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Committee Opinion No. 415: Impacted Fetal Head, Second-Stage Cesarean Delivery

(En francais : Césarienne au deuxième stade avec enclavement de la tête fœtale)

The English document is the original version. In the event of any discrepancy between the English and French content, the English version prevails.

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KEY MESSAGES

1 Early identification of situations that can lead to an impacted fetal head and team planning for a cesarean delivery involving a deeply impacted fetal head can reduce complications.

2 When planning the "push" technique of disengagement, identify the person(s) most competent to perform this manoeuvre.
3 Consider using the "pull" technique when performing a reverse breech extraction for delivery of an impacted fetal head; this method is associated with fewer complications than pushing upward from below.

ABSTRACT

Objective: To review the most effective clinical approaches to disengage an impacted fetal head during cesarean delivery.

Target Population: Women who undergo cesarean delivery of an infant with a deeply impacted head.

Options: The "push" technique (from below) or the "pull" technique (reverse breech extraction).

Outcomes: Proper management of this clinical scenario can reduce maternal and perinatal morbidity and mortality.

Benefits, Harms, and Costs: Using an evidence-informed approach when an impacted fetal head is anticipated has the potential to reduce maternal and fetal complications and short- and long-term harm and their associated costs. Research into the value of simulation learning, regular labour assessments, and team preparedness for possible interventions will help inform quality care.

Evidence: The following search terms were entered into PubMed/Medline, Google Scholar, and Cochrane for the publication period 2012–2019:

- 'Guidelines' 'manual'
- 'Caesarean Section'
- 'full dilation'
- 'operative delivery'
- 'impacted head'
- 'Caesarean' AND 'full dilation' AND 'impacted head'
- 'Caesarean' AND 'second stage of labour' OR 'second stage' AND 'impacted head'
- 'Caesarean' OR 'operative delivery' AND 'impacted head'

A total of 32 articles were retrieved and 24 were deemed appropriate to include as references. Many of these articles represented expert opinion. Randomized controlled trials had small sample sizes and were conducted in settings that limit the generalizability of their findings to the Canadian population.[20]

Intended Users: Intrapartum health care providers.

INTRODUCTION

An impacted fetal head (IFH) is a challenging situation during cesarean delivery and can result in both maternal and fetal morbidity and mortality. Reviews of clinical situations by the College of Physicians and Surgeons of Ontario and the Ontario Maternal Newborn Death Review Committee (Coroner's Committee) have identified the need for education, better planning, and evidenced-based care practices to prepare health care providers for this potential emergency situation.[1-5]

DEFINITION

Impaction of the fetal head refers to the situation in which the fetal head cannot be delivered by usual manoeuvres during cesarean delivery because the head is lodged deep within the maternal pelvis. Molding of the fetal head within the pelvis contributes to a lack of adequate space for the surgeon to insert a hand to dislodge the fetal head. Impaction can occur before full dilatation but is more often identified during cesarean delivery performed in the second stage of labour.

INCIDENCE

Canadian cesarean delivery rates continue to climb, with the Canadian Institute for Health Information reporting a rate of 28.2% in 2016/2017, ranging from 18.5% in the Northwest Territories to 35.3% in British Columbia.[1] There are limited statistics on cervical dilatation at the time of cesarean delivery, so it is unclear to what extent cesarean deliveries at full dilatation contribute to these increases. Statistics on the frequency of IFH in Canada are unclear owing to lack of specific definition, documentation, or database reporting. Worldwide, the rate of IFH has been estimated at 1.5% of all cesarean deliveries. Because a deeply impacted head is more likely to be encountered in an emergency cesarean delivery, the rate may be as high as 25% for those deliveries.[6, 7]

The increasing prevalence of risk factors, including obesity and gestational diabetes, that can increase fetal size also contributes to relative cephalopelvic disproportion.[8]

RISK FACTORS

Risk factors associated with IFH are occurring more frequently; thus, health care providers will need the skills and knowledge to address this potential scenario. Risk factors can be grouped into three main areas, discussed in the following.

