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ORIGINAL RESEARCH

Behavioral outcome in postoperative cases of neonatal unit

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ABSTRACT

Background: This study was conducted to assess the behavioural outcome in postoperative cases of neonatal unit. **Material and methods:** Ages and Stages Questionnaire (ASQ): It has been a valuable addition to the group of developmental screening tools based on parent completed questionnaire. Use of this is very simple and involves the active participation of parents in the evaluation of their child. ASQ was modified in 1997 and has been translated into various languages ever since. Overall study has shown good psychometric properties. No studies have been published in the Indian context so far. In this study we will evaluate the scores in Indian subjects. Developmental assessment Scale for Indian Infants (DASII), based on Bayley Scale of Infant Development (BSID) was used in this study as gold standard for developmental assessment. It assesses development in the age range of birth to 30 months and provides a measure of Motor development and Mental development as Motor Developmental Quotient (DQ) and Mental DQ, respectively, as in BSID. Although the published literature on its application is less, it is now a common score in practice. Developmental delay is defined on DASII as DQ score. As per AGES AND STAGES QUESTIONAIR those in white zones have normal development, those with grey zones need further evaluation and follow up while those in black areas need intervention by health personnel. All the data was selected randomly and was entered in to the Microsoft excel and tabulated, then the data will be analyzed with appropriate statistical tools "SPSS version 24". Data was presented as mean with Standard Deviation or proportions as appropriate. **Results:** Out of total 100 children were enrolled in our current study, In case group 33 (66%) were male and 17 (34%) were female. In control group 27 (54%) were male and 23 (46%) were female. There was no statistically significant difference in Gender distribution of children between two groups, with p-value 0.2230 {p>0.05}. Using the "Chi- Square Test {$\chi 2$ – Test}" In case group mean birth weight (in kg) was 2.85 ± 0.49 kg and in control group mean birth weight (in kg) was 2.66 ± 0.57 kg respectively. There was statistically not significant difference in comparison of mean Birth weight (kg) at admission between two groups, with p-value {p>0.05}. Using the "Unpaired | t | – Test {|t|– Test}". In case group mean age of children was 7.66 ± 7.002 days and in control group mean age of children was 4.26 ± 4.35 days respectively. **Conclusion:** We conclude that inpatient neonates who have undergone emergency surgical intervention(non CNS AND non cardiac) under general anaesthesia higher incidence of delayed neurodevelopment and behavioral outcomes when followed up at 6 month of age, due to a number of factors which include type of congenital anamolies and any associated complication, type duration and weaning of anaesthesia, post operative care , post discharge care and hygiene, regularity of follow and quality of feeding practices.

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INTRODUCTION

Neonatal post operative complications in infants have largely been stagnant for decades as survival rates of post operative infants are constantly increasing. Relatively few studies, however, have been conducted investigating effect of surgical interventions on neurodevelopment and behavioral outcome of neonates. This data is useful for neonatologists desiring quality improvement in their units, and government agencies seeking to determine the overall medical costs associated with neonatal care, For eg The occurrence of a seizure in the early postoperative period after repair or palliation of congenital diaphragmatic hernia is a marker for a central nervous system (CNS) injury and has been associated with adverse neurodevelopmental sequelae. The research standard for detection and quantification of postoperative seizures remains continuous electroencephalographic (EEG) monitoring.[1]

Short term outcomes are shock, seizures, apnea, bradycardia, feeding difficulties and multiorgan failure etc. Long term outcomes can be motor e.g. cerebral palsy, sensory such as hearing loss and visual impairment also it can lead to neurodevelopmental delay in some neonates. These outcomes not only depend on the efficacy of surgical practices but also

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on the type of anaesthesia given, duration and weaning of anaesthesia, associated comorbidities along with the surgical conditions, post operative care and management in NICU/SNCU and post discharge care by the parents, nutrition, adequacy of follow up. The aim of our study is to assess the effect of all these conditions on neurodevelopment and behavioural outcome of neonates which will help us to improve the quality of the post operative care so as to improve the survival and reduce the morbidity.[2,3]

MATERIAL AND METHODS

Ages and Stages Questionnaire (ASQ): It has been a valuable addition to the group of developmental screening tools based on parent completed questionnaire. Use of this is very simple and involves the active participation of parents in the evaluation of their child. ASQ was modified in 1997 and has been translated into various languages ever since. Overall study has shown good psychometric properties. No studies have been published in the Indian context so far. In this study we will evaluate the scores in Indian subjects. Developmental assessment Scale for Indian Infants (DASII), based on Bayley Scale of Infant Development (BSID) was used in this study as gold standard for developmental assessment. It assesses development in the age range of birth to 30 months and provides a measure of Motor development and Mental development as Motor Developmental Quotient (DQ) and Mental DQ, respectively, as in BSID. Although the published literature on its application is less, it is now a common score in practice. Developmental delay is defined on DASII as DQ score. As per AGES AND STAGES QUESTIONAIR those in white zones have normal development, those with grey zones need further evaluation and follow up while those in black areas need intervention by health personnel.

