Manual on OPERATIVE DELIVERY

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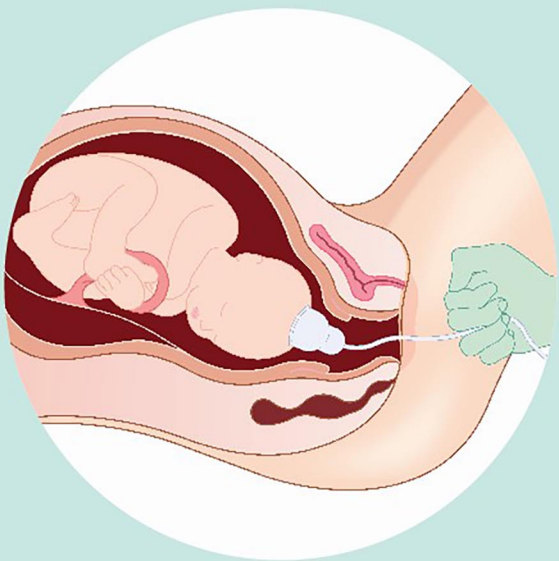

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CHAPTER

Introduction to Operative Deliveries

Surekha Tayade, Jaya Kore-Tulaskar

CONTEXT AND DEFINITIONS

Operative deliveries, also referred to as assisted deliveries, are interventions during childbirth that utilize surgical or mechanical tools to assist in the vaginal delivery of a baby and surgical procedures performed when vaginal birth fails or is not recommended.

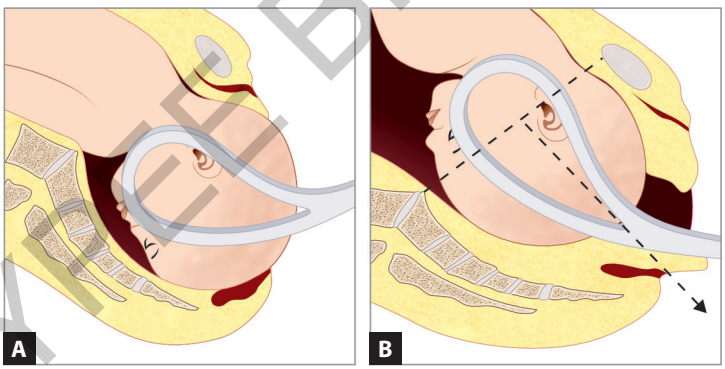
Assisted vaginal birth, also known as *operative vaginal birth*, is a delivery in which a clinician uses instruments such as forceps or a vacuum device to help extract the fetus from the birth canal, either with or without the mother's active pushing. This procedure is performed when there is a need to expedite delivery due to potential risks to the mother or baby, or when labor is not progressing adequately.[1] Failed vaginal delivery will require an expeditious cesarean section.

A *forceps delivery* is a type of assisted vaginal delivery where a clinician uses a specialized instrument called forceps to help guide the baby out of the birth canal during delivery. Forceps are a pair of curved, tong-like metal instruments that are carefully positioned around the baby's head to provide traction and help rotate or guide the baby through the birth canal, usually during a contraction and while the mother is pushing. Forceps delivery is indicated when there is a need to expedite delivery due to maternal exhaustion, prolonged second stage of labor, nonreassuring fetal status, or certain medical conditions in the mother where prolonged pushing is not advisable.[2] It requires skill and experience on the part of the clinician to minimize risks and ensure the safety of both the mother and baby.[3] Forceps which are approved in modern obstetrics outlet and low forceps are given in **Table 1 and Figure 1**.

Vacuum extraction, also known as *ventouse delivery*, is a type of assisted vaginal delivery in which a vacuum device is used to help deliver the baby. The procedure involves applying a soft or rigid cup to the baby's head, which is then attached to a vacuum pump. Gentle traction is applied by the clinician during maternal contractions and pushing to guide the baby through the birth canal.[3]

TABLE 1: Types of forceps approved in modern obstetrics.

Type of forceps	*Definition*	*Indications*	*Common forceps types*
Outlet forceps	Used when the fetal head is visible at the vaginal opening (perineum) without parting the labia, and the scalp is visible between contractions. The head is at or near the perineum, and rotation is less than 45°	When the fetal head is crowning or very low in the birth canal, with minimal assistance needed for delivery	Simpson forceps, Piper forceps (for breech deliveries), Wrigley forceps
Low forceps	Used when the fetal head is at +2 station or lower but not yet visible at the vaginal opening, and rotation of 45° or less may be needed	When the head is low in the pelvis but not yet crowning, such as in cases of maternal exhaustion, prolonged second stage of labor, or nonreassuring fetal status. To facilitate delivery with some traction and rotation	Simpson forceps, Elliot forceps, Tucker-McLane forceps



Figs. 1A and B: (A) Low forceps; (B) Mid forceps.

