

Diagnosis and Management of Labor Dystocia According to the Friedman Curve

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ABSTRACT

Introduction: Labor dystocia or abnormal prolonged delivery is one of the common indications regarding unplanned cesarean deliveries. A better understanding of the diagnosis and management of labor dystocia according to Friedman curve could lead to new opportunities to increase the rate of vaginal delivery. This paper aims to summarize known diagnosis and management techniques according to the Friedman curve.

Method: Literature reviews were compiled based on articles obtained using search engines “Google Scholar” and “PubMed” with keywords “Diagnosis”, “Friedman Curve”, “Labor”, “Dystocia” and “Management”. There were 10 articles that were appropriate for this purpose.

Result and Discussion: Labor dystocia is a labor complication where the labor process is abnormally slow, hence the term abnormal prolonged labor. This involves a variety of problems which is abbreviated by three P's, Power, Passage and Passenger. Power is defined by the ability of the uterus to contract during labor. Passage is defined as the divergence between the measurements of the fetal head and the maternal pelvis that might be caused by ineffective uterine contraction or macrosomic fetus, that result in obstructed labor. Passenger is defined as the presentation, position and fetal development that might influence the dystocia incident. Early diagnosis and management of labor dystocia are crucial in improving outcomes in labor dystocia patients, both for the mother and the newborn.

Conclusion: The theories of Friedman and recent significantly impacted the diagnosis of protraction or arrest disorder. Educating patients about labor preparation is vital to prevent adverse conditions that can lead to complications and even mortality for both mother and fetus.

Keywords: Diagnosis and Management, Dystocia, Friedman Curve, Labor.

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1. INTRODUCTION

Labor dystocia refers to slow progress during labor and is a common reason for unplanned cesarean deliveries [1], [2]. Cesarean deliveries carry significant risks compared to vaginal birth, which has important benefits for both mother and the baby. Vaginal birth reduces postpartum pain, enhances bonding between mother and baby, promotes breastfeeding, and lowers the risk of childhood conditions. On the other hand, cesarean surgery increases the likelihood of surgical complications, infections, and future pregnancy complications [1].

Early diagnosis and management of labor dystocia are key to avoiding unplanned cesarean surgery

regarding labor dystocia. However, the management of labor dystocia is known to not be precise. This leads to an overuse of unplanned cesarean births. Effective management of labor dystocia is dependent on the tool used to diagnose the disorder [3]–[5].

In 1954, Friedman conducted a study on the rate of cervical change during natural labor and created labor curves based on this data. These curves represented the expected rate of cervical change in the general population. When there are deviations from these curves, especially if the cervical change is slower than expected, it is referred to as protracted or arrest disorders, indicating labor dystocia [5]–[7]. The Friedman curve has been widely used as the main tool to diagnose abnormal labor. However,



more recent studies have shown slower average dilation rates for successful vaginal deliveries. As a result, clinical guidelines have been adjusted to allow for longer labor in order to reduce cesarean births without increasing adverse outcomes. These changes have been made by organizations such as ACOG/SMFM and ACNM [5], [6].

The available options for treating labor dystocia, which refers to difficulties during labor, are limited. One common approach is to use a medication called synthetic oxytocin to help strengthen the contractions. While oxytocin can make labor shorter, studies have shown that it doesn't necessarily reduce the need for cesarean section deliveries. The way individuals respond to oxytocin varies, and there are no clear signs to predict how a person will respond or how they will give birth. Current studies on labor dystocia are often influenced by the frequent use of oxytocin in women who have normal labor progress. Our understanding of the causes of labor dystocia is still limited, which makes it difficult to accurately diagnose and effectively manage the condition [3]–[5].

Enhanced comprehension of the diagnosis and management of labor dystocia holds the potential for exploring fresh clinical possibilities aimed at augmenting the frequency of successful vaginal deliveries, minimizing cesarean section rates, and enhancing the well-being of both mothers and newborns. We hope that this article will help readers to understand and expand their perspective on the diagnosis and management of labor dystocia according to the Friedman curve.

2. METHODS

Literature reviews were compiled based on articles obtained using search engines “Google Scholar” and “PubMed” with keywords “Diagnosis” “Friedman Curve”, “Labor”, “Dystocia”, and “Management”. There were 10 articles were appropriate for this purpose.

3. RESULT AND DISCUSSION

3.1. Dystocia

Labor dystocia, also known as difficult or obstructed labor, involves a variety of problems during childbirth. These problems include slow cervix dilation, fetal descent challenges during active labor, and shoulder dystocia where the baby's shoulders get stuck after the head is delivered. Issues mentioned above can be simplified into an abbreviation called Three P's, which is, Power, Passage and Passenger [4], [5].

Three “P's” are described as the contributing factors of labor dystocia. An expulsive force that comes from the uterus that is abnormal can be defined as power. Contractions of the uterine can be hypotonic or hypertonic. Hypotonic means there is insufficient strong pressure during contraction, whereas hypertonic is defined as there is elevation of basal tonus or there is inappropriate coordination to efface and dilate the cervix. The pelvis (passage) factor also contributes as the cause of dystocia. Pelvic bone or soft tissue abnormalities may create a contracted pelvis. The term cephalopelvic disproportion is one of the

conditions under the passage factor, defined as a divergence between the measurements of the fetal head and the maternal pelvis that might be caused by ineffective uterine contraction or macrosomic fetus, which results in obstructed labor. Passengers such as the presentation, position and fetal development also influence the dystocia incident. Malposition, malpresentation, congenital malformation, and macrosomia are some examples of passengers. The psychological state of the mother also can play an important role as the cause of dystocia [8].

