"MATERNAL AND FOETAL OUTCOME IN OUTLET FORCEPS DELIVERY – A STUDY OF 100 CASES"

By

Dr. JHANSI LAKSHMI KANUMURI

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Under the Guidance of

Dr. NARAYANASWAMY. M, M.D, D.G.O

Vice Principal, Professor

DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

SRI DEVARAJ URS MEDICAL COLLEGE

TAMAKA, KOLAR-563101

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DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY
SRI DEVARAJ URS MEDICAL COLLEGE
TAMAKA, KOLAR-563101

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Dr. NARAYANASWAMY. M, M.D, D.G.O, Vice Principal,
Professor, Department of Obstetrics and Gynecology and
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Dr. JHANSI LAKSHMI KANUMURI

Date:
Place : Kolar

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA , KOLAR , KARNATAKA

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Dr. JHANSI LAKSHMI KANUMURI

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OBSTETRICS AND GYNAECOLOGY

SIGNATURE OF THE GIUDE
Dr.NARAYAN SWAMY M, M.D, D.G.O
Vice Principal,
Professor,
Department Of OBG
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Date :

Place : Kolar

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND

RESEARCH TAMAKA , KOLAR , KARNATAKA

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Dr. JHANSI LAKSHMI KANUMURI

in partial fulfillment of the requirement for the Degree of

MASTER OF SURGERY in

OBSTETRICS AND GYNAECOLOGY

SIGNATURE OF THE CO-GIUDE
Dr. BEERE GOWDA.Y.C, M.D.
Professor & H.O.D.,
Department Of Pediatrics
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Date :

Place : Kolar

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND

RESEARCH, TAMAKA , KOLAR , KARNATAKA

ENDORSEMENT BY THE HOD,
PRINCIPAL / HEAD OF THE INSTITUTION

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"MATERNAL AND FOETAL OUTCOME IN OUTLET FORCEPS DELIVERY – A STUDY OF 100 CASES"

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under the guidance of **Dr. NARAYANASWAMY. M,** M.D, D.G.O

Vice Principal, Professor, Department Of Obstetrics and Gynaecology

Dr. PUSHPA KOTUR. M.D
Professor & HOD
Department Of OBG
Sri Devaraj Urs Medical College,
Tamaka, Kolar

Date:

Place:Kolar

Dr. M.B.SANIKOP
Principal,
Sri Devaraj Urs Medical College
Tamaka, Kolar

Date:

Place: Kolar

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH

TAMAKA , KOLAR , KARNATAKA

ETHICS COMMITTEE CERTIFICATE

This is to certify that the Ethics committee of Sri Devaraj Urs Medical College, Tamaka, Kolar has unanimously approved

Dr. JHANSI LAKSHMI KANUMURI

Post-Graduate student in the subject of

OBSTETRICS AND GYNAECOLOGY at Sri Devaraj Urs Medical College, Kolar

to take up the Dissertation work entitled

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to be submitted to the

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH

TAMAKA, KOLAR , KARNATAKA

Member Secretary

Sri Devaraj Urs Medical College,

Kolar–563101

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LIST OF ABBREVIATIONS

ACOG	-	American College of Obstetricians and Gynaecologists
APGAR	-	Appearance Pulse Grimace Activity Respiration
BP	-	Blood Pressure
CPD	-	CephaloPelvic Disproportion
GDM	-	Gestational Diabetes Mellitus
Gm	-	Gram
HIE	-	Hypoxic Ischemic Encephalopathy
Kg	-	Kilogram
LSCS	-	Lower Segment Caesarean section
LBW	-	Low Birth Weight
ml	-	Millilitre
MAS	-	Meconium Aspiration Syndrome
NICU	-	Neonatal Intensive Care Unit
OVD	-	Operative Vaginal Deliveries
PPH	-	Post Partum Haemorrhage
PROM	-	Premature Rupture Of Membranes
RMLE	-	Right Mediolateral Episiotomy
VBAC	-	Vaginal Birth After Caesarean section

ABSTRACT

MATERNAL AND FOETAL OUTCOME IN OUTLET FORCEPS DELIVERY – A STUDY OF 100 CASES

Objectives:

1) To know the Maternal Morbidity and Mortality associated with Forceps delivery.
2) To know the Foetal Morbidity and Mortality associated with Outlet Forceps delivery.

Materials and Methods:

Pregnant women with single term gestation with vertex presentation admitted to R.L.Jalappa Hospital and Research Centre, Tamaka, Kolar, who delivered through Outlet forceps were taken prospectively during the period January 2013 to June 2014. The sample size was 100. It was a prospective observational study. Wrigley's Outlet Forceps was applied in cases where spontaneous vaginal delivery or caesarean delivery is expected to result in more morbidity to mother and foetus when compared to instrumental vaginal delivery. Indication for application in each case was noted. Maternal complications in terms of Perineal tears, Vaginal tears, Cervical tears, Extension of episiotomy wound, Para urethral tears, Traumatic Postpartum haemorrhage, Hospital stay (no of days) were documented. Foetal outcome in terms of APGAR score at 1 minute and 5 minutes, NICU admissions, Skull fractures, Facial injuries, Intracranial haemorrhages, Neurological injuries, Cephalohaematoma, Early neonatal mortality was documented.

Results:

Totally 100 patients of Outlet forceps were included in this study. Majority (45%) of them were in the age group of 21 – 25 years. Foetal distress was the indication for forceps application in 41% of cases. Forceps was applied in 35 % of cases to cut short the second stage of labor among which the main entities were previous LSCS 13%, Anemia complicating pregnancies 11% and pre eclampsia 8%. In other 24% of cases,

forceps was applied for prolonged second stage of labour. Matenal complications due to forceps application in terms of extension of episiotomy was 7%, vaginal wall tears is 3 %, perineal tears is 3%, traumatic PPH and cervical tear is 2% and paraurethral tear is 1% . Among these, two women had multiple trauma to genital tract that resulted in traumatic PPH. Overall 13% of women had genital trauma following the forceps application. In terms of foetal complications, one neonate had abrasion over the right eye lid and one had cephalohematoma. Apgar scores at 1 minute was < 6 in 25 of neonates and at 5 minutes 10 neonates had Apgar scores of < 7. NICU admissions were 19% among which majority (9) of them were for observation in view of thick meconium stained amniotic fluid. . 7 babies had birth asphyxia for which they had NICU admission. One baby was admitted in view of cephalohematoma and one baby for hypoglycemia and one baby for meconium aspiration syndrome. There were no still births or early neonatal mortalities.

Conclusion:

It properly selected cases, Outlet forceps deliveries are associated with low rate of maternal injury and not associated with any significant maternal and foetal morbidity or mortality.

Key words – Outlet forceps, Maternal and Foetal Morbidity sand Mortality.

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INTRODUCTION

Women have delivered for thousands of years with various degrees of assistance from fellow human beings. As new tools and advances in the field of midwifery became available and as we refine our knowledge of which interventions are beneficial and which are harmful and to whom, the role of our tools has evolved.

The art of modern obstetrics is one that mandates from obstetricians the attentive vigilance of the development of natural processes and an active intervention, when such processes fall outside normally accepted standards. Forceps, vacuum, and caesarean section are relatively recent additions to the obstetrician's armamentarium. The last 100 years have seen a dramatic reduction in maternal mortality which can be attributed to the modern medical care including the use of operative deliveries.

Globally operative vaginal deliveries are coming down due to the preference of caesarean deliveries over it and fear of maternal trauma and foetal injuries, litigation, patient resistance and diminishing number of experienced physicians.[1] Though there is a decreased trend over the last decade for instrumental deliveries, especially forceps application, there will always be a need for instrumental intervention.

There are varieties of forceps available, but high forceps, mid cavity, and rotational forceps have no role in modern obstetrics. Now a days more commonly only outlet forceps are used. It is found that at present the rate of forceps delivery is declining due to fear of maternal trauma and/or foetal injuries, and long term sequelae of instrumental delivery.[2]

Outlets forceps application with mediolateral episiotomy has been demonstrated to give foetal and maternal results that equals if not exceed those of spontaneous vertex deliveries.[3,4] Women are more likely to have a spontaneous vaginal delivery in subsequent pregnancy if previously they have had instrumental vaginal delivery rather than a previous caesarean section.[5,6]

Operative vaginal delivery (OVD) refers to application of either forceps or vacuum device to assist the mother in effecting vaginal delivery of the foetus. With the operative vaginal deliveries, there is a significant decrease in maternal morbidity, decreased blood loss and decreased hospital stay when compared with caesarean delivery. Though in recent years there is a decreasing trend in the use of operative forceps with vacuum extractor taking its place, the controversy regarding their safety and efficacy still remains.

If Forceps is applied with proper selection of patients, the results are comparable to caesarean delivery. Delivery of forceps is also quicker than by vacuum extraction which may be of critical importance in cases with foetal distress.[6]

There are several hypotheses as to why a decline in OVD has occurred during the past half-century. One reason is that caesarean delivery has become much safer with easy accessibility of blood products, improved antibiotics, and better anaesthetic options. In addition, OVD has likely decreased because of a fear of litigation and patient misconception.

Given these trends, there is an emerging gap between the present paradigm and ideal practice of OVD. The goal of this article is to address this gap and better enable practicing obstetricians to elect OVD over Caesarean delivery on the basis of the available evidence and to evaluate maternal and foetal outcome in terms of benefits and risks to mother and baby in present day obstetric practice.

OBJECTIVES

1. To know the Maternal Morbidity and Mortality associated with Outlet Forceps delivery.
2. To know the Foetal Morbidity and Mortality associated with Outlet Forceps delivery.

REVIEW OF LITERATURE

Hindu writings from 1000 BC refer to the use of instruments to facilitate deliveries complicated by obstructed labour.[7] Soranus, an eminent Greek physician who practiced gynaecology in the second century AD, wrote about foetal extraction with instruments to protect the life of the mother after foetal demise or impaction. Avicenna, an Arabian obstetrician in about 1000 AD, was the first to propose a "saving forceps" which could save both mother and child.[8]

Art of modern forceps was invented by Peter chamberlain (Figure 1), the elder son of William in 1600 A.D. and the design was kept as a secret until the early 18th century. Since the time of obstetric forceps invention, their use has been controversial and when used by unskilled practitioners, often caused injury to both mother and child.[9]

In 1817, Princess Charlotte was in second stage of labour for 24 hours and the foetal head remained on the perineum for 10 hours and the baby was stillborn. The Princess died of postpartum haemorrhage (PPH) and her inconsolable obstetrician, Sir Richard Croft committed suicide 6 weeks later and this was known as "triple Obstetric tragedy". This tragedy was responsible for the resurgence of forceps use that lasted for more than 100 years, into the late 1940's.[10]

The introduction of Obstetric anaesthesia in the mid-19th century solidly established forceps popularity. Introduction of concept of prophylactic forceps by

DeLee in Chicago in 1920 ultimately contributed to nearly 70% incidence of forceps deliveries in some centers by the late 1940's.[11]

In 1960s, Matthias Saxtroph, a Danish obstetrician first demonstrated the importance of traction in the pelvic axis.[12] He proposed a combined two handed traction technique for instrumental delivery later discussed by Osiander and Charles P. Pajot as the Pajot-Saxtroph maneuver.

The enthusiasm for forceps delivery peaked in the early twentieth century when almost 50% of deliveries were with forceps. In the 1980s the rate of caesarean deliveries increased by 48% while forceps procedures declined by 43%. While there was a decline in operative vaginal delivery rates in few countries like United States & Scotland, a simultaneous increase in Norway was reported. The reported data showed operative delivery rates at 10- 12%.[13]

In 1988, O Grady J. P broadly classified forceps designs into classic instruments, modified classic instruments, specialized instruments, divergent blade instruments and axis traction devices. Classic instruments were originally invented by James Young Simpson and George L. Elliot Junior in the mid–19th century and modified classic instruments were designed by Tucker-Mclane, which have extended shanks, non fenestrated and solid blades and these are commonly used as mid pelvic rotators. Other designs are Bartons, Keillands, Laufe and Piper forceps.[14]

According to ACOG committee opinion, the indication for the forceps delivery should be specified in a detailed operative description in the patient's medical record.[15]

These indications include:

1. Foetal distress
2. Premature baby
3. Shortening of second stage of labour
4. Prolonged second stage
5. Maternal exhaustion

They also proposed contraindications for forceps delivery and they include:

1. Uncertainty of foetal position and station
2. Marked CPD (Cephalopelvic disproportion)
3. Absence of proper indication
4. Inadequate analgesia or anaesthesia
5. Failed vacuum
6. Operator inexperience
7. Any contraindication to vaginal delivery
8. Inadequate facilities

In 1991, Yancey MK and colleagues compared maternal and neonatal effects of Outlet forceps deliveries to spontaneous vaginal deliveries in term pregnancies and stated that prophylactic use of outlet forceps has a beneficial impact on the neonate as it shortens the second stage of labour and decreases incidence of neonatal hypoxia.[4] Prophylactic forceps should be applied only after fulfilling the criteria that is the

foetal head must be on the perineal floor with the sagittal suture in the anteroposterior diameter of the outlet.

In 1996, Kerr's M[16] stated Obstetric analgesia and anaesthesia in forceps delivery in his "Operative Obstetrics".

They include:

- Local analgesia
- Perineal infiltration
- Pudendal nerve block
- Epidural anaesthesia

O Grady J. P described failed forceps in his journal of "Modern instrumental delivery". When a deliberate attempt in vaginal delivery with forceps fails to expedite the process, it is termed failed forceps. Maternal causes include gross CPD, application before full dilatation of cervix, contraction ring grasping the foetus, non dilatation of paravaginal tissues. Foetal causes are malrotation, deflexion, and macrosomia. An instrumental delivery should be abandoned if there is difficulty in applying the instrument, if there is no appreciable descent with each pull or if descent is not significant following three pulls of a correctly applied instrument and the baby has not been delivered after 15 to 20 minutes.[14]

In a meta-analysis of the studies evaluating the routine use of episiotomy versus a restrictive policy for it, the restrictive policy was associated with more anterior vulval trauma, but less posterior perineal trauma, less suturing, and fewer healing complications, and had no effect on severe perineal or vaginal trauma,

dyspareunia, urinary incontinence, or severe pain measures. There was no difference noted when median episiotomies were compared with mediolateral episiotomies.[17]

Dahl C and Preben K conducted a retrospective case-control study in Sweden among 5435 primiparous women and found an association between Operative Vaginal Deliveries (OVD) and sphincter tears. Most interestingly, they found mediolateral episiotomy to be Protective.[18]

In 1993, Helwig JT and colleagues stated that midline episiotomies have been associated with an increased risk of external rectal sphincter lacerations, particularly when associated with an OVD.[29] Some other studies also came to the same conclusion that midline episiotomies result in more perineal trauma in operative deliveries.[19, 20]

In 1995, ACOG[21] recommended certain prerequisites for forceps application and those are as follows:

1. Head must be engaged.
2. Legitimate indication should be present.
3. The foetus must present as a vertex or the face with chin anterior.
4. The position of the foetal head must be precisely known.
5. Cervix must be fully dilated.
6. Membranes must be ruptured.
7. Cephalopelvic disproportion should be ruled out.

