Childbirth pain management is an integral aspect and concern for the obstetric anaesthetist.¹ There is increasing evidence that effective acute pain management is crucial with long term sequelae if pain is not treated adequately.²,³ In the case of pregnancy and childbirth, a significantly stressful and painful period for mothers, poor childbirth pain management may be associated with consequences on a mother's psychological well-being, which may lead to persistent pain and postpartum depression. There are broadly two main aspects of pain management:¹ labour and delivery pain management and anesthesia and analgesia for caesarean section.

Postpartum depression is a significant morbidity that affects the health of mothers and their newborns and is associated with long term psychological and socio-economic implications.⁴ Clinical presentations of major depression may include low or depressed mood, insomnia, weight loss or weight gain, psychomotor agitation or retardation, feelings of worthlessness and guilt, low self-esteem, difficulties in concentration and suicidal tendencies.⁵ The strong predictors of postpartum depression are depression during pregnancy, anxiety during pregnancy, experiencing stressful life events during early and advanced pregnancy, low levels of social support and a previous history of depression.⁶ Stressful childhood experiences such as physical and sexual abuse also increase the affinity of neural networks in the central nervous system involved in the regulation of stress and emotion to subsequent stress, making individuals more vulnerable to stress and consequently at an increased risk of depression in their adult lives.⁷

The incidence of postpartum depression varies between studies depending on the period of survey and population investigated. Verreault et al. reported that the rate of depressed mood was 28.3% during pregnancy and 16.4% at 3 months postpartum.⁸ Among women with postpartum depressed mood, 6.6% were new cases. Ding et al. reported an incidence of 24.3% at 6 weeks postpartum⁹ while other studies have reported an incidence of between 7% and 15%.¹,²,¹¹,¹² In O'Hara and Swain's meta-analysis,¹² the average prevalence of postpartum depression, which can vary in severity and prognosis, was 13% based on 59 pooled studies, major factors affecting the observed prevalence included method of assessment (larger estimates if self-report measures used), as well as the duration under evaluation (longer postpartum periods predict higher prevalence). Other possible reasons include differences in characteristics of these new mothers namely their age, education level and socio-economic situation, as well as the local health services available such as the use of labour analgesia.⁹

The causes of postpartum depression are likely to be multifactorial.¹³,¹⁴ Both psychological and biological factors contribute to postpartum depression.¹⁵ Animal studies have suggested that...
changes in hormonal and neurotransmitter concentration can modulate anxiety during pregnancy.15 Pregnancy alters chemical neurotransmitter regulation of the human brain gamma-aminobutyric acid (GABA), norepinephrine and prolactin, which may play a significant role in the changes in vulnerability to anxiety and depression during pregnancy and postpartum period.11 The reduced ability in handling stress and depressive mood due to regulation of neurotransmitters in the human brain suggests a biological mechanism of disease in postpartum depression. Studies have also demonstrated that women with early stages of postpartum depression are extremely sensitive to the huge reduction of gonadal steroid levels that occurs at birth, which further compounds the risk of major depressive disorder (MDD) on top of the pre-delivery risk factors.16,18

2. Consequences of postpartum depression

The prompt detection of maternal mood deterioration is of utmost importance because it may have a negative impact on mother-infant attachment and may inhibit the development of the newborn.20–22 Depressed mothers are more likely to demonstrate inappropriate maternal behaviours such as smoking tobacco or failing tovest them infants into adequately sized car seats, leading in medical and safety issues.24,25 Furthermore, maternal depression is associated with a higher incidence of behavioural issues as well as cognitive impairment in infants and children.26–30 Postpartum depression has been shown to significantly impair the quality of mothers’ lives up to four months postpartum. This has led to the recommendation that postpartum depression screening be fully integrated into routine postnatal care.31

As few as 18% of women who meet the criteria for MDD seek treatment during pregnancy and in the postpartum period.25 This could be because common symptoms of depression such as insomnia, loss of appetite and energy are interpreted as expected experiences of pregnancy. In a study comparing maternity mortality statistics in Finland, France and the American states of Massachusetts and North Carolina, Gissler et al. also showed that out of 151 pregnancy-related deaths, ten were due to suicide in mothers with postpartum depression.32

As postpartum depression usually occurs with the entry of a newborn into the family, it is not surprising that exposure to postpartum depression increases the child’s vulnerability to depression in the later stages of life.33 Therefore strategies such as the screening for depressive symptoms and self-harm ideation could have a substantial, multigenerational public health impact.11 Early detection of these conditions can also help avoid or minimize the use of pharmacological therapies to treat the psychological problems that children may face in the future, which carry potential side effects.24