Statistical Analysis

All the data was selected randomly and was entered in to the Microsoft excel and tabulated, then the data will be analyzed with appropriate statistical tools "SPSS version 24". Data was presented as mean with Standard Deviation or proportions as appropriate.

RESULTS

Table 1: Gender distribution between two groups

Gender	Case (n=50)		Control (n=50)		P value	Results
	No. of Children	Percentage	No. of Children	Percentage		
Male	33	66%	27	54%	0.2230	Not significant
Female	17	34%	23	46%		

Out of total 100 children were enrolled in our current study, In case group 33 (66%) were male and 17 (34%) were female. In control group 27 (54%) were male and 23 (46%) were female. There was no statistically significant difference in Gender distribution of children between two groups, with p-value 0.2230 {p>0.05}. Using the "Chi- Square Test {$\chi 2$ – Test}"

Table 2: Categorization of study population according to mean birth weight at admission between two groups

Birth Weight (in kg) at admission	Case (n=50)	Control (n=50)	$\|t\|_{cal}$	P Value	Results
Mean ± s.d	2.85 ± 0.49 kg	2.66 ± 0.57 kg	1.787	0.0770	Not Significant

The above table shows categorization of study population according to mean birth weight at admission between two groups,

In case group mean birth weight (in kg) was 2.85 ± 0.49 kg and In control group mean birth weight (in kg) was 2.66 ± 0.57 kg respectively. There was statistically not significant difference in comparison of mean Birth weight (kg) at admission between two groups, with p-value {p>0.05}.

Using the "Unpaired | t | – Test {|t|– Test}".

Table 3: Categorization of study population according to mean age between two groups

Age (in Years)	Case (n=50)	Control (n=50)
Mean ± s.d	7.66 ± 7.002 days	4.26 ± 4.35 days

Above table shows mean Categorization of study population according to mean age between two groups,

In case group mean age of children was 7.66 ± 7.002 days and In control group mean age of children was 4.26 ± 4.35 days respectively.

Table 4: Comparisons of age of study (At 6 month) between two groups

Age of study	Case (n=50)	Control (n=50)
No. of population	50	50
Percentage	100%	100%

100% of patients between two groups had same study time age.

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Table 5: Comparison of study population according to follow-up mean weight between two groups

Follow – up Weight (in kg)	Case (n=50)	Control (n=50)	$\|t\|_{cal}$	P Value	Results
Mean ± s.d	5.73 ± 0.57 kg	6.41 ± 0.55 kg	6.070	<0.0001	Significant

The above table shows comparison of study population according to follow-up mean weight between two groups,

In case group mean follow – up weight (in kg) was 5.73 ± 0.57 kg and

In control group mean follow – up weight (in kg) was 6.41 ± 0.55 kg respectively. There was statistically significant difference in comparison of follow – up mean weight (kg) after six months between two groups, with p-value {p<0.0001}.

Using the "Unpaired | t | – Test {|t|– Test}".

Table 6: Comparison of ages and Stages outcome in cases and control at 6 months of age

Stages Criteria		Case (n=50)		Control (n=50)	
		No.	Percentage	No.	Percentage
GROSS MOTOR	WHITE (35 – 60)	41	82%	45	90%
	GREY (22.25 - <35)	8	16%	5	10%
	BLACK (0 – 22.25)	1	2%	0	0%
FINE MOTOR	WHITE (35.5 – 60)	44	88%	47	94%
	GREY (25.14 – 35.5)	5	10%	3	6%
	BLACK (0 – 25.14)	1	2%	0	0%
PERSONAL SOCIAL	WHITE (35.25 – 60)	44	100%	48	96%
	GREY (25.34 – 35.25)	6	0%	2	4%
	BLACK (0 – 25.34)	1	0%	0	0%
PROBLEM SOLVING	WHITE (40 – 60)	43	86%	47	94%
	GREY (27.72 – 40)	5	10%	3	6%
	BLACK (0 – 27.72)	2	4%	0	0%
COMMUNICATION	WHITE (40 – 60)	40	80%	46	92%
	GREY (29.65 – 40)	7	14%	4	8%
	BLACK (0 – 29.65)	3	6%	0	0%

Table 7: Comparison of Motor Age at 6 months of babies between two groups

Motor Age	Case (n=50)		Control (n=50)		P Value	Results
	No.	Percentage	No.	Percentage		
<5.2	28	56%	14	28%	0.0048*	Significant
≥ 5.2	22	44%	36	72%		
Mean ± standard deviation	4.94 ± 0.64		5.18 ± 0.46		0.0338**	Significant

The above table shows Comparison of MoA between two groups

In case group DMoA was 28 (56%) in <5.2 scores and 22 (44%) in ≥ 5.2 scores.

In control group MoA was 14 (28%) in <5.2 scores and 36 (72%) in ≥ 5.2 scores. The mean MoA in case group was 4.94 ± 0.64

The mean MoA in case group was 5.18 ± 0.46.

There was statistically significant difference in Comparison of MoA between two groups, with p-value {p<0.05}.

