Case report

Buscopan and contemporary obstetric care – A therapeutic adjunct to management of cervical dystocia, uterine inversion and unremitting pain in labour

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Introduction to pathology

Cervical dystocia, defined as an inability of the cervix to dilate progressively during labour, presents significant clinical challenges. Timely cervical dilatation is crucial for normal labour, as it allows the baby to pass through the birth canal without complications. When cervical dilatation is delayed or fails to occur normally, it can have serious implications for both the mother and the baby. For the mother, complications may include an increased risk of infection, exhaution, and haemorrhage\textsuperscript{1}. For the baby, potential complications include fetal distress, low Apgar scores, and an increased likelihood of requiring special care neonatal support. Understanding and managing cervical dystocia proactively allows better outcomes for both mother and baby\textsuperscript{2}.

Uterine inversion is a rare but serious obstetric emergency that occurs when the uterus fundus prolapses caudally following childbirth, often associated with the delivery of the placenta. This condition can incur significant maternal morbidity due to severe haemorrhage and shock. Cervical spasm is often implicated, where the cervix constricts and prevents the uterus from returning to its normal position\textsuperscript{2,3}. The spasm can impede efforts to restore normal anatomy during manual or surgical repositioning if unresolved\textsuperscript{3}.

Pain and discomfort are very often integral to the experience of labour. They involve both psychological fears and apprehension but are grounded in the physiological and mechanical mechanisms of labour, which include uterine contractions, cervical dilatation, and the descent of the fetus through the pelvis and birth canal. Uterine contractions generate significant pressure and tension, which stimulate pain receptors in the uterus\textsuperscript{2}. As the cervix dilates, nerve endings in the cervical tissue are activated, adding to the overall pain experience. Additionally, the stretching and pressure exerted by the descending fetus further amplify discomfort and pain\textsuperscript{2}.

During the first stage of labour, pain is predominantly due to the dilation and effacement of the cervix. This stage involves the gradual opening of the cervix from closed to fully dilated, which allows the widest diameter of the presenting part to pass through – this is generally about 10 cm\textsuperscript{4}. The pain associated with cervical dilatation is largely visceral, originating from the stimulation of the lower uterine segment and cervix. This pain is
transmitted through the T10-L1 spinal nerves and is often experienced as a cramping or aching sensation. Traditionally, pain during labour is managed using a combination of supportive techniques and medications. The former include physical, emotional, and environmental interventions to reduce stress and promote comfort. Techniques such as breathing exercises, hydrotherapy (using water immersion for pain relief, such as taking a warm bath or shower), and applying heat or cold packs can help manage pain naturally. Additionally, continuous labour support from a partner, doula, or healthcare professional provides emotional reassurance and practical assistance, which can significantly alleviate anxiety and perceived pain.

Non-pharmacological methods like acupunture, acupressure, and transcutaneous electrical nerve stimulation (TENS) are also utilized to manage labour pain. These techniques work by stimulating nerve pathways to reduce or compete with normal pain perception and promote the release of endorphins, the body’s natural painkillers. In much the same way, active positioning and movement during labour, such as walking, swaying, or using a birthing ball, can aid in pain management by facilitating fetal descent and optimizing a favourable pelvic aperture.

Pharmacological pain relief options include inhaled nitrous oxide, commonly known as laughing gas, which offers moderate pain relief with minimal side effects, allowing women to remain mobile and alert during labour. Systemic medications, such as intermittent opioids (e.g., morphine or fentanyl), provide pain relief by acting on the central nervous system but may cause side effects like nausea, dizziness, and respiratory depression. Regional anaesthesia, particularly epidural analgesia, is widely used for effective pain relief during labour. An epidural involves the injection of anaesthetic and analgesic agents into the epidural space surrounding the spinal cord, blocking afferent pain signals from the lower body. This method provides significant pain relief and can be adjusted as labour progresses to provide sustained relief while encouraging the active participation of secondary powers. It may, however, particularly following insertion, be associated with a dramatic drop in maternal blood pressure that may compromise placental perfusion. Other risks include inadvertent venous infiltration or direct spinal injection leading to symptoms of local anaesthetic toxicity. A Spinal block is similar to an epidural and involves injecting anaesthetic directly into the cerebrospinal fluid for a more profound level of pain relief, typically required for caesarean deliveries. Local anaesthesia, involving the injection of anaesthetic agents directly into the perineal area, is often used to numb the area for procedures such as episiotomy or repair of perineal tears.