Prolonged Second Stage

Guidelines have become less restrictive on the length of the second stage of labour. According to Society of Obstetricians and Gynaecologists of Canada (SOGC) "Guideline No. 336: Management of Spontaneous Labour at Term in Healthy Women," an acceptable total duration for the second stage of labour is 3 hours in a nulliparous woman and 2 hours in a parous woman.[9] This time is extended to 4 and 3 hours, respectively, if the woman receives regional anesthesia. Longer periods of obstructed labour or pushing may contribute to the incidence of IFH.

Fetal Malposition

Malposition, asynclitism, or deflexion of the fetal head can impair descent during labour and increase the risk of IFH. At the time of cesarean delivery, flexion of the fetal head, which is required for safe disimpaction, can be more difficult when the infant is in an occiput posterior position.

Failed Assisted Vaginal Birth

A decline in the use of forceps-assisted birth, particularly rotational and midcavity deliveries, has contributed to a higher number of second-stage cesarean deliveries that historically may have been safely delivered vaginally. Increased use of vacuum, compared with forceps, to assist descent without the benefit of optimal positional change may result in the head becoming more deeply lodged in the birth canal without achieving a vaginal birth.

AVOIDING IFH SITUATIONS

Prevention and early identification of situations that can lead to IFH are key to reducing complications that have implications for intra- and postpartum management and future pregnancies (Box). Use of evidence-based labour management and careful assessment of the likelihood of a safe assisted vaginal birth (AVB) are important strategies.

Labour Management

In addition to following evidence-based labour management guidelines, comprehensive assessment throughout each stage of labour is fundamental. SOGC guideline No. 336 recommends hourly assessments of descent and position in the second stage.[9] Early identification of malposition or failure to descend can also inform the need for interventions. It is important to identify the presence of molding and caput early and consider the possibility of obstructed labour.

ABBREVIATIONS

AVB	assisted vaginal birth
IFH	impacted fetal head

Box. Complications described with an impacted fetal head[3, 11-13]

Maternal	Fetal/newborn
• Inferior or lateral extensions of the uterine incision • Injury to the bladder • Hemorrhage • Endometritis • Wound infection • Future PPROM and PTB	• Low Apgar scores • Neonatal intensive care unit admission • Fetal injuries including long bone fractures, skull fracture, and lacerations

PPROM: preterm premature rupture of membranes; PTB: preterm birth.

Assessment of the Potential for Safe AVB

The SOGC recommends that caregivers assess the option of AVB in cases of prolonged second stage.[10] This would include an assessment of progress of descent, fetal position, and pelvic adequacy, as well as the resources available. If AVB is not feasible, the option of moving to cesarean delivery should be considered. Consider reassessing fetal position and station with full neuraxial top-up in the operating room with the patient in the modified lithotomy position. With this information, in certain clinical circumstances, the health care team may reconsider the safe use of AVB (Box).

APPROACH TO CESAREAN DELIVERY OF IFH

Preparation

Anticipate

Recognize risk factors for an IFH in order to help with necessary preparation of personnel and equipment. Discuss with the woman the possible steps that may be required to deliver her baby.

Alert Staff

Clearly communicate to staff that the cesarean delivery is being performed at or near full dilatation with the possibility of an IFH, and include this information on the preoperative surgical safety checklist.

- The anesthesiologist must be aware of the possible need for uterine relaxation or change in patient or operating room table position, as well as the associated possibilities of greater than average blood loss and longer operating time.
- Neonatal resuscitation personnel must be present.
- The person(s) most competent to provide possible vaginal assistance with disimpaction should be identified. This should be an individual with sufficient competence in vaginal examination to determine fetal head position and an understanding of the need to flex the fetal head and apply pressure over a widely distributed area of the skull.

Positioning

Lower the operating room table or have standing stools available so that the delivering surgeon can direct pressure on the fetal head in an upward manner and not toward himself or herself to avoid lateral tears of the uterine incision. Consider placing the woman in the Trendelenburg position and/or the modified lithotomy (Whitmore) position,[11] in which the thighs are moderately abducted and flexed to an angle of approximately 135° relative to the trunk; this is sometimes referred to as the frog position.

