Reduction of maternal and neonatal harm through prevention of the primary Cesarean section

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ABSTRACT

While there are clear life-saving indications for Cesarean section (C-section), rates of this procedure have seen a continued rise without a concomitant improvement in maternal or neonatal outcomes. There is some evidence that outcomes may actually be worse for low-risk C-sections versus vaginal delivery. However, this is not necessarily common knowledge for healthcare providers, and therefore, their patients. Measures to safely reduce the C-section rate target management of labour arrest and specific indications for progression to C-section. In the active phase of the first stage of labour, C-section should be considered only in cases of failure to progress after 4 hours of adequate uterine contraction, or 6 hours of inadequate contraction. In the second stage of labour, expectant management of 3 hours of pushing in nulliparous women and 2 hours in multiparous women is safe and appropriate. Furthermore, manual rotation and operative vaginal delivery in the second stage are reasonable alternatives to C-section. Expectant management is also appropriate for certain non-reassuring fetal heart rate tracings. In post-dates pregnancies, induction of labour reduces both rates of C-section and neonatal mortality. Finally, evidence supports the use of external cephalic version in breech presentation as well as a more conservative approach to suspected macrosomia and multiple pregnancy. Taken together, these measures target the most common indications for progression to C-section and can allow us to safely reduce the C-section rate. Educating patients and physicians on the risks of the procedure and reasonable alternatives can improve outcomes for mothers and neonates.

INTRODUCTION

Cesarean sections (C-sections) have been performed for centuries when vaginal delivery would put the mother or baby at risk. It has been repeatedly shown that, when medically justified, caesarean section is effective at preventing maternal and neonatal mortality and morbidity.¹ Over recent decades, however, there has been a dramatic increase in the primary C-section rate, for example from just over 20% in 1996 to almost 33% in 2011 in the United States, which has not been associated with a corresponding decrease in maternal or neonatal mortality.^{2,3}

Perhaps the most important factor driving the increase in the overall C-section rate is prior C-section. More than 90% of women in the United States who deliver by C-section will go on to have an elective repeat C-section, representing one third of these procedures.⁴ The rise in the primary rate is multifactorial in nature. There

has been a decrease in the operative vaginal delivery rate, particularly forceps delivery, due to reduced training compounded by fear of litigation.^{5,6} Furthermore, the prevalence of electronic fetal monitoring has allowed detection of more indications for C-section.⁷ Increasing maternal age has also contributed, as older mothers are at higher risk of progression to C-section and significantly more likely to request the procedure electively.^{8,9} Additionally, maternal comorbidities such as diabetes and obesity have been linked with greater risk of C-section.¹⁰ There is a widespread misconception that this procedure poses very few risks to healthy women or may even be safer than vaginal delivery when in fact it has been shown that severe maternal morbidity may be higher with a planned C-section than with planned vaginal delivery.¹¹⁻¹³

While C-sections improve outcomes when vaginal delivery poses a risk, they are not without harm and should be avoided unless truly medically indicated. This review considers safe ways to decrease the primary C-section rate and thereby reduce unnecessary harm to mothers and neonates.

OUTCOMES IN C-SECTIONS

One study measured overall rates of severe maternal morbidity at 27.3 per 1000 deliveries for low-risk C-section and 9.0 for vaginal delivery.¹² Women undergoing C-sections experience higher rates of postpartum cardiac arrest, fever, wound complications, hysterectomy, venous thromboembolism, and hemorrhage.^{12,14} Rehospitalization after planned primary C-section is also significantly higher than after planned vaginal births. One analysis found that a woman undergoing a planned primary C-section was 2.3 times as likely to be rehospitalized in the first month, although this data may be confounded by unrecorded underlying medical conditions. Mothers with a planned primary C-section were also significantly more likely to be rehospitalized within the 31 to 180 and 181 to 365 day timeframes. The most common reason for readmission in the first 30 days after C-section was surgical wound complications.¹⁵

The risk of many adverse neonatal outcomes is also greater with C-section. The neonatal mortality rate for low-risk C-section with no labor complications was 1.69 times greater than for vaginal delivery in the entire US birth cohort between 1999 and 2002.¹⁶ Planned C-sections also place newborns at significantly higher risk of NICU admission and pulmonary disorders in comparison to planned vaginal deliveries.¹⁷

The financial burden of this procedure should also be considered. The cost of primary C-section is greater than vaginal delivery. In 2003 the average initial maternal hospital costs for a planned primary C-section were 76% higher than a planned vaginal birth. The cost discrepancy is due to the surgical nature of the procedure,

as well as length of stay. Following a C-section, the average initial stay is 4.3 days and 4.4 days for rehospitalization, compared with 2.4 and 3.9 days with vaginal delivery.¹⁵ These greater healthcare costs along with adverse outcomes give reason to pursue the safe prevention of C-section.

REDUCING PRIMARY C-SECTION RATES

There are safe ways to reduce the rate of primary C-section, which are best categorized as they relate to either the various stages of labour or specific indications for progression to C-section.

