

COMPARATIVE STUDY ON NEONATAL OUTCOME BETWEEN FIRST AND SECOND TWIN BABIES DELIVERED BY VAGINAL ROUTE

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ABSTRACT

BACKGROUND

Existing observations show that the second twin is at higher risk of morbidity and mortality compared to the first foetus because of obstetric complications that may occur after delivery of the first twin. A noticeable gap has been observed in statistical analysis of the same in Indian context. We wanted to analyse and establish the neonatal outcome between first and second twin.

METHODS

This is a prospective comparative study based on sample calculation based on 60 cases of twin pregnancies, 18-35 years of age, with more than 32 weeks of gestation where first twin was of cephalic presentation. Patients were in active labour and mode of delivery was vaginal. The key observation focuses on RDS development based on mother's age, gravida, parity, gestation week, presentation, mode of delivery, sex, birth weight discrepancy, delivery interval, APGAR score, Down scoring, number of antenatal corticosteroid doses and ventilation requirement.

RESULTS

Results indicates that the delivery between 32-34 weeks causes RDS in first and second twin is 43% and 60%, respectively. In addition to this, sepsis development was observed in 16% and 22%, convulsions in 5% and 6% for first and second twin respectively. RDS development of second twin significantly depends on mother's gravida ($p = 0.038$), number of antenatal corticosteroid doses ($p = 0.044$), and ventilation needed by the twins ($p = 0.044$).

CONCLUSIONS

RDS severity is more in second twin than the first twin. Completed dose of antenatal corticosteroid reduces the risk of RDS.

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BACKGROUND

Managing a twin gestation is a potential challenge for an obstetrician. The second twin is generally considered at higher risk of morbidity and mortality compared to the first foetus because of obstetric complications that may occur after delivery of the first twin. In many cases, there will be early placental separation, cord prolapse, uterine atony, long interval of delivery (after the first twin) and cervical spasm.^{1,2} Neonatal outcomes of non-presenting twins also seem to be associated with intertwin birthweight discordance³ and very low birth weight.⁴ In addition, these pregnancies are prone to complications inherent to twinning, such as acardiac foetus, conjoined twins and twin-twin transfusion syndrome. Also, the risk of congenital anomalies is ~1.7 times higher than among singleton pregnancies.⁵

Twin pregnancies account for approximately 3% of all gestations.⁶ The incidence of twinning has been increasing due to availability and increased use of ovulation inducing drugs and assisted reproductive technology. The twinning rate rose to ~76% from 18.9 per 1000 live births in 1980 to 33.2 in 2009.⁶ This is of course a study in USA. Corresponding and comparable studies in our country is lacking.

There is general consensus that vaginal delivery for twins is safe when both are in vertex presentation, whereas planned caesarean section is typically indicated for non-cephalic presentation of the first twin.^{7,8} This consensus is based on expert opinion rather than randomised clinical trials.⁹ Whereas planned vaginal delivery has been associated with an increased risk of neonatal mortality and morbidity of the second twin compared with first twin,⁹⁻¹³ primarily because of intra-partum asphyxia of the second twin,¹⁴ data from other series did not demonstrate any benefit if caesarean delivery was planned.¹⁵⁻¹⁷ The only randomised study of mode of delivery in twin pregnancy was performed towards the end of the 1980s and demonstrated that there was little difference in neonatal morbidity between twins delivered vaginally and those delivered by caesarean section.¹⁷ However, the incidence of Transient Tachypnoea of Newborn (TTN) is increased in case of

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caesarean delivery as because there is absent thoracic squeeze phenomenon.

Clinically, it is well recognized that the second twin is at increased risk of complications during labour due to difficulties in foetal monitoring and the possibility of instrumental delivery following vaginal birth of the first twin. It is suggested that the potential advantages of elective delivery in women with twin pregnancy from 37 weeks' gestation include a reduction in perinatal mortality and morbidity. As such this is recommended by NICE guidelines.¹⁸

In the present study, the neonatal morbidity of the second twin has been compared with the first, where both deliveries were done vaginally.

Aims and Objectives

- To evaluate neonatal outcome in terms of development and severity of respiratory distress syndrome (RDS) of second twin in comparison with first twin.
- To assess the incidence of neonatal morbidity among these babies.