Classification of forceps delivery:

Various classifications have been proposed since its invention and were described as below.

1. **Dennen classification**

Dennen classified forceps deliveries according to station of head in the pelvis.[22]

High forceps delivery:

The biparietal diameter is in the plane of inlet, leading bony point is at or just above ischial spines. (The plane of inlet is bounded by the sacral promontory and the upper inner border of the symphysis pubis).

Mid forceps delivery:

Biparietal diameter is in plane of greater pelvic dimensions leading bony point is at spines or below +2 station. The hollow of the sacrum is not filled. (The plane of greatest pelvic dimension extends between the middle of inner border of symphysis and junction of the fused 2, 3 sacral vertebra having crossed the obturator foramen.

Low forceps delivery:

Biparietal diameter is in plane of least pelvic dimensions, leading bony point is below +2 station; hollow of the sacrum is filled.The plane of least pelvic dimensions is bounded anteroposteriorly by the lower, inner border of the symphysis and the sacro-coccygeal joint and laterally by the ischial spines.

Outlet forceps delivery:

Biparietal diameter is in plane of outlet, leading bony point is +4 station or lower, the plane of the outlet is quadrilateral in shape is bounded by the sacrococcygeal joint posteriorly. The ischial tuberosities laterally and the inferior border of the symphysis anteriorly.

2. Reids classification[23]

a) High forceps operation

b) Mid forceps operation

c) Low mid forceps

d) Low forceps operation

3. ACOG Classification

Classification of forceps delivery adopted by the American College of Obstetricians and Gynaecologists 2000 is based on station and rotation.[15]

Outlet forceps: The application of forceps when

i. Scalp is visible at the introitus without separating the labia.

ii. The foetal skull has reached the pelvic floor.

iii. Sagittal suture is in the antero-posterior diameter or right or left occiput anterior or posterior position.

iv. The foetal head is at or on the perineum.

v. Rotation does not exceed 45 degree.

Low forceps:

i. Leading point of foetal skull is at station ≥ +2cm, and not on the pelvic floor.

ii. Rotation is 45 degrees or less (left or right occiput-anterior to occiput anterior, or left or right occiput posterior to occiput posterior).

iii. Rotation is greater than 45 degrees.

Mid forceps:

Station above +2cm but head is engaged.

High forceps:

Not included in classification.

Complications of forceps application:

One of the most important factors in the decline of instrumental deliveries and of forceps in particular has been the perceived morbidity of these instruments.[24, 25, 26] For years instrumental deliveries have been the subject of intense medical scrutiny that has associated its use to outcomes ranging from maternal sexual dissatisfaction to paediatric dental malocclusion of the foetuses exposed to them.[27,28]

Maternal complications:

Immediate:

1. Episiotomy extension
2. Vaginal lacerations
3. Perineal trauma
4. Cervical tear
5. Bladder, paraurethral, or urethral injuries
6. Vaginal hematoma

7. Postpartum haemorrhage
8. Uterine rupture
9. Rupture of the symphysis pubis
10. Urinary and faecal incontinence
11. Fracture or subluxation of coccyx
12. Nerve injuries
13. Vessel injuries

Delayed:

1. Faecal incontinence
2. Urinary incontinence
3. Anal sphincter defects and symptoms of anal incontinence
4. Pelvic organ prolapse
5. Infection:

   Cellulitis or local abscess

   Necrotizing fascitis
6. Uterine atony
7. Fistula formation:

   Rectovaginal

   Vesicovaginal

   Vesicouterine
8. Bladder atony, inability to void

Foetal complications:

1. Transient facial forceps marks
2. Facial abrasions, bruising, and lacerations
3. Facial nerve injuries
4. Cephalohematoma
5. Skull fracture, intracranial haemorrhage with falx or tentorial lacerations
6. Shoulder dystocia and brachial plexus injury
7. Subgaleal haematoma
8. Retinal haemorrhage
9. Spinal cord injury
10. Fracture clavicle
11. Cerebral palsy, mental retardation and behavioral problems
12. Epidural haemorrhage

In 1991, Seidman DS and colleagues studied long-term effects of vacuum and forceps deliveries and demonstrated that mean intelligence scores at age 17 years were no different in those delivered by forceps or vacuum extraction compared to those delivered by spontaneous vaginal delivery.[29]

In 1999, Johanson RB and colleagues conducted a 5-year follow-up study of patients randomized to either forceps or vacuum delivery, and observed no difference in the incidence of urinary dysfunction between these groups. They also followed a cohort of children for 5 years and found a rate of visual problems in 13%. However, there was no difference between those delivered by forceps compared with those delivered by vacuum extraction (12.8% vs. 12.5%).[30]

In 1999, Towner D and colleagues studied the effect of mode of delivery in nulliparous women on neonatal intracranial injury and observed that types of intracranial haemorrhage associated with instrumental deliveries are subdural and subarachnoid haemorrhages rather than intraventricular.[31,32] They showed that the incidence of subarachnoid haemorrhage was 1.3 per 10,000 after spontaneous vaginal delivery, 2.2 per 10,000 after vacuum extraction, 3.3 per 10,000 after forceps delivery.[31]

In 2000, Okunwobi SY and colleagues stated that 10% of deliveries develop urinary incontinence following forceps whereas 3.3% following vacuum extraction.[33]

In 2000, Mayer S and colleagues did a prospective study of short- and long-term effects of forceps delivery compared with spontaneous vaginal delivery, which included both patient survey and clinical examination data, and observed a similar incidence of urinary incontinence at both 9 weeks (32% vs. 21%) and 10 months (20% vs. 15%) in both the groups.[34]

In 2000, Johanson RB and Menon BK compared vacuum extraction and forceps assisted vaginal deliveries and found that Cephalohematoma occurs in 4% of forceps deliveries.[35]

Many other studies compared forceps with spontaneous vaginal deliveries and studied neonatal outcome and found that cephalohematomas occurred in 1 - 2% of

spontaneous vaginal deliveries, in 6 - 10% of vacuum extractions[35, 36, 37] and in 4% of forceps deliveries.[35]

In 2001, Macarthur C and colleagues had taken up a study on three months follow up for faecal incontinence following forceps delivery and it has been shown that structural damage to the anal sphincter has been significantly more common with forceps.[38]

In 2001, Wen SW et al compared maternal and foetal outcome between vacuum and forceps extraction and concluded that subarachnoid haemorrhage is the second most common intracranial haemorrhage after instrumental delivery. They found an incidence rate of subarachnoid haemorrhage of 0.6 per 1,000 after vacuum extraction, 0.1 per 1,000 after forceps delivery, and 0.1 per 1,000 after spontaneous vaginal delivery.[39]

In 2002, Johanson RB and Menon V compared vacuum extraction and forceps assisted vaginal deliveries and concluded that Vacuum-assisted vaginal deliveries increase the risk of neonatal retinal haemorrhages by approximately twofold compared with forceps deliveries. They recorded adverse maternal and neonatal events in a retrospective review of 508 forceps and vacuum deliveries and demonstrated that maternal injury is more common with forceps, but that foetal injury is more common with the vacuum extraction.[40]

In 2003, Bollard RC and colleagues collected 34-year follow-up data of 42 patients delivered by forceps, compared with 41 patients delivered by spontaneous

vaginal delivery and studied anal sphincter injury, faecal and urinary incontinence and demonstrated a higher rate of anal sphincter injury on ultrasonography in the forceps group (44% vs. 22%), but no difference in the rate of altered faecal continence (14% vs. 10%). Third degree tears incur a higher risk of faecal incontinence but these are rare occurring in 0.5-1% of vaginal births.[41]

In 2003, Poggi SH and colleagues studied effect of operative vaginal delivery on the permanent brachial plexus injury and observed that majority of brachial plexus injuries resulting from delivery resolve spontaneously, with permanent injury rates ranging between 5% and 25%.[42] One way to reduce the risk of brachial plexus injury is to limit lateral traction after the head is delivered, especially after instrument delivery.

In 2003, Uchil D and Arulkumaran S conducted study on neonatal subgaleal haemorrhage and its relationship to operative vaginal deliveries. They stated that Subgaleal haemorrhage develops by an accumulation of blood in the subaponeurotic space between the periosteum of the skull and the galea aponeurotica.[43] several studies stated that Subgaleal haemorrhage with a loss of 20% to 40% of the circulating blood volume will result in hypovolemic shock, disseminated intravascular coagulation, multiorgan failure and neonatal death in up to 25% of cases.[43, 44, 45, 46]

In 2004, Perlman JM, in his study on brain injuries in term infants, stated that subarachnoid haemorrhage is most frequently caused by rupture of the small bridging vessels of the leptomeninges.[47]

In 2004, De Parades and colleagues conducted a study on anal sphincter injury after forceps delivery and found anal sphincter injury (13%) and complaints of altered faecal continence (30%) following forceps delivery.[34]

In 2004, Murphy DJ and colleagues evaluated risk of epilepsy in adulthood in a cohort of more than 21,000 individuals and found forceps delivery was not associated with an increased risk of epilepsy or anticonvulsant therapy when compared with other methods of delivery.[48]

In 2007, Towner DR and Ciotti MC studied operative vaginal deliveries and their relation with birth injuries and observed that birth injury is rare with an incidence rate of 2.9 to 5 per 1000 forceps deliveries and the prognosis is good with recovery within 2 weeks.[49]

In 2008, Doumouchtsis SK and Arulkumaran S stated that the most common and widely accepted indication for operative vaginal delivery is prolonged second stage of labour when it is caused by malposition of the foetal head, and foetal distress in the form of non reassuring foetal heart rate tracing, where any delay may result in hypoxic brain damage or foetal death if no intervention is undertaken.[50]

A Cochrane review in 2009 concluded that forceps are more likely to succeed in achieving a vaginal birth but with more maternal complications than with vacuum. Furthermore, the Cochrane review concluded that vacuum delivery causes less pain

and maternal trauma but more foetal trauma than forceps delivery. There was no difference in foetal death rate between the two groups.[51]

ACOG-2011 recommends forceps delivery as an acceptable and safe option for delivery as it plays a very important role in obstetric practice and remains an appropriate tool in the armamentarium of the modern obstetrics.[2]

In 2012, Nielson PE and Gala HL stated that risks of foetal injury are generally instrument specific, with vacuum deliveries accounting for statistically significantly higher rates of cephalhematoma, sub-galeal and retinal haemorrhages, and forceps deliveries accounting for a non-significantly higher rate of scalp/facial injuries.[52]

In 2014, Vaishnav G. and Vaishnav J studied Outlet forceps and its significance in modern era and concluded that it is a lifesaving procedure for mother and foetus in many situations and in skilled hands it is very safe and important to cut short second stage of labour. Sound clinical evaluation and adherence to the ground rule and skill of operator will minimize the risk of failure and complications.[53]

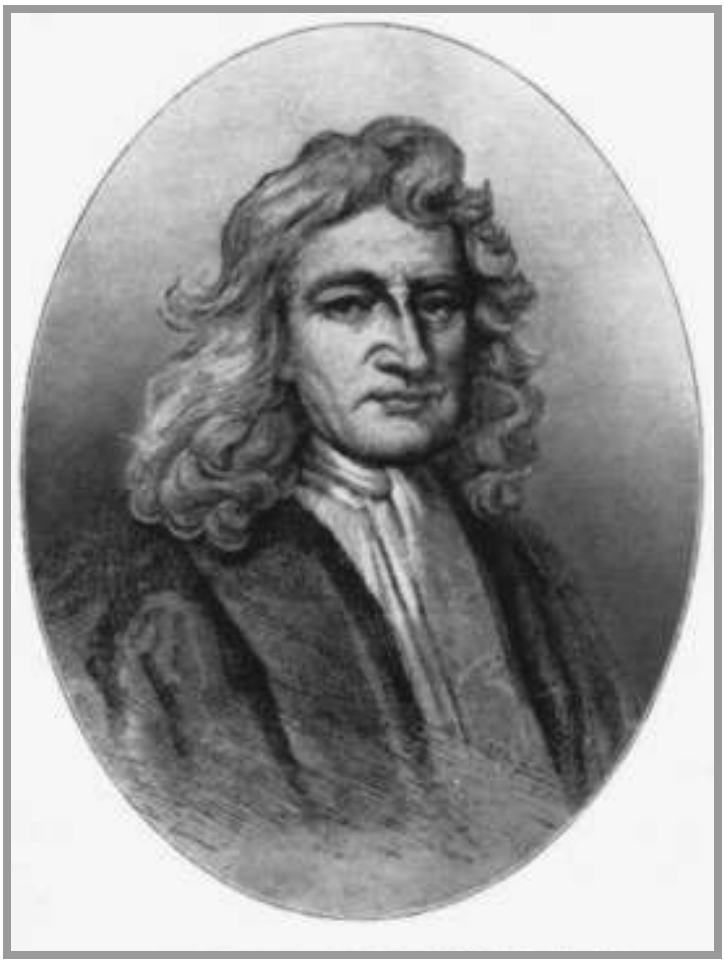


Figure 1: Dr. PETER CHAMBERLEN, *M.D.(1601 – 83)*

MATERIALS AND METHODS

All term pregnant women who delivered through Outlet Forceps in R.L. Jalappa hospital attached to Sri Devaraj Urs Medical College, Tamaka, Kolar were included in the study. The study was conducted from January 2013 to June 2014.

This is a prospective observational study with a sample size of 100.

Cases where spontaneous vaginal delivery or caesarean section was expected to result in more morbidity to mother and baby when compared to instrumental vaginal delivery were selected and enrolled into the study based on inclusion criteria mentioned below.

