Best Practice & Research Clinical Obstetrics and Gynaecology 56 (2019) 69–80

Contents lists available at ScienceDirect

Best Practice & Research Clinical Obstetrics and Gynaecology

journal homepage: www.elsevier.com/locate/bpobgyn

7

The role of manual rotation in avoiding and managing OVD

Stephen O'Brien, BMBS PhD [a, b, *], Sharon Jordan, RM [b], Dimitrios Siassakos, MD MRCOG [a, b]

[a] Translational Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK
[b] Dept of Women's Health, The Chilterns, Southmead Hospital, Bristol, BS10 5NB, UK

Keywords:
Manual rotation
Rotational birth
Birth

A B S T R A C T

Manual rotation (MR) is the most common technique used by accoucheurs who wish to correct malposition of the foetal head to either avoid or facilitate an operative vaginal delivery (OVD). MR can be performed using either a whole-hand or a digital approach. MR should be formally taught and trainees should be assessed for competence, and later, performance should ideally be tracked with statistical control charts. There is paucity of robust evidence evaluating MR relative to the other methods of rotational OVD: rotational forceps (RF) and rotational ventouse (RV). Furthermore, there is little evidence concerning long-term maternal outcomes of rotational OVD. A prospective randomised trial of MR versus either RF or RV is clearly needed, along with a core outcome set for OVD to facilitate comprehensive evaluation programmes that focus on aspects pertaining to women.

Background

Labour and birth is usually a safe experience for women and their babies in high-income countries. However, malposition of the foetal head can increase the risk of adverse events and outcomes to

* Corresponding author. Clinical Research Fellow in Obstetrics & Gynaecology, The Chilterns, Southmead Hospital, BS10 5NB, Bristol, UK .
E-mail addresses: stephen.o'brien3@nhs.net (S. O'Brien), Sharon.jordan@nbt.nhs.uk (S. Jordan), jsiassakos@me.com (D. Siassakos).

https://doi.org/10.1016/j.bpobgyn.2018.12.001
1521-6934/

women and their babies during this period. Retrospective cohort studies have found that malposition of the foetal head (either occiput transverse position or occiput posterior position) in the second stage of labour is associated with an increased risk of requirement for oxytocin augmentation of labour (relative risk (RR) 1.18), operative vaginal delivery (OVD) (RR 1.3) [1], failed OVD (RR 3.73) [2], caesarean section (RR 3.13), obstetric anal sphincter injury (OASI) (RR 1.31) and post-partum haemorrhage (PPH) > 500 ml (RR 1.46) [1].

Accoucheurs can try to mitigate these risks by rotating the foetal head. Current options for rotating the foetal head include manual rotation (MR), rotational ventouse (RV) and rotational forceps (RF). There are no randomised studies comparing these techniques [3], although cohort studies exist. There is therefore no consensus regarding which methodology is either most effective or associated with fewest adverse events [4].

MR is endorsed by several national professional bodies as an approved technique for the management of malposition of the foetal head [4–8]. While evidence is limited, MR appears to be more commonly performed than either RV or RF within the UK [9] (this is also evident, indirectly, by a greater number of MRs than that of RV or RF included in published cohort studies comparing two or more of these methodologies) [10,11].

Therefore, a need exists to define, classify and determine the role, risks and benefits of MR for the management of malposition of the foetal head.

Manual rotation

MR is defined by the RCOG Operative Birth Simulation Training manual as any attempt by an accoucheur to rotate a malpositioned foetal head to an occipitoanterior (OA) position using the hand only [12]. Techniques for performing MR can be classified as either manual and digital.

Techniques for MR

The national guidelines of the UK, Australia, Canada and the USA classify techniques for MR as either manual or digital and leave the choice of technique to the operator's experience and preference [5,6,8,12]. At present, there are no studies examining or reporting differences in outcome between these two techniques.

Manual rotation

MR is where the accoucheur inserts their hand completely into the vagina and cradles the occiput in their whole hand (Fig. 1). The accoucheur then applies gentle pressure (usually using the thumb) to the anterior fontanelle to generate flexion (Fig. 2). The foetal head is then gently disimpacted from the pelvis (Fig. 3) and rotated to the OA position, with the whole hand remaining around the foetal head. Once in an OA position, the woman pushes with contractions to re-engage the now OA and flexed foetal

Fig. 1. Cradling of the foetal head within the whole hand.

Fig. 2. Flexion of the foetal head.

Fig. 3. Disimpaction of the foetal head.

head. At this point, an instrument may also be applied to facilitate delivery. MR will usually require at least a pudendal block but may be attempted in a multiparous woman using nitrous oxide alone.

