Learning From Experience: Development of a Cognitive Task List to Perform a Safe and Successful Non-Rotational Forceps Delivery

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Abstract

Objective: Increased rates of delivery by Caesarean section have resulted in a reduction in rates of instrumental deliveries. This has led to a new educational challenge for teaching and development of skills. In teaching trainees, there are subconscious tasks that the supervising staff may not review because they are automatic. This study aimed to create a new tool to meet this challenge: to identify the core steps required to perform a non-rotational forceps delivery safely and successfully.

Methods: Labour and delivery nursing staff of three large teaching hospitals were asked to identify clinicians they considered to be particularly skilled in non-rotational forceps deliveries. Obstetricians who were identified consistently in this way were invited to participate in the study. After providing written consent, participants were then filmed performing a non-rotational forceps delivery on a model. Two clinicians reviewed all videos and documented verbal and non-verbal components of the assessment. Thematic analysis combined findings into an integrated summary. The initial summary was then circulated to all participants for their approval.

Results: Seventeen clinicians were identified and consented. Themes identified included the need for careful assessment of suitability for operative delivery, the role of the multidisciplinary team, the need for careful and appropriate communication with the parents, the technique of delivery itself, and postpartum care and documentation.

Conclusion: In the core steps identified, the clinicians balanced respect for the “elegant technique” of non-rotational forceps deliveries with careful assessment and knowing when to stop if safety criteria were not met.

Résumé

Objectif: La hausse des taux d’accouchement par césarienne a entraîné une baisse des taux d’accouchement instrumental. Cette situation a donné lieu à un nouveau défi sur le plan pédagogique en ce qui concerne l’enseignement et l’acquisition de compétences. Dans le cadre de l’enseignement offert aux stagiaires, certaines tâches menées par le subconscient pourraient passer inaperçues (car elles sont automatisées) et donc ne pas être abordées par le personnel de supervision. Cette étude avait pour but de créer un nouvel outil pour relever ce défi : identifier les étapes de base requises pour la réussite d’un accouchement par forceps non rotationnels en toute sûreté.

Méthodes : Les membres du personnel infirmier de la salle de travail et d’accouchement de trois hôpitaux universitaires d’envergure ont identifié les cliniciens qu’ils considéraient comme étant particulièrement compétents en matière d’accouchements par forceps non rotationnels. Les obstétriciens dont les noms revenaient les plus souvent ont été conviés à participer à l’étude. Après avoir offert leur consentement par écrit, les participants ont été filmés pendant l’exécution d’un accouchement par forceps non rotationnels sur un modèle. Deux cliniciens ont passé en revue toutes les vidéos et ont documenté toutes les composantes verbales et non verbales de l’évaluation. Une analyse thématique a combiné les résultats en un résumé intégré. Le résumé initial a par la suite été distribué aux participants pour que l’on obtienne leur approbation.

Résultats : Dix-sept cliniciens ont ainsi été identifiés et ont consenti à participer à l’étude. Les thèmes identifiés ont été les suivants:
learning From Experience: Development of a Cognitive Task list to Perform a Safe and Successful Non-Rotational Forceps Delivery

Conclusion: Au moment d’identifier les étapes de base, les cliniciens ont mis en balance leur respect envers « l’élégance de la technique » utilisée pour les accouchements par forceps non rotationnels avec la nécessité de procéder à une évaluation rigoureuse et le fait de savoir quand mettre fin à l’intervention lorsque les critères de sûreté ne peuvent être satisfaits.

INTRODUCTION

In the 11 years from 1995 to 2004, the rate of forceps delivery in Canada fell from 7.4% to 4.6%. While the causes of the decline are multifactorial and complex, the fundamental reasons lie in both physicians’ willingness to offer a forceps delivery and patients’ willingness to accept it. Physicians’ willingness to offer operative delivery may be based on their experience, their training, their proficiency, and the local hospital culture, with 38% of hospitals in the United States performing no forceps deliveries in 2008. The Task Force on Caesarean Delivery, convened by the American College of Obstetricians and Gynecologists, proposed that hospitals with high Caesarean section rates should consider introducing training in the appropriate use of obstetrical forceps or ventouse in the management of second-stage arrest at all stages of training and practice. It has also been suggested that institutions consider making the assistance of obstetricians experienced in operative vaginal deliveries available to obstetricians in practice who desire this expertise.

