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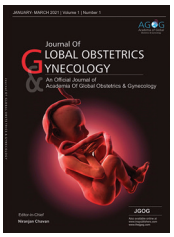
Review Article



Impacted Foetal Head during Caesarean Delivery: An Obstetrician's Dilemma

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ABSTRACT

In India, the lower segment cesarean section rate as per National Family Health Survey-5 is between 17% and 21.5%. Studies have highlighted that the second-stage cesarean rates are up to 2.3% and increasing. A similar trend has been reported in the United States of America, where 1 in 5 women undergo a cesarean section and 5% of them undergo a cesarean section at full dilatation. The United Kingdom is no different with around 1 in 20 births occur by cesarean section at full dilatation. Labor progresses and becomes prolonged in the first stage of labor, the fetal head may become wedged deep into the pelvis, rendering the delivery of the fetal head challenging and difficult. This obstetric emergency is termed as impacted fetal head. In the United Kingdom around 1 in 10 (1.5%) unplanned cesarean sections may end up with an impacted fetal head. Impacted fetal head has both maternal and neonatal adverse implications. The women can have traumatic intrapartum and post-partum hemorrhage due to injury to adjacent structures and inadvertent extension of uterine incision, which can not only cause an increment in maternal morbidity but also increase risk in subsequent pregnancies. Neonatal complications can be severe as well as fatal, ranging from skull fractures and neuromuscular injuries to hypoxic ischemic injury, rarely, perinatal mortality. Literature is replete with maneuvers and methods to help in delivering the fetal head when impacted, but clear consensus on which method supersedes is lacking. Indians are more comfortable with using the Patwardhan method of delivering the fetus, while the West utilizes the reverse breech delivery technique. Another popular method is by assistance at the vaginal end to push the fetal head, so as to aid in delivery of fetal head. Lack of consensus and no clear guidelines further worsens the confusion about the method used as well as weakens the confidence of the operating obstetrician. This article highlights the methods to prevent and manage this life-threatening obstetric emergency and provides recommendations for practice.

Key words: Impacted fetal head, Cesarean delivery at full dilatation, Perinatal injury, Obstetric emergency

INTRODUCTION

Cesarean section rates have been on the rise, not only in India but also, globally.[1] As the cesarean section rate is rocketing, so is the rate of complications. Impacted fetal head, remains one such obstetric emergency, attributing to both maternal and neonatal complications.[2,3] Impacted fetal head, unfortunately, does not have a clear definition in literature, thus making its reporting, varied. A national survey conducted in the United Kingdom helped formulate a definition for the impacted fetal head as, "a cesarean birth where the obstetrician is unable to deliver the fetal head with their usual delivering hand, and additional maneuvers and/or tocolysis are required to disimpact and deliver the head.[4]

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Increase in the rate of maternal complications and co-morbidities as well as increased perinatal complications with the number of litigations owing to impacted fetal head, makes it an important problem to tackle. Decrease in skill and prevalence of mid-cavitary operative vaginal delivery, also has caused an increment in the number of cesareans at full dilatation.[5] This article explores the different methods to combat impacted fetal head during cesarean delivery, its risk factors and recommendations of practise and scope for further research.

INCIDENCE

The lack of consensus on a definition of the impacted fetal head has hampered the accurate estimation of the incidence of this obstetric dilemma.[6] The MIDAS of impacted fetal head at cesarean birth, has estimated that one in ten unplanned cesarean births have an impacted head (1.5%). While around 16% of cesarean sections done at full dilatation face difficulty in delivering the head.[2,7] One of the most important reasons for facing an impacted head,

is the overall upward trend in the number of cesarean deliveries, worldwide.[2,6] The global rate of cesarean delivery averages at around 21% while the more developed countries reaching up to 30%. Out of these cesarean deliveries, almost 5% of them occur at full dilatation of the cervix.[8,9]

RISK FACTORS

Cesarean section at full dilatation prevails as one of the most important risk factors for an impacted fetal head. One in three cesareans that take place at full cervical dilatation is complicated by impacted fetal head, and a failed trial of assisted vaginal delivery further worsens the risk.[2] Vigilance is imperative while delivering the head, during cesareans with the low station of presenting part as well as when there are signs of obstructed labor. A retrospective study conducted has highlighted that an impacted fetal head was encountered in around 50% first stage cesarean sections.[10] Cephalopelvic disproportion and malposition of the fetus further increase the chances of encountering an impacted fetal head.[11] The overlap between the risk factors between cesarean at full dilatation and those of impacted fetal head make it difficult to attribute it to either and studies in the past have similarly failed to segregate the risk factors.[2] Figure 1 further highlights the risk factors for impacted fetal head.