Technique

Incision

Make the uterine incision relatively high (in the upper portion of the possibly distended lower uterine segment). This may help avoid inadvertent entry through the cervix or into the vagina when a cesarean delivery is performed at or near full dilatation. Extension of the incision as a "J" or "inverse T" incision may facilitate reverse breech extraction (see Pull Technique). If a decision has been made in advance to perform a reverse breech extraction (e.g., after an unsuccessful AVB), then the surgeon should perform either a higher transverse uterine incision or a low vertical incision, which can be extended cephalad as required.

Relaxation of the Uterus

Disimpaction of the fetal head will be easiest when the uterus is relaxed and between contractions. The uterus will usually contract after it has been incised and will take 1–2 minutes to relax.

The surgeon should avoid acting with haste or force, even in the context of an abnormal fetal heart rate tracing. Slow, deliberate, and gentle movements are essential when operating on the lower uterine segment with an IFH. It is crucial to avoid wrist flexion against the myometrium between the incision and cervix, which can result in lateral or inferior extensions.

Pharmacological uterine relaxation may aid in delivery. This can be achieved with nitroglycerin (50–200 μg intravenously), followed by a period of uterine palpation inside the abdomen until adequate relaxation is achieved.[12] Relaxation occurs within 30–45 seconds, and the effect lasts 2 minutes. The techniques described in Manoeuvres for Delivery can then be performed with minimal uterine

resistance in an effort to reduce the risks of extension and trauma.

A Bandl's ring is a pathological constriction between the thickened upper contractile uterine segment and the thinned lower uterine segment, which may be encountered with obstructed labour. This area of constriction may need to be incised vertically to facilitate delivery.[12]

Manoeuvres for Delivery

The part of the fetus that is encountered after the incision is made will influence the subsequent approach. The surgeon's hand is introduced around the occiput to flex the fetal head. Which hand slides more easily around the fetal head may be influenced by the position of the infant. Exerting pressure upwards (towards the mother's head) without flexing the fetal head may worsen the deflexion/impaction and increase the likelihood of uterine incision extension. If the surgeon's hand cannot be advanced easily between the pubic bone and the fetal head, consider elevating the fetal shoulders

Elevation of the Fetal Shoulders

In this technique, the shoulders are elevated by the obstetrical surgeon placing the index and middle fingers over each fetal shoulder to steadily elevate the fetus. Once the fetal shoulders and head have been elevated, the hand passes over the occiput to promote flexion during the final stages of delivery.

If the surgeon's hand still cannot be advanced easily between the fetal head and maternal pelvis, an alternative technique should be considered. The choice of manoeuvres is at the discretion of the surgeon. Options include the

- pull technique from above (reverse breech extraction) and
- push technique from below.

Pull Technique

Reverse breech extraction involves the surgeon reaching up to grasp the fetal legs and deliver the infant (Figure 1). If reverse breech extraction is planned, a high transverse or low vertical uterine incision will facilitate this manoeuvre. If a low transverse incision has already been made, extending the uterine incision (as a T or J) may be necessary. The procedure is easier in the occiput posterior position because the lower limbs of the fetus are accessible and the head will naturally flex during delivery. The procedure is more difficult with an occiput anterior position because the fetal back dominates the area of exposure. Therefore, a

Figure 1. Pull from above (reverse breech extraction). The surgeon reaches into the upper uterus to grasp the legs and deliver the fetus breech.

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fetal arm is released first, followed by lateral rotation of the fetus (creating room to access the ipsilateral lower limb), followed by both lower limbs for a controlled delivery, with the inferior arm released last.

Systematic reviews and meta-analyses have suggested the pull technique carries a lower risk of fetal injury and results in less maternal tissue injury and thus less overall blood loss than the more frequently performed push technique, described in the following section.[3, 13-16] Experience with the pull technique may be limited in North America, but it warrants further consideration and study.

