

AN EIGHT YEAR EXPERIENCE WITH THE USE OF KIELLAND'S FORCEPS IN SINGAPORE

K Singh
O Viegas
S H Heng
S S Ratnam

University Department of Obstetrics and
Gynaecology
Kandang Kerbau Hospital
Hampshire Road
Singapore 0821

K Singh, MBBS (S'pore), M Med (O & G) (S'pore),
MRCOG (London)
Lecturer

O Viegas, MBChB, MRCOG, MD (UK), DA, AM
Senior Lecturer

S H Heng, B Sc (Hons) (Birmingham)
Biostatistician

S S Ratnam, MD, AM, FRCS, FRCSEd, FRCSG,
FACS, FRACS, FRCOG, FRACOG (Hon)
Professor and Head

SYNOPSIS

An eight year experience with the use of Kielland's forceps for rotation of the fetal head and delivery at the Kandang Kerbau Hospital, Singapore, is presented.

Out of a total of 62,753 singleton births during this period, 398 were delivered by this method giving an overall incidence of rotation delivery using Kielland's forceps of 0.63% with an incidence of 1.17% in primiparae and 0.17% in multiparae.

Induction of labour and primiparity were associated with a significantly higher incidence of rotation delivery. The majority of patients requiring Kielland's forceps delivery had labours in excess of 11 hours; they were significantly taller and produced heavier babies.

There was no maternal mortality but more than a third of the mothers experienced postpartum morbidity. The neonatal mortality rate attributable to use of the forceps was 7.5 per 1000 and babies delivered with Kielland's forceps however, had a significantly higher incidence of neonatal jaundice.

We believe that the lowered incidence of malrotation of the fetal head necessitating Kielland's forceps delivery in our practice compared with other reported studies may reflect our conservative attitude to obstetric interventions such as the use of lumbar epidural analgesia in labour or liberal policies for induction of labour. Careful selection of patients based on cervicometric progress in labour and continuous intrapartum fetal monitoring will play an important role in preventing any morbidity due to instrumentation.

INTRODUCTION

Since the introduction of Kielland's forceps into clinical obstetrics in 1916, (1) there has been considerable debate regarding their safety and efficacy. Some reports have drawn clear associations between the use of these forceps and poor perinatal outcome (2, 3, 4) so that there has, in some countries, been a tendency to recommend caesarean section as the better alternative for delivery when there is a malposition of the fetal occiput. (5)

Recent studies have provided conflicting results as regards perinatal outcome; some have reported a neonatal mortality rate attributable to the use of the forceps as high as 34.9% per 1000 (4) whilst others have observed no mortality. (6) These studies however involved relatively small numbers and were undertaken in centres where important variables such as continuous epidural analgesia was 'available on request' and different policies on induction of labour were practiced. Such conflicting results on limited data also stress the need for each delivery unit to assess their own experiences with the use of the forceps so that relevant recommendations may be made that would favourably influence obstetric outcome within a particular unit. We have therefore undertaken this retrospective analysis to assess as fully as possible, the place for Kielland's forceps delivery in our population in a hospital where obstetric intervention is kept to a minimum. We did not set out to seek alternative methods of delivery as there is already good evidence that the only realistic alternative i.e. caesarean section is not better. (6)

PATIENTS AND METHODS

All 398 patients who were delivered with Kielland's forceps between 1.1.76 and 31.12.83 were included in the study and their case histories examined. The influence of various antenatal and intrapartum factors on perinatal outcome after the use of the forceps was analysed. All patients received routine antenatal care but delivery with Kielland's forceps was always carried out by a specialist obstetrician or under his direct supervision in theatre. None of the patients received epidural analgesia in labour and continuous intrapartum heart rate monitoring was performed in selected cases only. Cervical dilatation was assessed by serial vaginal examinations in labour and the results were displayed on a partogram. Indications for the use of Kielland's forceps were examined; a prolonged second stage which accounted for 83% of deliveries was defined arbitrarily as one lasting for more than 60 minutes in a primiparous patient and longer than 30 minutes in a multipara. Outcome at birth and early neonatal progress of the infant were also recorded. Neonatal jaundice was diagnosed when the total serum bilirubin concentration exceeded 10 mg per 100 ml.

A random selection of 64 babies completing their second year were subjected to neuro-developmental tests and their performances compared with those of 60 babies delivered normally by the vertex.

The 'students t test' was used to compare mean values between groups where relevant and the χ^2 test with Yates' correction used to compare frequencies between groups.

All patients having singleton vaginal births in 1983 excluding elective Caesarean section births and Kielland's forceps deliveries ($n = 7466$) were used to derive data such as mean birthweight, maternal height and duration of labour. The Kolmogorov-Smirnov test was used when cumulative frequencies were compared for statistical testing.

