

KIELLAND'S FORCEPS DELIVERY: IS IT A DYING ART?

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ABSTRACT

A retrospective study in the use of Kielland's Forceps for rotation of the foetal head and mid-cavity delivery in Kandang Kerbau Hospital, Singapore from 1987 - 1990 is presented.

Out of a total of 53,889 singleton births during this period, Kielland's Forceps was used for delivery in 137 (0.25%) patients with an incidence of 0.65% in the primiparae and 0.07% in the multiparae. Primiparity, induction of labour and epidural analgesia were associated with a significantly higher incidence of rotational delivery by Kielland's forceps. The success rate of Kielland's forceps delivery was 93.4% (128 of 137).

There was no maternal or perinatal mortality. About one-third of the mothers experienced postpartum morbidity, commonest being retention of urine, postpartum haemorrhage and vaginal lacerations. Traumatic injuries were present in about one-quarter of the babies and were minor.

Out of a total of 306 mid-cavity deliveries for occipitotransverse malposition, Kielland's forceps accounted for 38.2% (117), vacuum extraction 30.7% (94), manual rotation followed by Neville-Barnes forceps 11.1% (34) and Caesarean section 20.0% (61). The junior specialists tended to use vacuum extraction for rotational delivery more than the senior specialists.

Keywords: *Kielland's forceps, mid-cavity rotational delivery, complications, maternal, neonatal*

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INTRODUCTION

Non traumatic, mid-cavity rotational delivery by Kielland's forceps remains one of the few surgical procedures that sets the skilful obstetrician apart from other surgical colleagues. Christian Kielland (1916) designed his obstetric forceps primarily for application to the non-engaged foetal head, but in modern obstetrics, high forceps delivery has been replaced by Caesarean section. The Kielland's forceps is now used in the mid-pelvis for rotation of the foetal head from a persistent occipito-posterior position or arrested transverse position. Since its introduction in 1916, the use of the Kielland's forceps has been shrouded in considerable debate regarding its safety and efficacy. Some reports have shown clear association between the use of these forceps and poor perinatal outcome^(1,2). Chiswick and James⁽¹⁾ reported a neonatal mortality rate attributable to the use of the Kielland's forceps of 34.9 per 1000 for their population in 1976. Singh showed 3 neonatal deaths from tentorial tears in a local study of 398 patients from 1976 to 1983 where Kielland's forceps were used for delivery, giving a neonatal mortality of 7.5 per 1000 attributable to the use of the forceps⁽²⁾. However, Chow in 1987⁽³⁾ showed that even in the presence of foetal distress, Kielland's forceps can be safely employed for rotational delivery if performed by a skilled obstetrician and with strict guidelines.

The aims of the study are to analyse all the Kielland's forceps deliveries including the maternal and neonatal complications arising from its use, as well as to assess the popularity of the use of Kielland's forceps in rotational deliveries in the hospital within the study period.

PATIENTS AND METHODS

All the patients in which the Kielland's forceps was used for delivery between 1 January 1987 and 31 December 1990 were studied and their case histories examined.

All patients received routine antenatal care but delivery with Kielland's forceps was always performed by a specialist obstetrician or under his/her direct supervision. Vaginal prostaglandin E₂ (Prostin Upjohn) pessary, amniotomy and oxytocin were used either singly or in combination to induce labour.

Cervical dilatation was assessed by serial vaginal examinations in labour and the progress was displayed on a partogram. Oxytocin was used to augment labour, and continuous intrapartum foetal heart monitoring was performed in selected cases including those who were induced. Pain relief in labour included the use of nitrous oxide-oxygen mixture (Entonox), pethidine and an epidural service. Epidural analgesia when given, was recorded.

Indications for the use of Kielland's forceps were examined; a prolonged second stage of labour was defined as one lasting more than 60 minutes in a primiparous patient, and longer than 30 minutes in a multiparous, despite adequate uterine contractions either spontaneous or augmented by oxytocin, with or without the use of epidural analgesia.

Postpartum haemorrhage was diagnosed with a blood loss of >300ml and anaemia when Hb<10mg/100ml. Retention of urine was recorded if the patient had difficulty passing urine and required catheterisation, and urinary tract infection was diagnosed if there were signs or symptoms, with confirmation by urinalysis and culture.

Outcome at birth and early neonatal progress of the infant were also recorded. Neonatal jaundice was diagnosed when the total serum bilirubin exceeded 10mg/100ml.

All deliveries of mid-cavity occiputo-transverse(OT) malpositions in the hospital during the study period were

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examined with respect to the methods employed and the preference of different grades of specialists.

The χ^2 test with Yates' correction was used to compare frequencies between groups.

RESULTS

During the period of study, there was a total of 53,889 singleton births, of which 17,162 (31.8%) were primiparae and 36,727 (68.2%) were multiparae. Kielland's forceps was used in 137 deliveries, giving an overall incidence of 0.25%, of which 111 were in the primiparae (0.65%) and 26 were in the multiparae (0.07%) ($p < 0.001$).