Push Technique

With the woman in the modified lithotomy position, the identified health care provider places a hand into the vagina, applying upward pressure and flexion to the fetal head between contractions (Figure 2). The surgeon simultaneously provides upward traction on the fetal shoulders to help dislodge the head. It is important that the push technique only be applied when the uterus is relaxed and that it be performed with an open hand—excessive force applied to the skull has been associated with intracranial trauma. The pressure on the fetal head must be distributed over as wide an area as possible using the palm or cupped fingers to minimize the risk of skull injury.

Figure 2. Push from below. One health care provider inserts a hand into the vagina and uses cupped fingers or palm to push the head up. Pressure is distributed over the broadest area possible, and flexion of the head is actively promoted.

Some authors have described using a vacuum device to assist in pushing upwards; however, to date, this technique has not been comprehensively described in the literature, and risk of severe fetal injuries, including intracranial hemorrhage, has been reported.[3, 13-15, 17]

Patwardhan Technique (Shoulders-First Technique).[18, 19]

This technique, first described in 1957, involves initial delivery of the anterior shoulder followed by posterior shoulder, buttocks, legs, and, finally, the head.[18] A 2016 meta-analysis of mostly observational studies comparing techniques used to deliver a deeply impacted fetal head at full dilatation noted that the shoulders-first technique was associated with a lower rate of uterine incision extension than the push technique.[13] To date, studies have yet to compare the Patwardhan and reverse breech extraction techniques.

Additional Devices

Fetal head elevators are a group of instruments that are designed to take up less space than the surgeon's hand and are easier to manoeuvre around the deeply impacted head. Minimal data have been published on the efficacy and risks associated with the use of these instruments.[20] Some of these instruments include:

- Coyne spoon
- Selheim spoon
- Murless head extractor[21]

The Fetal Pillow (https://www.safeob.com/animation) is a more recently developed device that is inserted into the vagina by the surgeon before a second-stage cesarean delivery and steadily inflated; the device is retained vaginally by keeping the patient's legs straight, as is typical for cesarean delivery. Evidence suggests the device is associated with a reduced risk of uterine incision extension, but the sample size was limited and not powered to assess differences in neonatal outcomes.[22] Other trials are in progress.[23, 24]

Another strategy to break the vacuum (or suction) encountered with impaction may be the passage of a rigid single-use bladder catheter or large-diameter Foley catheter over the posterior aspect of the fetal head.[4] (Figure 3)

CHECKING FOR COMPLICATIONS

Maternal

Extension of the uterine incision may be more easily identified to the apex by exteriorizing the uterus. It may be necessary to dissect the bladder farther off of the lower uterine segment to visualize and repair an extension and rule out bladder injury.

Neonatal

Beyond initial resuscitation, consider the possibility of skull and long bone fractures.

