noted a
significative increase in the number of positive blood
cultures when the volume sample was 3 or more millimeters

In clinical practice we know difficulties that it takes; not
only by complications in sample extraction and theremore
because these patients may be with hemodynamic
inestability

Intrapartum antibiotic prophylaxis: Each time is more
frecuently an IAP for a SGB in maternal genital tract or
urine infection, maternal fever, prolonged rupture of
membranes or fetal tachycardia. The antibiotic action
difficults bacterial grow in culture mediums. Other face like
we can read in the interesting article by Schrag et col. is a
numerous percetage of E.coli sensible to GBS IAP, that can
take to ginecologists to extent IAP to mothers with urinary
tract infections to E.Coli (8).

Time to obtain blood sample. We think that time from born
to blood sample extraction is important for this patients
because it’s mean more time to antibiotic effect. We take an
umbilical blood sample imediately in the delivery room.
And we know that bacterial concentration is more important
in this case(11,14,15)

Time to treatment: With this strategy we can obtain
laboratory results in the first 24 hours of life than meens an
early diagnosis and treatment with a better outcome (10)

**CONCLUSIONS**

Neonatal sepsis is a serious illness with a significant cause of
mortality and morbidity and an early treatment influences
prognosis.

Owning to a scarce time to newborn observation; usually
made by parents, an actually infection strategies aim to
control SGB infection and if we have an illnes that can has
subtle initial sings we devise a new strategy to obtaining
precocious results previous to a significantly clinical
alterations.

Blood culture obtained from an umbilical chord sample has
been shown in our center as a good way to increase
etiological diagnosis of sepsis

Nevertheless is neccesary more accuracy studies to stablish
which prenatal risk factors must take to obtain an umbilical
chord blood simple an what is the correct way to control this
patients

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