INCLUSION CRITERIA:

1. Primigravida or multigravida
2. Gestational age more than 37 completed weeks
3. Singleton pregnancies
4. Vertex presentations
5. Occipetoanterior positions

The following conditions were excluded:

1. Preterm deliveries
2. Intrauterine deaths
3. Anomalous babies
4. Multiple gestation
5. Midcavity forceps
6. Low forceps

METHOD OF COLLECTION OF DATA

- Relavent clinical history was recorded according to the proforma and clinical examination was performed. Written informed consent was taken from all the patients included.
- Baseline investigations were performed, which included:
  - Complete blood picture
  - Blood grouping and typing
  - Urine microscopy
  - Random blood sugar
  - Blood for serology.
  - Obstetrics ultrasonography
  - Cardiotocography (CTG)
- Obstetric complications and associated medical complications if present were documented for each case and related investigations were done.
- Final diagnosis was made for each case after obtaining complete history, performing thorough examination and interpreting the laboratory investigations, ultrasonography report and CTG.
- Appropriate indication for forceps application was noted for each case.
- The following check list was fulfilled and documented before applying forceps for each case.
  - Indication for forceps application
  - Adequacy of the pelvis
  - Cervical dilatation
  - Presentation and position
  - Complete rotation of foetal head
  - Station of foetal head

- *Wrigleys Outlet Forceps* (figure 2) was applied in all the cases included according to the method described below.

Method of application:

- Vaginal examination was performed by the operator to confirm the position, rotation and station of the foetal head.
- Patient was brought to the edge of the table and placed in lithotomy position.
- Under aseptic precautions parts were painted and draped.
- Bladder was drained under sterile conditions.
- Perineal infiltration was given with 1% lignocaine.
- Phantom application (figure 3) of the forceps was performed prior to insertion in front of the perineum in the angle and position of the final application to confirm the easy locking of blades.
- The left blade was identified and lubricated with examination gel.
- The handle of the left blade was held lightly in the operator's left hand in a pen holding fashion.
- Between the uterine contractions, the operator's right hand was passed into the vagina, creating a potential space between the foetal head and the vaginal side wall.
- The left blade was then gently introduced through the vaginal introitus and posterolaterally along the foetal parietal bone.
- The left hand was guided gently and did not apply any force, where as the right hand walked the blade between the foetal head and pelvic side wall with firm but gentle finger pressure, displacing the maternal soft tissue to permit the blade to advance over foetal scalp in the potential space created.

- The handle of the blade was swept gently down and towards the same side as it passed into the pelvis and once the blade was introduced, the position of the blade was readjusted and was supported by the assistant.
- Following application and adjustment of left blade, the right blade was lubricated and inserted by holding the right blade with right hand, passing the right hand into the vagina and guiding the right blade along the right side of maternal pelvis.
- After the right blade was inserted, forceps were articulated and the accuracy of application was verified (figure 4).
- Before giving traction the following points were confirmed by the operator.
    1. Sagittal suture position lied in the midplane of the shanks.
    2. Operator was unable to insert more than a finger tip between the fenestration of blades and foetal head on either side.
    3. Posterior fontanelle of foetal head was no more than one finger breadth above the plane of the shanks.
    4. Adequate analgesia and proper maternal positioning
    5. Foetal heart rate
- At the height of uterine contraction, traction was applied by two handed Saxtroph-Pajot maneuver i.e the operator was seated with one hand pulling horizontally while other hand added downward force over the lock. This assured that the traction force vector followed the pelvic curve (Carus curve) as the descent occurred.

- The force was built progressively and slowly released, paralleling the pattern of the uterine contraction, where as abrupt or jerking movements were avoided.
- Advancement of foetal head was checked after each traction effort and as the foetal head crowned, Right mediolateral episiotomy (RMLE) was given and the head is delivered slowly (figure 5).
- The forceps handles were swung upward with the head as it crowned and in the same time maternal perineum and foetal chin were protected by the support given by the assistant.
- Once the foetal head was delivered, blades were removed in the reverse order of application.
- Following the removal of blades, restitution, and external rotation followed and then the baby was delivered. (figure 6)
- The baby was then handed over to the paediatrician and the placenta was removed by controlled cord traction.
- After placental removal, the birth canal was carefully examined for lacerations and hematomas.
- The RMLE was sutured in layers and at the end of the process the rectum was digitally examined.

- After delivery of placenta and before repairing the RMLE, birth canal was thoroughly examined for injuries and Maternal morbidity was documented in terms of :

- Perineal tears
- Vaginal tears
- Cervical tears
- Para urethral tears
- Extension of episiotomy wound
- Traumatic Postpartum haemorrhage
- Extended Hospital stay (no of days)

- Neonate was weighed immediately after delivery by electronic weighing scale. Newborn examination was done in detail, monitored and followed till they got discharged. The Foetal outcome was documented in terms of:

- APGAR score at 1 minute and 5 minutes
- NICU admissions
- Cephalohematoma
- Facial injuries
- Skull fractures
- Intra cranial haemorrhages
- Neurological injuries
- Early neonatal mortality

Figure 2: Wrigley's Outlet Forceps

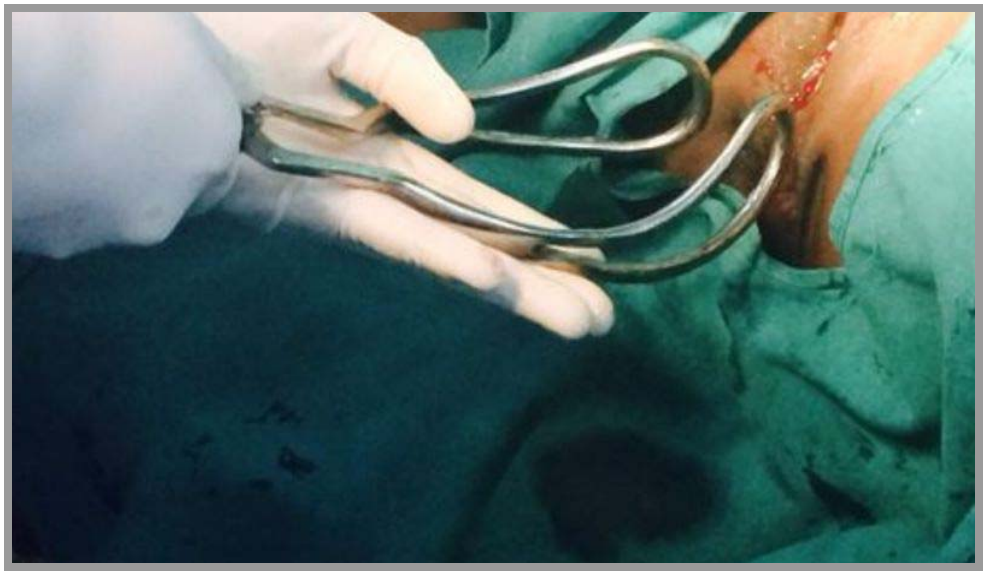


Figure 3: Phantom application

Figure 4: Accuracy of application

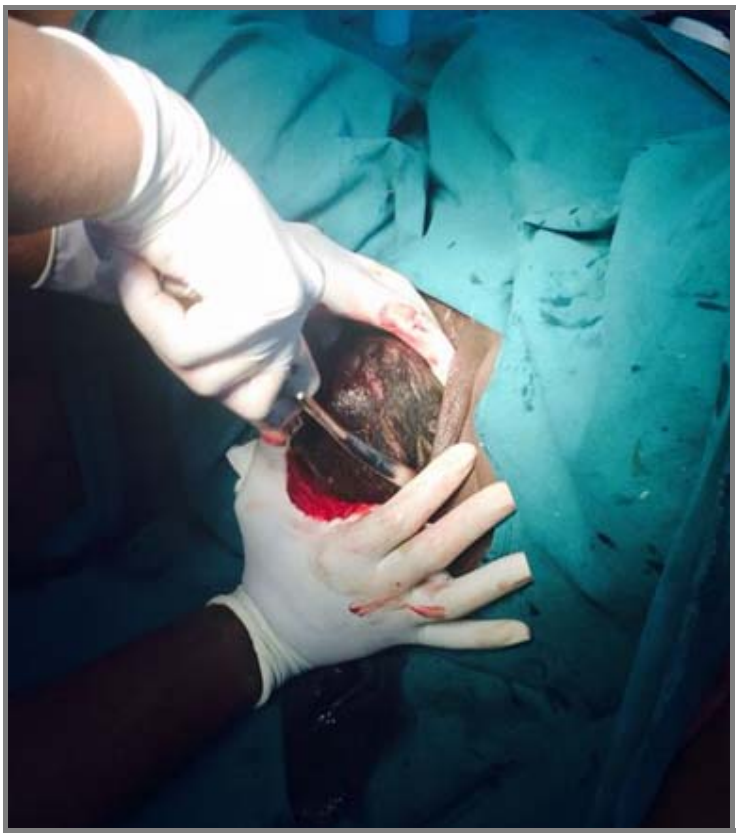


Figure 5: Delivery of foetal head

Figure 6: Healthy neonate born by outlet forceps

RESULTS

Our study is a prospective observational study of 100 women who required Outlet Forceps delivery in one and half year study period i.e from January 2013 to June 2014.

All antenatal patients who were admitted at RL Jalappa Hospital and research center attached to Sri Devaraj Urs Medical College and delivered through Outlet Forceps were enrolled according to the inclusion and exclusion criteria mentioned in methodology.

Detailed history, complete clinical examination and required investigations were done and a final diagnosis and indication for forceps application was documented prior to application.

Maternal age distribution, gravidity distribution, Obstetric complications, associated medical disorders and indications for application were noted. Maternal and Foetal outcome was documented in terms as mentioned in the methodology and analysed.

TABLE 1: MATERNAL AGE DISTRIBUTION

Age in years	No. of Cases	Percentage
18-20	31	31.0
21-25	45	45.0
26-30	22	22.0
31-35	2	2.0
Total	**100**	**100.0**

- Mean maternal age was 23.21±3.62 years.
- Majority of them were in age group of 21 – 25 years i.e 45 (45%).
- Only 2 of them were in age group of 31 – 35 years i.e 2%.

GRAPH 1: MATERNAL AGE DISTRIBUTION

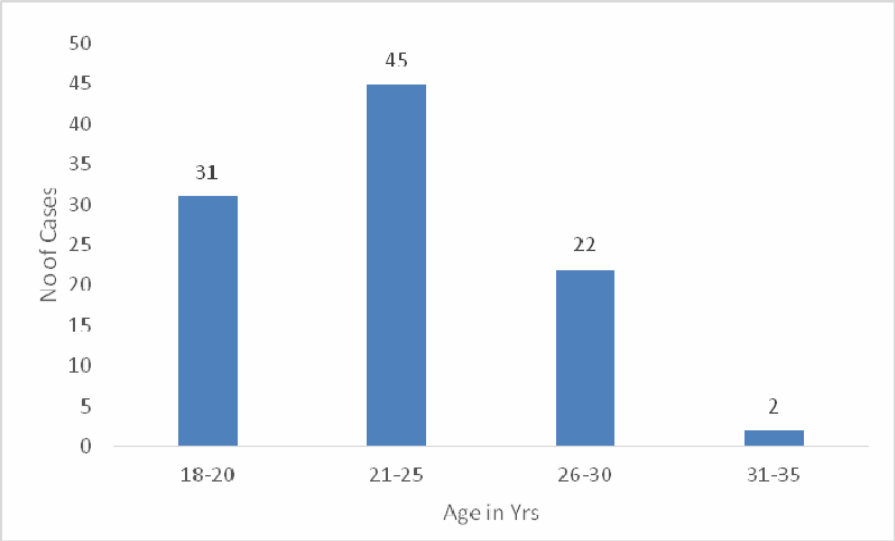


TABLE 2: GRAVIDITY DISTRIBUTION

Gravidity	No. of cases	Percentage
Primi	63	63.0
Multi	37	37.0
Total	**100**	**100.0**

- Majorities (63%) of the patients were primigravida and the remaining 37% were multigravidas.

GRAPH 2: GRAVIDITY DISTRIBUTION

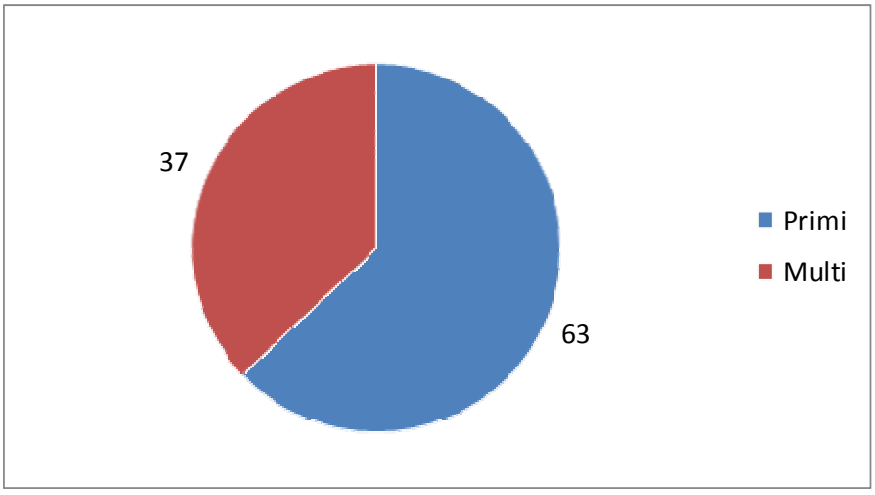


TABLE 3: OBSTETRIC COMPLICATIONS

Obstetric complications	**No. of cases (n=100)**	**Percentage**
Previous LSCS	13	13.0
PROM	13	13.0
Hypertensive disorders in pegnancy		
• Severe preeclampsia	10	10.0
• Mild preeclampsia	1	1.0
• Antepartum eclampsia	1	1.0
GDM	2	2.0
None	60	60.0

- Among 100 patients studied, 13% of the patients had previous Lower segment caesarean section (LSCS) and 13% were complicated with Preterm rupture of membranes (PROM).
- Pregnancies complicated with severe pre eclampsia were 10%.
- Gestational Diabetes Mellitus was present in 2%.
- Mild pre eclampsia and antepartum eclampsia complicated 1% each.