*Using the "Chi - Square Test {$|\chi^2|$– Test}".

** Using the "Wilcoxon Rank Test". For paired sample

DISCUSSION

Out of total 100 children were enrolled in our current study, in case group 33 (66%) were male and 17 (34%) were female while in control group 27 (54%) were male and 23 (46%) were female, which indicates that there was no statistically significant difference in Gender distribution of children between two groups, with p-value 0.2230 {p>0.05}.

For study population according to mean age between two groups, in case group mean age of children was 7.66 ± 7.002 days and in control group mean age of children was 4.26 ± 4.35 days respectively.

In case group mean birth weight (in kg) was 2.85 ± 0.49 kg and in control group mean birth weight (in kg) was 2.66 ± 0.57 kg respectively which indicates there was statistically not significant difference in comparison of mean Birth weight (kg) at admission between two groups, with p-value {p>0.05}.

All the cases included in this study were of age not more than days. The above table shows comparison of study population according to follow-up mean weight between two groups, In case group mean follow – up weight (in kg) was 5.73 ± 0.57 kg and in control group mean follow – up weight (in kg) was 6.41 ± 0.55 kg respectively.

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There was statistically significant difference in comparison of follow – up mean weight (kg) after six months between two groups, with p-value {p<0.0001}. This indicates that the cases were nutritionally deprived. This may be due to poor feeding practices, increased body demand due to stress and other comorbidities, post op sepsis. In control group Motor age was 14 (28%) in <5.2 scores and 36 (72%) in ≥ 5.2 scores. The mean MoA in case group was 4.94 ± 0.64. The mean MoA in control group was 5.18 ± 0.46. There was statistically significant difference in Comparison of MoA between two groups, with p-value {p<0.05}. This indicates that cases had delayed motor age as compare to control. In case group mean Mental age (MeA) was 26 (52%) in <5.2 scores and 24 (48%) in ≥ 5.2 scores. In control group mean Mental age (MeA) was 13 (26%) in <5.2 scores and 37 (74%) in ≥ 5.2 scores. The mean Mental age (MeA) in case group was 4.97 ± 0.82 The mean Mental age (MeA) in control group was 5.27 ± 0.46. There was statistically significant difference in Comparison of mental Age between two groups, with p-value {p<0.05}. This indicates that the cases had delayed mental age as compared to control group.

In case group mean Deviation in motor Motor quotient (DMoQ) was 12 (24%) in <75 scores and 38 (76%) in ≥ 75 scores and in control group mean Deviation in Motor Quotient (DMoA) was 4 (8%) in <75 scores and 46 (92%) in ≥ 75 scores. The mean Deviation in motor Motor quotient (DMoQ) in case group was 82.05 ± 11.92. The mean in control group was 86. Deviation in motor Motor quotient (DmoQ) 86.27 ± 7.61. There was statistically significant difference in Comparison of Deviation in motor Motor quotient (DmoQ) between two groups, with p-value {p<0.05}.

In case group mean Deviation in Mental Quotient (DMeQ) was 13 (26%) in <75 scores and 37 (74%) in ≥ 75 scores while in control group mean was 4 (8%) in <75 scores Deviation in Mental Quotient (DMeQ) and 46 (92%) in ≥ 75 scores. The mean Deviation in Mental Quotient (DMeQ) in case group was 80.02 ± 17.97 The mean Deviation in Mental Quotient (DMeQ) in control group was 88.29 ± 7.25. There was statistically significant difference in Comparison of DASI mental Q between two groups, with p-value {p<0.05}.

Henri Tuomilehto et al[4] in 2002 performed a study on children who had undergone adenoidectomy with proactive pain treament. In the hospital ,213 children received first dose of ketoprofen before surgery and 87 children received first dose at the time of discharge. For pain treatment after discharge, these children were given ketoprofen tablets for 72 hours.

Kain et al in 1999[5] examined the association between preoperative sedative medication and postoperative behavioural changes report contradictory findings. Although two investigations report some beneficial effects of premedication on postoperative behaviour, others report no effect. Further, a recent preliminary investigation found a higher incidence of negative postoperative behavioural changes in children who were premedicated. These contradictory results may be explained by the methodological complexity of this issue. Confounding variables, such as age of child, surgical procedure, postoperative pain, type of anesthesia induction (mask vs. intravenous), and recent stressful major life events, must be considered. One cannot simply assume that all negative behavioral changes after surgery relate to perioperative events. The possibility of other stressful life events (e.g., death in family, divorce of parents) as an alternative explanation for new-onset behavioral changes was virtually ignored in all previous studies.

CONCLUSION

We conclude that inpatient neonates who have undergone emergency surgical intervention (non CNS AND non cardiac) under general anaesthesia higher incidence of delayed neurodevelopment and behavioral outcomes when followed up at 6 month of age, due to a number of factors which include type of congenital anamolies and any associated complication, type duration and weaning of anaesthesia, post operative care , post discharge care and hygiene, regularity of follow and quality of feeding practices.

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