Currently, training is provided that is based on textbooks, courses, or apprenticeship. There is a real need for high quality training programs for residents, fellows, and new staff in how best to perform a forceps delivery, as well as for continuing medical education for experienced staff to learn from their peers. The need for such a program is illustrated by the residents themselves, with one study that surveyed residents in the United States reporting that while nearly all felt competent to perform a ventouse delivery (94%), just over one half had similar confidence in their ability to perform a forceps delivery (55%). Nearly all of the residents surveyed wished to learn how to perform forceps deliveries, and would be willing to offer it in their practice if they felt competent to do so. In the editorial accompanying the publication of that study, these statistics were described as “unacceptable,” with the low percentage not guaranteeing

introducing training in the appropriate use of obstetrical forceps or ventouse in the management of second-stage arrest at all stages of training and practice.

For this study, the following scenario was used:

A 29-year-old primiparous woman at term has been pushing for two hours. The vertex is +1 and occiput anterior (OA). The woman has an effective epidural and is tired. She is keen to avoid a Caesarean section and has been already counselled regarding the options for delivery, including instrumental delivery.
Using the Delphi method, consensus between the expert clinicians was obtained to determine the most important and relevant components for teaching. The study protocol dictated that if some of the components deviated from the Society of Obstetricians and Gynaecologists of Canada guidelines for operative birth, then further discussion would take place between both the participants and the study group until consensus was reached.

This study was approved by the Clinical Ethics Committee, Mount Sinai Hospital; the Research Ethics Board, St Michael’s Hospital; and the Hospital Ethics Committee, Sunnybrook Hospital, all in Toronto ON.

RESULTS

Seventeen clinicians were identified in the three maternity units that consented to take part in the study. Two members of the study team reviewed each video and recorded teaching points; these were then grouped under overarching themes, and a consensus task list was developed. A first draft was circulated to the participants to stimulate discussion and was checked against the SOGC guidelines. None of the components of the task list deviated from the guidelines. Following consensus, a second draft of the task list was sent to three senior obstetricians from outside Canada in order to obtain their opinions. Minimal changes were made, and a third and final task list was then developed, the highlights of which are shown in the Table.

Review the Indication for Forceps Delivery
Is there a compelling and convincing reason to perform a forceps delivery? If not, reconsider whether a forceps delivery is required.

Assess Whether it Is Safe to Perform a Forceps Delivery
The potential for safe forceps delivery must be assessed, as described previously. The examination to assess the potential should be repeated just before beginning the instrumental delivery, when the parturient woman's legs are in stirrups (especially if the delivery is to be performed in the operating room).

The following criteria must be met:
1. analgesia must be adequate;
2. continuous fetal monitoring should be in place;
3. cervix must be fully dilated;
4. membranes must be ruptured;
5. the presenting part must be at least at the level of the ischial spines;
6. the presenting part must be in the occipito-anterior (OA) or posterior (OP) position;
7. the bladder must be empty; and
8. ideally, the rectum should also be empty, as a full rectum may prevent delivery.

   If I can feel the head abdominally, [I] don’t do [a] forceps [delivery]

   The things that I always try to feel are how much of the head I can feel suprapubically, and how much of my hand I can put between the xiphoid and the fundus; if I can’t get any of my hand here, the baby may be still up in the abdomen and I bear it in mind (though my final decision will come later).

Consider Where to Perform the Forceps Delivery
This can be carried out in the delivery room, with the operating room on standby, or in the operating room itself. The choice will depend on the examination findings and local unit culture. Only an experienced and confident clinician should perform a forceps delivery or supervise a trainee in doing so. Performing the operative delivery in the operating room confers three advantages: firstly, if it is unsuccessful then there is immediate recourse to Caesarean section; secondly, doing so signals to the multidisciplinary team (and the woman and her partner) that this may be a difficult delivery; and finally, it gives the operator permission to fail (although the emphasis should be on success). It is important to consider who should be present at the delivery.

