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Rotational forceps versus manual rotation and direct forceps: A retrospective cohort study

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ABSTRACT

Objective: Rotational forceps and manual rotation followed by direct forceps are techniques used in the management of malposition of the fetal head in the second stage of labor. However, there is widespread debate regarding their relative safety and utility.
We aimed to compare the effectiveness and safety of rotational forceps with manual rotation followed by direct forceps, for management of fetal malposition at full dilation.
Study design: A retrospective cohort study in a single tertiary obstetric unit with >6000 births per year. We recorded and analysed outcomes of 104 sequential rotational forceps births over 21 months (Jan 2010–Sept 2012) and 208 matched chronologically sequential attempted manual rotations and direct forceps births (1:2 by number). Univariable and multivariable approaches used for statistical analysis. The main outcome measure was vaginal birth.
Results: The rate of vaginal birth was significantly higher with rotational forceps than with manual rotation followed by direct forceps (88.5% vs 82.2%, RR 1.17, 95% CI 1.04–1.31, p = 0.017). Births by rotational forceps were associated with a significantly higher rate of shoulder dystocia (19.2% vs 10.6%, RR 2.35, 95% CI 1.23–4.47, p = 0.012), but not of neonatal injury. There were no significant differences in all other maternal and neonatal outcomes between the two modes of birth.
Conclusions: The use of rotational forceps was associated with a statistically significantly higher rate of vaginal birth, but also of shoulder dystocia, compared to manual rotation followed by direct forceps. This is the first study to demonstrate a statistically significant increase in the rate of shoulder dystocia following rotational forceps birth.

Introduction

Rotational forceps (RF) and manual rotation (MR) followed by direct forceps are both used to perform rotational operative vaginal birth. In the absence of strong evidence from randomised controlled trial to guide best practice, there remains debate regarding the safest and most effective method to assist birth in the presence of malposition.

The use of RF to achieve vaginal birth has been advocated by the Royal College of Obstetricians and Gynaecologists [1]. In previous generations, higher rates of complications, such as delayed onset of respiration, birth trauma or neonatal irritability, were reported following the use of RF [2]. However, these data come from small cohort studies without appropriate control groups of babies delivered with other rotational operative birth method. Nonetheless, fear of increased complication rates compounded by a lack of supervised training to achieve independent competent practice, has led large numbers of current day obstetricians to discontinue or never acquire skills in the use of RF [3,4]. Renewed interest in the safety and efficacy of RF is emerging [3,5–9]. The use of RF may be associated with high rates of successful vaginal birth and comparable or lower rates of adverse outcomes than alternative modes of birth [10–14].

We conducted a retrospective cohort study to determine differences in maternal and neonatal outcomes between RF and MR followed by direct forceps, in a unit with regular interprofessional training in birth emergencies.

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Materials and methods

This was a retrospective cohort study of rotational operative vaginal births which took place between January 2010 and September 2012 in a single tertiary-level maternity unit in Bristol, UK with more than 6500 births per annum.

All rotational operative births conducted in this hospital were performed or directly supervised by senior obstetricians qualified to perform mid-cavity rotational operative vaginal birth (OVB) independently. Obstetricians with ≥4 years training (Speciality Trainee (ST) 4+) would usually perform MR followed by direct forceps independently. All attempts at RF were either supervised or conducted by a consultant, or undertaken independently by a senior trainee (ST6-7) who had previously been assessed as competent by the consultant team to perform RF without supervision.

All births conducted in the study period were assessed for eligibility. Eligible participants were women who had singleton, cephalic pregnancies with persistent malposition at full cervical dilation (occipito-transverse or occipito-posterior) and attempted RF or attempted MR followed by direct forceps births. Every attempted RF birth and the next two sequential MR followed by direct forceps attempts were electronically identified and extracted in order to obtain a comparative cohort frequency-matched 1:2.

Demographic, clinical variable factors and outcomes were extracted from maternity paper notes and electronic medical records (EuroKing Software, Chertsey, UK). Neonatal data was extracted from the Badger electronic database (Clevermed Ltd, Edinburgh, UK).