GRAPH 3: OBSTETRIC COMPLICATIONS

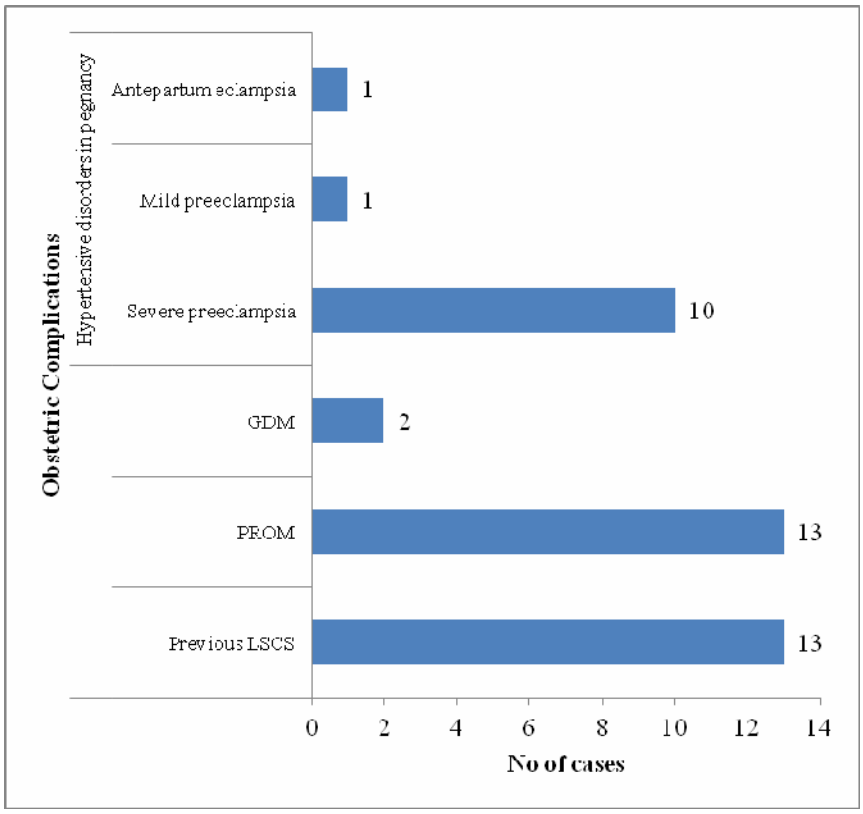


TABLE 4: ASSOCIATED MEDICAL DISORDRS

Associated medical disorders	No. of Cases (n=100)	Percentage
Anemia		
• Severe	7	7.0
• Mild	4	4.0
• Moderate	2	2.0
Heart disease complicated pregnancies		
• RHD	2	2.0
Biohazard		
• HBsAg	3	3.0
• HIV	1	1.0
None	81	81.0

- In our study, anemia was the commonst associated medical disorder accounting for 13% of cases and also resulted in severe maternal morbidity.
- Pregnancies complicated with heart disease were 2 i.e 2%.
- Biohazard cases were 4% in which 3% were HBSAG positive and 1% was HIV positive.

GRAPH 4: ASSOCIATED MEDICAL DISORDERS

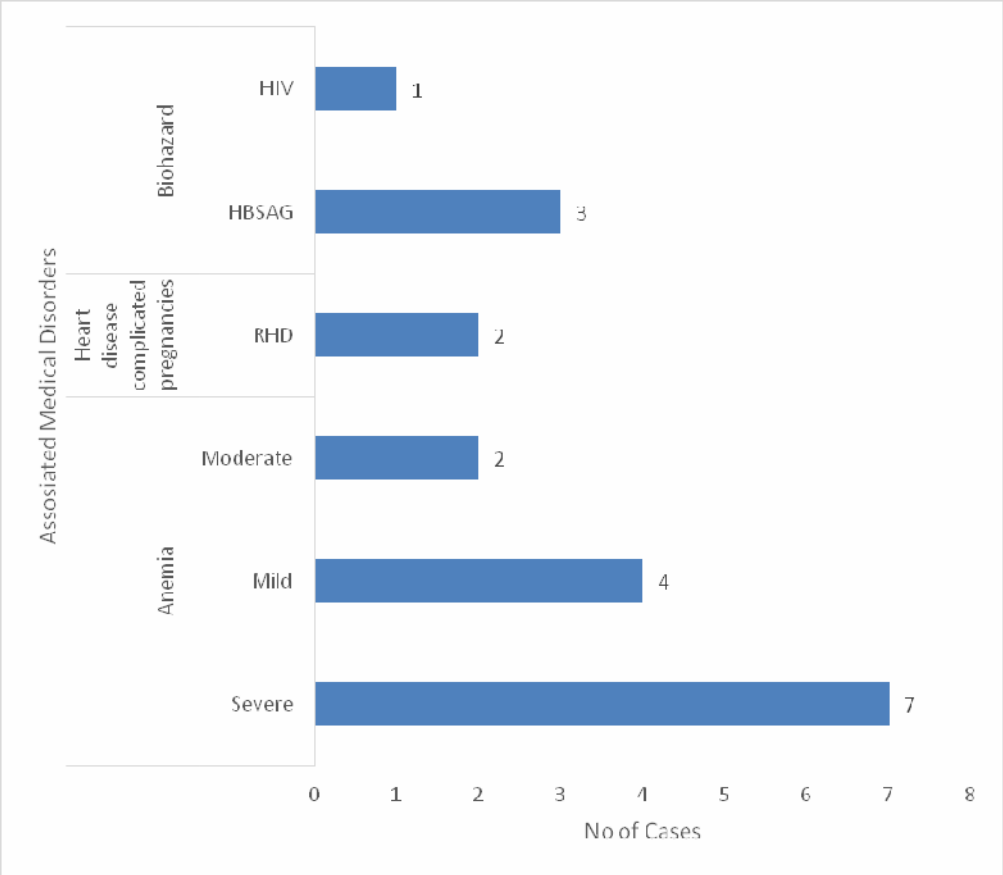


TABLE 5: INDICATIONS FOR FORCEPS APPLICATION

Indications for forceps application	No. of Cases (n=100)	Percentage
Foetal distress		
• Variable decelerations	27	27.0
• Foetal bradycardia	14	14.0
Prolonged second stage	24	24.0
To cut short second stage		
• VBAC	13	13.0
• Anemia	11	11.0
• Pre eclampsia	8	8.0
• RHD	2	2.0
• Eclampsia	1	1.0

- In our present study, Foetal distress was the indication for outlet forceps delivery in 41% of cases. Among these, 27(27%) had foetal distress in the form of variable decelerations and 14 (14%) had foetal distress in the form of foetal bradycardia.

- Forceps was applied in 35 % of cases to cut short the second stage of labor so as to prevent undue stress and strain to the mother. 13% of these cases were previous LSCS complicated pregnancies who had VBAC (vaginal birth after caesarean section). 13 cases had pregnancies complicated with anaemia amongst which, forceps was applied in 11 cases to cut short the second stage

of labor . In the remaining two anemia complicated cases, the indication was foetal distress.

- In 24% of women, forceps was applied in view of prolonged second stage of labor.

GRAPH 5: INDICATIONS FOR FORCEPS APPLICATION

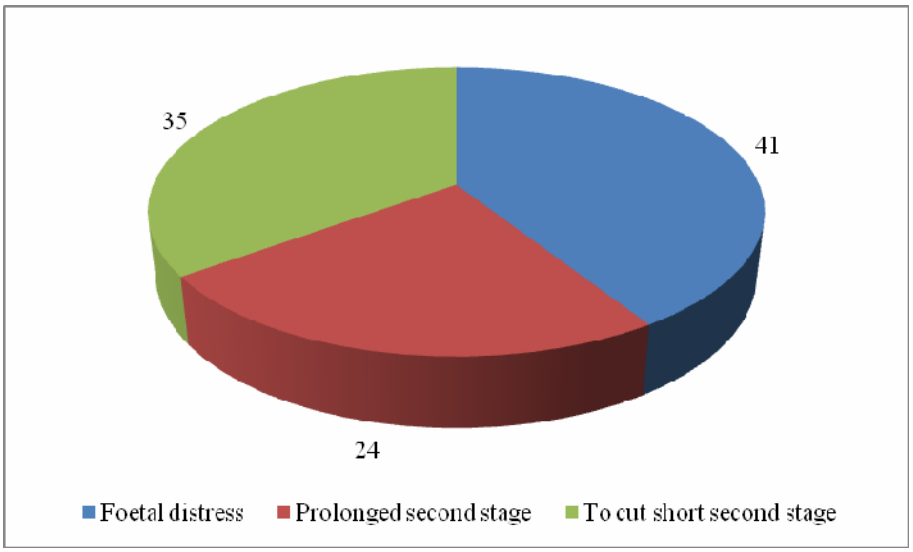


TABLE 6: BIRTH WEIGHT (KG)

Birth weight (kg)	No. of neonates	Percentage
<2.5	11	11.0
2.5-3.5	82	82.0
>3.5	7	7.0
Total	**100**	**100.0**

- Mean Birth weight was 2.86±0.38 kgs .
- Majority of babies belonged to 2.5 – 3.5 kgs i.e 82 (82%)

GRAPH 6: BIRTH WEIGHT (KG)

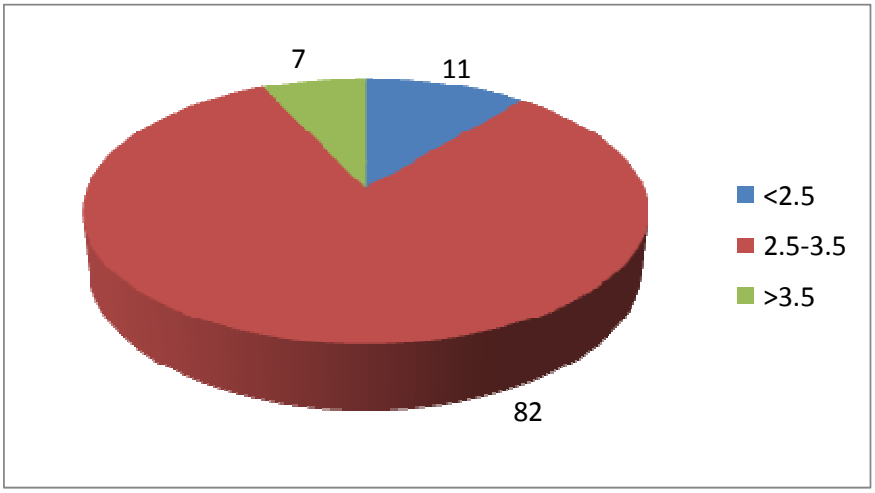


TABLE 7: MATERNAL COMPLICATIONS

Maternal complications	No. of patients (n=100)	percentage
Extension of episiotomy		
• Absent	93	93.0
• Present	7	7.0
Vaginal tear		
• Absent	97	97.0
• Present	3	3.0
Paraurethral tear		
• Absent	99	99.0
• Present	1	1.0
Cervical tear		
• Absent	98	98.0
• Present	2	2.0
Perineal tear		
• Absent	97	97.0
• II degree	2	2.0
• III degree	1	1.0
Traumatic PPH		
• Absent	98	98.0
• Present	2	2.0

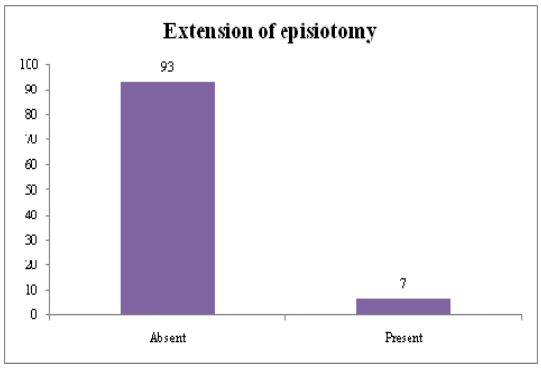
Atonic PPH		
• Absent	96	96.0
• Present	4	4.0
Blood transfusions		
• None	87	87.0
• 1 pint packed cells	5	5.0
• 2 Pints packed cells	7	7.0
• 3 pint packed cells	1	1.0

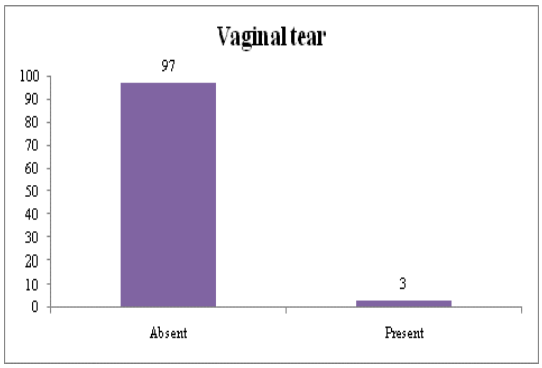
- In our study, Maternal complications following forceps application in terms of blood transfusions consisted of 13%, extension of episiotomy was seen in 7%, 4% of patients had atonic PPH, vaginal wall tears and perineal tears were seen in 3% each, traumatic PPH and cervical tear complicated 2% each, 1% had paraurethral tears.

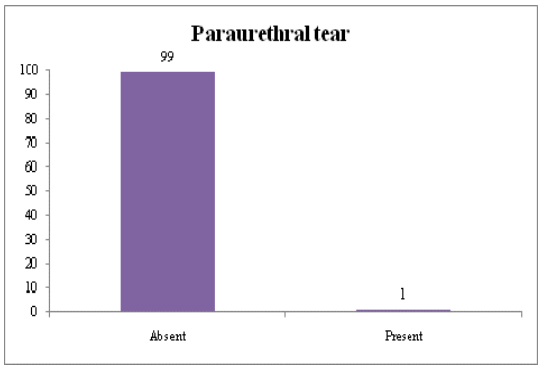
- Among the women who had blood transfusions, 4% were due to atonic PPH and 2% were due to Traumatic PPH. Remaining underwent blood transfusions for the correction of anemia.

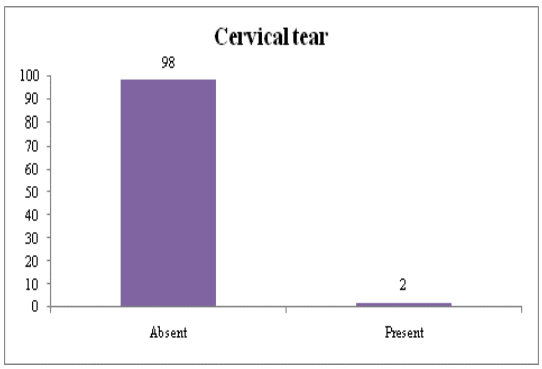
- Among 4 cases of atonic PPH, two cases did not have any confounding risk factors where as other two cases had an additional risk factor of anemia and severe pre eclampsia.