Digital rotation

Digital rotation requires the accoucheur to place their fingers on the medial aspect of either the lamboidal or coronal sutures of the foetal skull and exert lateral pressure to encourage rotation to the OA position (Fig. 4). This is usually done without either flexion or disimpaction, as both these manoeuvres require greater control of the foetal head. Digital rotation can be attempted without regional anaesthesia but does not exploit the benefits of flexion – for example, reduced presenting diameter.

Fig. 4. Digital rotation.

Timing of MR

MR can be classified as either prophylactic or therapeutic depending on whether or not it is intended to reduce the chance of subsequent OVD or to facilitate an immediate attempt at OVD.

Prophylactic MR

Prophylactic MR (pMR) is where MR is undertaken with the aim of increasing the chance of a vaginal birth, without an immediate attempt to deliver using either forceps or ventouse. This can be done at any point in labour but is most frequently reported following full (or near-full) cervical dilatation [13–15]. pMR is anecdotally considered to be safe [8], with only one case report of significant foetal harm appearing in published literature (resulting from umbilical cord prolapse) [16].

Efficacy

No powered, randomised studies have yet examined maternal and neonatal outcomes following pMR [17]. One small ($n = 30$) randomised pilot study has been conducted to evaluate the efficacy of pMR at reducing the risk of either OVD or caesarean section, and this did not show a significant difference between women who had MR versus those who did not (13/15 unassisted births versus 12/15, respectively) [18].

Cohort studies have not reliably identified that pMR has an impact on outcomes. For example, a large ($n = 3258$) retrospective cohort study conducted within one unit in the USA using data of births between 1976 and 2001 found that women with persistent malposition of the foetal head at full cervical dilatation who underwent pMR had a lower likelihood of caesarean birth (RR 0.12, 95% CI 0.09 to 0.16, $p < 0.01$) than those who did not. However, there was no significant difference in the number of women who subsequently had an OVD (RR 0.87, 95% CI 0.69 to 1.08, $p = 0.37$) [19]. This is in contrast to a secondary analysis of the data of 331 women taken from a separate intra-partum study in two units in France between 2010 and 2011. This analysis found a reduction in the rate of attempted OVD in women who underwent pMR compared to that in women who did not (OR 0.45, 95% CI 0.25 to 0.85) but did not find a reduction in the rate of caesarean birth (RR 0.85, 95% CI 0.4 to 1.6, $p = 0.59$) [15]. Despite this disparity, both studies found no significant differences in reported neonatal outcomes.

The lack of robust evidence demonstrates a clear need for properly powered randomised studies of maternal and neonatal outcomes following pMR. One randomised controlled trial is currently underway in Australia and should provide much needed clarity on this subject [20].

Therapeutic MR

Therapeutic MR (tMR) is a technique wherein the foetal head is rotated to the OA position and an instrument is immediately applied (either forceps or ventouse) to expedite delivery. As tMR is therefore part of a rotational OVD (rOVD), it is appropriate to consider tMR and the subsequent instrumental application and attempted birth as one manoeuvre. Comparisons of efficacy and safety should therefore be made between tMR and the other modalities of rOVD, RF and RV.

Options for rotation and delivery of the malpositioned foetal head

Indirect comparative evidence

Several studies have reported retrospective, non-randomised, non-intention-to-treat outcomes following the successful use of various modalities of rOVD. The largest such study comparing outcomes of successful tMR to RV, RF and primary caesarean birth found that maternal and neonatal outcome measures (admission to neonatal intensive care unit (NICU), shoulder dystocia, umbilical artery $pH < 7.1$, estimated blood loss > 1500 ml and OASI) did not show significant difference between the modalities [21]. However, as these studies only include successful, rather than all attempted rOVDs, their results are not necessarily directly applicable to clinical situations where there is a need to identify the likely safest and most effective method of rOVD before commencement.

Direct comparative evidence

Four studies have been published within the last 15 years that have compared any two of attempted tMR, RV and RF [10,11,22,23].

The characteristics of these studies are given in Table 1.

Rates of clinically significant maternal and neonatal outcomes can be extracted from these studies to provide an estimation of the relative efficacy of these techniques. Outcomes which were reported by at least two studies were success with first chosen instrument, OASI(third- or fourth-degree tear), PPH >500 ml, Apgar score <7 at 5 min and admission to NICU. Pooled, non-weighted rates of these outcomes from applicable studies are shown in Tables 2–6. These tables should, however, be interpreted with caution and used as a broad estimate rather than an accurate predictor of relative performance in any given clinical scenario. This is due to the presence of some results within these studies, which, although may be accurate, would need to be replicated before they could be generally accepted. This would include the 0% OASI rate within the RV group found by Tempset et al. This is in contrast to the rate of OASI reported by multi-decade national-level retrospective cohort studies, which have demonstrated a ventouse and episiotomy OSAI rate of 6.4% [24] – this may be an anomalous result or potentially the result of under-reporting.