Common indications include:

- *Prolonged second stage of labor:* When labor is not progressing despite adequate contractions and maternal effort
- *Maternal exhaustion:* When the mother is too fatigued to continue pushing effectively
- *Nonreassuring fetal status:* When there are concerns about the baby's well-being and prompt delivery is necessary
- *Certain maternal conditions:* Such as cardiac or hypertensive disorders, where prolonged pushing may pose a risk.

Types of Vacuum Extractors (Fig. 2)

- *Soft cups (silicone or plastic):*
  - Flexible and associated with less trauma to the baby's scalp
  - Suitable for low and outlet applications, where minimal traction is needed
- *Rigid cups (metal or plastic):*
  - Provide a stronger grip and are used when more traction or rotation is needed
  - May be chosen in cases where the fetal head is higher in the birth canal or requires rotation[4]

The *Odón device* is a novel instrument designed to facilitate assisted vaginal deliveries by gently helping to extract the baby from the birth canal. It is considered a less invasive alternative to traditional forceps, vacuum extractors, and aims to reduce complications associated with these methods[5] **(Fig. 3)**.

A *cesarean section* (*C-section*) is a surgical procedure used to deliver a baby through incisions made in the mother's abdominal wall (laparotomy) and uterus (hysterotomy). This procedure is performed when vaginal delivery poses a risk to the health of the mother or baby, or when complications

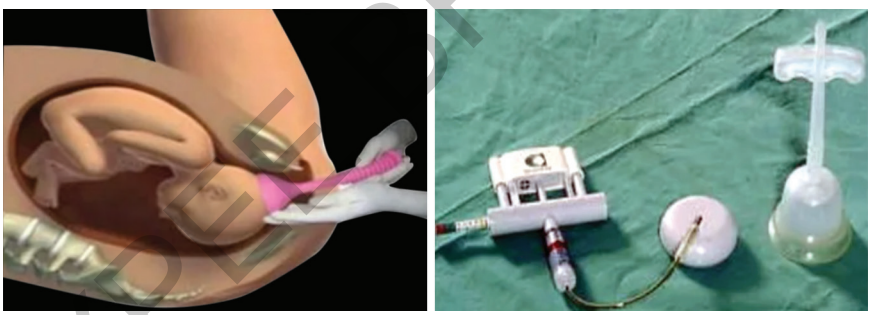


Fig. 2: Vacuum extractors.

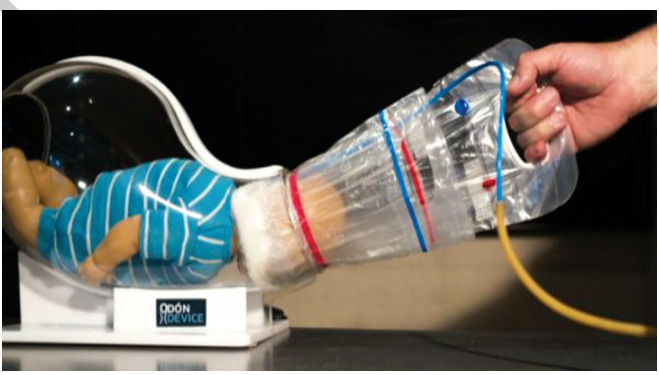


Fig. 3: Odón device.

arise that make vaginal delivery unsafe or impractical. C-sections can be planned (elective) or performed as an emergency intervention during labor if unexpected complications develop.

PREVALENCE OF OPERATIVE DELIVERIES

In the United States, 3.1% of all births in 2017 were achieved using an assisted vaginal approach, according to the latest available data.[6] Of these, forceps-assisted deliveries comprised 0.5% of all vaginal births, while vacuum-assisted deliveries accounted for 2.6%, making up 83% of all instrument-assisted vaginal deliveries. The prevalence of these assisted vaginal births varies greatly across different regions in the United States, reflecting possible inconsistencies in the application of evidence-based guidelines or declining familiarity and expertise with these techniques in some areas.[7] The highest rates for both forceps- and vacuum-assisted deliveries are seen in the Midwest, while the Northeast has the lowest rate for forceps use, and the South reports the lowest rate for vacuum use.[7] Overall, there has been a national and regional decline in the rates of assisted vaginal births in the United States.