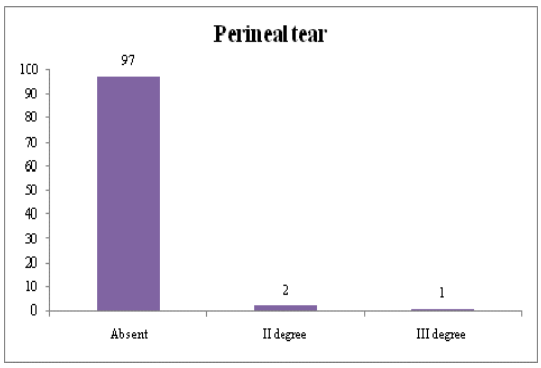
GRAPH 7: MATERNAL COMPLICATIONS











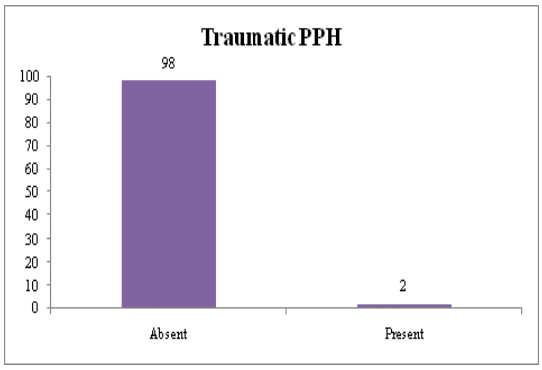


TABLE 8: DURATION OF HOSPITAL STAY(DAYS)

Hospital stay (days)	No. of Cases n = 100	Percentage
1-5	69	69.0
6-10	30	30.0
11-15	1	1.0
Total	**100**	**100.0**

- Mean ± SD: 5.21±1.49
- Majority of patients i.e 69 (69%) were discharged with in 5 days following delivery.

GRAPH 8: DURATION OF HOSPITAL STAY (DAYS)

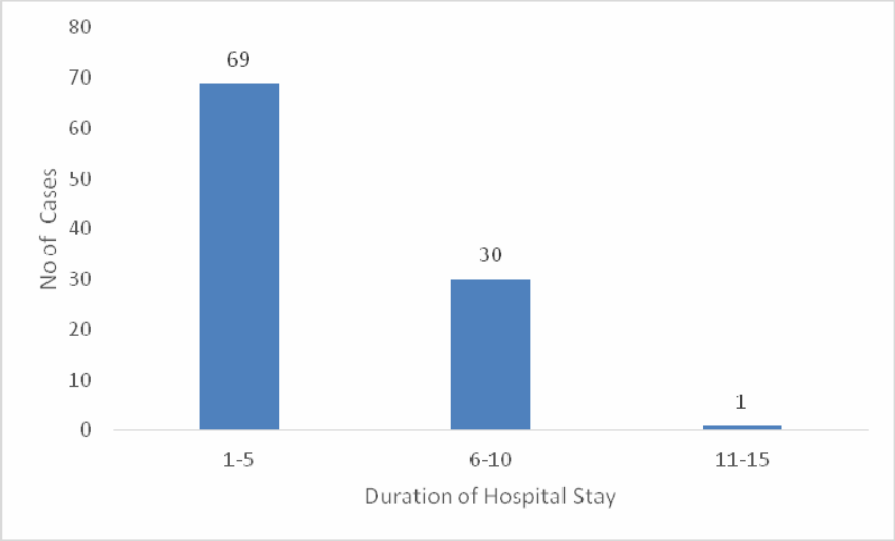


TABLE 9: FOETAL OUTCOME

Foetal outcome	**No. of neonates (n=100)**	**Percentage**
Apgar at 1 min		
• <6	25	25.0
• ≥6	75	75.0
Apgar at 5 min		
• <7	10	10.0
• ≥7	90	90.0
NICU admission		
• Not Required	81	81.0
• Required	19	9.0
HIE		
• Absent	98	98.0
• HIE I	1	1.0
• HIE II	1	1.0
Birth injuries		
• Absent	98	98.0
• Abrasion on right eyelid	1	1.0
• Cephalohematoma	1	1.0

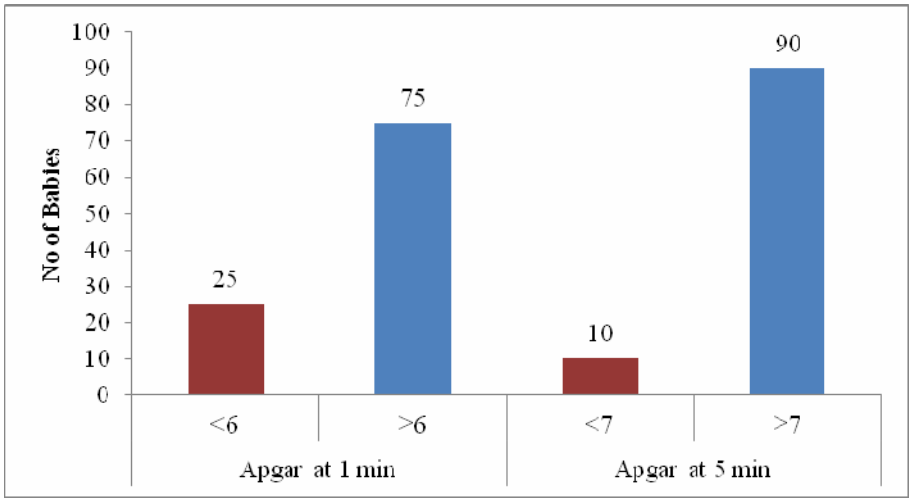
- Apgar scores at 1 min were < 6 in 25 % of neonates and at 5 minutes the scores were < 7 in 10% of the neonates.

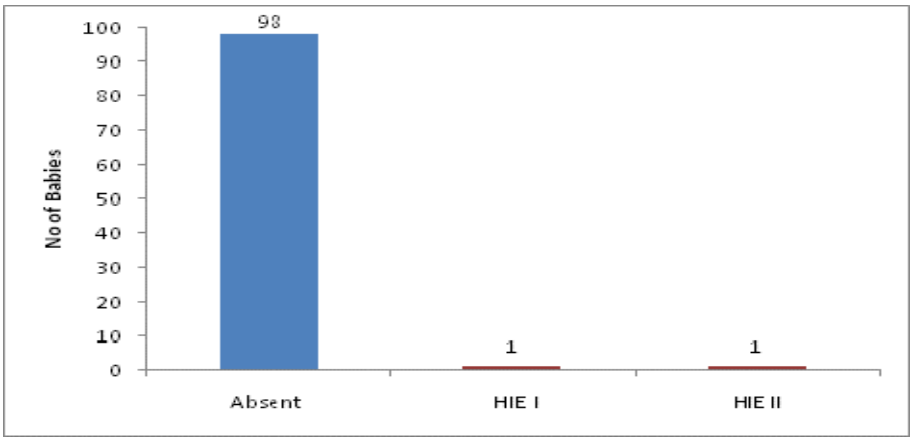
- In our study, NICU admissions were 19% among which 9 babies were admitted for observation in view of thick meconium stained amniotic fluid (TMSAF). 7 neonates were admitted in view of birth asphyxia, of which 2 had hypoxic ishchaemic encephalopathy (HIE). 1 baby was admitted in view of cephalohematoma, 1 baby for hypoglycemia and 1 baby was diagnosed to have meconium aspiration syndrome.

- In terms of foetal complications related to forceps application, only two babies had morbidity one in the form of cephalohematoma and other in form of abrasion over right eyelid.

- Skull fractures, neurological injuries, and intra cranial haemorrhages did not occur in any of the neonate delivered through outlet forceps. There were no still births or early neonatal mortalities in our study.

GRAPH 9: FOETAL COMPLICATIONS





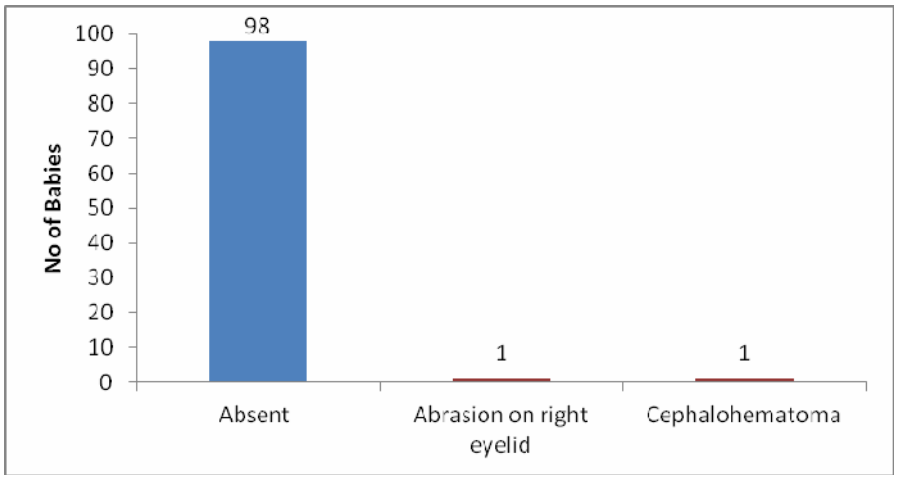
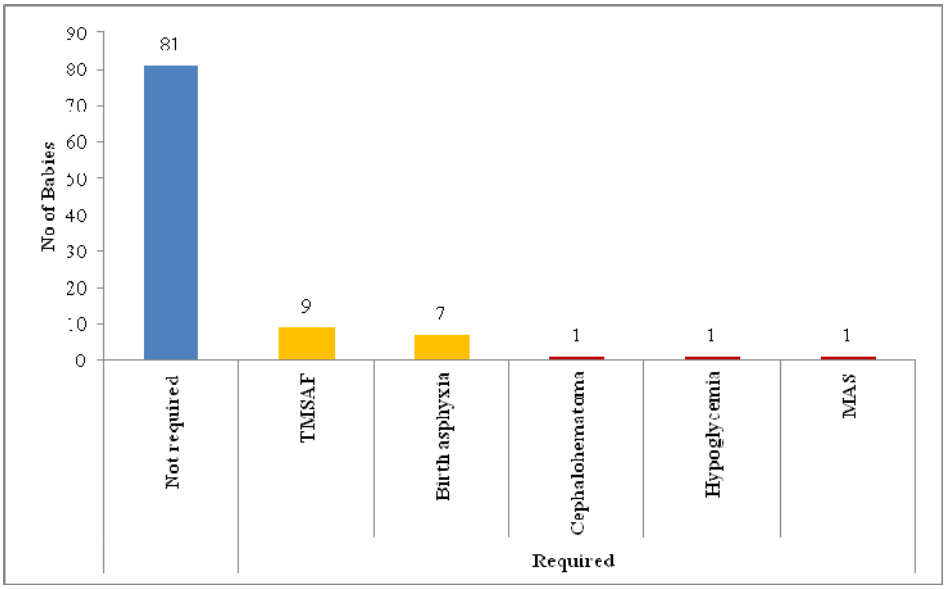


TABLE 10: NICU ADMISSIONS

NICU admission	No of Cases (n = 100)	Percentage
Not required	81	81.0
Required		
• **TMSAF**	9	9.0
• **Birth asphyxia**	7	7.0
• **Cephalohematoma**	1	1.0
• **Hypoglycemia**	1	1.0
• **MAS**	1	1.0
Total	**100**	**100.0**

- Among 19 NICU admissions, majority (9) were admitted in view of thick meconium stained amniotic fluid. Only one baby had admission for birth injury (Cephalohematoma).

GRAPH 10: NICU ADMISSIONS



DISCUSSION

This prospective observational study included 100 patients who delivered through Outlet forceps and analysed the Maternal and Foetal morbidity and mortality in the terms mentioned in methodology.

There were several studies comparing Forceps deliveries with spontaneous deliveries, vacuum deliveries and caesarean deliveries, however the effect of Forceps when used exclusively as an Outlet is not highlighted by any of these studies. The present study was an observational study of maternal and foetal complications associated with Outlet forceps delivery.

In our institute, there were 3787 deliveries in one and half year study period among which 129 were Forceps assisted vaginal deliveries accounting to the rate of 3.4%. Among those, 121 were Outlet forceps deliveries accounting to 3.1%. Based on the criteria mentioned in methodology, 20 were excluded and 1 case was removed for statistics purpose.

- **Rate of forceps deliveries**

Study and year	**Forceps (%)**
Meniru GI[54], 1993	6.2
Kozak LJ[55], 2000	4
Vaishnav G and Vaishnav J[53], 2012	0.74
Present study	**3.1**

In our study, rate of forceps delivery was 3.4% in which Outlet forceps deliveries constituted 3.1%. It is comparable to the study of kozak LJ which showed rate of forceps delivery at 4% in United States in the year 2000.

- **Maternal age distribution**

Study and year	**Maternal age 21-25 years (%)**
Arul HN[56], 1992	42.58
Present study	**45**

In the present study, 45% were in the age group of 21 – 25 years which is comparable to the study conducted by Arul HN in 1992 (42.58%).

- **Primigravida distribution**

Study and year	**Primigravida(%) in forceps**
Johanson RB[57] , 1993	78
Shihadeh A[58], 2001	76
Kabiru WN[59], 2001	65.3
Gardella C[60], 2001	75
Present study	**63**

In our present study, 63% of the patients were primigravidas which is comparable to the study done by Kabiru WN and colleagues in 2001.

- **Foetal distress**

Study and year	**Foetal distress (%) in forceps deliveries**
Broekhuizen FF[61], 1987	27
Shihadeh A[58], 2001	44.67
Gardella C[60], 2001	9
Johnson JH[62], 2004	39
Present study	**41**

In the present study, majority (41%) of the patients had Outlet forceps application for foetal distress. The studies done by Shihadeh A (44.7%) and Johnson JH (39%) correlates well with the present study.

Forceps was applied in 35 % of our cases to cut short the second stage of labor so as to prevent undue stress and strain to the mother. Among those the main entities were previous LSCS (13%) and Anemia complicating pregnancies (11%).

Prolonged second stage of labor was the indication in another 24% of the cases. These patients had prolonged second stage due to various reasons such as PROM, maternal dehydration, and poor maternal bearing down efforts.

- **Birth weight (2.5 – 3.5 kg)**

Study and year	**Birth weight % in forceps deliveries (2.5 – 3.5 kgs)**
Shihadeh A[58], Jan 2001	66.67
Present study	**82**

In our study 82% of the neonates delivered through outlet forceps weighed between 2.5 and 3.5 kgs which is comparale to the study done by Shihadeh A[58] in the year 2001.

- **Extension of episiotomy**

Study and year	**Extension of episiotomy (%)**
Damania KR[63], 1988	12%
Vaishnav G and Vaishnav J[53], 2012	5.8
Present study	**7**

In the present study, extension of episiotomy occurred in 7% of the cases which is comparable to the study of Vaishnav G and Vaishnav J i.e 5.8%.