Furthermore, there may be significant variations in data collection methodology between studies that precludes effective comparison. For example, Bahl et al. demonstrated a PPH rate of 22%, 25% and 31% for RV, KF and tMR, respectively, whereas Al-Suhel et al. reported a PPH rate of 4% for both RV and RF. While each study is internally consistent, the significant heterogeneity in results between studies limits the inference that can be drawn from pooled data.

These studies suggest that although rates of most maternal and neonatal outcomes (with the exception of PPH) appear to be similar between methods of rOVD on the first inspection, the heterogeneity of the studies precludes meaningful conclusion. There are also potentially significant differences between rates of successful vaginal birth with the allocated instrument. There is a clear need to determine robustly where the balance of risks and benefits lies between rotational delivery options.

Discussion

Risks and efficacy

No published studies have demonstrated that manual or digital rotation is associated with adverse maternal or neonatal outcomes [8]. While there remain theoretical concerns regarding the risks of cord prolapse (if the foetal head is overly disimpacted) or foetal skull or cervical spine fracture (from overly forceful attempted rotation), these concerns have not yet been demonstrated in the literature. However, accoucheurs should be alert to the possibility of an initial misdiagnosis of the foetal position, thereby resulting in a rotation from a favourable to an unfavourable position. Previous studies have

Table 1
Characteristics of recent comparative studies for rOVD.

Study	Al-Suhel 2009	Bahl 2013	Tempest 2013	O'Brien 2017
Design	Retrospective cohort study	Prospective cohort study	Retrospective cohort study	Retrospective cohort study
Participants	85 participants in the RV group, 94 participants in the RF group	163 participants in the tMR group, 73 participants in the RV group, 145 participants in the RF group	107 participants in the RV group, 1038 participants in the RF group	208 participants in the tMR group, 104 participants in the RF group
Interventions	RV; RF	tMR; RV; RF	RV; RF	tMR; RF
Outcomes	Mode of birth Maternal trauma Neonatal trauma	Mode of birth Maternal trauma Neonatal trauma	Mode of birth Maternal trauma Neonatal Trauma	Mode of birth Maternal trauma Neonatal trauma
Notes	Single centre, Australia, 2002 to 2005	Two centres, UK, 2004 to 2006	Single centre, UK, 2006 to 2010	Single centre, UK, 2010 to 2012

Table 2
Rate of success with the first-chosen instrument for rOVD.

Study	tMR		RV		KF	
	Failures	Attempts	Failures	Attempts	Failures	Attempts
Al-Suhel 2009			20	85	5	94
Bahl 2013	7	163	5	73	14	145
Tempest 2013			24	107	38	1038
O'Brien 2017	37	208			12	104
Total births	44	371	49	265	69	1381
Rate of success with the first instrument (%)		**88.1**		**81.5**		**95**

Table 3
Rate of OASI for different types of rOVD.

Study	tMR		RV		KF	
	OASI	Attempts	OASI	Attempts	OASI	Attempts
Al-Suhel 2009			3	85	4	94
Bahl 2013	17	163	8	73	15	145
Tempest 2013			0	107	25	1038
O'Brien 2017	12	208			10	104
Total births	29	371	11	265	54	1381
Rate of OASI (%)		**7.8**		**4.2**		**3.9**

Table 4
Rate of PPH for different types of rOVD.

Study	tMR		RV		KF	
	PPH	Attempts	PPH	Attempts	PPH	Attempts
Al-Suhel 2009			3	85	4	94
Bahl 2013	51	163	16	73	36	145
Tempest 2013						
O'Brien 2017						
Total births	51	163	19	158	40	239
Rate of PPH (%)		**31.3**		**12**		**16.7**

Table 5
Rate of Apgar <7 at 5 min for different types of rOVD.

Study	tMR		RV		KF	
	Apgar <7	Attempts	Apgar <7	Attempts	Apgar <7	Attempts
Al-Suhel 2009			1	85	0	94
Bahl 2013	1	163	1	73	3	145
Tempest 2013						
O'Brien 2017	3	208			4	104
Total births	4	371	2	158	7	343
Rate of Apgar <7 at 5 min (%)		**1**		**1.3**		**2**

demonstrated position misdiagnosis rates of up to 20% using foetal skull palpation alone [25]. This, therefore, represents a significant group of women who may experience harm from an attempted MR following a misdiagnosis of foetal position.

pMR may be a useful tool in the accoucheur's armamentarium to reduce the rate of subsequent obstetric intervention in cases of malposition for the foetal head, although available low-quality evidence is conflicting [15,19].

Table 6
Rate of admission to NICU for different types of rOVD.