Indications for the use of Kielland's forceps are outlined in Table I. A prolonged second stage accounted for 73.0% (100) of the deliveries. Foetal distress accounted for 10.2% (14) of the deliveries.

Table I - Indications for the use of Kielland's forceps

	n=137 No.	%
Prolonged Second Stage	100	73.0
Maternal Distress	18	13.1
Foetal Distress	14	10.2
Prophylactic eg cardiac disease	3	2.2
Poor Maternal Effort	2	1.5
Total	137	100.0

Labour was induced in 5,998 births (11.1%) but these accounted for 29.2% (40 of 137) of the babies delivered with the use of Kielland's forceps ($p < 0.001$).

The percentage of patients who had epidural analgesia was 8.0% (11 of 137) among those delivered by Kielland's forceps compared to 0.64% (345) among the general obstetric population of the hospital over the same period ($p < 0.01$).

Out of a total of 306 mid-cavity deliveries for occipitotransverse (OT) malposition, Kielland's forceps accounted for 38.2% (117), vacuum extraction 30.7% (94), Caesarean section 20.0% (61) and manual rotation followed by forceps 11.1% (34) (Table II).

Table II - First Attempted Methods for the Delivery of Mid-cavity Occipitotransverse (OT) Malposition

	n=306 No.	%
Kielland's forceps	117*	38.2
Vacuum Extraction	94	30.7
Caesarean Section	61	20.0
Manual Rotation followed by Neville-Barnes (NB) Forceps	34	11.1
Total	306	100.0

*This excludes the 20 cases where Kielland's forceps delivery was performed for persistent occiput-posterior malposition.

Kielland's forceps was the most popular method for rotational delivery, with the senior specialists preferring it while junior specialists tended to use the ventouse ($p < 0.01$) (Table III).

Kielland's forceps was successfully used in the delivery of 128 out of the 137 patients, giving a success rate of 93.4%. The outcome of the failures is detailed in Table IV.

The mean maternal height was 153.6cm (SD±5.9cm) and the mean baby weight was 3,250g (SD±470g).

Table III - Comparison of the use of Kielland's forceps and Vacuum Extraction for OT rotational delivery by Grade of Specialists

	Kielland's forceps n=117 (%)	Vacuum Extraction n=94 (%)	Total n=211 (%)
Consultant	48 (72.7)	18 (27.3)	66 (100.0)
Senior Registrar	18 (45.0)	22 (55.0)	40 (100.0)
Registrar	51 (48.6)	54 (51.4)	105 (100.0)
Total	117 (55.5)	94 (44.5)	211 (100.0)

$\chi^2 = 11.755$
 $p < 0.01$

Table IV - Outcome of the Failed Kielland's forceps Deliveries (n = 9)*

	No.
Emergency Caesarean Section performed for no descent despite traction with Kielland's forceps	4
Vacuum Extraction*	3
Manual Rotation followed by NB forceps unable to rotate fully to occiput-anterior with Kielland's forceps	2

*This does not include two patients delivered with NB forceps after rotation to direct occiput-anterior with Kielland's forceps and one delivered as direct occiput-posterior because of failed rotation with Kielland's forceps.

*Two failures were for inability to lock and the other for inability to rotate with Kielland's forceps.

Table V - Maternal Complications associated with Kielland's forceps delivery

	n=137 No. (%)
THIRD STAGE	
Vaginal laceration	17 (12.4)
Postpartum haemorrhage (PPH)	16 (11.7)
PPH requiring blood transfusion	4 (2.9)
Manual removal of placenta	7 (5.1)
Cervical laceration	2 (1.5)
Third degree tear	1 (0.7)
PUERPERAL	
Retention of urine	21 (15.3)
Anaemia	13 (9.5)
Urinary tract infection	9 (6.6)
Perivaginal haematoma/ vulval oedema	4 (2.9)
Breakdown of episiotomy	1 (0.7)

Complications (Tables V and VI)

There were no maternal deaths or serious complications like uterine rupture or fistulae. Seventeen (12.4%) patients had vaginal lacerations and 2 (1.5%) cervical lacerations, while 21 (15.3%) developed retention of urine and 9 (6.6%) urinary tract infection. Postpartum haemorrhage occurred in 20 (14.6%) patients, including 4 (2.9%) who required blood transfusion. There was only one case of third degree tear (0.7%).

All babies had Apgar scores of >7 at 5 minutes and none required intubation. The most common injury was facial bruising (13.1%), followed by cephalohaematoma (8.7%), though prominent forceps marks were seen in 69.3% of the 137 babies. There were 2 cases (1.5%) of transient nerve palsies (C5

brachial plexus and facial nerve). Neonatal jaundice was recorded in 35 (25.5%) babies compared with 4% of the general population⁽⁴⁾ ($p < 0.001$).