- **Postpartum haemorrhage (PPH)**

Study and year	**PPH (%)**
Williams MC[64], 1991	12
Shrivastava M[65], 2000	5.2
Vaishnav G and Vaishnav J[53], 2014	2.8
Present study	**6**

In our study PPH was seen in 6% of the cases which is comparable to the study of Shrivastava M (5.2%). Among these 6%, traumatic PPH complicated 2% and 4% had atonic PPH.

- **Vaginal lacerations**

Study and year	**Vaginal lacerations (%)**
Broekhuizen FF[61], 1987	23.7
Damania KR[63], 1989	11
Johanson RB[57], Jan 1993	30
Johnson JH[62], 2004	19
Present study	**3**

In our study, rate of vaginal lacerations is 3% following forceps application which is low compared to other studies.

- **Cervical tears**

Study and year	**Cervical tears (%)**
Broekhuizen FF[61], 1987	6
Damania KR[63], 1989	4
Shihadeh A[58], 2001	4.67
Kabiru WN[59], 2001	3.7
Present study	**2**

In the present study, cervical tears were present in 2% of the patients following forceps application which are comparable to the studies of Damania KR (4%) and Kabiru (3.7)

- **II degree perineal tears**

Study and year	**II degree perineal tears(%)**
Vaishnav G and Vaishnav J[53], 2014	4.35
Present study	**2**

In present study 2% of women had II degree perineal tears that are comparable to the study done by Vaishnav G and Vaishnav J, where maternal complications following Outlet forceps application in terms of II degree perineal tears were seen in 4.35%.

Among these two women, one woman also had extension of episiotomy wound along with perineal tear and resulted in traumatic PPH.

- **III degree perineal tears**

Study and year	**III degree perineal tears (%)**
Taylor E[66], 1953	3.2
Cosgrove RA[67], 1957	3.5
Vaishnav G and Vaishnav J[53], 2014	2.9
Present study	**1**

III degree Perineal tear was seen in one (1%) case which was less compared to the studies mentioned above. This patient had multiple trauma to the genital tract (III degree perineal tear, vaginal tear, cervical tear) and had maternal morbidity in the form of traumatic PPH, blood transfusions and extended hospital stay.

In our study, maternal morbidity in the form of genital trauma was seen in 13%. A part from this, 4 women had atonic PPH.

Among 13% of women who had blood transfusions, 4% were due to atonic PPH and 2% were due to Traumatic PPH. Remaining 7 women underwent blood transfusions for the anemia correction.

Among 4 cases of atonic PPH, two cases did not have any confounding risk factors where as other two cases had an additional risk factor of anemia and severe pre eclampsia.

In terms of duration of hospital stay, majority of patients (69%) were discharged with in 5 days following delivery. Only one patient who had multiple tears had stayed in the hospital for 11 days.

- **Facial abrasions**

Study and year	**Facial abrasions (%)**
Shihadeh A[58], 2001	6.66
Johnson JH[62], 2004	5.4
Vaishnav G and Vaishnav J[53], 2012	5.80
Present study	**1**

In our study, one (1%) neonate had abrasion over the right eyelid which is less compared to other studies.

- **Cephalohematoma**

Study and year	**Cephalohematoma (%)**
Broekhuizen FF[61], 1987	4.3
Johanson RB[57], 1993	3
Johnson JH[62], 2004	12.5
Vaishnav G and Vaishnav J[53], 2012	4.35
Present study	**1**

In the present study, Cephalohematoma was seen in only 1% of newborns and is comparable to the study done by Johanson RB in 1993.

- **Apgar scores <7 at 5 minutes**

Study and year	**Apgar score <7 at 5 minutes (%)**
Johanson RB[57], June 1993	4
Shihadeh A[58], 2001	3.34
Present study	**10**

In the present study, Apgar scores at 1 minute was < 6 in 25% of neonates and at 5 minutes, 10 neonates had Apgar scores of < 7. Rate of low Apgar score at 5 minutes was comparatively more in our study. This was related to the indication for which forceps was applied i.e foetal distress, rather than the forceps instrument.

- **NICU admissions**

Study and year	**NICU admissions (%)**
Vaishnav G and Vaishnav J[53], 2012	11.9
Present study	**19**

In our study, 19 neonates were admitted in NICU following forceps delivery which is comparable to the study of Vaishnav G and Vaishnav G in 2014.

Among these 19 neonates, 9 were admitted in NICU for observation in view of thick meconium stained amniotic fluid.7 babies had birth asphyxia for which they had NICU admission in which two neonates had Hypoxic ischemic encephalopathy.

One baby was admitted in view of cephalohematoma, one baby for hypoglycemia and one baby had meconium aspiration syndrome.

In terms of foetal complications directly related to forceps application, only 2 babies had morbidity, one in the form of cephalohematoma which required NICU admission and other in the form of abrasion over right eyelid, both the babies recovered completely.

Skull fractures, neurological injuries, and intra cranial haemorrhages did not occur in any of the neonate delivered through outlet forceps. There were no still births or early neonatal mortalities in our study.

SUMMARY

- The rate of Outlet forceps deliveries in our hospital during the period of our study was 3.1%.

- Majority (45%) of the women were in the age group of 21 – 25 years.
- Mean age of the women included in the study was 23.21±3.62 years.
- Majority (63%) of the patients were primigravidas
- There were 13 patients with previous LSCS who delivered vaginally with outlet forceps application.
- There were 13 patients complicated with PROM, 11 with pre-eclampsia and one with antepartum eclampsia.
- Among medical complications, there were 13 patients with anemia and two with Rheumatic heart disease.
- The common indications for forceps application were foetal distress (41%), shortening of the second stage of labor (35%) and prolonged second stage (24%)

- Mean Birth weight of neonates was 2.86±0.38 kg.
- Majority (82%) of the neonates weighed between 2.5 – 3.5 kg.
- Blood transfusions for PPH were required in 6% of women, two traumatic and four atonic PPH.
- Genital trauma was seen in 13 patients and most (7 cases) of it was extension of episiotomy wound. Two patients had multiple tears which required blood transfusion.
- Mean duration of hospital stay was 5.21±1.49 days.
- Majority (69%) of patients were discharged within 5 days following delivery.

- Apgar scores at 1 minute was < 6 in 25% of neonates and at 5 minutes 10 neonates had Apgar scores of < 7.
- There were 19 NICU admissions. Among those 9 babies had thick meconium stained amniotic fluid and 7 had birth asphyxia which was related to the foetal distress rather than the forceps used . One baby had meconium aspiration syndrome, one had cephalohematoma and one was admitted for hypoglycemia.
- In terms of foetal complications directly related to forceps application, only 2 babies had morbidity, one in the form of cephalohematoma which required NICU admission and other in the form of abrasion over right eyelid, both the babies recovered completely.

CONCLUSION

- In our hospital, the rate of forceps deliveries during the study period was 3.4% out of which 3.1% consisted of Outlet forceps deliveries.
- The common indications for Outlet forceps application were foetal distress (41%), shortening of the second stage of labor (35%) and prolonged second stage (24%)
- Maternal and foetal morbidity associated with outlet forceps application was low.
- It is the need of the hour, to ensure proper training in the field of forceps delivery.
- Outlet forceps delivery has a place in present days obstetric practice .If used in properly selected cases, may reduce an unnecessary caesarean section.

BIBLIOGRAPHY

1. McQuivey RW. Vaccum assisted delivery: a review. J matern fetal neonatal med 2004; 16:171-79.
2. ACOG Medical Teaching Module: forceps incidence in modern Era. 2011:232.
3. Dennen PC. Dennen's Forceps Deliveries 3rd ed. New York, Davis Company, F. A 1989;188.
4. Yancey MK, Herpolsheimer A, Jordan GD, Benson WL, Brady K. Maternal and neonatal effects of outlet forceps delivery compared with spontaneous vaginal delivery in term pregnancies. Obstet Gynecol 1991;78(4):646-50.
5. Bahl R, Strachan B, Murphy DJ, Outcome of subsequent pregnancy three years after previous operative delivery in second stage labour: cohort study. BMJ 2004;doi:10.1136,.
6. Patel RR, Murphy DJ. Forceps delivery in modern obstetric practice. BMJ 2004;328:1302-05.
7. Laufe LE. Obstetric Forceps. New York, Harper *and* Row. 1968.
8. Das KN. Obstetric Forceps: Its History and Evolution. St. Louis, MO:Mosby;1929.
9. Armstrong ES, Yeomans ER. Advances in Obsterics and Gynaecolgy.1995;2.
10. Holland E. The Princess Charlotte of Wales: A triple obstetric tragedy. J Obstet Gynecol 1951;58:905 – 19.

11. DeLee JB: The prophylactic forceps operation. Am J Obstet Gynecol 1920;1:34 – 44.

12. Kelly. Am J Obstet Gynecol 1963;87: 529.

13. Cunningham FG, Grant NF, Kenneth J. Forceps Delivery and Vacuum Extraction: Williams Obstetrics. 21st ed.

14. O Gardy JP. Modern Instrumental Delivery. 1988.

15. American College of Obstetricians and Gynecologists: Operative vaginal delivery. Practice Bulletin No 17, June 2000.

16. Kerr's M. Operative obstetrics, 10th ed. 1996;276-95.

17. Carroli G, Mignini L. Episiotomy for vaginal birth. Cochrane Database Syst Rev 2009;1:CD000081.

18. Dahl C, Preben K. Obstetric anal sphincter rupture in older primiparous women:a case–control study. Acta Obstet Gynecol Scand 2006;85:1252–258.

19. Baskett TF, Fanning CA, Young DC. A prospective observational study of 1000 vacuum assisted deliveries with the omnicup device. J Obstet Gynaecol Can 2008;30(7):573–80.

20. Youssef R, Ramalingam U, Macleod M, *et al*. Cohort study of maternal and neonatal morbidity in relation to use of episiotomy at instrumental vaginal delivery. BJOG 2005;112:941–45.

21. Dystocia and Augmentation of labour: ACOG Technical Bulletin. 1995; 218:1-7.

22. Dennen EH. A classification of forceps operations according to station of head in pelvis. Am J Obstet Gynecol 1952;63:272.

23. Cunnigham FG, Gant NF, Leveno KJ, Gilstrap LC, Hauth JC, Wenstrom KD.Williams Obstetrics. 22nd Edn. 2005;485-508.

24. Bailey PE. The disappearing art of instrumental delivery: time to reverse the trend. Int J Gynaecol Obstet 2005;91:89–96.

25. Hillier CE, Johanson RB. Worldwide survey of assisted vaginal delivery. Int J Gynaecol Obstet 1994;47:109–14.

26. Althabe F, Belizan JM, Villar J *et al*. Mandatory second opinion to reduce rates of unnecessary caesarean sections in Latin America: a cluster randomised controlled trial. Lancet 2004;363:1934–40.

27. Signorello LB, Harlow BL, Chekos AK, *et al*. Postpartum sexual functioning and its relationship to perineal trauma: a retrospective cohort study of primiparous women. Am J Obstet Gynecol 2001;184:881–8.

28. Pirttiniemi P, Gron M, Alvesalo L, *et al*. Relationship of difficult forceps delivery to dental arches and occlusion. Pediatr Dent 1994;16:289–93.

29. Seidman DS, Laor A, Gale R, *et al.* Long-term effects of vacuum and forceps deliveries. Lancet 1991;337:1583-5,.

30. Johanson RB, Heycock E, Carter J, *et al*. Maternal and child health after assisted vaginal delivery: five-year follow up of a randomized controlled study comparing forceps and ventouse. Br J Obstet Gynaecol 1999;106:544.

31. Towner D, Castro MA, Eby-Wilkens E, *et al*. Effect of mode of delivery in nulliparous women on neonatal intracranial injury. N Engl J Med 1999;341:1709–14.

32. Jhawar BS, Ranger A, Steven D, *et al*. Risk factors for intracranial hemorrhage among fullterm infants: a case-control study. Neurosurgery 2003;52:581–90.

33. Smith YO, Cooke I, Mackenzie IZ. Decision to delivery intervals for assisted vaginal vertex delivery. Br J Obstet *and* Gynaecol. 2000;107:467-471.

34. Meyer S, Hohlfeld P, Achtare C, *et al*. Birth trauma: short and long term effects of forceps delivery compared with spontaneous delivery on various pelvic floor parameters. Br J Obstet Gynaecol 2000;107:1360.
35. Johanson RB, Menon BK. Vacuum extraction versus forceps for assisted vaginal delivery. Cochrane Database Syst Rev 2000:CD000224.
36. Vacca A. Vacuum-assisted delivery. Best Pract Res Clin Obstet Gynaecol 2002;16:17–30.
37. Simonson C, Barlow P, Dehennin N, *et al*. Neonatal complications of vacuum-assisted delivery. Obstet Gynecol 2007;109:626–33.
38. MacArthur C, Glazener CMA, Wilson PD, Herbison GP, Gee H, Lang GD *et al*. Obstetric practice and faecal incontinence three months after delivery. Br J Obstet and Gynaecol. 2001;108:678-83.
39. Wen SW, Liu S, Kramer MS, *et al*. Comparison of maternal and infant outcomes between vacuum extraction and forceps deliveries. Am J Epidemiol 2001;153:103–7.
40. Johanson RB, Menon V. Vacuum extraction versus forceps for assisted vaginal delivery. In The Cochrane Pregnancy and Childbirth Database. The Cochrane Collaboration; Issue 1, Oxford, Update Software, 2002.
41. Bollard RC, Gardiner A, Duthie GS: Anal sphincter injury, fetal and urinary incontinence: a 34-year follow-up after forceps delivery. Dis Colon Rectum 2003;46:1083.
42. Poggi SH, Ghidini A, Allen RH, Pezzullo CJ, Rosenbaum CT, Spong CY.Effect of operative vaginal delivery on the outcome of permanent brachial plexus injury. J Reprod Med 2003;48:692-96.

