ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

"CYTOLOGICAL STUDY OF GASTRIC ASPIRATE IN NEONATAL SEPTICAEMIA"

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Manuscript Info

Manuscript History:

Received: 15 June 2015
Final Accepted: 26 July 2015
Published Online: August 2015

Key words:

Gastric aspirates, Neonates, Septicaemia

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Abstract

Background: Septicaemia refers to systemic disease associated with the presence and persistence of pathogenic microorganisms or their toxins in the blood. According to the data from National Neonatal perinatal database, incidence of sepsis is 3% in live births. Klebsiella, S.aureus and E.coli as the predominant bacteria isolated causing sepsis. Respiratory distress is most common presenting symptom. Examination of gastric aspirate has been used in the newborn for neonatal infection. The presence of more than five polymorphs per high power field is co-relate with increased risk of neonatal infection.

Aims and Objectives: To study correlation between positive gastric aspirate and development of early onset septicaemia, prompt and proper management to prevent septicaemia at early stage and to reduce mortality rate by early diagnosis of septicaemia.

Material and Methods: This prospective study was carried out at NICU of a tertiary care hospital during period from January 2012 to November 2012. 100 neonates were included in this study that were at risk for development of early onset septicaemia.

Results: Out of these 100 neonates, 55 were positive for blood culture and 45 were negative for blood culture,gastric aspirate examination was positive in 38 patients and negative in 62 patients,64 neonates were preterm and 36 were full term, 27 neonates were positive for C – reactive protein and 73 were negative. Septicaemia is more common in upper lower and lower socioeconomic class. Present study show 14% mortality rate.

Conclusion: Blood Culture is the gold standard for diagnosis of septicaemia and should be performed in all cases of suspected sepsis. CRP along with total leucocyte count, I/T ratio, band cells has sensitivity of 100% and specificity of 83%. Gastric aspirate examination is not a 100 % sensitive screening test but it may be helpful in high risk neonates. But with the help of gastric aspirate and various methods available, we can diagnose septicaemia up to 99.99% cases.

INTRODUCTION

Septicaemia refers to systemic disease associated with the presence and persistence of pathogenic microorganisms or their toxins in the blood. Bacteremia is an invasion of bacteria into blood stream. When septicaemia is accompanied by altered organ perfusion (hypoxia, increase blood lactate, oliguria and alteration in mental state)it should be termed as sepsis syndrome.

In World over 20 million new born get infected each year and of which 4 million neonate die each year. The incidence of early onset bacterial infections ranges from 1 to 8 per 1000 live births in western literature (Klein, 2001).[1] The incidence of sepsis according to the data from National Neonatal perinatal database (NNPD, 2002-03) is 30 per 1000 live births. The database comprises 18 tertiary care neonatal units across India.[2,3] NNPD found sepsis to be one of the commonest causes of mortality contributing 19% of all neonatal deaths.

In International Pediatric Sepsis Consensus Conference, infections are classified into SIRS(Systemic Inflammatory response Syndrome), Sepsis, Severe Sepsis, Septic Shock and Multiple organ dysfunction syndrome(MODS) according to its severity. Definitions for each terminology is defined in Pediatric Critical Care Medicine in 2001.[4]

Depending upon the onset of symptoms sepsis can be classified into three major categories Early onset sepsis (EOS-present within 72 hours of life), Late onset sepsis(LOS-present after 72 hours of life) and Late late onset (present after 30 days of life).[2,5]

Factors seem to be associated with an increased risk of sepsis are low birth weight (<2500 gms), prematurity, febrile illness in the mother with bacterial infection within 2 weeks prior to delivery, foul smelling or meconium stained liquor, rupture of membranes before 24 hours in term delivery and more than 18 hours in preterm delivery,[6] Prolonged labor (>24 hours.), any nosocomial or community acquired infections. Mechanical ventilation, any invasive procedures, poor hygiene, poor cord care, bottle feeding are also risk factors.[2,5,6,7,8,]

Organisms responsible for causing sepsis vary from place to place. NNPD-2000 revealed Klebsiella, S.aureus and E.coli as the predominant bacteria isolated causing sepsis. In Gram Positive Bacteria Staphylococcus aureus, Staphylococcus, Group B streptococcus, Streptococcus pneumonia, Viridans streptococcus, Enterococci, Clostridia, Listeria monocytogenes and in Gram Negative Bacteria Klebsiella, Escherichia coli, H. influenza, Pseudomonas aeruginosa, Serratia, Neisseria gonorrhoeae, Proteus, Salmonella, Bacteroides, Campylobacter and Citrobacter may be responsible pathogens. Candidiasis is the most common cause of fungal sepsis in neonatal period.[3,9]