Study	tMR		RV		KF	
	NICU	Attempts	NICU	Attempts	NICU	Attempts
Al-Suhel 2009			8	85	4	94
Bahl 2013	20	163	4	73	15	145
Tempest 2013			13	107	107	1038
O'Brien 2017	17	208			9	104
Total births	37	371	25	265	135	1381
Rate of admission to NICU (%)		**9.9**		**9.4**		**9.8**

tMR, performed as part of an rOVD manoeuvre, should be compared to other rOVD modalities, RV and RF, on an intention-to-treat basis. At present, only a small number of cohort studies have examined maternal and neonatal outcomes following any two of these modalities [10,11,22,23]. There is, therefore, a demonstrable need for meta-analyses or, ideally, a prospective, randomised trial of these modalities to confirm or reject this hypothesis.

Variations in recommendations between national guidelines

National guidelines in the UK, Australia, Canada, the USA and France all discuss the place of MR within contemporary OVD, and variation exists between them. Guidelines from the UK and the USA support the use of MR within the context of highlighting the potential risks of RF but do not explicitly support the use of MR over or above RF or RV [4,5]. In contrast, guidelines produced by the Collège National des Gynécologues et Obstétriciens Français (CNGOF) state that while tMR may be used before an attempted rotational spatula birth, RV is generally the 'instrument of choice' for delivering a baby with persistent malposition [7]. Moreover, these guidelines support the use of pMR in labour but state that the use of RF is expressly contraindicated.

Guidelines drawn up by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and the Society of Obstetricians and Gynaecologists of Canada (SOGC) expressly support the use of MR both in labour and during birth, in preference to either RV or RF.

RANZCOG guidelines state that MR is the first-line management technique for the malposition of the foetal head and that RF may only be attempted following an unsuccessful attempted MR [6]. SOGC guidelines also strongly support the use of MR. They state that MR is 'part of the art of obstetrics' and that MR 'may be used alone or in conjunction with instrumental birth with little or no increased risk to the pregnant woman or to the foetus' [8].

Importantly, all guidelines recognise that their recommendations around the use of MR (as well as RV and RF) are 'expert consensus' rather than directly evidence based. Moreover, given that all national guideline-developing groups had access to and analysed broadly the same limited evidence, variations between expert consensuses are likely to reflect national historic practice rather than based on robust clinical trial data.

Training and monitoring of performance

An rOVD is not something that any woman would ideally like to have nor is it something that any accoucheur wants to have to perform too often. However, good-quality evidence exists that it is at least as safe as the alternative (caesarean section at full cervical dilatation) [26]. MR, likely the most commonly performed type of rOVD, therefore deserves significant levels of training and quality assurance to ensure that women with persistent malposition of the foetal head at full cervical dilatation receive the best possible care.

Training

Previous published papers have recognised that MR does not have the same level of formal guidance or prescribed steps as that of rotations with instruments attract [21]. Moreover, the performance

of MR is not currently assessed within the UK obstetric curriculum [27]. This, combined with the lack of a standardised reporting form (which exists for both RV and RF) [4,12], has the potential for MR to be a relatively unregulated form of practice [21].

Despite this, techniques for performing MR have been well described in original studies [19], national guidelines [5,8] and formal training manuals – for example, ROBuST [12]. There is a clear demand from junior accoucheurs for more and better training in rotational birth [28]. Furthermore, accoucheurs' competent in RF is scarce and appears to be becoming scarcer [29,30]. MR has the potential to fill this gap.

MR should be taught in a structured and formal manner, using hands-on simulation models, and delivered locally. Trainees should understand the differences between manual and digital MR and proactively choose the option that suits each specific clinical circumstance.

Competence should be confirmed in formalised, pre-declared assessments and recorded in trainee's portfolios of evidence. Structured proformas specific to rOVD should be generated and used to record procedures.

Monitoring of performance

OVD, performed incorrectly, has a high potential to result in significant adverse maternal and neonatal outcomes. Moreover, OVD (rOVD, in particular) suffers from poor public perception. Clinical incidents arising from attempted OVD have been the subject of highly charged coverage in national newspapers in the UK, the USA and Australia [31–33]. Furthermore, forceps has been a subject of legislative attempts to ban their use in some jurisdictions within the USA [34]. Given high and reasonable demands of transparency from women and the wider public, being able to demonstrate clear evidence of continued competence within any one procedure as an experienced practitioner may be of significant value to both the public and the individual accoucheur. Given the available negative public perception and significant potential harm, this may be particularly true for rOVD.

Real-time reporting and collation using statistical control charts of simple 'success' or 'failure' outcomes for attempted ventouse deliveries has been demonstrated as being a possible and useful tool with which to target training in a large teaching unit within the UK [35]. On a wider basis, reporting of real-time outcomes has been practiced routinely within surgical specialties within the UK since 2013 [36], and large population-based studies have not found an association with a change in surgical patient selection or 'gaming' of the system [37].