Labour dystocia in the 1st stage (failure to progress): The established definition of active phase arrest is a lack of cervical change for greater than 2 hours with adequate uterine contractions.² This definition has been recently challenged: Rouse et al. looked at extending this timeline in women in active-phase labour arrest, and found that oxytocin administration for 4 hours allowed most (92%) to successfully deliver vaginally. If a patient could not achieve sustained contraction of greater than 200 Montevideo units, a C-section was not considered until 6 hours of oxytocin augmentation. This did not negatively affect neonatal outcomes. This study recommends C-section only in women who fail to progress after 4 hours of adequate uterine contraction or 6 hours of inadequate contraction during active phase in the first stage of labour.¹⁸

Labour dystocia of the 2nd stage (failure to descend): A consensus on maximum duration of the second stage of labour does not currently exist. Extending this stage in nulliparous women has historically been linked with adverse maternal outcomes. However, recent research using much larger sample sizes has found that greater duration of pushing resulted in higher risk of adverse neonatal outcomes such as brachial plexus palsy, seizures and hypoxic-ischemic encephalopathy, although the absolute risk remained low. Risks to the mother include infection, perineal lacerations, and postpartum hemorrhage, as well as higher risk of C-section and operative vaginal delivery. The absolute risk remains low even up to 4 hours of pushing. Risk of adverse neonatal outcomes is 1.3% with 2 hours of pushing, and 2.0% with 3 hours. Expectant management within this time frame is appropriate as nulliparous mothers rarely push for greater than 3 hours and parous women rarely exceed 2 hours.^{19,20}

In a comparison between C-section, forceps-assisted and vacuum-assisted vaginal deliveries, forceps-assisted vaginal delivery was associated with the lowest risk of adverse events such as neonatal seizure, intraventricular hemorrhage, and subdural hemorrhage. There was no significant difference between vacuum-assisted and cesarean delivery.²¹ The role of manual rotation of a fetus in occiput posterior or transverse position has also been investigated. A retrospective cohort study by Shaffer et al. found a significant reduction in C-section with manual rotation (9% versus 41%) with no significant difference in birth trauma or neonatal acidemia relating to attempt at manual rotation.²² Based on these studies, both manual rotation and operative vaginal delivery should be attempted if possible before progressing to C-section.

Non-reassuring fetal heart rate: The widespread use of electronic fetal heart rate monitoring is controversial as it has contrib-

uted to the rise in C-section rate without measurably decreasing adverse neonatal outcomes.²³ There are some heart rate tracings that can be managed expectantly, such as recurrent variable decelerations, which are not necessarily pathologic but can cause fetal acidemia if they persist. These can be initially addressed using conservative measures, such as position changes.² Amnioinfusion with normal saline has also been shown in randomized clinical trials to prevent progression to C-section as well as reduce occurrence of variable decelerations, meconium aspiration, and bradycardia.²⁴

Post-dates: Induction of labour in post-dates pregnancies is a reasonable alternative to C-section. In a 2012 Cochrane meta-analysis, neonatal mortality and C-section rate were reduced following induction of labour at 41 weeks gestation compared with expectant management.²⁵ A 2005 study by Simon and Grobman found that many women whose latent phase of labour lasts 12 to 18 hours will go on to have a successful vaginal delivery with oxytocin augmentation and amniotomy. A latent phase lasting greater than 18 hours was not associated with increased maternal or neonatal morbidity.²⁶ This data supports a trial of induction of labour before progressing to C-section for postdates mothers.

Fetal malpresentation: The American Congress of Obstetricians and Gynecologists (ACOG) recommends external cephalic version (ECV) in cases of breech presentation. A meta-analysis found that ECV is successful in 53% of cases, and that clinical factors such as multiparity, nonengagement, a relaxed uterus, a palpable fetal head and maternal weight less than 65 kg are predictive of success.²⁷ This technique is safe in low-risk pregnancies when appropriate precautions are taken.²⁸ ECV significantly reduces the frequency of non-cephalic presentation at term. While there is greater risk of C-section compared to cephalic presentation, the average C-section rate after successful ECV is 21% compared with 85% when ECV is not attempted.^{2,29}

Macrosomia: Estimates of fetal weight are unreliable and birth weights greater than 5,000 g are very uncommon. ACOG recommends that C-section only be considered in cases of estimated fetal weights of over 5,000 g (over 4,500g in diabetic mothers).²

Multiple pregnancy: A randomized clinical trial comparing cesarean and vaginal delivery in twin pregnancies found that C-section did not significantly change neonatal outcomes when the first twin was in the cephalic presentation, therefore these mothers can safely attempt vaginal delivery.³⁰

CONCLUSION

C-sections occur more often than is truly medically indicated and can result in worse outcomes than vaginal delivery. There are safe ways of lowering the C-section rate, which would reduce unnecessary harm to mothers and babies. Targeting the primary C-section rate should be a priority, as this will feed forward to the repeat rate. C-sections can be avoided by educating patients on the relative safety of vaginal delivery, and by training physicians to more accurately assess the need to progress to C-section. Decreasing the rate of C-section in Canada may improve outcomes for mothers and neonates as well as reduce the costs of childbirth.

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