METHODS

Our study was conducted at labour room, Department of Obstetrics & Gynaecology, R. G. Kar Medical College and Hospital, Kolkata from 2017 to 2018 for 18 months. Patients were selected as per inclusion and exclusion criteria then they were admitted in the maternity ward of R. G. Kar Medical College and Hospital. Inclusion Criteria were pregnant twin mother of age 18-35 years, at more than 32 weeks of gestation, first twin with cephalic presentation, selected for vaginal delivery, patients in active labour. The twin mothers having Intrauterine death of either one of twins before the onset of labour, complicated by foetal malformations, lethal anomaly of either twin, contraindication to vaginal birth, known medical/ obstetrical disorder (Gestational hypertension, Antepartum haemorrhage, Gestational/Pre-gestational diabetes etc.,). This was a clinical observational comparative study where pre-designed study proforma (attached with); interview and clinical examination (for case selection and neonatal assessment); follow-up of the new born if admitted in SNCU (for the assessment of neonatal complication) was done. Case recruitment of 60 twin pregnant mothers was done after taking proper written informed consent from the subjects. Selected patients were studied and evaluated in detail with history, clinical examination, investigation and follow up for neonatal outcome. Investigations and ultrasound examination were carried out at our hospital. Detailed patient history and obstetric examination was done. No sedation, epidural analgesia was given, and spontaneous delivery was awaited after proper patients' preparations. The progress of labour, maternal vitals and foetal heart rates were monitored and studied. Detail history of patients was obtained with routine haematological and USG investigation. Along with these routine investigations, screening for antenatal risk factors like hydramnios, anaemia and gestational hypertension was carried out.

Augmentation was done with escalating doses of intravenous oxytocin infusion when needed. Lie, presentation, foetal heart rate of the second twin was confirmed immediately after delivery of first twin. Per vaginal examination was done to confirm presentation, to rule out cord prolapse, to note cervical dilatation, station of presenting part. For uterine inertia, augmentation was done or continued. Continuous monitoring of foetal heart rate, uterine contractions, maternal vitals and progress of labour was done to avoid complications. Internal Podalic Version (IPV), External Cephalic Version (ECV) or instrumental delivery were done when required after individualization of cases.

Following delivery, intervals between these two deliveries noted. Oxytocic drugs were added as intravenous oxytocin infusion immediately following delivery of second twin and ergometrine 0.2 mg were injected intramuscularly after delivery of placenta.

Babies were monitored by paediatricians. Spontaneous respiratory efforts and cry were observed. In case of poor spontaneous respiratory efforts and cry, resuscitation was done immediately. APGAR scoring of both the babies were done at 1 minute and 5 minutes following their birth.

Mode of delivery, cry, sex, birth weight, complications, time interval between deliveries, SNCU admission, complications developed during SNCU care were noted. After SNCU admission, development of RDS was assessed and if there is sign of RDS, severity of RDS is graded by Downs Respiratory Distress Syndrome scoring. Babies were monitored for infection, proper exclusive breast feeding, hygiene, immunization.

Sample Size Calculation

Sample size (n) calculation can be done on the basis of RDS developed in the first twin (as it is the primary outcome measure of neonatal morbidity) by using following formula:

$$n = \frac{(Z\alpha/2)^2 \times p \times q}{l^2}$$

n = sample size required,

$Z\alpha/2$ = Constant; a confidence level of 95% = 1.96

p = Measure of prevalence or proportion of event in %

q = Opposite of p = (100 - P)

l = Precision value (95% confidence interval)

It was estimated that 50 subjects would be required for the present study. Considering the possibility of lost to follow up cases, another 20% study subjects was included in the calculated sample space. The final study population was $(50 + 50 * 20\%) = 60$. Considering our hospital statistics for last 5 years, it was quite possible to have cases for the purpose in 18 months.