COMPLICATIONS

Maternal complications arise as a result of repeated attempts to disimpact the head by passing the hand between the head and the symphysis pubis.[3] As in most cases when the labor is advanced the lower segment is stretched out and oedematous. Thus, the extension of the uterine incision, injury to the bladder, intrapartum hemorrhage, and ureteric injuries are common.[12] These injuries can also lead to complications in subsequent pregnancies.[13]

Trauma to the fetus can occur during the process of trying to flex the head and to elevate it to the level of the incision.[3] There could ensue complications such as skull fractures, fractures of long bones, intracranial hemorrhage, subgaleal bleeding, hypoxic-ischemic injury and rarely perinatal death.[12,14] The number of litigations for perinatal brain injuries owing to impacted fetal head is increasing worldwide. In 2018, the United Kingdom saw 10% of the most expensive maternity claims stemming from impacted fetal head.[10]

PREVENTION STRATEGIES

Two strategies are used to prevent the occurrence of an impacted fetal head during a cesarean section.

1. The vaginal push method of disimpaction
   Pre-incision pushing the head vaginally has been advocated as a strategy to prevent impaction of the fetal head. However, literature neither supports nor refutes this.[10] Canadian guidelines put forth the use of a lithotomy position and then lowering the woman's leg to a lower them so as to keep the thighs at the level of the abdomen; a frog-leg position to aid in vaginal disimpaction.[6]
2. Fetal pillow
   The Fetal Pillow is a silicon ballon-like device that is inserted vaginally before commencing the cesarean section (Figure 2). It aims to elevate the head so as to make the delivery quicker and less traumatic. The Fetal Pillow is useful when the fetal station is low, the head is deeply engaged, or after a failed attempt of assisted vaginal birth. There is some evidence that this helps in disimpaction of the fetal head, and this method is gaining popularity.[15,16]

Studies have compared the Fetal Pillow to the "push technique," Patwardhan technique, or no Fetal Pillow. They have found that the pillow improved the ease of delivery and a decrease in the incision-to-delivery time. Studies have also stated that the Fetal Pillow has decreased the rates of unintentional extension of the uterine incision.[17,18] Although these findings of improved maternal complications are controversial as newer observational studies have not corroborated them.[19] Clear benefit to neonatal outcome is lacking as the data is conflicting. Improved umbilical arterial pH with the use of the Fetal Pillow in comparison to the "push technique" was highlighted by a recent meta-analysis.[20] When compared to the Patwardhan method a decrease in admission to neonatal intensive care unit (NICU) was seen.[21]

Studies, however, do not explore its cost-effectiveness and the decision to delivery time. Furthermore, only one study has explored the time taken to insert this pillow.[10] It is often encountered that, following the use of the pillow, subsequent maneuvers could be required to deliver the head.[22]

STRATEGIES FOR MANAGEMENT OF IMPACTED FOETAL HEAD

While operating if an impacted fetal head is encountered, a trial of abdominal disimpaction, that is, flexing the head to elevate it to the level of incision should be done. If this fails, one should resort to other methods like, the vaginal push method, reverse breech extraction, the Patwardhan method, or tocolysis, if needed.

Table 1 highlights the newer methods available for disimpacting the foetal head.

1. Vaginal disimpaction
   This method of abdominovaginal delivery, the vaginal push technique, was first put forth in 1984.[22] And still remains a popular method for delivering an impacted head. This technique of delivery is undertaken by aid of an assistant who pushes the fetal head with a cupped hand from the vaginal end, while the patient is in a semi-lithotomy position. Flexion of the fetal head is pivotal in attaining successful vaginal disimpaction. Incorrect pressure to fetal head can worsen the delivery by increasing the deflexion and impacting it behind the symphysis pubis.[23] Unfortunately, this technique, due to lack of training, has varied practise practice like the use of two or three fingers to apply pressure on the fetal head. This leads to higher chances of failure and may even cause injury to the head.[4,23,24] Although

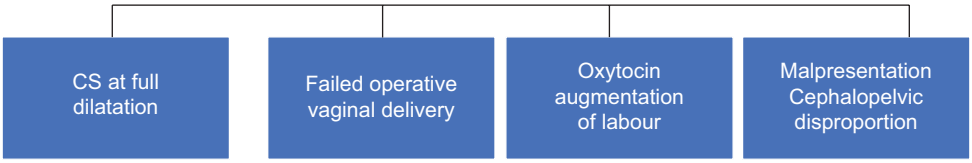

Figure 1: Different risk factors for impacted fetal head

Figure 2: The inflatable device, Fetal Pillow
Image taken from Cornthwaite K, Eur J Obstet Gynecol Reprod Biol. 2021 Jun; 261:85–91.