Table VI - Neonatal Morbidity associated with Kielland's forceps delivery

	n=137	
	No.	(%)
Prominent forceps marks	95	(69.3)
Neonatal jaundice	35	(25.5)
Birth trauma		
Facial bruising	18	(13.1)
Cephalohaematoma	12	(8.7)
Nerve palsy	2	(1.5)
Facial nerve		
C5 Brachial plexus		
Scalp blister/abscess	2	(1.5)
Periorbital haematoma	1	(0.7)
Subconjunctival haemorrhage	1	(0.7)
Apgar score < 7 at 5 minutes	0	(0.0)
Intubation	0	(0.0)

DISCUSSION

The use of Kielland's forceps appears to be on the decline. Need⁽⁵⁾ noted a sharp fall in the use of Kielland's forceps in her population since 1983. This corresponds to a doubling in the incidence of the use of the ventouse from 1.8% to 4.0% and the introduction of a particular epidural cocktail of pethidine and bupivacaine which preserves muscle tone and appears to reduce the need for rotational assistance. In Europe and in instances where the accoucheur is less experienced, the ventouse or the vacuum extractor is more frequently used than rotational forceps.

Our study showed a low incidence of 0.25% in Kielland's forceps usage in our hospital despite a higher general forceps rate of 7.4% compared to vacuum extraction rate of 1.0% for the period 1987-90. This incidence is lower than the 5.4% in Chow's population with 76% receiving epidural analgesia⁽³⁾, and lower even than the earlier study by Singh⁽²⁾ in the same hospital as ours a decade ago, which showed an incidence of 0.63% with no epidural service. The low incidence of Kielland's forceps delivery in our practice could mainly be due to the low rate of epidural analgesia of 0.64% among our patients in labour and the unfamiliarity with the Kielland's forceps especially amongst our junior specialists. With the increasing popularity of the ventouse especially with the introduction of the silicone rubber cup which allows easier application and traction compared to the metal cup, we expect the incidence of Kielland's forceps delivery to decrease even further.

James and Chiswick⁽⁶⁾ found that factors significantly associated with the use of Kielland's forceps were primiparity, short maternal stature, induction of labour, late engagement of foetal head, low ratio of maternal height to foetal occipito-frontal head circumference, slow dilatation of the cervix in labour and the use of epidural analgesia in labour. We were able to confirm primiparity, induction of labour and epidural analgesia in labour to be associated with a significantly higher incidence of rotational delivery by Kielland's forceps ($p < 0.01$).

Ryden⁽⁷⁾ stated that maternal complications are unquestionably less severe after vacuum extraction than after forceps deliveries and that vacuum extraction may be used for mid-pelvis extraction as an alternative to Caesarean section and is preferable to forceps in occipitolateral positions. Vacca et al⁽⁸⁾ agreed that there seemed to be no question that forceps deliv-

ery causes more maternal injury than vacuum extraction, finding in his study that maternal trauma, use of analgesia and blood loss at delivery were significantly less in the latter group. However, in finding small facial abrasions and haematomas to be more common after forceps delivery, whereas cephalohaematomas and neonatal jaundice were commoner after vacuum extraction, Vacca cautioned that although his trial clearly demonstrated that vacuum extraction causes less maternal trauma, another larger trial is required to address which instrument is best for the baby. Cardozo et al⁽⁹⁾ in their series showed that infants delivered by non-rotational forceps did little better than those delivered by Kielland's forceps and the outcome of ventouse deliveries was, if anything, worse. They found hardly any difference in neonatal outcome between patients delivered for foetal distress and those delivered because of failure to progress. Overall, more babies had lower Apgar scores after Caesarean section than after Kielland's forceps delivery regardless of the indication.

In a retrospective study comparing Kielland's forceps and the ventouse for the delivery of deep transverse arrest of the head, Herabutya et al⁽¹⁰⁾ found no differences in maternal morbidity overall, but that maternal complications were more frequent with the less experienced operators in the forceps group. They concluded that in experienced hands, Kielland's forceps cause no more maternal and neonatal complications than the vacuum extractor. Healy et al⁽¹¹⁾ made a retrospective comparison of Kielland's forceps, other forceps, and manual rotation/forceps in the management of rotational deliveries. There was no significant difference in maternal or foetal morbidity between the three groups, regardless of whether the indication was for delay in the second stage of labour or foetal distress. When Kielland's forceps was used by junior staff, there were more vaginal and cervical lacerations and primary postpartum haemorrhage, but no increase in foetal morbidity.

Our study did not address the comparison of outcome and complications of the various methods for mid-cavity rotational delivery. We however confirmed that Kielland's forceps delivery under skilled hands and strict guidelines as proposed by Paintin⁽¹²⁾ and extended by Cardozo⁽⁹⁾ can be a safe method for rotational delivery. There was no maternal nor neonatal death. The success rate and minor nature of the delivery trauma in our study is reassuring and compares well with other series. We believe the Kielland's forceps will in future be used less frequently and we hope, more safely.

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