Obtain Maternal Consent
It is important to explain to the parturient woman what has been found to date, why an instrumental delivery is required and the likely chance of success, and what will happen if the instrumental delivery is not successful. It is important to emphasize the likelihood of success rather than failure, because if the experienced clinician is recommending a forceps delivery then his or her assessment is that this will be successful.

Different institutions may require written or verbal consent for the procedure from the parturient woman. The time taken to perform this will vary depending on the urgency of the situation, but some explanation should be provided in all cases. In true emergencies a brief explanation must be given, but should be followed by a detailed debriefing after delivery. Possible outcomes such as maternal lacerations or the need for episiotomy should also be discussed, and an outline of options if the instrumental delivery is unsuccessful should be provided.

The operator must tell the parturient woman how long the attempt to deliver should last. Indicating that delivery will be
achieved within 15 minutes may provide inspiration for the
woman to push, and this will reduce the effort required by the
operator to deliver the baby, thereby reducing complications.

Before applying the forceps, the operator should warn
the woman so that she can choose whether to watch their
application or not. The forceps should be unwrapped
quietly to avoid startling her.

Position the Parturient Woman
The woman should be positioned in semi-recumbency,
with her legs in stirrups or foot-pedals and buttocks at
the end of the bed, tilted slightly so that she can grasp
her legs, push adequately, and observe what is happening.
Alternatively, she can be positioned in the left lateral
position, as this may give better protection to the perineum.
The bed should be raised or lowered to the appropriate
height for the operator; for example, if the operator is
going to stand for the procedure it will be appropriate to
raise the bed to waist height.

Confirm Adequate Analgesia
The level of analgesia for the procedure must be adequate,
and may require “topping up” of epidural anaesthesia, a
spinal anaesthetic, or a pudendal block if regional analgesia
is not appropriate (e.g., with a fetal bradycardia or maternal
thrombocytopenia). The presence of the anaesthetist is
obviously essential for placing regional anaesthesia.

Arrange the Multidisciplinary Team
All required team members (senior nurse or midwife,
support nurse or midwife, and paediatrician and anaesthetist
as appropriate) must be present and aware of their roles.
Other required equipment, including episiotomy scissors
and cord clamps, must be within easy reach.

Decide Which Forceps to Use
Simpson forceps have an overlapping lock, a pelvic curve,
a cephalic curve and open fenestration. Tucker McLean
forceps also have an overlapping lock and a pelvic curve,
but the cephalic curve is more rounded (and therefore more
suitable for an unmolded head) and has no fenestration.
The shanks of the Tucker McLean forceps are narrower
than Simpson forceps. The choice of forceps will depend
on availability and operator preference.

Phantom Application
Before the forceps are applied, they can initially be held
externally against the perineal tissues to provide the
operator with a mental image of how they should be
positioned internally. Using the image of where the fetal
head is internally in relation to the maternal forceps, the
operator can imagine how the forceps will appear when
positioned correctly.

I would do a phantom application. Left hand,
left blade first; delicate hold; opposite hand
in the perineum to guide the forceps; rotate in
the clockwise fashion and drop it in the correct
position.

Application of the Forceps
Timing of application
Forceps blades must be applied between contractions (it
is best to avoid using the word “blades” in front of the
parturient woman or her partner). A midwife or nurse
can palpate contractions; the absence of contractions
is the time for forceps application, and the presence of
contractions is the time for delivery. Application of the
forceps blades during a contraction tends to push the
forceps out again without the fetus.

Lubrication
Before insertion, lubrication should be applied to the
forceps blades. Some operators lubricate both internal
and external surfaces of the forceps and some only the
external (or maternal) surfaces.

Application of the left blade
The left blade (maternal left) of Simpson forceps is
normally applied first because it is designed so that the
right blade will fall on to the top of the left and lock
appropriately. If the right blade is applied first, the blades
must be “opened” further in order to lock them, which
may put pressure on the fetal head.