Table 1: Highlights the novel methods and devices

• Tydeman tube	• Single-use, hollow silicon tube with a rounded cup inserted vaginally to elevate the fetal head.[36] • Research in clinical settings warranted.
• C-Snorkel	• Disposable tube with ventilation ports, intended to release the vacuum between the fetal head and vaginal wall.[37] • Data is lacking.
• Fetal head elevators	• Specifically designed obstetrical spoons • Look similar to a single blade of an obstetric forceps[38] Coyne spoon • Sellheim spoon • Murless head extractor, • Originally developed in the 1950s

parietal fractures cannot be attributed to digital pressure, alone.[25]

2. Reverse breech extraction
   Furthermore, known as the "pull-technique" entails delivering the feet first followed by the buttocks and the trunk and lastly the head.[26] Reverse breech extraction is rampantly used worldwide, however seems to be commoner in low-resource settings.[27-29] This technique comes with the risk of increased chance of femoral and humeral fractures, as the technique used may be faulty owing to lack of training and confidence.[30,31]
3. Patwardhan method
   Dr Patwardhan, in 1954, devised this method of delivery in deeply impacted head, and since its inception is commonly used in India.[32] It is a modification of the reverse breech extraction, wherein the arms are delivered first. Usually, after taking the uterine incision the shoulders would be encountered first, so by gentle traction by assistant both the shoulders are delivered followed by the trunk and legs and then the head is delivered by extension.[14] Due to need of training, this method is not very popular around the world.

TOCOLYSIS

Rarely, while attempting to deliver the head, the uterus undergoes a reflex contraction, making it challenging to manipulate the head. During such instances, a decision to give a tocolytic for uterine relaxation may be taken.[33] However, caution should be applied by weighing the risks and benefits of subsequent atonic post-partum hemorrhage. The evidence regarding tocolytic use is lacking, as well.[34,35] Using a tocolytic that is short acting is advocated for example, nitroglycerine.

EXTENDING THE INCISION

The operator can either use an inverted T or J incision when the space for delivering the breech is limited and to prevent extensions, as well. When using the abdominal cephalic disimpaction method, the risk for extension of uterine incision increases. Lateral extension can involve the uterine arteries, venous plexus, or broad ligament while, extension in the lower segment can reach up to the bladder, cervix, and vagina. This may contribute to worsening morbidity, hemorrhage, infection, prolonged operating time, and prolonged hospital stay.

PAUCITY OF EVIDENCE

Substantial evidence regarding which method reigns supreme over the other is lacking. The meta-analysis done comparing the various techniques has deemed the "pull" technique which is either the reverse breech extraction or the Patwardhan method, to

be safer compared to the "push" technique.[12,34] Newer evidence has pointed that, reverse breech extraction has lower NICU admissions due to the fact that it does not entail compression of the head like that while undertaking abdominal disimpaction.[28] One major drawback hindering robust studies is the lack of consensus on a uniform definition for impacted fetal head. There is a dearth of data regarding the correctness of disimpaction technique performed. Most studies explore positive outcomes as decreased incidence of uterine extension and decreased NICU admission. Another domain that may remain unexplored is the occurrence of an impacted fetal head in the first stage of labor as most research concentrates on cesarean section at full dilatation.

METHODS NOT RECOMMENDED IN CLINICAL PRACTISE

Use of a single blade of forceps or the ventouse cup should not be used for delivery of an impacted fetal head. The chance of injury to fetus like intracranial and subgaleal bleeding increases with the use of vacuum. These, also, do not work with the physics of disimpaction of the fetal head from pelvic, hence, are not recommended.

CONCLUSION

In the United Kingdom, a recent survey conducted has highlighted that training regarding delivering an impacted fetal head is inconsistent. Nearly 50% of trainees do not feel confident undertaking the reverse breech extraction and only 1 in 10 know the Patwardhan technique.[6]

There is a lack of clear guidelines and algorithms in managing this obstetric emergency, which on certain occasions may warrant a cascade of methods to tackle. Simulation training and drills would be of great help to the trainees and obstetric staff so as to bolster their confidence while handling this emergency. Apart from the necessary maneuvers need for a smooth chain of communication and referral is also imperative and training must be directed toward this.

There remains scope for further research, with a need for randomized control trials comparing various techniques and devices, quality of performing the techniques, and cost-effectiveness, and health care burden, to ameliorate the increasing perinatal complications and maternal morbidity.

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