RESULTS

During the period of the study there was a total of 62753 singleton births; 29349 (46.8%) were in primiparae and 33404 (53.2%) were in multiparae. There were 398 babies delivered with Kielland's forceps giving an overall incidence of 0.63% for the use of this instrument, 342 (1.16%) were in primiparae and 56 (0.17%) were in multiparae ($p < 0.001$).

Labour was induced in 6778 birth (10.8%) but these accounted for 20.4% of babies delivered with Kielland's forceps. Indications for the use of Kielland's forceps are outlined in Table I and the association between induction of labour and parity in relation to the malposition of the occiput in Figure 1.

TABLE I INDICATIONS FOR THE USE OF KIELLAND'S FORCEPS

INDICATION	NO (%)
Delayed 2nd Stage	331 (83.2%)
Fetal distress	56 (14.1%)
"Prophylactic"	
Previous LSCS	
Severe preeclampsia	4 (1%)
Maternal distress	7 (1.8%)

Maternal Characteristics (Figure 2)

Overall, mothers requiring Kielland's forceps delivery were significantly taller compared with other mothers ($159 \text{ cm} \pm 6.8$ cf $155 \text{ cm} \pm 5.1$; $p < 0.001$) but they also had significantly heavier babies ($3286 \text{ g} \pm 398$ cf $3122 \text{ g} \pm 491$; $p < 0.001$). These mothers also had significantly longer labours. Cumulative distributions of maternal height, birth weight and duration of labour are shown in Figure 2.

Maternal Complications

There were no maternal deaths but one patient required urgent hysterectomy for a ruptured uterus (Table II). During the puerperium, 45 patients developed retention of urine requiring bladder catheterisation. There was also one case of rectovaginal fistulae successfully repaired 6 weeks after delivery. Maternal complications during delivery and the puerperium are listed in Table II.

98% of the babies had birth Apgars of more than 7 at 5 minutes but 29 required admission to SCBU of which only 7 were detained therein for more than 48 hours. Birth injuries were present in 66 neonate (16.5%) and these are listed in Table III.

The most common injury was cephalohaematoma occurring in 7.8% of cases. Facial bruising occurred in 6.8% of patients and 2 nerve palsies were recorded. Neonatal jaundice was recorded in 107 (27% of the infants) compared with 4% of the general population (7) ($p < 0.01$).

Difficulties during application (21 cases); rotation (28 cases) and traction (10 cases) were noted and in 3 cases resulted in fetal death attributed to the traumatic delivery — Table IV. All 3 patients showed no evidence of abnormalities on continuous intrapartum foetal heart rate monitoring and pelvimetry in the postnatal period excluded any degree of pelvic contraction. All the mothers however were below the mean height of the general population and birthweight did not seem markedly excessive. All 3 cases were induced and had long labours; in all 3 cases delivery could not be achieved with Kielland's forceps. Two required delivery



Figure 1 The association between induction of labour and parity in relation to malposition of the occiput in the second stage of labour.