Information on the following maternal characteristics were collected: maternal age, body mass index (BMI) (<25, 25–30, ≥30 kg/m^2), parity, history of previous Caesarean or vaginal birth, length of gestation (<37 weeks, ≥37 weeks), duration of first and second stage (minutes), indication for birth (presumed fetal compromise, delay in 2nd stage), position of fetal head (right occipito-anterior, right occipito-transverse, right occipito-posterior, occipito-posterior, left occipito-posterior, left occipito-

Table 1
Demographic details of women who had an attempted rotational operative vaginal birth by rotation technique used.

		Total n = 302 (%)	MR n = 208 (%)	RF n = 104 (%)
Maternal age	<35y	253 (81.1)	170 (81.7)	83 (79.8)
	>=35y	59 (18.9)	38 (18.3)	21 (20.2)
Parity	previous pregnancy	53 (17.0)	34 (16.4)	19 (18.3)
	nulliparity	259 (83.0)	174 (83.7)	85 (81.7)
Previous normal vaginal delivery	no previous NVD	269 (86.2)	179 (86.1)	90 (86.5)
	previous NVD	43 (13.8)	29 (13.9)	14 (13.5)
Previous Caesarean section delivery	no previous CS	298 (95.5)	202 (97.1)	96 (92.3)
	previous CS	14 (4.5)	6 (2.9)	8 (7.7)
BMI	<25	183 (58.7)	116 (55.8)	67 (64.4)
	25–30	89 (28.5)	66 (31.7)	23 (22.1)
	≥30	38 (12.2)	25 (12.0)	13 (12.5)
	unknown	2 (0.6)	1 (0.5)	1 (1.0)
Length of gestation	<37 weeks	11 (3.5)	7 (3.4)	4 (3.9)
	>=37 weeks	284 (91.0)	185 (88.9)	99 (95.2)
	unknown	17 (5.5)	16 (7.7)	1 (1.0)
Reasons for delivery	fetal compromise	114 (36.5)	75 (36.1)	39 (37.5)
	delay	156 (50.0)	102 (49.0)	54 (51.9)
	compromise and delay	40 (12.8)	29 (13.9)	11 (10.6)
	unknown	2 (0.6)	2 (1.0)	0 (0.0)
First stage duration	<=12 h	219 (70.2)	145 (69.7)	74 (71.2)
	>12 h	74 (23.7)	49 (23.6)	25 (24.0)
	unknown	19 (6.1)	14 (6.7)	5 (4.8)
Second stage duration	<=2 h	108 (34.6)	74 (35.6)	34 (32.7)
	>2 h	190 (60.9)	122 (58.7)	68 (65.4)
	unknown	1 4(4.5)	12 (5.8)	2 (1.9)
Baby in-utero position	OT	169 (54.2)	125 (60.1)	44 (42.3)
	OP	122 (39.1)	65 (31.3)	57 (54.8)
	LOA/ROA	21 (6.7)	18 (8.7)	3 (2.9)
Station	−1	1 (0.3)	1 (0.48)	0 (0)
	0	174 (57.6)	129 (62)	45 (43)
	+1	130 [(43)	81 (38.9)	49 (47.1)
	+2	10 (3.3)	2 (0.9)	8 (7.6)
Presence of caput	None	66 (21.8)	45 (21.6)	21 (20.1)
	+	129 (42.7)	81 (38.9)	48 (46.1)
	≥++	120 (39.7)	87 (41.8)	33 (31.7)
Analgesia	Epidural	216 (71.5)	147 (70.6)	69 (66.3)
	Spinal	94 (31.1)	59 (28.3)	35 (33.6)
	Pudendal	8 (2.6)	0 (0)	8 (3.8)
Birth weight	<4 kg	255 (81.7)	169 (81.3)	86 (82.7)
	≥4 kg	56 (18.0)	38 (18.3)	18 (17.3)
	unknown	1 (0.3)	1 (0.5)	0 (0.0)
Operator (years of training)	1–2	19 (6.1)	18 (8.7)	1 (1.0)
	3	83 (26.6)	68 (32.7)	15 (14.4)
	4–5	80 (25.6)	57 (27.4)	23 (22.1)
	6–7	90 (28.9)	48 (23.1)	42 (40.4)
	consultant	40 (12.8)	17 (8.2)	23 (22.1)
Supervision	nil	191 (61.2)	121 (58.2)	70 (67.3)
	trainee in years 6–7	68 (21.8)	60 (28.9)	8 (7.7)
	consultant	53 (17.0)	27 (13.0)	26 (25.0)