43. Uchil D, Arulkumaran S. Neonatal subgaleal hemorrhage and its relationship to delivery by vacuum extraction. Obstet Gynecol Surv 2003;58:687–93.
44. Davis DJ. Neonatal subgaleal hemorrhage: diagnosis and management. CMAJ 2001;164:1452–453.
45. Plauche WC. Subgaleal hematoma. A complication of instrumental delivery. JAMA 1980;244:1597–598.
46. Gebremariam A. Subgaleal haemorrhage: risk factors and neurological and developmental outcome in survivors. Ann Trop Paediatr 1999;19:45–50.
47. Perlman JM. Brain injury in the term infant. Semin Perinatol 2004;28:415–24.
48. Murphy DJ, Libby G, Chien P, *et al.* Cohort study of forceps delivery and the risk of epilepsy in adulthood. Am J Obstet Gynecol 2004;191:392.
49. Towner DR, Ciotti MC. Operative vaginal delivery: a cause of birth injury or is it? Clin Obstet Gynecol 2007;50:563–81.
50. Doumouchtsis SK, Arulkumaran S. Head trauma after instrumental births. clin perinatol 2008;35:69-83
51. Johanson RB, Menon V. Vacuum extraction versus forceps for assisted vaginal delivery. Cochrane Database of Systematic Reviews 1999;2:CD000224.
52. Nielsen PE, Gala HL, Operative vaginal delivery: Obstetrics normal and problem pregnancies 2012;15:312-329
53. Vaishnav G, Vaishnav J. Outlet forceps in modern era, a dangerous instrument or an art of obstetrics? medicine science 2012;1(3):171-76.
54. Meniru GI. An analysis of recent trends in vacuum extraction and forceps delivery in the United Kingdom. Br J Obstet *and* Gynecol 1996;103:168-70.

55. Kozak LJ, Weeks JD: US trends in obstetric procedures. 1990-2000. Birth 2002;29:157.

56. Auru H. Nayak, Asha R Dalal, Krittika G, Puranik. Fetal Outcome in vacuum and forceps delivery. J. Obstet *and* Gynecol 1992; 465-68.

57. Johanson RB, Rice C, Doyle M, Arthur J, Anyanwu L, Ibrahim J *et al*. A randomized prospective study comparing the new vacuum extractor policy with forceps delivery. Br J Obstet *and* Gynaecol. 1993;100:524-30.

58. Shihadeh A, Al-Najdawi W. Forceps or vacuum extraction: a comparison of maternal and neonatal morbidity. J Eastern Mediterranean Health 2001; 7: 106-14.

59. Kabiru WN, Jamieson D, Graves W, Lindsay M. Trends in operative vaginal delivery rates and associated maternal complication rates in an inner-city hospital. Am J Obstet *and* Gynaecol. 2001;184:1112-14.

60. Gardella C, Taylor M, Benedetti T, Hitti J, Critchlow C. The effect of sequential use of vacuum and forceps for assisted vaginal delivery on neonatal and maternal outcomes. Am J Obstet *and* Gynaecol 2001;185:896-902.

61. Broekhuizen FF. Vacuum extraction vs forceps delivery: indication and complication. J Obstet Gynecol 1987;69:338-42.

62. Johnson JH, Figueroa R, Garry D, Elimian A, Maulik D. Immediate maternal and neonatal effects of forceps and vacuum- assisted deliveries. Am J Obstet *and* Gynaecol. 2004;103:513-18.

63. Damania KR. The prophylactic silastic vacuum cup extraction. J Obstet *and* Gynaecol of Ind, 1989 Apr; 39(2): 190-92.

64. Williams MC, Knuppel RA, O'Brien WF *et al*. A randomized comparison of assisted vaginal delivery by obstetric forceps and polyethylene vacuum cup. Obstet Gynecol 1991;78;789-94.

65. M Shrivastava, Urvashi, Shrivastava and Anupama Shrivastava, Forceps application in selected cases. Asian J Obs *and* Gynae practices 2000;4:2.

66. Taylor E. Can mid-forceps operations be eliminated? Obstet Gynecol 1953;2:302-07.

67. Cosgrove RA, Weaver OS. An analysis of 1,000 consecutive mid forceps operations. Am J Obstet Gynecol 1957;73:556-58.

CASE PROFORMA

NAME: AGE: Yrs SEX: IP NO:

OCCUPATION: DOA:

ADDRESS: DOD:

EDUCATION:

HUSBANDS OCCUPATION:

SOCIOECONOMIC STATUS:

CHIEF COMPLAINTS:

HISTORY OF PRESENT ILLNESS:

OBSTETRIC HISTORY:

Marital life:

Consanguinity:

Obstetric formula:

Details of previous pregnancy:

Details of present pregnancy:

MENSTRUAL HISTORY

Last menstrual period: Age of menarche:

Expected delivery date: Past menstrual cycles:

Period of gestation:

Period of gestation according to early scan:

PAST HISTORY:

HTN/DM/BA/RHD/TB/DENGUE/MALARIA/BLOOD DYSCRASIAS/ Others

H/O blood transfusions: H/O Surgeries:

PERSONAL HISTORY:

Sleep and appetite: Diet:

Bowel and bladder: Addictions:

FAMILY HISTORY:

DRUG HISTORY:

GENERAL EXAMINATION:

Built: Nourishment:

Ht: …… cms Wt: ……. kgs BMI:

Pallor / Icterus/ Cyanosis/ Clubbing/ Lymphadenopathy/ Pedal oedema:

VITALS:

Pulse rate:

Respiratory rate:

Blood pressure

Temperature:

SYSTEMIC EXAMINATION:

Cardiovascular system:

Respiratory system:

Central nervous system:

PER ABDOMEN:

PER SPECULUM:

PER VAGINUM:

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

Blood group and Rh typing:

CBC: HB:	RBS:	HIV:
PCV:	Urine routine and microscopy:	HbsAG:
RBC:		VDRL:
WBC:		
PLT:		

OBSTETRICS SCAN:

Others:

MODE OF DELIVERY:

INDICATION:

DELIVERY DETAILS:

Date: APGAR SCORE:

Time: I min:

Sex: 5 min:

Birth weight:

LIQUOR:

PLACENTA AND CORD:

MATERNAL COMPLICATIONS: FETAL COMPLICATIONS:

TREATMENT GIVEN:

CONDITION AT DISCHARGE:

Mother: Baby:

CONSENT FOR OUTLET FORCEPS APPLICATION

I Mrs …… W/O Mr……

Residing at ……

……

In sound consciousness, I was explained regarding my condition i.e _____

_____

_____

_____

I was also explained the need for outlet forceps application to deliver the baby.I was also told the benefits and risks associated with forceps application in my own understandable language.I here by giving consent to the treating doctors for applying forceps.The decision was taken by me without any external influence. I also accept the risks associated with the outlet forceps application.

Signature of patient

Place:

Date:

Time: Signature of patient husband/ guardian

KEY TO MASTER CHART

AP	Antepartum
DOA	Date Of Admssion
DOD	Date Of Discharge
FB	Foetal Bradycardia
MSAF	Meconium Stained Amniotic Fluid.
Min	Minute
PC	Packed Cells
PE	Preeclampsia
PROM	Premature Rupture Of Membranes
LSCS	Lower Segment Caesarean Section.
HIE	Hypoxic Ischaemic Encephalopathy
MAS	Meconium Aspiration Syndrome
RHD	Rheumatic Heart Disease
KG	Kilogram
VD	Variable Deccelerations
NICU	Neonatal Intensive Care Unit

Master Chart

CASE NO	NAME	AGE (yrs)	HOSPITAL NO	DOA	DOD	DURATION OF HOSPITAL STAY (Days)	OBSTETRIC INDEX	OBSTETRIC COMPLICATIONS				ASSOCIATED MEDICAL DISORDERS			INDICATION FOR FORCEPS APPLICATION			BIRTH WEIGHT (KG)	MATERNAL COMPLICATIONS								FOETAL COMPLICATIONS							
								PREVIOUS LSCS	HYPERTENSIVE DISORDERS IN PREGNANCY	PROM	RH NEGATITVE	ANAEMIA	HEART DISEASE	BIOHAZARD	FOETAL DISTRESS	PROLONGED SECOND STAGE	TO CUT SHORT SECOND STAGE		EXTENSION OF EPISIOTOMY	VAGINAL TEAR	PARAURETHRAL TEAR	CERVICAL TEAR	PERINEAL TEAR	TRAUMATIC PPH	ATONIC PPH	BLOOD TRANSFUSIONS	APGAR AT 1 MIN	APGAR AT 5 MIN	NICU ADMISSION	MSAF	BIRTH ASPHYXIA	HIE	MAS	BIRTH INJURIES	EARLY NEONATAL MORTALITY
1	JYOTHI	25	875915	1/13/2013	1/18/2013	6	PRIMIGRAVIDA	-	-	-	-	-	-	HBSAG	VD	-	-	2.6	-	-	-	+	-	-	-	-	5	6	TMSAF	Thick	-	-	-	-	-
2	NAGAMANI	20	876755	1/16/2013	1/19/2013	3	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.9	-	-	-	-	-	-	-	-	5	8	-	-	-	-	-	-	-
3	RAJINI	18	875960	1/14/2013	1/18/2013	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.8	-	-	-	-	-	-	-	-	7	8	-	Thin	-	-	-	-	-
4	MALA	21	866214	1/21/2013	1/24/2013	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	3.6	-	+	-	-	-	-	-	-	5	7	Cephalohematoma	Thin	-	-	-	Cephalohematoma	-
5	VIJAYALAKSHMI	22	877963	1/21/2013	1/28/2013	8	G2P1L1	-	-	+	+	mild	-	-	-	-	anaemia	3.2	-	-	-	-	-	-	-	-	6	7	-	-	-	-	-	-	-
6	SAVITHA	22	874140	2/5/2013	2/7/2013	3	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.7	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
7	VARALAKSHMI	20	882609	2/6/2013	2/9/2013	4	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	2.9	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
8	SARASWATHI	20	884686	2/12/2013	2/18/2013	7	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.7	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
9	MUNEERA TAJ	20	885636	2/15/2013	2/18/2013	4	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	VD	-	-	2.5	-	-	-	-	-	-	-	-	7	9	-	Thin	-	-	-	-	-
10	VENKATAMMA	21	888057	2/25/2013	2/28/2013	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.9	+	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
11	KOUSER TAJ	22	894312	3/8/2013	3/11/2013	4	PRIMIGRAVIDA	-	-	-	-	severe	-	-	-	-	anemia	2.5	-	-	-	-	-	-	-	1 pint PC	6	8	-	-	-	-	-	-	-
12	JEELANI SULTANA	27	902033	3/16/2013	3/22/2013	7	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.7	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
13	RANI	20	902506	3/17/2013	3/20/2013	4	G3A2	-	-	-	-	-	-	-	VD	-	-	2.4	-	-	-	-	-	-	-	-	6	9	-	Thin	-	-	-	-	-
14	RENUKA	28	903651	4/22/2013	4/25/2013	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	3.5	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
15	LAKSHMI	20	905004	4/25/2013	4/29/2013	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	3.7	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
16	ARUNA	19	847891	4/27/2013	5/4/2013	9	PRIMIGRAVIDA	-	-	-	-	-	RHD	-	-	-	RHD	2.8	-	-	-	-	-	-	-	-	6	7	-	-	-	-	-	-	-
17	SOWMYA	21	907719	5/5/2013	5/9/2013	5	PRIMIGRAVIDA	-	Sev PE	-	+	-	-	-	VD	-	-	2.3	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	abrasion on right eyelid	-
18	MANJULA	20	909959	5/13/2013	5/20/2013	5	PRIMIGRAVIDA	-	-	-	+	-	-	-	VD	-	-	2.9	-	-	-	-	-	-	-	-	5	7	Birth asphyxia	Thin	+	-	-	-	-
19	ASHARANI	23	913035	5/23/2013	5/27/2013	5	G2A1	-	-	-	-	severe	-	-	-	-	anemia	3	-	-	-	-	-	-	-	2 Pints PC	5	8	-	-	-	-	-	-	-
20	PARVATHAMMA	28	915927	6/2/2013	6/6/2013	5	G3P1L1A1	+	-	-	-	-	-	-	-	-	VBAC	3.4	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	
21	SWAPNA	22	916989	6/6/2013	6/11/2013	6	G2P1L1	-	-	-	-	-	-	-	VD	-	-	2.7	-	-	-	-	-	-	-	-	7	8	-	Thin	-	-	-	-	-
22	SHABEENA	22	920834	6/19/2013	6/23/2013	5	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2.9	-	+	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
23	UMADEVI	35	910715	6/20/2013	6/25/2013	6	G3P1L1A1	-	-	-	-	-	-	-	-	+	-	2.9	+	-	-	-	II degree	+	-	2 Pints PC	8	9	-	-	-	-	-	-	-
24	MEENAKSHI	22	922567	6/26/2013	6/29/2013	4	G2P1L0	-	-	-	-	-	-	-	VD	-	-	3.6	-	-	-	-	-	-	-	-	4	6	Birth asphyxia	Thin	+	HIE II	-	-	-
25	GOWRAMMA	20	922940	6/27/2013	6/30/2013	4	G3A2	-	-	-	+	-	-	-	VD	-	-	2.4	-	-	-	-	-	-	-	-	7	8	TMSAF	Thick	-	-	-	-	-
26	NAGAVENI	21	923895	7/1/2013	7/6/2013	6	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.6	+	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
27	PAVITRA	20	922764	7/4/2013	7/10/2013	7	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.5	-	-	-	-	-	-	-	-	5	7	-	Thin	-	-	-	-	-
28	MEENAKSHI	24	924872	7/3/2013	7/9/2013	7	G2P1L1	-	-	-	-	-	-	-	FB	-	-	2.8	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
29	LAKSHMI DEVI	20	926206	7/9/2013	7/14/2013	6	PRIMIGRAVIDA	-	-	-	-	severe	-	-	-	-	anemia	3.4	-	-	-	-	-	-	-	2 Pints PC	7	9	-	-	-	-	-	-	-
30	VEENA	25	922847	7/16/2013	7/22/2013	7	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	3.9	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
31	AMREEN TAJ	19	929775	7/22/2013	7/27/2013	6	G2A1	-	-	-	-	-	-	-	FB	-	-	3	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
32	BHARATI	27	874177	7/29/2013	8/2/2013	5	PRIMIGRAVIDA	-	-	-	+	-	-	-	VD	-	-	2.8	-	-	-	-	-	-	-	-	5	6	TMSAF	Thick	-	-	-	-	-
33	HAMIDA KHANUM	30	938833	8/21/2013	8/24/2013	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.9	-	-	-	-	-	-	-	-	8	9	-	-	-	-	-	-	-
34	RATNAMMA	25	939634	8/24/2013	8/26/2013	3	G3A2	-	-	-	+	-	-	-	-	+	-	2	-	-	-	-	-	-	-	-	5	8	-	-	-	-	-	-	-
35	SUNANDA	25	941518	8/29/2013	9/1/2013	4	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.5	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
36	ROOPA	26	942325	9/2/2013	9/6/2013	5	PRIMIGRAVIDA	-	-	-	-	severe	-	-	-	-	anemia	2.2	-	-	-	-	-	-	-	2 Pints PC	7	9	Hypoglycemia	-	-	-	-	-	-
37	SANDHYA	20	942683	9/3/2013	9/10/2013	8	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.9	-	-	+	-	-	-	-	-	3	6	TMSAF	Thick	-	-	-	-	-
38	SUJATHA	25	943424	9/4/2013	9/8/2013	5	G3P2L1D1	+	-	-	-	-	-	-	-	-	VBAC	3.4	-	-	-	-	-	-	-	-	3	6	Birth asphyxia	Thin	+	-	-	-	-
39	LAKSHMI	27	944441	9/8/2013	9/12/2013	5	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.9	-	-	-	-	-	-	-	-	8	9	-	-	-	-	-	-	-
40	SARASWATHI	20	947399	9/18/2013	9/22/2013	5	G2A1	-	-	-	-	-	-	-	FB	-	-	3.4	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
41	GAYATRI	28	952820	10/7/2013	10/11/2013	5	PRIMIGRAVIDA	-	Sev PE	-	-	severe	-	-	FB	-	-	2.8	-	-	-	-	-	-	-	-	6	8	TMSAF	Thick	-	-	-	-	-
42	REKHA	24	954511	10/13/2013	10/17/2013	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	FB	-	-	2.9	-	-	-	-	-	-	-	-	3	6	Birth asphyxia	-	+	-	-	-	-