Dystocia can be diagnosed during the active phase of the first or second stage of labor. Slow progress labor, less than 1 cm/hour of cervix dilatation during the active phase can be defined as primary dystocia. Secondary dystocia can be defined as no progress for at least two hours after initially normal progress. Commonly labor dystocia is found among nulliparous. The risk of dystocia increased in parous women without previous vaginal delivery than in other parous women. The body mass index of the maternal also plays a role in the risk factor of labor dystocia. Higher body mass index in nulliparous women displayed a longer first stage and the active phase was found to be delayed in obese women. In other words, there is slower labor progression in the first stage for overweight and obese women. Several conditions that are associated with the prolonged second stage are premature rupture of membrane (PROM), polyhydramnios, gestational diabetes and hypertensive disease. Psychological factors like fear of maternal childbirth itself can increase the labor duration also [9].

3.2. Protraction and Arrest Diagnosis

Protraction disorder means that delivery is progressing but is slower than normal. Arrest disorder means that there is complete cessation of dilatation and/or descent. If there is no progression to the next centimeter within the subsequent expected time frame, the condition is known as primary protraction of cervical dilatation. When there is no progression to the next centimeter within any expected time frame after normal active labor is determined, known as secondary protraction of cervical dilatation. The first stage of arrest in the active phase may be diagnosed in spontaneous labor if there is 6 cm or greater dilatation with ruptured membranes and adequate contractions for 4 hours or more. It also can be diagnosed if there are 6 hours or more if contractions are inadequate with no change of cervical appearance. For protraction in the latent phase, it can occur for about 20 hours or more in nulliparous women and 14 hours or more in multiparous women [4].

Friedman curve consists of the relationship between the duration of labor and cervical dilation, which consists of latent and active phases then followed by the second stage of labor [10]. Deviations from the Friedman curve which shows slower change of the cervix are referred to as protracted or arrest disorders and represent labor dystocia. The definition of prolonged latent phase labor based on Friedman in 1950 was re-endorsed by the American College of Obstetrics and Gynecologic and the Society for Maternal-Fetal Medicine. Based on Friedman's theory, it is indicated that at the end of latent labor the cervical dilatation approximated 2.5 cm for nulliparous and 2.0 cm

for multiparous women. Recently, the American College of Obstetrics and Gynecology reported that the duration of time to dilate from 3 to 6 cm alone approximates 18 hours at the statistical limit regardless of parity. The second stage of protraction and arrest may be diagnosed more than 3 hours without an epidural or 4 hours with an epidural in nulliparous women. It also can be diagnosed more than 2 hours without an epidural or 3 hours with an epidural in multiparous women [3].

3.3. Management

The risk of fetal distress, uterine rupture, infection for both maternal and fetal, and postpartum hemorrhage can be increased during prolonged labor conditions. To prevent poor outcomes for both maternal and fetal, active management is needed in abnormal labor progression. Amniotomy (artificial rupture of the amniotic membranes) during labor might decrease the total duration of labor in nulliparous women without affecting other outcomes. It can help treat prolonged latent and active phases. Based on an article about labor dystocia, reported that early amniotomy does not make any significant difference in rates of hemorrhage, infection or pelvic floor trauma between the case and control groups.

The use of partograms for monitoring the cervix dilatation over time to identify patients with slow labor progress conditions can also help. Fetal heart rate monitoring is also shown in partograms. Partograms have not been shown to increase outcomes of labor in high-resource settings, but they might be useful in low-resource settings. Administration of oxytocin can be given during absent or minimal descent (less than 1 cm) after 60 to 90 minutes of pushing and if there are rare contractions of the uterus. Gill et al. [4] reported that oxytocin administration plus routine amniotomy decreases the duration of labor and has a similar effect in both nulliparous and parous women. Early oxytocin administration does not affect the cesarean delivery rate compared with delayed administration, there is also no difference in maternal outcomes like hemorrhage or a mode of delivery. The comparison between different assessments such as partogram monitoring, administration of oxytocin and amniotomy would help reduce the risk that might happen during prolonged labor so that the outcomes of both maternal and neonatal can be balanced [3].

3.4. Barrier

The starting point where the active phase of labor or prolonged second stage of labor might be diagnosed if it has proven that the medication found to fail, somehow still becomes subjective. These subjectivities come from a lack of consistency in diagnostic criteria or there is no historical dystocia and overused oxytocin to fasten the labor with normal development on its process [8].

4. CONCLUSION

Labor dystocia encompasses a range of issues in childbirth, including slow cervical dilation, difficulty in fetal descent, and shoulder dystocia. The theories of Friedman and recent advancements have significantly impacted the diagnosis of protraction or arrest disorder. Early

identification and appropriate management are crucial in addressing these challenges, especially in difficult circumstances. Patient education plays a vital role in preparing for labor and avoiding potential complications that can affect both maternal and fetal health. Further research and advancements in understanding labor dystocia are necessary to improve outcomes for mothers and newborns.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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