The assistant who is palpating contractions must
confirm that there is no uterine contraction at the time
of application. The left blade is held in the left hand in
a gentle grip (often described as a “pencil grip”) and
applied to the left side of the pelvis. Holding the blade with a “full hand” grip may mean that excessive force could be applied (Figure 1). The examiner’s right hand separates the labia and protects the vaginal sidewall using two fingers. With the thumb of the examiner’s left hand gently on the shanks of the forceps, the forceps can then be gently introduced into the vagina. The forceps initially are held either parallel to the opposite inguinal ligament or held nearly perpendicular to the abdominal wall and in the midline and then swept gently in a curve to enter the vagina. No force should be required. The forceps should be swept only once the blade is positioned flat against the fetal head (if the fetal station is +2 then the fetus is lying 2 cm below the spines and within the vagina). Turning the blade too early, before it is against the fetal head, results in the tip of the blade striking the head and not turning further. The hollow of the sacrum should be used initially to guide the blade in; the blade is then swung clockwise in a semi-circle around the fetal head until the curve of the blade (in an OA position) runs from the fetal chin to the anterior fontanelle. The first blade may be positioned 1 to 2 cm beyond the planned final position as an “overcorrection” until the second blade is positioned.

**Application of the right blade and confirmation of position**

The right blade (for the right side of the pelvis) should be applied in a similar way to the left blade: the right forceps handle is held in the right hand close to the right side of the pelvis and is swept in a curve (as for the left blade) to enter the vagina, with the vaginal wall protected by the left hand. The blades should lock, but it is not of concern if they do not do so completely; a gap of up to 1 cm is permitted. The blades do not need to remain locked between contractions because this may compress the fetal head. The application should be checked to ensure that the sagittal suture is in the midline and is equidistant from the two blades (for both OA and OP) and that the occipital sutures are 1 cm from the blades (if OA). If they are not positioned in this way, the blades lie too close to the fetal eyes. The sagittal suture should split the blades at right angles, and there should be a fingerbreadth between the shaft of the forceps and the presenting part. It is important to confirm that there is no maternal tissue caught between the blades.

The handles of the forceps should be visible; if they disappear into the vagina, then the head may be higher than the examiner had estimated, and another examination to determine whether it is suitable to perform an instrumental delivery is indicated. An exception to this rule is in the case of maternal obesity.

If the applied forceps blades do not lie parallel to the midline of the vagina, this may indicate an oblique position of the fetal head.

An exception to the “left blade first” rule is if a manual rotation from ROP to ROA has been performed. In this case, placing the left blade first may rotate the fetus again, so instead the right blade can be placed first to hold the fetus in place and prevent it from rotating back.

If the parturient woman has a pudendal block instead of epidural anaesthesia, she may be more aware of the pressure of the forceps blades than if she had effective epidural anaesthesia. Women in these situations may need more reassurance and explanation.
Following the Curve
In order to deliver the fetus through the pelvic curve of Carus, two forces need to be taken into account: an outward vector and a downward vector. The point at which the pelvic curve changes from a downward to an upward curve varies between women, and this will be seen and felt by the operator when performing the delivery, in order to determine when it is most appropriate to change the direction of pull. This in effect mimics the normal delivery process, during which the fetus delivers by extension.

The issue when you’re pulling: you have to remember that you are pulling a semi-circle, the symphysis is about 60 degrees away from the horizontal, so you don’t pull straight out—you pull down and literally describe a semicircle.

The options for traction are as follows:

1. The dominant hand can be used to grasp the shanks and pull while the non-dominant hand presses on the shanks and pushes gently downwards. The dominant hand can be either palm up or palm down, and stronger operators may use the palm up position to limit the amount of force they can apply.
2. Alternatively, both hands can be used gently on the blades, with the fingers on the shanks and the palms facing downwards in order to complete the curve.
3. For a trainee who is being supervised by a senior obstetrician, the trainee may hold the shanks and pull, while the supervisor guides the angle with his or her hand pressing on the shanks. This allows the supervisor to assess the degree of force being applied and to give feedback.
4. An axis traction handle can be used to guide the forceps and the fetus through the pelvic curve. If an axis traction handle is not available, the operator can devise one using a green towel (Figure 2).