RESULTS

Findings of proportions were tabulated as number and percentage distribution. Data's were analysed using both the

Microsoft excel 2016 and Statistical Package of Social Science (SPSS) version 20 as per relevance. Comparison of results for difference between two proportions was done by using Pearson's chi square test. The differences were considered statistically significant only if $p < 0.05$. Most of the subjects (58%) are within the range of 18 to 25 years. Mean gestational age was found to be 34 week 6 days. In this study most of the twin deliveries (50%) were occurred between 32 to 34 weeks of gestation and most of the twin deliveries (38%) were occurred for primi-gravida and nulliparous mother.

Pregnancy	n	Resuscitation Needed	Resuscitation Not Needed	SNCU Admission (%)
1 st twin	60	20 (33%)	40 (67%)	19 (70%)
2 nd twin	60	32 (53%)	28 (47%)	32 (100%)

Table 1. Distribution of Babies According to Early Neonatal Outcome

Table 1 shows that all (100%) the second twins who needed resuscitation, admitted in SNCU, whereas 70% of first twin required SNCU admission.

Complications	1 st Twin (n=19)	2 nd Twin (n=32)	χ^2 (p)
RDS	14 (74%)	25 (78%)	0.131 (0.718)
Sepsis	3 (16%)	7 (22%)	0.280 (0.597)
Convulsion	1 (5%)	2 (6%)	0.021 (0.885)
Stay > 7 days	16 (84%)	29 (90%)	0.473 (0.492)

Table 2. Distribution of Babies According to Complications Developed in SNCU

Gravida	Total	RDS	
		1 st Twin	2 nd Twin
G1	23 (38.3%)	6 (26.0%)	8 (34.8%)
G2	19 (31.7%)	3 (15.79%)	6 (31.6%)
G3	10 (16.7%)	6	1
G4	5 (8.3%)	0	4 (80%)
G5	3 (5.0%)	0	2 (66.7%)

Table 3. Distribution of Incidence of RDS According to Mother's Gravida

Chi-square (χ^2) = 10.1388, $p = 0.038$, statistically significant. Association between incidence of RDS of twin babies with mother's gravida was statistically significant ($p < 0.05$), but this association is not significant with mother's parity.

Though, the association of delivery interval and incidence of RDS was not statistically significant ($p > 0.05$), incidence of RDS in second-born is maximum during 5-10 minutes delivery interval. In this study, incidence of RDS among the first and second-born twins according to the mother's age, period of gestation and sex of twin were not statistically significant ($p > 0.05$).

Increasing birthweight discrepancy causes increased morbidity in the new-born specially in lighter twin. Incidence of RDS in second-born is maximum during 5-10 minutes delivery interval but association of delivery interval and

incidence of RDS was not statistically significant. ($p > 0.05$). Association between RDS and APGAR 1 and APGAR 5 was not statistically significant ($p > 0.05$). Increasing the Downs scoring causes increasing severity of RDS. All babies with score >4 developed RDS. Development of RDS with respect to Down scoring was found statistically insignificant ($p > 0.05$).

Antenatal Corticosteroid Dose no.	1 st Twin	RDS	2 nd Twin	RDS
0	9 (15%)	0	9 (15%)	0
1	7 (12%)	7	7 (12%)	5
2	19 (32%)	13	19 (32%)	6 (32%)
3	18 (30%)	6 (33%)	18 (30%)	13
4	7 (12%)	1 (14%)	7 (12%)	7

Table 4. Distribution of Incidence of RDS According to The Number of Antenatal Corticosteroid Dose

Chi-square (χ^2) = 9.7618, $p = 0.044$, Statistically significant association between incidence of RDS of twin babies with number of antenatal corticosteroid dose was statistically significant ($p < 0.05$).

Incidence of RDS was seen most commonly observed in breech presentation with in spontaneous vaginal delivery in second-born twin. (Table 5)

Pregnancy	Mode of Delivery	Total (%)	RDS (%)
1 st Twin	Vaginal	57 (95%)	14 (25%)
	Instrumental	3 (5%)	0
2 nd Twin	Vaginal	58 (97%)	25 (43%)
	Instrumental	2 (3%)	0

Table 5. Distribution of Incidence of RDS According to Mode of Delivery of The Twin Babies

1 st Twin		2 nd Twin	
RDS	Ventilation needed	RDS	Ventilation Needed
19 (70%)	5 (26%)	32 (100%)	23 (72%)

Table 6. Distribution of Incidence of RDS and Ventilation Needed by The Twins

Chi-square (χ^2) = 4.407, $p = 0.044$, Statistically significant.