Clinically, respiratory distress is most common presenting symptom. Other less specific signs include irritability, lethargy, temperature instability, poor perfusion, and hypotension.[10]
To diagnose septicaemia various investigations are performed such as complete blood count with neutrophil indices, C-reactive protein, gastric aspirate for polymorphs, blood culture, urine culture, lumbar puncture, micro ESR, PCR etc. Blood culture is the gold standard for diagnosis of septicaemia and should be performed in all cases of suspected sepsis prior to starting antibiotics. A positive blood culture with sensitivity of the isolated organism is the best guide to antimicrobial therapy.[1,2,11]

Examination of gastric aspirate has been used in the newborn for neonatal infection. The presence of more than five polymorphs per high power field is correlate with increased risk of neonatal infection. Gastric fluid sample represent amniotic fluid protected from vaginal Contamination. Gastric aspirate polymorphs have thus been assumed to represent intraamniotic fetal response to inflammation.[12]

This test is simple, easy, quick and cheaper and can be performed as early as possible. This may be of great importance in our country due to higher infection rate and limited resources.

AIMS AND OBJECTIVE

- To study correlation between positive gastric aspirate and development of early onset septicaemia.
- Prompt and proper management to prevent septicaemia at early stage.
- To reduce mortality rate by early diagnosis of septicaemia.

MATERIAL AND METHOD

This prospective study was carried out at NICU of Smt. N.H.L. Municipal Medical College, Ahmedabad – a tertiary care hospital during period from January 2012 to November 2012.In this study, we included neonate who got admitted in NICU and are at risk for development of septicaemia. In this study, neonate whose aspirate cannot be sent within required period of time because of some reason like early initiation of feeding,gastric aspirate contaminated with maternal blood, child expired within 24 hour of life, some technical problem, problem in sending gastric aspirate in proper period with proper technic, were not included.

All neonates included in study, examined thoroughly, appropriate details were taken and recorded as per proforma. Gastric aspirates were taken by aspiration of gastric materials with an oral or nasogastric tube and sent to central laboratory of pathology department for polymorphs examination within required period of time. Neonates were observed up to period of stay in the NICU for development of septicemia or any other complication. In this study, positive blood culture is taken as definitive criterion for infection. Along with gastric aspirate examination, other relevant investigation were also sent to detect sepsis and repeated as per requirement.

In central laboratory a slides were made from gastric aspirate material by putting a small drop 1.0 cm from one end of the slide then with the help of other slide spread this drop on the slide and allow it to be air dried. No any fixative is used. All slides were stained with Leishman's stain and then examine for the presence of neutrophils under microscope. Count the number of polymorphs per high power field. We consider positive gastric aspirate when more than 5 polymorphs are seen per high power field.

OBSERVATION AND DISCUSSION

A study was done during period of January 2013 and November 2013, during which 1023 neonates were admitted in our nursery. 100 neonates were included in this study that were at risk for development of early onset septicaemia.

TABLE – 1: SEPTICAEMIA AND GASTRIC ASPIRATE POSITIVE RATE

No. of patient		Gastric aspirate positive	Gastric aspirate negative
With septicemia	55	30 (54.54 %)	25 (45.46 %)
Without septicemia	45	8 (17.17 %)	37 (82.83%)
Total	100	38 (38.0%)	62 (62.0%)

Out of these 100 neonates, 55 were positive for blood culture and 45 were negative for blood culture. In positive blood culture reports, Streptococci, E. Coli and Acinobactor Boumani each were isolated in 1(1.81%) neonate. Enterococci was isolated in 4 (7.27%) neonates, Coagulase negative Straptococci was isolated in 20 (36.36%) neonates and Klebsiella was isolated in 28 (50.90%) neonates. So, most common bacteria that causes septicaemia was Klebsiella (50.90 %) and second most common bacteria was coagulase negative Staphylococci (36.36 %).

In our study out of total 55 patients developed septicaemia, 45 (81.82%) had early onset septicaemia and 10(18.18%)had late onset septicemia. As we included most of neonate having various risk factors for development of early onset septicemia, their number is more.

In present study of 100 patients, gastric aspirate examination was positive (>5 polymorphs / high power field examination) in 38 patients and negative in 62 patients.

Out of these 38 patients with positive gastric aspirate, 30 (78.95%) patients developed septicaemia and 8 (21.05%) patients did not develop septicaemia. This shows that in high risk newborn, if gastric aspirate is positive than neonate will have increases chances of early onset septicemia.

In present study 55 neonates had septicemia and gastric aspirate examination test is positive in 30 (54.54 %) patient and negative in 25 patients (45.46 %).While it was positive in 8(17.17%) neonates without septicaemia and negative in 37 (82.83%) neonates were without septicaemia. Out of these 30 neonates with positive gastric aspirate who developed septicaemia, 26 (86.67%) neonates were of early onset septicaemia and 04 (13.33%) neonates were of late onset septicaemia.