Pulling directly out of the pelvis rather than following the pelvic curve means that the fetal head, and then the shoulders, are being pulled into the symphysis pubis, and the wide shanks of a Simpson forceps will be pulled into the perineal body. After completion of traction following the pelvic curve, the forceps may be in a position nearly perpendicular to the maternal abdomen, as the fetal head extends to deliver successfully. The forceps can be removed once the fetal head has delivered to allow the fetus to extend its head normally. Angling upwards too late will tear the perineal body; angling upwards too early in the curve may result in sulcal tears (Box 1).

Position of the Operator and Force Required
Delivery can be carried out in the standing, sitting, or kneeling position: sitting or kneeling means that only the strength of the arms can be used, but standing allows use of the strength of the whole body. Care should be taken not to use excessive strength as this may overwhelm the soft tissues of the vagina. The procedure should not be forceful, but should be gentle. The operator’s strength should be provided through the triceps and deltoid muscles rather than through the muscles of the back or the weight of the whole body. In addition, sitting or kneeling may help in ensuring that the appropriate downward traction is provided. If the parturient woman begins to slide down the bed, the force may have been applied in the wrong direction, and adjustments may be required. The operator should never place a foot on the bed to deliver the fetus (Box 2).

The traction provided should be steady and constant. This will provide a smoother delivery and reduce the possibility of extensive tearing of mucosa. Maternal effort is hugely important, as the parturient woman is doing the work of the delivery and the operator is merely pointing the direction.

The delivery may require two or three contractions to complete, as long as there is progress with each contraction. If the delivery is not completed after three contractions, or if there is no progress within each of these three contractions, then discontinuing the attempt at instrumental delivery must be considered. Between contractions the blades can be opened to relax the pressure on the fetus and to minimize the possibility of fetal markings from the forceps.

After delivery of the head, the forceps are removed in the opposite sequence to the manner in which they were applied.

If the head is not descending, the angle of the forceps may need to be changed in case the curve of the pelvis differs from the examiner’s initial assessment. If there is still no descent over one or two pulls, then the procedure should be abandoned in favour of Caesarean section (Boxes 3 and 4).
Learning from Experience: When a trainee is being supervised, the more senior obstetrician may try the first pull in order to assess whether the delivery will be successful or not. This is not meant to show lack of respect to the trainees’ ability, but instead using the senior obstetrician’s experience to guide the delivery.

### BOX 3
**Learning from Experience: Development of a Cognitive Task List to Perform a Safe and Successful Non-Rotational Forceps Delivery**

- The head is too high
- The head is direct OT and manual rotation or rotational delivery are not possible
- The woman does not give consent
- Forceps cannot be applied
- No descent with traction despite adjustments

### BOX 4
**Learning from Experience: When to abandon the instrumental delivery and convert to Caesarean section:**
- The head is too high
- The head is direct OT and manual rotation or rotational delivery are not possible
- The woman does not give consent
- Forceps cannot be applied
- No descent with traction despite adjustments

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### The Decision to Perform Episiotomy

In most cases, especially in primigravid women, episiotomy can be performed as the perineum is stretching, as with a normal vaginal delivery. Performing an episiotomy earlier is inappropriate because the instrumental delivery may be unsuccessful. If an assistant is available to perform an episiotomy this may be the best option, but care should be taken not to pull further and tear the perineum while waiting for the episiotomy. It is important to consider overcompensating in the angle of the episiotomy (i.e., aiming for 8 or 9 o’clock rather than 7 o’clock) because of the distension of the perineum by the combination of forceps and a crowning head. If the indication for forceps delivery is non-urgent (such as labour dystocia or maternal exhaustion), then the forceps can be removed when the head is crowning, and the perineum massaged, and then the woman may be able to complete the delivery herself.

### Delivery of the Shoulders and Body

Once the fetal head has successfully delivered, it is important to assess how easily the shoulders will deliver, as the focus cannot just be the delivery of the head. If the uterine contraction resulting in delivery of the head has continued, the fetus can be delivered with the same contraction; otherwise, the operator and parturient woman can wait for the next contraction to complete the delivery.