Master Chart

CASE NO	NAME	AGE (yrs)	HOSPITAL NO	DOA	DOD	DURATION OF HOSPITAL STAY (Days)	OBSTETRIC INDEX	OBSTETRIC COMPLICATIONS				ASSOCIATED MEDICAL DISORDERS			INDICATION FOR FORCEPS APPLICATION			BIRTH WEIGHT (KG)	MATERNAL COMPLICATIONS								FOETAL COMPLICATIONS							
								PREVIOUS LSCS	HYPERTENSIVE DISORDERS IN PREGNANCY	PROM	RH NEGATITVE	ANAEMIA	HEART DISEASE	BIOHAZARD	FOETAL DISTRESS	PROLONGED SECOND STAGE	TO CUT SHORT SECOND STAGE		EXTENSION OF EPISIOTOMY	VAGINAL TEAR	PARAURETHRAL TEAR	CERVICAL TEAR	PERINEAL TEAR	TRAUMATIC PPH	ATONIC PPH	BLOOD TRANSFUSIONS	APGAR AT 1 MIN	APGAR AT 5 MIN	NICU ADMISSION	MSAF	BIRTH ASPHYXIA	HIE	MAS	BIRTH INJURIES	EARLY NEONATAL MORTALITY
43	ANITHA	23	964713	11/19/2013	11/22/2013	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.7	-	-	-	-	-	-	-	-	4	8	-	-	-	-	-	-	-
44	NAZIHUNNISA	30	972401	12/16/2013	12/20/2013	5	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	3.2	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
45	NAZIMA TAJ	25	979394	1/9/2014	1/12/2014	4	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	3.6	-	-	-	-	-	-	-	-	3	8	TMSAF	Thick	-	-	-	-	-
46	PADMA	32	973605	1/16/2014	1/20/2014	5	G5P4L2D2	-	-	-	-	-	-	-	VD	-	-	2.7	-	-	-	-	-	-	+	1 pint PC	7	9	-	Thin	-	-	-	-	-
47	LAKSHMI	19	983207	1/21/2014	1/27/2014	7	PRIMIGRAVIDA	-	-	-	-	moderate	-	-	-	-	anemia	2.9	-	-	-	-	-	-	+	2 Pints PC	7	9	-	-	-	-	-	-	-
48	GAYATRI	20	983922	1/21/2014	1/28/2014	8	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	3	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
49	KAVITHA	23	985047	1/27/2014	2/6/2014	11	PRIMIGRAVIDA	-	-	-	-	-	-	-	FB	-	-	2.6	-	+	-	+	III degree	+	-	1 pint PC	2	4	Birth asphyxia	Thin	+	HIE I	-	-	-
50	NOOR HUSNA	20	985719	1/29/2014	1/31/2014	3	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.4	-	-	-	-	-	-	-	-	7	9	-	Thin	-	-	-	-	-
51	MUNILAKSHMI	21	990494	2/14/2014	2/17/2014	4	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2.8	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
52	NIRMALA	20	991583	2/17/2014	2/19/2014	3	PRIMIGRAVIDA	-	-	-	-	mild	-	-	-	-	anemia	3.2	-	-	-	-	-	-	-	-	8	9	-	-	-	-	-	-	-
53	ROOPA	23	992824	2/21/2014	2/24/2014	4	PRIMIGRAVIDA	-	-	-	-	severe	-	-	-	-	anemia	3.5	-	-	-	-	-	-	-	3 pint PC	7	8	-	-	-	-	-	-	-
54	VIJAYAMMA	20	993143	2/21/2014	2/25/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.5	-	-	-	-	-	-	+	1 pint PC	7	8	-	Thin	-	-	-	-	-
55	SHYLAJA	19	989355	2/21/2014	2/25/2014	5	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2.4	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
56	RADHIKA	22	997290	3/4/2014	3/13/2014	10	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.3	+	-	-	-	-	-	-	-	7	9	-	Thin	-	-	-	-	-
57	SWETHA VINOD	24	994674	3/9/2014	3/12/2014	4	G2A1	-	-	-	-	-	-	-	FB	-	-	2.7	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
58	MANJULA	22	999075	3/10/2014	3/13/2014	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.6	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
59	ANITHA	26	992358	3/12/2014	3/15/2014	4	PRIMIGRAVIDA	-	-	+	-	-	-	-	-	+	-	3.7	-	-	-	-	-	-	-	-	6	9	-	-	-	-	-	-	-
60	VINDHYA	18	1E+06	3/18/2014	3/26/2014	9	PRIMIGRAVIDA	-	-	-	-	-	-	-	FB	-	-	2.5	-	-	-	-	-	-	-	-	3	7	MAS	Thick	-	-	+	-	-
61	BHARATI	30	940943	3/19/2014	3/24/2014	6	G2P1L1	-	-	-	-	-	-	-	VD	-	-	2.8	-	-	-	-	-	-	-	-	7	8	-	Thin	-	-	-	-	-
62	BHUVANESWARI	26	1E+06	3/20/2014	3/26/2014	7	PRIMIGRAVIDA	-	AP eclampsia	-	-	-	-	-	-	-	eclampsia	2.7	+	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
63	YELLAMMA	24	1E+06	4/1/2014	4/4/2014	4	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	2.9	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
64	KULSAR BEE	28	1E+06	4/2/2014	4/6/2014	5	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	3	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
65	ARUNA	25	1E+06	4/4/2014	4/7/2014	4	G4P3L1D2	+	-	-	-	-	-	HBSAG	-	-	VBAC	2.8	-	-	-	-	II degree	-	-	-	7	9	-	-	-	-	-	-	-
66	SARASWATHI	22	1E+06	4/7/2014	4/11/2014	5	PRIMIGRAVIDA	-	-	-	-	-	RHD	HIV	-	-	RHD	2.7	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
67	RUKSAR	26	1E+06	4/7/2014	4/11/2014	5	G2A1	-	-	-	-	-	-	-	FB	-	-	2.8	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
68	CHANDRAMMA	20	1E+06	4/19/2014	4/24/2014	6	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.9	-	-	-	-	-	-	-	-	2	6	TMSAF	Thick	-	-	-	-	-
69	ANURADHAMMA	30	1E+06	4/19/2014	4/22/2014	4	PRIMIGRAVIDA	-	-	-	-	moderate	-	-	-	-	anemia	2.7	-	-	-	-	-	-	-	-	5	8	-	-	-	-	-	-	-
70	KOKILA	20	1E+06	4/20/2014	4/24/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	FB	-	-	2.5	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
71	JYOTHI	21	1E+06	4/22/2014	4/29/2014	8	PRIMIGRAVIDA	-	-	-	-	-	-	HBSAG	VD	-	-	2.7	-	-	-	-	-	-	-	-	3	7	TMSAF	Thick	-	-	-	-	-
72	JANCY DAYANA	30	963727	4/24/2014	4/29/2014	6	G7P2L2A4	-	-	-	-	-	-	-	VD	-	-	3.4	-	-	-	-	-	-	-	-	2	6	Birth asphyxia	Thin	+	-	-	-	-
73	BHAVYA	25	761	4/27/2014	4/30/2014	4	G2A1	-	-	-	-	-	-	-	FB	-	-	2.6	-	-	-	-	-	-	-	-	6	9	-	-	-	-	-	-	-
74	SRIDEVI	28	1E+06	4/23/2014	4/28/2014	6	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	3.7	+	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
75	SOWMYA SREE	20	1E+06	4/22/2014	4/26/2014	5	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
76	SUMEENA TAJ	24	1494	5/1/2014	5/5/2014	5	G2A1	-	-	-	-	-	-	-	-	+	-	2.9	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
77	SUMAVATHI	25	2910	5/6/2014	5/10/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.9	-	-	-	-	-	-	-	-	6	9	-	Thin	-	-	-	-	-
78	VARALAKSHMI	23	4054	5/11/2014	5/15/2014	5	G3P1L1A1	-	-	-	-	-	-	-	FB	-	-	2.6	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
79	PRIYANKA	22	4059	5/12/2014	5/14/2014	3	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.8	-	-	-	-	-	-	-	-	5	8	-	-	-	-	-	-	-
80	ASHWINI	24	5008	5/14/2014	5/18/2014	4	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	3.2	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
81	KALAVATHI	28	8120	5/21/2014	5/25/2014	5	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	2.5	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
82	SHASHIKALA	21	8218	5/21/2014	5/26/2014	6	PRIMIGRAVIDA	-	-	-	+	-	-	-	VD	-	-	2.4	-	-	-	-	-	-	-	-	7	9	-	Thin	-	-	-	-	-
83	RIZWANA	27	8492	5/22/2014	5/26/2014	5	G3P1L1A1	-	-	-	-	-	-	-	-	+	-	2.9	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
84	UMA	19	9131	5/24/2014	5/27/2014	4	PRIMIGRAVIDA	-	Sev PE	-	-	-	-	-	-	-	PE	2.8	-	-	-	-	-	-	-	-	6	8	-	-	-	-	-	-	-
85	SHILPA	23	9428	5/25/2014	5/29/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.5	-	-	-	-	-	-	-	-	5	6	TMSAF	Thick	-	-	-	-	-
86	BHARATI	22	10125	5/27/2014	5/31/2014	5	G2P1L1	-	-	-	-	-	-	-	FB	-	-	2.9	-	-	-	-	-	-	-	-	4	6	Birth asphyxia	-	+	-	-	-	-
87	ASHWINI	20	10757	5/28/2014	6/2/2014	6	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2.8	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
88	GOWTHAMI	22	10859	5/28/2014	5/1/2014	5	G2P1L1	+	-	-	-	-	-	-	-	-	VBAC	3.1	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
89	SUGUNA	19	15028	6/8/2014	6/12/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.5	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-

Master Chart

CASE NO	NAME	AGE (yrs)	HOSPITAL NO	DOA	DOD	DURATION OF HOSPITAL STAY (Days)	OBSTETRIC INDEX	OBSTETRIC COMPLICATIONS				ASSOCIATED MEDICAL DISORDERS			INDICATION FOR FORCEPS APPLICATION			BIRTH WEIGHT (KG)	MATERNAL COMPLICATIONS								FOETAL COMPLICATIONS								
								PREVIOUS LSCS	HYPERTENSIVE DISORDERS IN PREGNANCY	PROM	RH NEGATITVE	ANAEMIA	HEART DISEASE	BIOHAZARD	FOETAL DISTRESS	PROLONGED SECOND STAGE	TO CUT SHORT SECOND STAGE		EXTENSION OF EPISIOTOMY	VAGINAL TEAR	PARAURETHRAL TEAR	CERVICAL TEAR	PERINEAL TEAR	TRAUMATIC PPH	ATONIC PPH	BLOOD TRANSFUSIONS	APGAR AT 1 MIN	APGAR AT 5 MIN	NICU ADMISSION	MSAF	BIRTH ASPHYXIA	HIE	MAS	BIRTH INJURIES	EARLY NEONATAL MORTALITY
90	YASMEEN TAJ	22	18242	6/12/2014	6/16/2014	5	PRIMIGRAVIDA	-	-	-	-	severe	-	-	-	-	anemia	2.8	-	-	-	-	-	-	-	2 Pints PC	6	9	-	-	-	-	-	-	-
91	ARFA FIRDOZ	18	18529	6/17/2014	6/20/2014	4	PRIMIGRAVIDA	-	-	-	+	-	-	-	-	+	-	2.4	-	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
92	NARAYANAMMA	30	18255	6/17/2014	6/21/2014	5	G3P2L2	-	-	-	-	mild	-	-	-	-	anemia	2.8	-	-	-	-	-	-	-	-	-	8	9	-	-	-	-	-	-	-
93	RAMA DEVI	28	20434	6/22/2014	6/27/2014	6	G3P2L2	-	Sev PE	-	-	-	-	-	-	-	PE	3.4	-	-	-	-	-	-	+	1 pint PC	8	9	-	-	-	-	-	-	-
94	BHAVANI	21	20289	6/21/2014	6/23/2014	3	PRIMIGRAVIDA	-	Mild PE	-	-	-	-	-	-	-	PE	3.1	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
95	KAVITHA	22	20745	6/23/2014	6/26/2014	4	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.6	-	-	-	-	-	-	-	-	7	9	-	-	-	-	-	-	-
96	SULTANA BEGUM	20	20987	6/23/2014	6/27/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.9	-	-	-	-	-	-	-	-	5	7	-	Thin	-	-	-	-	-
97	SUDHA	23	21443	6/25/2014	6/30/2014	6	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	3.1	-	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
98	SUKANYA	22	21363	6/23/2014	6/28/2014	6	PRIMIGRAVIDA	-	-	-	-	-	-	-	VD	-	-	2.6	-	-	-	-	-	-	-	-	7	8	-	Thin	-	-	-	-	-
99	LAKSHMI	30	23623	6/30/2014	7/4/2014	5	PRIMIGRAVIDA	-	-	-	-	-	-	-	-	+	-	2.8	+	-	-	-	-	-	-	-	7	8	-	-	-	-	-	-	-
100	RAZIYA SULTANA	20	23096	6/28/2014	7/3/2014	6	G2A1	-	-	-	-	mild	-	-	FB	-	-	3.4	-	-	-	-	-	-	-	-	5	7	-	Thin	-	-	-	-	-