Therefore, it may be useful to encourage real-time open reporting of selected outcomes following an attempted rOVD. Trainees would benefit from confirmation of continued competence, thereby allowing them to grow in confidence and become more assured of their skills. Trainers and hosting hospital would be able to use the data generated to target training effectively and pick up when individuals are not meeting expected thresholds of competence, potentially enabling sub-standard practices to be corrected at an earlier stage [35]. This could both reduce the overall risk of litigation to the hospital and would also demonstrate that the unit has effective procedures in place for monitoring and rectifying performance. National bodies (RCOG, NHS England and NICE) would be able to identify units that as whole fall outside of expected performance levels and could support appropriate remedial action without having to wait for a catastrophic outcome to highlight existing deficiencies. Taken together, women would benefit from having their rOVD performed by an accoucheur who is confident in their skills, can demonstrate previous success and works within a unit with robust monitoring and training procedures so that any deviations from good practice are proactively acted upon.

Together, these training and quality assurance measures could provide a new generation of accoucheurs with a technique that they understand and are confident in and realistically able to use as they move toward independent practice.

Midwife perspective

Midwife means 'with woman', and after caring and steering the woman and her birth partner through a somewhat uncertain journey and often many hours of exhausting labour, developing a

rapport and offering reassurance that 'all will be ok', it can become a frightening invasion when obstetricians enter the birth room, put harsh lights on and wield heavy clanging metal instruments to deliver the baby. While midwives must trust the obstetric colleague's judgement to undertake the rotational technique most likely to succeed, successful vaginal birth alone is not always necessary and rarely sufficient for women and their partners to feel they have had a 'good birth'. For this, it is vital that they feel supported, listened to and have an assisted birth conducted in a calm, professional atmosphere. To facilitate this, obstetricians must be well-trained and confident in their skills, and there must be excellent communication and multidisciplinary working between midwife and obstetrician. This is particularly true for rotational births where both women and the midwife may perceive an additional element of risk.

In the experience of the co-author of this paper, during recent years, there has been a noticeable fall in mid-cavity rotational instrumental deliveries, with operators becoming seemingly less confident in the use of forceps. This includes senior obstetricians, which, in turn, has had a knock-on effect leading to less guidance for trainees at the coalface. In the last 15–20 years, the use of MR seems to have become a more favoured method, especially among female trainees (which may be due to the smaller size and subsequent greater dexterity in the enclosed pelvis). In recent years, this trend has been exacerbated by the higher ratio of female obstetricians in training.

Midwives generally favour what we perceive to be the most 'gentle' method when assisting with rotational deliveries. For this reason, MR and RV are favoured rotational techniques of many midwives. These methods appear to be less invasive and use less 'force' than the placing and locking of forceps' blades around the baby's head, which can appear primitive and barbaric to novice midwives (and birth partners).

Anxiety is increased when the operator is underconfident. The obstetrician's body language and the confidence in the way they introduce themselves and explain what they are about to do to expedite the delivery will 'make or break' the success of the delivery and, more importantly, the atmosphere in the room. Adequate consent and 'buy in' from the woman and the midwife will assist the accoucheur, in addition to meaningful multidisciplinary team-working. If the woman has not been made to feel as though she has 'failed' and is still key to the success of the delivery, she will push more effectively. Considered use of language and attempting to tailor the wishes of the mother (such as allowing the partner to cut the cord) or acknowledging something within her birth plan shows respect for her views and taking just a few seconds to listen to her concerns will increase her confidence.

Good teamwork and communication will improve outcomes. Challenging deliveries can require the complete concentration of the accoucheur, to the extent that they can lose situational awareness. Direct and inclusive communication to the attending midwife will encourage and enable her to act as a much needed 'wing man'. She is then more likely to proactively alert the obstetrician emerging situations such as a low foetal heart rate, offer to find more senior support or anticipate the need for and locate equipment.

It is much less frightening for the woman if the obstetrician is 'sitting' rather than towering above her (between her legs), and the correct use of Pajot's manoeuvre appears gentler than standing and heaving the baby down with forceps. Any technique that results in less perceived force by the woman and her partner is to be strongly encouraged. Similarly, any situation in which the woman is dragged down the bed is likely to be very alarming for the woman and her partner and, regardless of the neonatal outcome, will require substantial postnatal debriefing by the delivering obstetrician to justify the amount of force exerted. A failure to do this will almost certainly leave the woman feeling that the use of this amount of traction was excessive, even if it was clinically justifiable.

If failure of the first-chosen instrument occurs, it is essential that this is openly communicated to the team, and a calm explanation of the next step is given to the mother and her partner in terms that are easy to understand. The delivery seems far less traumatic if the accoucheur does not persist in continuing a delivery that is not looking to be successful or if they do not appear to be re-evaluating their decision.

The features of a 'good' rotational operative vaginal birth are the same as any other kind of birth – the delivering professional should be competent, confident, clam and supportive; the whole team should be engaged and the woman should be actively listened to. Rotational operative births appear more technically demanding, increasing the need for excellent team work and situational awareness in

the very situation where it is most needed. A strong collaborative relationship between the midwife, obstetrician and woman will help promote the best possible outcomes for women and their babies.