### Following Successful Forceps Delivery: Aftercare

After delivery, the baby can be delivered onto the mother’s abdomen and the cord clamped, depending on the baby’s condition. Pediatric assessment may be required immediately, depending on the indication for delivery, the condition of the neonate, and the local institution’s procedures. The obstetrician should also examine the baby and discuss any forceps marks with the parents, including giving reassurance that these will be temporary. Umbilical cord blood can be collected to assess cord pH, especially if the operative delivery was performed for suspected fetal distress.

Following an operative delivery, the team should be prepared for postpartum hemorrhage and should actively assess for related risk factors or signs or symptoms. Active management of the third stage should be carried out unless the woman declines after counselling.

A careful assessment must be made for vaginal and cervical tears.

The parents should be congratulated and debriefed. Debriefing can occur immediately after delivery and ideally again the next day. A thorough note should be written in the medical notes reviewing all the aspects of the delivery.

### DISCUSSION

We have developed a task list allowing both the novice and the experienced clinician to hone their skills related to non-rotational forceps deliveries. Based on the experience of 17 skilled and respected clinicians, this task list represents the lessons they have learned from performing thousands of deliveries and from their apprenticeships to the previous generation of clinicians.

When the Friedman labour curve was developed in the 1950s, the cohort on which the curve was based was very different: 68 of the 100 women in Friedman’s study delivered by forceps and only one by Caesarean section. Only 22 women received “caudal analgesia.” With nearly one quarter of major teaching hospitals in the United States not performing any forceps deliveries in 2008, a cohort such as Friedman described is difficult to imagine today.

There have been calls to increase the rate of operative delivery because of its advantages over Caesarean section performed at full cervical dilatation. Research in this area has largely focused on how to teach forceps deliveries, reviewing the effect of simulation as well as the provision of proactive faculty to facilitate resident learning. It is gratifying that education in instrumental deliveries does make a difference, reducing both maternal and neonatal morbidity (as measured by the rate of cervical, severe labial, and high vaginal tears) and reducing the rates of admission to NICU, neonatal scalp injuries, and facial injuries.

A recent systematic review has supported the safety of forceps deliveries and their continued use.

We are unaware of any other studies that have evaluated what should be taught to residents, based on the
The study group also gratefully acknowledges the staff members and fellows who gave up their time to participate in this study. We would also like to acknowledge the guidance of Professors Colm O’Herlihy and John Murphy of the National Maternity Hospital, Dublin, for their review of the manuscript.

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A limitation of this study is that it involved clinicians working in large referral units in the city of Toronto. However, these clinicians came from a variety of national and international training centres. In addition, two highly experienced non-Canadian obstetricians reviewed the draft manuscript to establish a wider applicability.

We have developed a basic clinical skills video presentation based on the interviews in this paper. Future research studies will evaluate this video presentation and the task list as an educational tool for residents and staff within each institution, as well as in multidisciplinary education. If this is successful, we anticipate it will result in a Canadian version of the teaching tool used by the Royal College of Obstetricians and Gynaecologists in the United Kingdom for teaching operative deliveries, but based on locally acquired data. Performing a non-rotational forceps delivery is a practical skill that all trainees are expected to be competent in by the completion of training.

CONCLUSION

Despite a reduction in rates of instrumental delivery and a rise in rates of Caesarean section, trainees are nevertheless expected to be competent in non-rotational forceps delivery by the completion of their training. Trainees have indicated that they lack confidence in their own ability to perform a forceps delivery. In this study we used an iterative qualitative approach to derive key teaching points from skilled clinicians who were acknowledged by their nursing colleagues to be experts in forceps delivery. Use of these teaching points, developed after many years of experience, will provide both the trainee and the experienced obstetrician with a basis for performing a non-rotational forceps delivery and will, we hope, increase the safety of instrumental deliveries. As with any manual technique in medicine, this task list should be used by trainees under the supervision of a competent and confident senior obstetrician. Obstetricians already in practice may use the task list to hone the technique they have learned.

experiences of experienced and valued teachers. Other similar studies have developed task lists for rotational forceps21 and ventouse deliveries,22 and we acknowledge that these studies inspired our wish to perform a similar study within a Canadian setting.

The study group gratefully acknowledges the labour ward nurses in Mount Sinai, St Michael’s, and Sunnybrook Hospitals for their help in identifying the skilled clinicians.