On a global scale, the frequency of operative deliveries, which includes both assisted vaginal births and cesarean sections, differs widely depending on local clinical practices, the availability of resources, and the training level of healthcare providers.[8] In some regions, the use of forceps and vacuum devices is either not part of clinical training or is rarely practiced. In a large prospective study conducted in low- and middle-income countries, the rate of assisted vaginal births dropped from 1.6 to 0.3%, while the cesarean section rate more than doubled, reaching 14.4%.[9]

PREVALENCE OF OPERATIVE DELIVERIES IN INDIA

In India, the prevalence of operative deliveries varies significantly due to regional differences in healthcare practices, resource availability, and clinician training. According to the National Family Health Survey (NFHS-5) data (2019–2021), the rate of C-sections in India has increased substantially, reaching an average of 21.5% of all births. This marks a significant rise from 8.5% in 2005–2006.[10] The rates of cesarean delivery are notably higher in urban areas (29.3%) compared to rural areas (16.7%) and vary widely among states. For instance, states like Telangana and West Bengal report high C-section rates of 58% and 47.5%, respectively, whereas states like Nagaland (5.8%) and Bihar (6.2%) have much lower rates.[11]

Assisted vaginal deliveries, such as forceps and vacuum-assisted births, are less commonly performed in India compared to cesarean sections. Although large-scale national data specifically on the rates of assisted vaginal

TABLE 2: Prevalence of operative deliveries in India.[10,11]

Indicator	*Data/percentage*
Overall cesarean section rate (India, 2019–2021)	21.5%
Urban cesarean section rate	29.3%
Rural cesarean section rate	16.7%
Highest state cesarean section rates	Telangana (58%), West Bengal (47.5%)
Lowest state cesarean section rates	Nagaland (5.8%), Bihar (6.2%)
Cesarean section rate increase	8.5% (2005–2006) to 21.5% (2019–2021)
Assisted vaginal deliveries (forceps and vacuum)	Less commonly performed; specific national data limited
Factors for high C-section rates	Perceived safety, medicolegal concerns, patient preferences

deliveries is limited, studies and regional data suggest that these account for a small percentage of all births. The reliance on C-sections has increased due to factors like perceived safety, medicolegal concerns, and patient preferences **(Table 2)**.

The trend in India mirrors the global shift toward a higher rate of cesarean deliveries, with a corresponding decline in the use of assisted vaginal birth techniques. The reduced frequency of assisted vaginal births may also be influenced by the declining training opportunities for these procedures and the growing availability and preference for cesarean delivery.

The Decision for Operative Births

The decision to use an instrument for assisted vaginal birth involves a careful assessment of the risks and benefits to the mother, fetus, and neonate.[12] This decision balances the procedure's advantages against the alternative options of cesarean delivery or continued expectant management, considering factors such as maternal exhaustion, nonreassuring fetal status, or complications that may preclude further waiting or pushing. The choice of instrument (forceps or vacuum) is also influenced by clinical expertise, availability of equipment, and the specific clinical scenario.

OVERVIEW OF OUTCOMES AND COMPLICATIONS OF ASSISTED BIRTHS

Table 3 shows the overview of outcomes and complications of operative deliveries.

TABLE 3: Overview of outcomes and complications of operative deliveries.

Category	*Outcomes/complications*
Maternal outcomes	• Higher risk of perineal trauma, including third- and fourth-degree tears (especially with forceps delivery) • Increased likelihood of postpartum hemorrhage, infection, and extended hospital stay • *Potential long-term issues:* Pelvic organ prolapse, urinary incontinence, pelvic floor disorders
Fetal outcomes	• Risk of scalp injuries, cephalohematoma, or subgaleal hemorrhage (more common with vacuum extraction) • Risk of facial nerve injury or skull fractures (more common with forceps delivery) • Increased likelihood of neonatal jaundice due to cephalohematoma • Generally, low but potential risk of hypoxic-ischemic encephalopathy if the indication for operative delivery is prolonged fetal distress
Complications	• *For forceps delivery:* Facial nerve palsy, skull fractures, intracranial hemorrhage, shoulder dystocia • *For vacuum extraction:* Scalp lacerations, cephalohematoma, subgaleal hemorrhage, retinal hemorrhage • *For cesarean delivery:* Surgical complications (infection, bleeding, thromboembolism), anesthesia-related risks

CONCLUSION

Operative deliveries, while essential in certain clinical scenarios, require careful consideration of indications and potential risks. Knowledge of the types, indications, outcomes, and complications is critical for healthcare providers to make informed decisions that optimize maternal and neonatal health outcomes.

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