The normal process of labor and cervical dilation
Labour is a multi-factorial integrative process involving myometrial contractile activity, cervical ripening and dilation, and the orderly descent and delivery of the fetus and placenta. The first stage of labour lasts 12-16 hours in primigravidae (first-time mothers) and usually 6-8 hours in parous women (those who have given birth before). Labour is assessed by the progressive dilation and effacement of the cervix and the descent of the presenting part. Hormones such as oxytocin and prostaglandins are essential in promoting uterine contractions and cervical ripening. Oxytocin, released from the posterior pituitary gland, stimulates strong, rhythmic contractions of the uterus. At the same time, prostaglandins, produced locally in the cervix and pelvic floor tissues, aid in softening and remodelling of cervical length and opening. Relaxin, another hormone of labour, helps to relax the cervical tissues and the pelvic ligaments. Mechanical factors play a significant role in cervical dilation, with the physical pressure of the descending presenting part being crucial to the effective stretching of the lower uterine segment and cervix. Integral to all, effective coordinated uterine contractions push the baby downwards, applying progressive pressure to the cervix and vaginal tissues.

Cervical dystocia: causes of poor cervical dilation
Prolonged labour, defined as labour lasting over 24 hours, presents significant challenges for both the mother and the baby. This may occur due to physiological, anatomical, maternal, fetal, and external factors, each presenting impediments to effective cervical dilation and vaginal descent. Physiological causes often point towards ineffective or incoordinate uterine activity. Hypotonic and irregular contractions fail to efface and dilate the cervix effectively. To do so, they must pull cervical tissues upwards, incorporating them into the lower segment of the uterus with each successive contraction. Collaboratively, they must push the presenting part downwards into the pelvis while maintaining pressure on the cervix to thin out and open the tissues effectively. In contrast, hypertonic con-
tractions, which are excessively strong and frequent, can lead to placental insufficiency and foetal distress. In each case, the pathology may relate to the tissues themselves or the support of coordinating hormones such as endogenous oxytocin or prostaglandins.

Anatomical issues can also significantly impact labour progression. Cervical scarring or stenosis, often resulting from previous surgical procedures such as conization or loop electrosurgical excision procedures (LEEP), can make the cervix less malleable and more resistant to dilation. Maternal factors also play a critical role in labour dynamics. Advanced maternal age is associated with a higher risk of complications, usually secondary to impaired circulation and elasticity of tissues. Obesity can affect not only maternal anatomy but also the presenting size of the foetus, making the risk of dystocia more likely. Dehydration, fatigue, and other co-morbidities can also affect resilience and maternal adaptation to the demands of labour. Fetal factors such as malposition can also obstruct labour. Commonly, an occiput posterior position may lead to a malpresentation of the baby’s head as it pushes on the cervical tissues, impeding effective dilation. Macrosomia, or a large for gestational age baby, can create a disproportion between the transit diameters of the maternal pelvis and the presenting part, leading to obstruction and failed descent or internal rotation.

Despite appropriate indications, iatrogenic intervention, including induction procedures, may lead to secondary harm, such as more difficult labour. The early implementation of epidural analgesia, while beneficial for pain relief, can reduce mobility as well as the strength and frequency of uterine contractions, compromising subsequent progress.

The rationale for using buscopan in labor

Scopolamine and its natural derivatives have been used in obstetric care since antiquity. In ancient Egypt, Greece, and Rome, plants containing scopolamine, such as henbane (Hyoscyamus niger) and mandrake (Mandragora officinarum), were used for their sedative, antispasmodic, and analgesic effects in various medical treatments, including childbirth. During the medieval and Renaissance periods, herbalists and physicians continued to use extracts from these plants to manage pain and ease labour, often as part of complex herbal concoctions. By the 19th century, the isolation and identification of scopolamine and other alkaloids allowed for more precise medicinal use, including systematic application for its antispasmodic properties in childbirth to relieve pain and discomfort. In the early 20th century, scopolamine was combined with morphine to create a state of “twilight sleep”, which helped to alleviate pain and anxiety during labour. Typically administered via injection or transdermal patch, dosages required careful balance to ensure efficacy without risk of side effects, which included drowsiness, confusion, dry mouth, and potential respiratory depression. These concerns were significant and led to a steady decline in scopolamine use, particularly as alternative analgesic and anaesthetic options, such as epidural analgesia, became available.

In current practice, Buscopan (Hyoscine Butylbromide) inhibits cholinergic transmission in intraneural parasympathetic ganglia. It blocks the action of acetylcholine on predominantly muscarinic receptors of smooth muscle cells, leading to muscle relaxation, particularly in the gastrointestinal tract and cervix.

Buscopan can facilitate smooth muscle softening to allow less encumbered effacement and dilatation of the cervix during the first stage of labour, which may shorten the duration of this phase and, so too, the amount of pain and discomfort experienced by the woman as she labours. This dual action of pain reduction and optimization of labour progress underscores the potential benefits of Buscopan in improving the experience and outcomes of childbirth for expectant mothers. Additionally, Buscopan may also play a largely acknowledged role in the critical management of uterine inversion. By inhibiting cholinergic transmission, Buscopan reduces cervical spasms, which may allow immediate internal manipulations to correct the inversion more effectively. The early success of these manoeuvres will support resuscitation, particularly cardiovascular support, by reducing the risk of catastrophic haemorrhage and discomfort.