Difference between incidence of RDS and ventilation required in first and second-born twin was statistically significant ($p < 0.05$).

Birth Weight Discrepancy	Heavier Twin		Lighter Twin	
	Total Number	RDS	Total Number	RDS
<10	23 (38.33%)	7 (30.43%)	23 (38.33%)	7 (30.43%)
10-20	16 (26.67%)	4 (25%)	16 (26.67%)	4 (25%)
21-30	12 (20%)	2 (66.67%)	12 (20%)	6 (50%)
31-40	7 (11.67%)	-	7 (11.67%)	6 (85.72%)
>40	2	-	2	(50%)

	(3.33%)		(3.33%)	
Table 7. Distribution of Incidence of RDS According to Birth Weight Discrepancy of The Twin Babies				
Increasing birthweight discrepancy causes increased morbidity in the new-born specially in lighter twin.				

Delivery Interval (min.)	2 nd Twin	RDS
<5	16 (27%)	5 (31%)
5-10	25 (42%)	13 (52%)
11-20	12 (19%)	5 (42%)
21-30	4 (7%)	1 (25%)
>30	3 (5%)	1 (33%)

Table 8. Distribution of Incidence of RDS in Second Born Twin According to the Delivery Interval	
$(\chi^2) = 0.9113$, $p = 0.922$, Statistically not significant.	
Incidence of RDS in second-born is maximum during 5-10 minutes delivery interval. Association of delivery interval and incidence of RDS was not statistically significant. ($p > 0.05$).	

DISCUSSION

Modern obstetrics has witnessed an increase in the rate of multiple pregnancies due to ovulation induction and Artificial Reproductive Techniques. The duration of gestation decreases with increasing foetal number. Delivery before term is a major reason for increased neonatal morbidity and mortality rates in multifoetal pregnancy.

The study was performed to compare the neonatal outcome between first and second twin babies delivered by vaginal route. 60 subjects were selected as per inclusion and exclusion criteria.

Higher neonatal morbidity was observed for second twin in our study. High neonatal morbidity was mainly attribute to preterm births, with multiple factors like low birth weight, birth weight discordancy etc. Among the 60-first-born twin, ~70% required resuscitation and was admitted in SNCU (Table 1). On the other hand, among 60 second-born twins, 100% required resuscitation and admitted in SNCU. Observed RDS development for first twin and second twin was ~74% and ~78% respectively (Table- 2).

Armson, et al.¹¹ concluded that the second twin has a greater risk of adverse perinatal outcome than the first twin, independent of presentation or infant sex. Present work is also in line with their observations.

On the basis of mode of delivery RDS development was observed in vaginal delivery for ~25% and ~43% of first twin and second twin respectively (Table-5). Whereas, RDS development was not found in case of instrumental deliveries.

According to Schmitz, et al.¹⁷ planned vaginal delivery after 35 weeks of gestation is a safe option for management of the second twin delivery. A similar observation has been found in the present case.

Chasen, et al.¹⁹ have reported that the neonatal respiratory disease was more common in case of twins born by caesarean section compared to those born vaginally.

However, this study not found any neonatal respiratory disease for first twins and only ~2% was observed for the second born twin at more than 37 weeks of gestation.

It has also been suggested that the mode of delivery for vertex-vertex twins should be based on the infant's birth weight. For example, Society of Obstetricians and Gynaecologists of Canada (SOGC) have provided recommendations based on the expert opinions, rather than the results obtained from randomized controlled trials or observational studies. Our findings are consistent with the recommendations.²⁰

Presentation is the most important factor for mode of delivery as non-vertex presenting twin undergoes caesarean section. Neonatal outcome was analysed on basis of the presentation. Most common presentation combination were vertex-vertex (88.33%) followed by vertex-breech (11.67%). In vertex-vertex pair, the incidence of RDS in case of second born twin was found to be ~40% and in vertex-breech pair, the incidence of RDS in second born twin was ~57%. In contrary, the incidence of RDS for first born twin was found to be only ~23%.

Birth weight is an important predictor of neonatal outcome of twin gestation. A lower birth weight might be associated with prematurity, Intrauterine Growth Restriction, pre-eclampsia, birth weight discordancy, acting as single factor or simultaneously. Mean birth weight for first and second twin was found to be 1.926 kg and 1.729 kg respectively. A lower mean birth weights of first and/or second twins were mainly due to 90% preterm patients in this study. Increase in the incidence of preterm labour is due to the factors like increased preterm labour, Preterm Premature Rupture of Membranes (PPROM), foetal or maternal indication for pregnancy termination at lesser gestation age due to increasing complications associated with increasing gestational age.

A low APGAR score is a direct indicator of neonatal morbidity and mortality. APGAR at 1 and 5 minutes with score <4 produces 100% RDS in both first and second twin babies. When this is compared with relation to birth weight, low APGAR is seen with low birth weight babies.

Minakami H²¹ studied the effect of inter-twin delivery time on APGAR scores of the second twin. According to their study, gestational age is the most important factor influencing the APGAR scores of second twins. The addition of delivery interval improves the predictivity of second twin's APGAR score by gestational age. It was noted that gestational age is the most important factor influencing the APGAR scores of second twins.

Foetuses of a multiple gestation generally do not grow at the same rate as singleton foetuses. Discordance can be caused by structural or genetic foetal anomalies; discordant infection; an unfavourable placental implantation or umbilical cord insertion site; placental damage (i.e. partial abruption); or complications related to monochorionic placentation, such as twin-twin transfusion syndrome.²²

About 50% morbidity noted in discordancy >40%, followed by ~85.71% for discordancy 30 to 40% groups while again ~50% in 20 to 30% group. Incidence of

neonatal morbidity for smaller twin increasing as discordance was increasing (Table-7). Similar findings were reported by Amaru, et al,²³ Bagchi and Salihi.²⁴

As reported by Vergani P,²⁵ the present study also emphasizes the influence of gestational age at delivery and birth weight discordance are the important independent predictors of neonatal morbidity among preterm twins.

Present study also noted adverse neonatal outcome in lighter twin with birth weight discordance between 30% and 40%. It has been recommended that in such cases mode of delivery should be decided in individual case with proper assessment of associated risk factors.

The highest neonatal morbidity was observed for twins with delivery interval 5-10 minutes (~52%) followed by ~42% with delivery interval 11 to 20 minutes. Increased neonatal morbidity in second twin is due to intrapartum hypoxia,²⁶ which may result from premature separation of the placenta after the vaginal delivery of the first twin or a longer period of aortocaval compression for the second twin.²⁷ Therefore, this risk in second twins can theoretically increase with increasing time between the deliveries of twins (Table-8).

Schneuber, et al²⁸ found that twin delivery time was inversely related to 1 minute and 5 minutes APGAR scores. This study is streamlined with these findings. Arnold and colleagues²⁹ noted the risk of RDS was increased for the second twin compared to the first if delivery was vaginal.

Preterm birth is observed commonly in twin pregnancies, few of these births have an iatrogenic origin and are related to maternal or foetal complication while the other half consists of cases of spontaneous premature labour or premature membrane rupture. In the present study, mean gestational age was found to be ~34 week 6 days.

Preterm birth is a major causative factor for increased morbidity due to the immaturity of lung tissues and consequently suboptimal oxygenation. Intrapartum management plays an important role in the ultimate outcome of any delivery, especially in twin gestations. The risks associated with delivery of the presenting twin differ from those for the second twin, often depending on the mode of delivery and delivery interval.

In the present study, pregnancies more than completed 37 weeks were monitored and allowed for spontaneous labour only if no medical or obstetric indication present. This supports optimal administration of antenatal glucocorticoids for twin pregnancies with risk of preterm labour.

In this study, increasing incidence of RDS in second born twin is with advancing maternal age.

CONCLUSIONS

The second twin has always had an increased morbidity, especially development of RDS. Special care has to be given during delivery to the second twin. As such, prevention and vigorous treatment of RDS is vital in the case of second twin. Special consideration should be given for antenatal glucocorticoids in high risk twin delivery. When the first twin is presented by vertex, vaginal delivery is safe.

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