TABLE – 2 : TERM, SEPTICEMIA AND GASTRIC ASPIRATE EXAMINATION

No of patient		Develop septicaemia		Positive Gastric Aspirate who develop Septicaemia
		Yes	No	
Pre term	64	38(59.37%)	26(40.63%)	18 (28.12%)
Full term	36	17(47.22%)	19(52.78%)	12 (33.33%)
Total	100	55 (55.0%)	45 (45.0%)	30 (30.0%)

Above table shows that in present study, 64 neonates were preterm and 36 were full term. Out of 64 preterm,38 (59.37%) neonates developed septicaemia, as prematurity is a major risk factor for early onset septicemia. And in them gastric aspirate is positive in 18 (28.12%) neonates. Preterm neonates are more prone to develop septicemia in early period. Out of 36 full term neonates 17(47.22%) neonates developed septicaemia, and 12 (33.33%) neonates developed septicaemia and have positive gastric aspirate.

TABLE – 3 : SEPTICEMIA, POSITIVE GASTRIC ASPIRATE AND GENDER DISTRIBUTION

No of patient		Developed septicemia		Positive gastric Aspirate
		Yes	No	
Female	38	17 (44.74%)	21(55.26%)	14 (36.84%)
Male	62	38(61.29%)	24(38.71%)	24 (38.70%)
Total	100	55 (55.0%)	45 (45.0%)	38 (38.0%)

This table shows that there were 38 female patients out of which 17(44.74%) patients developed septicemia and 21(55.26%) patients were non septic and 14 (36.84%) patients had positive gastric aspirate. While out of 62 male patients 38 (61.29%) patients developed septicemia and 24 (38.71%) patients were non septic and 24 (38.70%) have positive gastric aspirate.

TABLE – 4 : SEPTICAEMIA AND POSITIVITY OF CRP AND GASTRIC ASPIRATE POSITIVE

C –reactive protein		Developed septicemia	Positive gastric aspirate
Positive	27	25 (92.59 %)	7 (25.92 %)
Negative	73	30 (41.10 %)	6 (8.21 %)

This table show that in present study, 27 neonates were positive for C – reactive protein and 73 were negative. Among 27 positive neonates, 25(92.59%) neonates developed septicemia and 7 (25.92 %) shows positive gastric aspirate.So CRP test is also a major indicator for detection of septicaemia.

In present study, prolonged labour was more strongly associated with positive gastric aspirate, as in 60% of cases with prolonged labour have positive gastric aspirate examination. Second common association was with prolonged rupture of membranes as in 55.55% cases it has positive gastric aspirate, followed by birth asphyxia in 22.73 %and meconium stain liquor in 22.22%.

In term of socioeconomic status, highest number of chances of developing septicaemia is in upper lower and lower class with 63.33% and 69.69% respectively. Rate of gastric aspirate positivity is also high in these two classes with 33.33% and 45.45% respectively.

In present study 14 neonates who developed septicemia were expired showing 14% mortality rate. Out of this 13 (92.86%) neonates had early onset septicemia while 01 (7.14%) had late onset septicemia.

TABLE – 5 : COMPARISION WITH OTHER STUDY

Sr. No.	Auther	Year	Septicaemia Develop
1	S. Thomas et al[10]	1980	26.7%
2	M. Leibovich et al[13]	1987	75%
3	Present Study	2012	55%

This table show that in study of S. Thomas et al[10], 26.7% patients develop septicaemia. In study of M. Leibovich et al[13], 75% patients develop septicaemia. In present study 55% patient develop septicaemia.

SUMMARY &CONCLUSION

- Most of neonates had early onset septicaemia.
- Klebsiellawas the commonest organism found positive in blood culture followed by Coagulase negative Staphylococci.
- 78.94 % neonates developed septicaemia in all positive gastric aspirates examination. Positive gastric aspirate examination was more strongly associated with early onset septicaemia.
- In preterm neonates with gastric aspirate positivity, chances of septicaemia were more likely.
- Positivity of gastric aspirate examination is associated more with prolonged labour followed by prolonged rupture of membranes, meconium stained liquor and birth asphyxia.
- CRP test is also a major indicator for detection of septicaemia. CRP along with total leucocyte count, I/T ratio, band cells has sensitivity of 100% and specificity of 83%.
- As prematurity is a major risk factor for development of early onset sepsis.
- Chance of developing septicaemia was higher in Upper Lower and Lower socioeconomic class.
- In present study, mortality rate in septicaemia was 14%.Prevention is better than cure, but early detection of septicaemia will help a lot in reducing mortality and morbidity with the proper treatment.

- Blood Culture is the gold standard for diagnosis of septicaemia and should be performed in all cases of suspected sepsis.

- Though Gastric aspirate examination is not a100 % sensitive screening test, it may be helpful in high risk neonates in developing countries where resources are limited. But with the help of gastric aspirate and various other methods available, we can diagnose septicaemia up to 99.99% cases.This test is simple, easy, quick and cheaper and can be performed as early as possible.

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