Further research

At present, only low-quality cohort studies exist examining comparative outcomes in both tMR and pMR. These should be interrogated by meta-analyses for evidence of the effect on maternal and neonatal outcomes.

However, while meta-analyses are a useful adjunct to existing studies (and may help to describe the relative rates of rarer but significant outcomes such as subgaleal haemorrhage), they cannot compensate for a deficit of evidence from randomised trials or other good-quality studies. Moreover, studies and their findings are often too heterogeneous to synthesise meaningfully. There is, therefore, a strong case that robust randomised trials comparing these modalities are required. None has ever been performed for rotational birth despite the high number of women and babies affected (approximately 15% of all women who reach full cervical dilatation [38]) and the predictably poorer outcomes they sustain than women with a baby in the OA position [1]. Such a study would provide invaluable guidance to obstetric training and practice and could have a highly significant impact on maternal and neonatal outcomes. At present, there is a high degree of familiarity among UK obstetricians with tMR and variable or low levels of familiarity with RV and RF. Therefore, any such study should seek to compare tMR (the current 'standard care') to both RV and RF or either RV or RF, with the choice left to the individual accoucheur. However, because of low levels of practice, seeking to recruit equal numbers of participants, to have a birth performed with RF as well as tMR may not be practicable.

Furthermore, the current published studies report different sets of maternal and neonatal outcomes. This is a significant barrier to demonstrate consistent treatment effects across studies. This barrier to data synthesis and reporting can be mitigated by the use of a core outcome set (COS). As a frequently performed obstetrical intervention, there is clear prima facie case for developing a COS in the field of OVD. Such a COS should include input from women, midwives, obstetricians, neonatologists and health service managers to determine which outcomes should be reported by future studies within OVD. Any COS for OVD must include data on medium- and long-term maternal and neonatal outcomes. No currently published studies have included later gynaecological outcomes (incontinence, resumption of sexual intercourse, need for prolapse surgery, etc.) as a study outcome, although later reproductive behaviours have been addressed by secondary studies of women on pre-existing databases [39]. Given the significant recent attention on the association between OVD and ultrasound-detectable pelvic floor injuries [40], but lack of consensus around association with eventual clinical symptoms [41,42], this would be invaluable in helping to inform joint decision making by women and accoucheurs around the mode of birth.

Summary

Persistent malposition of the foetal head at full cervical dilatation is both common and associated with predictably poorer maternal and neonatal outcomes than birth with a normally presenting foetal head. Current management strategies suffer from a lack of good-quality evidence supporting their use, training that is not universally structured and has not yet covered all techniques in detail and a lack of ongoing monitoring and assurance of outcomes that meets the needs of women, accoucheurs and maternity units. With appropriate action, MR has the potential to bridge these gaps and provide accoucheurs with a usable, evidence-based technique.

Training in MR should be followed by formal structured and recorded assessments of competence in clinical practice. When performed in clinical practice, MR should be recorded on rOVD-specific proformas. Outcomes for rOVD should be recorded and monitored by maternity units on an accoucheur-specific basis. Unit-level outcomes should be reported to national bodies responsible for patient safety and NHS performance.

Prospective randomised trials should be performed to determine maternal and neonatal outcomes following an attempted rOVD using either tMR, RV or RF. In any such study, tMR should be considered 'standard care' and act as a single stand-alone variable. A COS including long-term outcomes of rOVD

should be developed to enable uniform reporting among future studies. Women, their families and the accoucheurs who care for them deserve action, now, to make all births safer.

Practice points

- Manual rotation (MR) is a reasonable strategy to correct malposition of the foetal head either before or after full cervical dilatation.
- Techniques for MR can be classified as either manual or digital – accoucheurs should know the difference between these techniques and proactively choose an appropriate strategy.
- When performing an rOVD, accoucheurs should explain the procedure to the woman and her birth partner, coach her through it and actively engage the wider maternity team during the process. This is likely to lead to a better perceived birth.

Research agenda

- A prospective randomised trial should examine differences in maternal and neonatal outcomes (including long-term maternal outcomes) following manual rotation, rotational ventouse and rotational forceps.
- A core outcome set for OVD should be developed.

Conflicts of interest

Two authors (DS and SOB) are lead and co-applicants, respectively, on an NIHR HTA grant currently in submission (18/43) to determine the most effective and acceptable method for performing rOVB.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bpobgyn.2018.12.001.