3. Significance of childbirth pain

Labour pain is one of the worst pain experiences a woman will suffer in her lifetime.35 As high as 60% of first time mothers have described their pain as “severe” or “extremely severe.”36 In one study by Soet et al., a correlation was found between labour pain and the development of posttraumatic stress disorder and approximately 34% of parturients rated their childbirth experience as traumatic. This suggests a strong stress stimulus can inflict severe adverse neuropsychological consequences on labouring mothers. In addition, the prevalence of persistent pain at 8 weeks after delivery was reported at 10% (95% CI, 7.7–12.3) following vaginal delivery and 9.2% (95% CI, 5.5–12.6) after Caesarean delivery in the study by Eisenach et al.37 Of these women who reported persistent pain, 36–60% had constant or daily pain, and almost 50% of women complained of pain interfering with activities of daily living. Mood and sleep were also negatively affected in 33–50% of these women. Persistent childbirth pain can hinder a mother’s ability to cope with the numerous stresses that are present after delivery. However, the consequences of childbirth pain may be underestimated as in general mothers do not reveal such issues readily due to embarrassment or difficulties in expressing themselves even though they may desire more guidance and help.38,39 In an Australian study by Brown et al., 94% of women reported one or more health problems such as backache and perineal pain after childbirth, but up to 25% of these women did not talk to their healthcare professional about these problems. Among those who reported postnatal health issues, as high as 49% of them verbalized that they would have liked more help or advice.40

Boudou et al. have postulated a link between the intensity of labour pain and the intensity of mood disorders in the early postpartum period.41 Knowing that intense labour pain is a risk factor for these mood disorders could improve their detection and focus attention on the psychological impact of labour and subsequent risk of post-traumatic stress disorders. In women without a previous history of depression, it was found that physicians’ diagnoses of fear of childbirth and fear of Caesarean section were associated with postpartum depression.41 Dysphoric emotions were especially associated with affective dimension of pain, suggesting that women distressed by childbirth pain would be at increased risk of developing posttraumatic stress symptoms.42

4. Labour pain and postpartum depression

In a recent study, Ding et al. reported that epidural labour analgesia is associated with a decreased risk of postpartum depression (odds ratio [OR] 0.31, 95% confidence interval [CI], 0.12–0.82, P = 0.018). Postpartum depression occurred in 14.0% (15 of 107) of parturients who received epidural labour analgesia and in 34.6% (37 of 107) of those who did not (p < 0.001). In addition, attendance at childbirth classes during pregnancy (OR 0.30, 95% CI, 0.12–0.79, p = 0.015) and continued breast-feeding after delivery (OR 0.02, 95% CI, 0.00–0.07, P < 0.001) were associated with decreased risks of postpartum depression. A high Edinburgh Postnatal Depression Scale (EPDS) score at 3 days postpartum was associated with an increased risk of postpartum depression (OR 1.20, 95% CI, 1.05–1.37, p = 0.009). However, when EPDS score and breastfeeding was excluded from analysis, epidural labour analgesia remained an independent predictor of decreased risk of postpartum depression at 6 weeks (OR 0.35, 95% CI, 0.14–0.86, p = 0.02 and OR 0.30, 95% CI, 0.14–0.65, p = 0.002, respectively). When all variables were included in the model, epidural analgesia also remained an independent predictor of decreased risk of postpartum depression (OR 0.32, 95% CI, 0.11–0.89, p = 0.02).

The association between not breast-feeding and postpartum depression can be explained in 2 ways: women with depressive symptoms immediately after delivery are less likely to attempt nursing and have a higher tendency to stop breast-feeding early, and34 early discontinuation of breast-feeding is associated with increased severity of postpartum depression.53,44 Previous studies have demonstrated that breastfeeding promotes high levels of prolactin in the maternal circulation,55 which has been shown to minimize distress and low moods in new mothers.45

Interestingly, studies by Hiltunen and Eisenach suggest that the mode of delivery does not affect postpartum depression.37,38 Hiltunen demonstrated that Caesarean delivery did not increase the risk of high EPDS scores when compared with vaginal delivery in the first week or at 4 months postpartum. These findings were
similar to those found in Eisenach’s study, where the prevalence of postpartum depression eight weeks after delivery was 11.4% for vaginal delivery and 10.5% for Caesarean delivery (p = 0.34 before propensity adjustment, and p = 0.56 after adjustment). This could be because the development of persistent postpartum pain and depression after childbirth is not primarily related to the degree of physical trauma, grossly measured by Caesarean section as compared to vaginal delivery, but instead is related to the mother’s pain response to that injury.

Non pharmacological remedies such as music therapy have been shown to reduce the incidence of postpartum depression. Simavli et al. found that women who received music therapy during labour experienced less pain, decreased postpartum anxiety, increased satisfaction with their childbirth experience and reduced early postpartum depression rates. However, the subjects were blinded and late postpartum depression was not investigated.