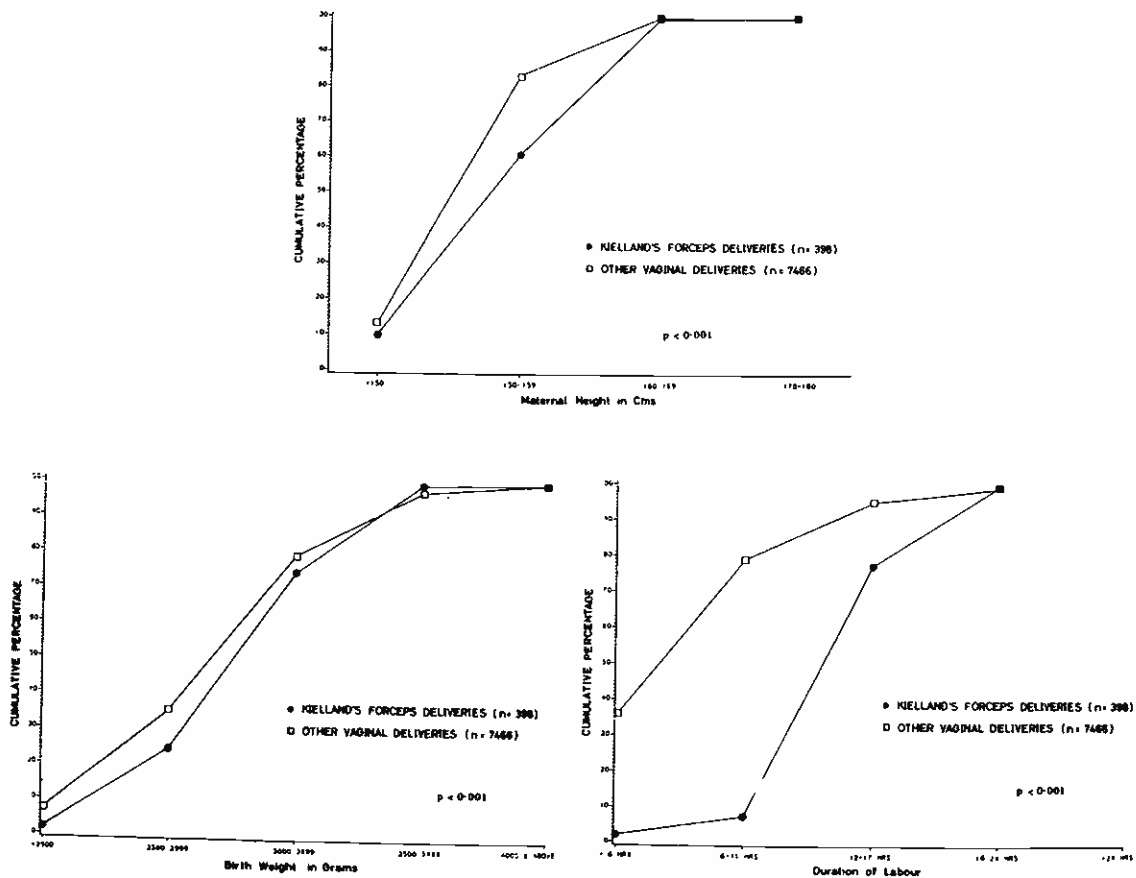


Figure 2 Cumulative distributions of maternal height, birthweight and duration of labour in relation to malposition of the fetal occiput in the second stage of labour necessitating the use of Kielland's forceps for rotation and delivery.

TABLE II MATERNAL COMPLICATIONS ASSOCIATED WITH KIELLAND'S FORCEPS

	No (%)
THIRD STAGE	
Vaginal laceration	74 (18.6)
Postpartum haemorrhage requiring blood transfusion	48 (12.1)
Manual removal of placenta	24 (6.0)
Haematuria	8 (2.0)
Third degree tears	8 (2.0)
Cervical laceration	8 (2.0)
Rupture of uterus	1 (0.3)
PUERPERAL	
Retention of urine	45 (11.3)
Urinary tract infection	24 (6.0)
Anaemia	20 (5.0)
Breakdown of episiotomy	8 (2.0)
Genital tract infectin	4 (1.0)
Recto-vaginal fistulae	1 (0.3)

TABLE III NEONATAL MORBIDITY ASSOCIATED WITH KIELLAND'S FORCEPS

	No (%)
BIRTH APGARS AT 5 MINUTES	
SCORE 6 or more	390 (98.0)
6	8 (2.0)
ADMISSION TO SCBU	29 (7.3)
NEONATES REQUIRING INTUBATION	11 (2.8)
BIRTH TRAUMA	
Cephalohaematoma	31 (7.8)
Facial bruising	27 (6.8)
Nerve palsy	2 (0.5)
Fracture clavicle	2 (0.5)
Intracranial haemorrhage	3 (0.8)
NEONATAL JAUNDICE (serum bilirubin 10 mgm%)	107 (26.9)

TABLE IV DETAILS OF THE 3 NEONATAL MORTALITIES

Patient	Gestation (weeks)	Birth weight (grams)	Maternal Height (cms)	Labour	Duration of labour (hrs)	Difficulty encountered at delivery	Post Mortem Findings	Maternal Morbidity
1	41	3400	150	Induced	18	Easy application but considerable difficulty with rotation and extraction	Bilateral tentorial tears; I-V haemorrhage haemoperitoneum. Died within 15 minutes of birth.	Ruptured uterus causing PP collapse and emergency hysterectomy.
2	41	3160	154	Induced	21	Considerable difficulty application and failure to rotate the occiput despite several attempts. Emergency CS done 45 mins after first application of Kielland's forceps.	Intracerebral haemorrhage with tentorial tears. Neonatal death after 48 hours.	None
3	42	2880	144	Induced	20	Difficulty with application and failure to rotate despite several attempts. Emergency LSCS undertaken 60 mins after intact application of Kielland's forceps.	Intracranial haemorrhage with tentorial tears — death occurring 30 minutes after birth.	None

by caesarean section and one by Neville Barnes forceps in this study giving an incidence of 0.75% for failed forceps — a much lower incidence than reported by Cardozo et al who recorded an incidence of 27.7% in their primiparae. (6)

Of the 64 patients selected randomly for a 2 year assessment by a paediatrician who remained blind to the mode of delivery, developmental tests showed no significant difference between Kielland's forceps delivered babies compared with 60 children born normally (Figure 3).