References

[1] Senécal J, Xiong X, Fraser WD. Pushing Early or Pushing Late with Epidural study group. Effect of fetal position on second-stage duration and labor outcome. Obstet Gynecol 2005 Apr;105(4):763–72.
[2] Palatnik A, Grobman WA, Hellendag MG, Janetos TM, Gossett DR, Miller ES. Predictors of failed operative vaginal delivery in a contemporary obstetric cohort. Obstet Gynecol 2016 Mar;127(3):501–6.
[3] Majoko F, Gardener G. Trial of instrumental delivery in theatre versus immediate caesarean section for anticipated difficult assisted births. Cochrane Database Syst Rev 2012 Oct 17;10:CD005545.
[4] RCOG. Operative vaginal delivery. RCOG; 2011 Jan. p. 1–19.
[5] ACOG. ACOG practice bulletin No. 154: operative vaginal delivery. New York: ACOG; 2015 Oct. p. 1–10.
[6] RANZCOG. Instrumental vaginal birth. 1st ed., vol. 1. Royal Australian & New Zealand College of Obstetricians and Gynaecologists; 2016 Mar. p. 1–25.
[7] Vayssière C, Beucher G, Dupuis O, Feraud O, Simon-Toulza C, Sentilhes L, et al. Instrumental delivery: clinical practice guidelines from the French College of Gynaecologists and Obstetricians. Eur J Obstet Gynecol Reprod Biol 2011 Nov;159(1):43–8.
[8] Cargill YM, MacKinnon CJ. No. 148-Guidelines for operative vaginal birth. J Obstet Gynaecol Can 2018 Feb;40(2):e74–80.
[9] Nash Z, Mascarenhas L, Nathan B. A re-evaluation of the role of rotational forceps: retrospective comparison of maternal and perinatal outcomes following different methods of birth for malposition in the second stage of labour. BJOG 2014 Mar 18;121(5):641–2.
*[10] O'Brien S, Day F, Lenguerrand E, Cornthwaite K, Edwards S, Siassakos D. Rotational forceps versus manual rotation and direct forceps: a retrospective cohort study. EJOG 2017 Mar 25;212:119–25. Elsevier Ireland Ltd.

*[11] Tempest N, Hart A, Walkinshaw S, Hapangama DK. A re-evaluation of the role of rotational forceps: retrospective comparison of maternal and perinatal outcomes following different methods of birth for malposition in the second stage of labour. BJOG 2013 Mar 21;120(10):1277–84.

[12] Attilakos G, Draycott T, Gale A, Siassakos D, Winter C. ROBuST: RCOG operative birth simulation training. Cambridge University Press; 2013.

[13] Phipps H, de Vries B, Jagadish U, Hyett J. Management of occiput posterior position in the second stage of labor: a survey of midwifery practice in Australia. Birth 2014 Mar;41(1):64–9.

[14] Phipps H, de Vries B, Lee PN, Hyett JA. Management of occiput posterior position in the second stage of labour: a survey of obstetric practice in Australia and New Zealand. Aust N Z J Obstet Gynaecol 2012 Oct;52(5):450–4.

[15] Le Ray C, Deneux-Tharaux C, Khireddine I, Dreyfus M, Vardon D, Goffinet F. Manual rotation to decrease operative delivery in posterior or transverse positions. Obstet Gynecol 2013 Sep;122(3):634–40.

[16] Usta I, Mercer B, Sibai B. Current obstetrical practice and umbilical cord prolapse. Am J Perinatol 1999 Dec 31;16(09): 0479–84.

[17] Phipps H, de Vries B, Hyett J, Osborn DA. In: Phipps H, editor. Prophylactic manual rotation for fetal malposition to reduce operative delivery. Chichester, UK: John Wiley & Sons, Ltd; 2014.

[18] Graham K, Phipps H, Hyett JA, Ludlow JP, Mackie A, Marren A, et al. Persistent Occiput Posterior: OUTcomes following digital rotation: a pilot randomised controlled trial. Aust N Z J Obstet Gynaecol 2014 Mar 16;54(3):268–74.

[19] Shaffer BL, Cheng YW, Vargas JE, Caughey AB. Manual rotation to reduce caesarean delivery in persistent occiput posterior or transverse position. J Matern Fetal Neonatal Med 2011 Jan;24(1):65–72.

[20] Phipps H, Hyett JA, Kuah S, Pardey J, Ludlow J, Bisits A, et al. Persistent Occiput Posterior position - OUTcomes following manual rotation (POP-OUT): study protocol for a randomised controlled trial. Trials 2015 Mar 15;16(1):96.

[21] Tempest N, McGuinness N, Lane S, Hapangama DK. Neonatal and maternal outcomes of successful manual rotation to correct malposition of the fetal head; A retrospective and prospective observational study. PLoS One 2017;12(5): e0176861.

*[22] Al-Suhel R, Gill S, Robson S, Shadbolt B. Kjelland's forceps in the new millennium. Maternal and neonatal outcomes of attempted rotational forceps delivery. Aust N Z J Obstet Gynaecol 2009 Oct;49(5):510–4.