Responsive and effective treatment of pain during pregnancy is important. Gaudet et al. found a dose-related association between the number of types of perinatal pain at the time of interview and postpartum depression. Women with increased perinatal pain were associated with more frequent postpartum depressive symptoms. Since mothers who reported chronic perinatal pain were at higher risk of developing postpartum depression, pain management should be focused on addressing the specific needs of pregnant mothers especially with regards to concerns of transferring analgesics to the neonate via breastfeeding.

Even though there is extensive evidence substantiating the association between depression and pain, relatively few studies focusing on postpartum depression have included the evaluation of pain during the childbirth process and postpartum period. In one study, the odds of a positive screen for postpartum depression in women with prolonged perinatal pain compared to those who were relatively pain free in the first 3 months after childbirth was 1.7. In addition, Hiltunen et al. suggested that managing intrapartum and early postpartum pain could decrease the risk of future depression. The study found that women who received epidural or paracervical blocks during their labour had lower depressive scores in the initial week after delivery compared to women who did not have analgesia during their labour (OR 0.25, 95% CI, 0.09–0.72). This difference was not significant at four weeks after delivery. Ding et al. performed an analysis of pre-delivery variables that may have influenced women who requested versus declined epidural analgesia to determine whether women who chose epidural analgesia had pre-existing features associated with a lower risk for postpartum depression. These variables included education level, family income, presence of any pre-gestational disease, previous abortions or surgeries, attendance at childbirth classes during pregnancy, gravidity and presence of any pregnancy related complications. They found that demographic and clinical characteristics were not significantly different between the two groups, further supporting the conclusion that pain reduction with epidural analgesia alone may be associated with a reduced risk for postpartum depression. The rate of Caesarean section was also significantly reduced in patients who requested for epidural analgesia. This finding contrasts with a recent review which found that the use of epidural analgesia seemed to prolong the duration of the second stage of labour and increase the rate of assisted vaginal deliveries, but did not change the rate of Caesarean deliveries. Some possible postulations for this discrepancy include: severe labour pain being associated with a higher Caesarean section rate as shown in previous studies, presumably because more intense pain is a risk factor for Caesarean section and maternal preference and request in women with un-medicated labour in view of severe pain, in the absence of a medical indication.

5. Post caesarean pain and postpartum depression

Caesarean section represents major surgery leading to moderate to severe postoperative pain and may result in significant tissue trauma. Of note, Caesarean section rates have increased significantly in recent years. The incidence of Caesarean sections in the United States in 2009 was reported to be 32.9% of all deliveries. Since women have been shown to be at increased risk compared to men for developing chronic pain after thoracotomy and spinal surgery, and exhibiting higher chronic back pain severity, surgical trauma from Caesarean section could be a concern for chronic pain development. Eisenach et al. investigated the severity of acute pain in a prospective longitudinal multicentred study involving 1288 women. They found that women with severe acute pain had a 2.5 fold increased risk of persistent pain and a threefold increased risk for postpartum depression compared with those with mild postpartum pain. The incidence of persistent pain after Caesarean section is reported to be between 1% and 18% and it is well established that chronic pain often co-exists with depression. Furthermore, the immediate postpartum period may be a time period typically of decreased attention to personal patient care, and poorly controlled acute pain during this time period may be a crucial contributor to persistent pain and depression after childbirth.

There is conflicting evidence with regards to an association between post Caesarean section pain and postpartum depression. Boyce et al. found that emergency Caesarean section was an independent risk factor for postnatal depression. Women who undergo Caesarean section are likely to spend less time with their newborn in the immediate postoperative period, their partner might not be present at delivery and in the case of the emergency Caesarean section, these women may have more complications such as wound infections all of which may influence their psychological well-being. Ryding et al. compared the psychological reactions of women after emergency Caesarean section, elective Caesarean section, instrumental and normal vaginal delivery. They found that the patients in the emergency Caesarean section group reported the most negative delivery experiences a few days post delivery and also at one month post delivery. They also showed more symptoms of posttraumatic stress compared with elective Caesarean section and normal vaginal delivery patients. The unplanned or unexpected nature of these deliveries were suggested to be risk factors for possible posttraumatic stress. This corroborates another study of 211 women where women who underwent emergency Caesarean section reported more disappointment with their delivery as did those with more pain or inadequacy in pain relief. However, this did not translate to an association with postnatal depression.

Despite the fact that there would be few objections to optimal pain control for new mothers, some pharmacological treatments for moderate to severe pain carry warnings against their use by breastfeeding women. There are contrasting results on the antihyperalgesic therapy of gabapentin after Caesarean section. Moore et al. concluded that a preoperative dose of gabapentin 600 mg in the setting of multimodal analgesia reduces post caesarean delivery pain and led to higher maternal satisfaction scores when compared to placebo. The mean pain scores on movement at 24 h using a visual analogue scale (0–100 mm) were 21 mm (CI, 13–28) in the gabapentin group and 41 mm (CI, 31–50) in the placebo group (p = 0.001). However, this finding was not replicated in a later study by Short et al., where there was no clear benefit from a single preoperative dose of either gabapentin 300 mg or 600 mg. Currently, gabapentin is not advocated as
antihyperalgesic therapy in lactating mothers with its use restricted to research and off-licence clinical use.