DISCUSSION

There were 3 neonatal deaths from tentorial tears attributable to Kielland's forceps during the period of study. The neonatal mortality rate was therefore 7.5 per

1000. In all these 3 cases, labour was induced and none of the babies demonstrated any signs of fetal distress on continuous fetal heart rate monitoring prior to delivery. The overall neonatal mortality rate in the Unit during this period for infants weighing >1000 g was 5.04 per 1000 so that the mortality rate associated with Kielland's forceps delivery, at least in our practice, is unacceptably high. This is consistent with findings in the British Perinatal Mortality Survey (2) and the more recent data of Chiswick and James. (4) All infants were delivered following induced labours lasting longer than the mean duration of labour in our population. But they were all delivered by specialist obstetricians so that the skill of the operator, arguably, is unlikely to have been, an important factor in these deaths. Furthermore, xray pelvimetry in all 3 cases revealed no pelvic contraction that could account for the difficulties encountered

during delivery. We have not compared this form of rotation with any other as there is evidence to show that the mortality rate is independent of the method of rotation used (8) and these findings support O'Driscoll's view of the dangers implicit in the delivery of a malrotated occiput rather than any special risk of Kielland's instrument. (9)

Based on this hypothesis and the conflicting results of the dangers associated with Kielland's forceps deliveries, in the recent major studies (4, 6, 8) we believe that emphasis must be placed on attempts at minimizing the incidence of malrotation in addition to perfecting the method of use of this instrument.

The incidence of rotation delivery in this study is lower than those reported by the other works. (4, 6) In Chiswick's series, 66% of primiparae were induced and epidural analgesia used in 67% of primiparae; in the study by Cardozo et al, induction of labour was performed in 10% of cases only but epidural analgesia was used in 22% of primiparae and 13% of multiparae. The incidence of rotation and delivery with Kielland's forceps was 2.1% and 2.95% respectively compared with 0.63% in this study where the induction rate was 10.8% overall and epidural analgesia not provided. A significant relationship between epidural analgesia and malrotation has been shown (10, 11) and the results of this study support such findings. Furthermore, the liberal use of induction of labour although controversial, (12) has also been associated with an increased incidence of malposition of the occiput. Such observations serve as a reminder that there is no room for complacency when such forms of obstetric intervention are undertaken and the value of these procedures must be assessed critically on an individual basis.

We could not confirm the relationship between short maternal stature and malrotation. Indeed, mothers requiring rotation delivery were significantly taller than those mothers giving birth spontaneously. Their birth-weights however are correspondingly heavier. Interestingly, although all 3 neonatal deaths occurred in mothers below average height, no skeletal pelvic contraction could be identified on radiological assessment of their pelvis. It appears therefore that factors resulting in malrotation of the occiput cannot be explained solely in terms of 'mechanical factors' such as maternal height, birth weight or pelvic dimensions. The duration of labour in those mothers requiring Kielland forceps deliveries was significantly longer stressing the need for a strict protocol for augmentation of labour using partograms and a labour stencil as recommended by Studd. (13)

The incidence of fetal morbidity (16.5%) is consistent with other studies and serves to illustrate the potential dangers associated with Kielland forceps in an individual patient. (14, 15) The significantly higher incidence of jaundice in babies delivered with Kielland's forceps was probably accounted for by the greater incidence of cephalhaematoma and facial bruising. We however, did not record any cases of transient neurological abnormalities described by Chiswick and only a small number of infants required admission to SCBU for more than 24 hours. Indeed, a major finding of our study is that the neurological development of those infants delivered with Kielland's forceps was no different from that in infants born normally by the vertex.

Clearly, it would be wrong to make any generalizations on the basis of a few disasters in which the forceps have been implicated. In our practice at least, we should aim to minimize those factors responsible for malrotation by implementing strict protocols for the

use of induction or augmentation of labour and the use of epidural analgesia in labour and meticulous monitoring of cervimetric progress in labour. As regards the use of Kielland's forceps, we strongly recommend the safeguards outlined by Paintin. (16)

All 3 perinatal deaths in this series can be attributed to unnecessary perseverance on the part of the obstetrician. This factor combined with the use of a variety of instruments to achieve a vaginal delivery makes for bad obstetric practice amounting to negligence which cannot be justified. In our view there is no place in current obstetric practice for difficult rotational delivery. Recognition of such possible difficulty must be followed by a formal "trial of forceps" in theatre with anaesthetic facilities available so that an emergency caesarean section can be resorted to in good time.

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