*[23] Bahl R, Van de Venne M, Macleod M, Strachan B, Murphy DJ. Maternal and neonatal morbidity in relation to the instrument used for mid-cavity rotational operative vaginal delivery: a prospective cohort study. BJOG 2013 Aug 7;120(12): 1526–33.

[24] Gurol-Urganci I, Cromwell DA, Edozien LC, Mahmood TA, Adams EJ, Richmond DH, et al. Third- and fourth-degree perineal tears among primiparous women in England between 2000 and 2012: time trends and risk factors. BJOG 2013 Jul 3;120(12):1516–25.

[25] Ramphul M, Ooi PV, Burke G, Kennelly MM, Said SAT, Montgomery AA, et al. Instrumental delivery and ultrasound : a multicentre randomised controlled trial of ultrasound assessment of the fetal head position versus standard care as an approach to prevent morbidity at instrumental delivery. BJOG 2014 Jul;121(8):1029–38.

[26] Aiken AR, Aiken CE, Alberry MS, Brockelsby JC, Scott JG. Management of fetal malposition in the second stage of labor: a propensity score analysis. Am J Obstet Gynecol 2015 Mar;212(3). 355.e1–355.e7.

[27] RCOG. Core module 11: management of delivery [Internet]. 2016 [cited 2018 May 10]. Available from:, www.rcog.org.uk. https://www.rcog.org.uk/en/careers-training/specialty-training-curriculum/core-curriculum/core-module-11-management-of-delivery/.

[28] Gale A, Siassakos D, Attilakos G, Winter C, Draycott T. Operative vaginal birth: better training for better outcomes. BJOG 2014 Mar 18;121(5):643–4.

[29] Chinnock M, Robson S. An anonymous survey of registrar training in the use of Kjelland's forceps in Australia. Aust N Z J Obstet Gynaecol 2009 Oct;49(5):515–6.

[30] Hardy C, Roberts R. The role of rotational forceps. BJOG 2014 Apr 1;121(5):641–2.

[31] Darvall K, Johnson S. "Broken beyond repair": Personal trainer, 37, who suffered horrific injuries during childbirth calls for forceps to be BANNED [Internet]. dailymail.co.uk [cited 2018 May 14]. Available from: https://www.dailymail.co.uk/news/article-5514951/Brisbane-mother-Amy-Dawes-calls-forceps-banned.html.

[32] Feinmann J. In: Dacre P, editor. Why do doctors still use forceps when they killed our baby? London: Daily Mail; 2010 Feb 22. p. 1–36.

[33] James SD. Forceps delivery crushed baby's skull, caused death, family alleges [Internet]. ABC News; 2014 [cited 2017 Oct 18]. Available from:, https//abcnews.go.com/Healthtexas-family-alleges-forceps-delivery-crushed-babys-skullstoryid.

[34] Deering S. Forceps, simulation, and social media. Obstet Gynecol 2016 Sep;128(3):425–6.

[35] Lane S, Weeks A, Scholefield H, Alfirevic Z. Monitoring obstetricians' performance with statistical process control charts. BJOG 2007 May;114(5):614–8.

[36] NHS England. Everyone counts: planning for patients 2013/14 [Internet]. 2012 [cited 2018 May 14]. Available from:, england.nhs.uk. https://www.england.nhs.uk/2012/12/everyonecounts/.

[37] Vallance AE, Fearnhead NS, Kuryba A, Hill J, Maxwell-Armstrong C, Braun M, et al. Effect of public reporting of surgeons' outcomes on patient selection, 'gaming,' and mortality in colorectal cancer surgery in England: population based cohort study. BMJ 2018 May 2;361:k1581.

[38] Loudon JAZ, Groom KM, Hinkson L, Harrington D, Paterson-Brown S. Changing trends in operative delivery performed at full dilatation over a 10-year period. J Obstet Gynaecol 2010 May;30(4):370–5.

[39] Bahl R, Strachan B, Murphy DJ. Outcome of subsequent pregnancy three years after previous operative delivery in the second stage of labour: cohort study. BMJ 2004 Feb 7;328(7435):311.

[40] Caudwell-Hall J, Kamisan Atan I, Martin A, Guzman Rojas R, Langer S, Shek K, et al. Intrapartum predictors of maternal levator ani injury. Acta Obst Gyne Scand 2017 Apr;96(4):426–31.

[41] Trutnovsky G, Kamisan Atan I, Martin A, Dietz HP. Delivery mode and pelvic organ prolapse: a retrospective observational study. BJOG 2016 Aug;123(9):1551–6.

[42] Volløyhaug I, Mørkved S, Salvesen Ø, Salvesen K. Pelvic organ prolapse and incontinence 15-23 years after first delivery: a cross-sectional study. BJOG 2015 Jun;122(7):964–71.