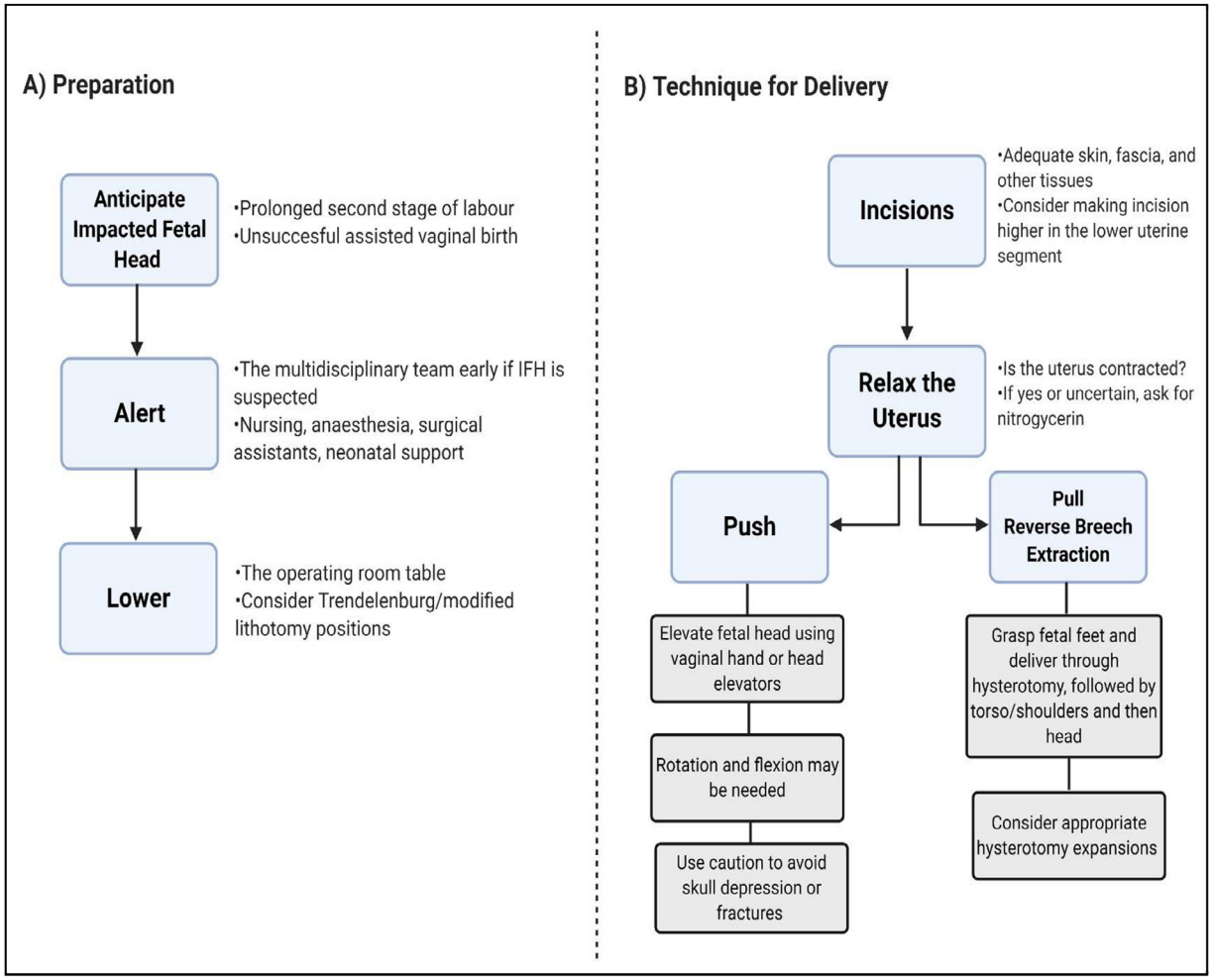
DOCUMENTATION AND DEBRIEF

In the event of an IFH, the cesarean delivery documentation, in addition to the standard information, includes information on:

- Preparatory steps, including discussions with the woman and the health care team
- Manoeuvres carried out
- Uterine incisions/extensions
- Maternal complications and treatment
- Any contraindications or concerns with future pregnancies, labours, or births

Debriefing with families after an event, particularly if there is an unexpected outcome, is essential. Details of the circumstances and how members of the health care team responded

Figure 3. Management of an impacted fetal head during cesarean delivery.[4]



are important for families to hear and understand. The type of uterine incision performed should also be discussed, specifically within the context of whether a trial of labour would be considered a safe option for future pregnancies.

EDUCATION

Simulation exercises and team training for the care of a woman with an IFH can facilitate the techniques required for safe delivery.

SUMMARY

Ongoing assessment during labour to determine the potential for IFH, appropriate preparation at cesarean delivery, and communication with the health care team, including those caring for the newborn, will reduce the maternal and newborn complications of IFH. Further data collection and research on delivery approaches used for IFH will continue to enhance our understanding of the best options and techniques.

TOOLKIT

SOGC members can visit the Guideline Resource Kit webpage on sogc.org to find complementary tools and resources and to participate in accredited continuing professional development activities.

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