The concern of transfer of medications during breastfeeding may lead to fewer women willing to expose their newborns to pain medications. These observations also suggest the need to direct more attention to educating women, improving acute pain control and increasing the options available in the postpartum period and not just during childbirth, as this will hopefully reduce the incidence of postpartum depression and minimize any long term morbidities. There is also evidence that in addition to attempts at reducing childbirth pain, the aspect of pain catastrophizing should be addressed before analgesia is provided, for enhanced identification of the sub group of parturients who are at higher risk of developing impaired postpartum social functioning.60,70

6. Pain vulnerability

Pain catastrophizing is a measure of pain vulnerability on the negative thoughts patients have when exposed to pain or painful experiences. It consists of three components: rumination (process of fixating on pain), magnification (propensity to exaggerate the adverse consequences of the pain), and helplessness (the degree of hopelessness experienced during the pain). The study by Ferber found that pain catastrophizing during labour, when controlled for maternal age, education, parity, type of analgesia and labour pain intensity was associated with maternity blues and a decrease in postpartum social activity. A higher score on the Pain Catastrophizing Scale [PCS] measured during active labour before receiving analgesia was shown to be a significant predictor for maternity blues and social functioning at 6 weeks postpartum. This was in contrast to the finding that the Visual Analogue Scale, which was used as a measure of the pain intensity of the entire labour process, did not predict the occurrence of postpartum maternal adjustment problems. These findings suggest that emotional and cognitive factors connected to the pain experience during childbirth, in addition to the pain intensity experienced during labour, may be more relevant to the future emotional adjustment of women after childbirth.

An analysis of the different components of the PCS showed that rumination and helplessness were the most accurate predictors of maternity blues. According to Wisner et al., women with postpartum depression were characterized by helplessness and obsessive thoughts (which are comparable to the rumination domain of pain catastrophizing), suggesting that pain catastrophizing leads to the development of maternity blues by inhibiting spontaneous mood and adjustment processes after delivery.

In another prospective study investigating how pain catastrophizing was associated with labour pain intensity and physical recovery after childbirth in 88 Swedish women, women who were catastrophizers forecasted and experienced more severe pain than those who were non-catastrophizers (p < 0.01). Non-catastrophizers also reported better recovery after delivery when compared to those who catastrophized about labour pain (p < 0.01). These conclusions were similar to findings from earlier studies, the majority of which were conducted in chronic pain patients, where catastrophizing was related to increased pain and reduced participation in daily activities.

The results also supported the theory that the fear-avoidance model of pain, which was initially used to describe the development of chronic pain, may be relevant to childbirth pain. It is believed that some individuals interpret pain stimuli as terrifying which generates catastrophic thoughts, tension, vigilance, fear of pain and attempts to avoid the pain. This tendency to harbour fear-avoidance beliefs can also exist in some pain-free individuals, and these beliefs become activated when they approach pain. Women may also concentrate their attention on the pain, leading to an overestimation of its intensity and an underestimation of their own coping abilities. The heightened vigilance of pain is also believed to be associated with increased muscle tension which may increase pain intensity and induce attempts to avoid the pain, such as the tendency to avoid certain movements after childbirth including walking and cooking thus resulting in a slower resumption of daily activities.

Current research on childbirth pain mainly focuses on varying techniques to reduce pain intensity. With the knowledge that pain catastrophizing is associated with postnatal blues the use of the PCS in clinical practice may be a valuable tool as it can accurately and reliably identify women who catastrophize their labour pain which is important because of the increased risk of impaired social adjustment during the postpartum period.

7. Conclusion

Pregnancy and childbirth are major events in a woman’s life. They are also experiences that may lead to immense anxiety, especially for new mothers. Despite being a natural process, it can result in long term maternal morbidity. For most women, childbirth is inevitably associated with severe pain and overwhelming stress. The severity of acute postpartum pain is an independent risk factor for persistent pain and postpartum depression, both of which represent significant public health concerns in view of the negative implications they can have with regards to maternal well-being and the care of a newborn.

Optimal management of acute postpartum pain facilitates the new mother’s ability for attachment and infant caregiving, and sets in motion adaptive maternal behaviours and a positive emotional environment for the developmental tasks of parenting. More research is needed to define predictive factors for severe postpartum pain and investigate therapeutic interventions to reduce persistent pain and depressive episodes in this vulnerable group of women during their postpartum period.

Conflict of interest

There are no conflicts of interest of note.

References