Cervical dilation and effacement are key undertakings of the work required during the first and second stages of labour. Optimizing these can significantly reduce the overall duration of labour, thereby reducing maternal and fetal risks associated with prolonged labour, such as uterine rupture, postpartum haemorrhage, and maternal morbidity and mortality. It may also decrease the need for additional interventions such as oxytocin augmentation and assisted instrumental vaginal or caesarean delivery when the progress of labour, otherwise unassisted, is considered less than favourable. Finally, the controlled and gradual descent of the
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presenting part during the second stage permitted by the use of Buscopan may help prevent maternal complications such as lacerations and perineal injury and the risk of intracranial haemorrhage, which can occur when the fetal head is rapidly and forcefully expelled during precipitous delivery.

Pharmacology of buscopan

Buscopan is a synthetic drug derived from scopolamine, a naturally occurring alkaloid found in plants of the Solanaceae family, such as henbane (Hyoscyamus Niger). It is a semi-synthetic derivative, chemically modified to enhance its antispasmodic properties and improve its pharmacokinetic profile, which includes absorption, systemic distribution, and renal excretion. Buscopan rapidly distributes into tissues with limited passage across the blood-brain barrier after administration. Its actions are localized to the smooth muscles of the gastrointestinal, biliary, and genitourinary tracts, the uterus, and the cervix.

Current clinical evidence and efficacy

Clinical studies and pharmacovigilance reports suggest that Buscopan is generally well-tolerated with a low incidence of side effects. Commonly, these may include symptoms of a dry mouth, dizziness, and blurred vision, which are typically mild and self-limiting. More specifically, Buscopan is contraindicated for patients with myasthenia gravis, megacolon, and angle-closure glaucoma, as the drug’s anticholinergic effects may exacerbate these conditions. Overall, the risk-benefit profile of Buscopan in labour is favourable. Case studies have shown it to be used successfully in labour. In these reports, Buscopan helped facilitate cervical dilation and alleviate pain, allowing smoother progress in labour and improved outcomes. Current research to support the effectiveness of Buscopan for cervical dilation has, however, shown mixed results. A systematic review which included multiple randomized clinical trials in multiparous women in active labour with a normal singleton term fetus (gestational age 37-42 weeks) in vertex presentation showed that Buscopan was associated with a reduction in the duration of the first and second stages of labour. Other studies, however, have shown minimal or no significant impact. Further research, however, is needed to establish definitive guidelines for using Buscopan in obstetrics, particularly regarding the optimal dosage and administration timing, ensuring that it can be used safely and effectively to improve labour outcomes with minimal risk of adverse exposure.

Administration and dosage

Pharmacokinetic studies indicate that Buscopan has low systemic availability following oral administration because of significant first-pass metabolism in the liver, which limits absorption into the bloodstream before excretion by the kidneys. Despite low plasma concentrations, Buscopan remains effective because of its high affinity for muscarinic and nicotinic receptors to create therapeutic activity. For obstetrics, the recommended dosage is 20 mg by intramuscular injection when required. It should not be given intravenously. The dosage seldom needs to be repeated with administration intervals usually timed to resolve a critical event or as an adjunct to normal labour in which setting it may be repeated after 6 hours.

Clinical guidelines and recommendations

Professional organizations such as the American College of Obstetricians and Gynecologists (ACOG) and the Royal College of Obstetricians and Gynaecologists (RCOG) have yet to issue specific guidelines for using Buscopan in labour. However, they emphasize the importance of managing cervical dystocia and labour pain effectively to improve maternal and fetal outcomes. Recent updates in obstetric care guidelines emphasize the importance of minimizing unnecessary interventions and promoting non-pharmacological pain relief methods. While there are no specific recommendations regarding Buscopan, ongoing research into its efficacy for cervical dilation and pain management may lead to a more defined invitation for use in the future, particularly when other methods have proven insufficient, or the cascade of further intervention is otherwise pending.

Conclusion

Labour is a multifaceted process involving myometrial contractions, cervical remodelling, and the progressive descent of the fetus to birth. These require complex coordination of physiological, hormonal, and mechanical powers, including hormones such as oxytocin and local prostaglandins, to initiate and sustain effective change.
Cervical dystocia, characterized by inadequate cervical dilation during labour, poses significant challenges for both maternal and fetal outcomes. It may lead to complications such as prolonged labour, maternal exhaustion and pain, an increased risk of sepsis and haemorrhage, as well as an incidence of surgical intervention. For the baby, concerns of fetal distress and low Apgar scores at the time of birth are also more common. Cervical spasm is also associated with uterine inversion, a rare but serious obstetric emergency, which may lead to catastrophic postpartum haemorrhage.

The use of scopolamine and its derivatives in antiquity underscores the long-standing recognition of the therapeutic benefit that Buscopan may provide to contemporary obstetric practice. A broader familiarity with the nuances of cervical dystocia in labour and the likely benefits of appropriate pharmacological intervention using Buscopan may help us improve pregnancy outcomes and better support patient expectations for a safe and positive birth experience.

References

Clinical Evidence and Safety Profile:

Clinical Guidelines and Recommendations: