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A longitudinal study of women's memory of labour pain—from 2 months to 5 years after the birth

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Objective To investigate the memory of labour pain at 2 months, 1 year and 5 years after childbirth and its association with the use of epidural analgesia and overall evaluation of childbirth.

Design Longitudinal observational.

Setting All hospitals in Sweden.

Population One thousand three hundred eighty-three women, who were recruited at their first antenatal visit and who provided complete data up to 5 years after the birth.

Methods Postal questionnaires in the second trimester and 2 months, 1 year and 5 years after the birth.

Main outcome measures Memory of labour pain measured by a seven-point rating scale (1 = no pain at all, 7 = worst imaginable pain).

Results Memory of labour pain declined during the observation period but not in women with a negative overall experience of childbirth. Women who had epidural analgesia reported higher pain scores at all time points, suggesting that these women remember 'peak pain'.

Conclusions There was significant individual variation in recollection of labour pain. In the small group of women who are dissatisfied with childbirth overall, memory of pain seems to play an important role many years after the event. These findings challenge the view that labour pain has little influence on subsequent satisfaction with childbirth. In-labour pain and long-term memory of pain are discussed as two separate outcomes involving different memory systems.

Keywords Childbirth, epidural analgesia, labour pain, memory.

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Introduction

Knowledge about memory of labour pain is still limited. A review by Niven and Murphy-Black[1] was inconclusive as to whether or not women forget pain over time. Few studies in the review had measured pain during the different stages of labour[2–4]; rather, they had compared postpartum pain scores with recollected pain at a later time point.[5–10] Investigating the accuracy of women's memory of labour pain by comparing postnatal assessments with intrapartum assessments is problematic. First, pain varies during the different stages of labour, and it may therefore be difficult to determine which pains are recalled. Recall of pain during the first stage of labour may be confounded by second-stage pain. Second, it is well acknowledged that it is almost impossible to re-experience the real quality of pain.[11] It is possible that women only remember labour pain vividly when they are in labour in a subsequent pregnancy or to some extent when they are watching a videotape of their own labour.[12]

Assessments made during and after labour probably reflect different dimensions of pain. The in-labour experience has a stronger focus on the sensory and affective dimensions, reflecting pain intensity and psychological factors such as anxiety, whereas memory of pain after the birth has a stronger focus on the cognitive-evaluative dimension.[13] The in-labour experience is thus more affected by emotions in comparison with recollection pain, which is more of a mental process. This process may also be more or less explicit.[14] According to Tulving,[15] long-term memory involves three different memory systems. 'Episodic memory' is the 'highest' system that enables people to remember personal events from the past. It is 'a *mental* phenomenon in that it entails a conscious experience of a unique kind'. 'Semantic memory' has to do with 'knowledge of the world' and relates to knowledge

shared by many individuals. Finally, 'procedural memory' is less conscious. It refers to long-term memory of skills and procedures or 'how to' knowledge, and these memories are often not easily verbalised.

Based on these theories, we suggest that in-labour pain and recollection of pain should be regarded as two separate outcomes, both of which are important and relevant in research and in the clinical context but for different reasons. Knowledge about the in-labour experience may help to optimise support during labour and to inform decisions about the administration of pain relief. Knowledge about a woman's recollection of labour pain, on the other hand, may guide the content of postnatal support in order to avoid long-term effects on women's overall experience of childbirth.

Our interest in long-term memory of labour pain was triggered by research findings showing that the evaluation of the birth experience may have an impact on future reproduction.[16] Primiparous women who remembered childbirth as a negative experience at 2 months after the birth had fewer subsequent children and a longer interval to their next pregnancy, compared with women who had had a positive overall experience. Fear of pain is one of the reasons given by pregnant women who worry about the approaching birth[17–19] or request a caesarean section.[20]

Since the review of memory of labour pain was published in the year 2000,[1] very few studies have been published on this topic. We investigated recollection of labour pain at 2 months and 1 year after the birth in a representative nationwide sample of 2428 Swedish-speaking women and found a decrease in pain scores at group level but great individual variation.[21] We also found that primiparas who had used epidural analgesia remembered pain as more intense than those who did not receive this form of pain relief.[22]

We have now conducted a 5-year follow up of the same cohort of women in order to find out whether memory of labour pain continues to decline. Our investigation covered changes over time at three time points after the birth, 2 months, 1 year and 5 years, in the total cohort and in relation to parity, the use of epidural analgesia, and whether women had another baby during the observation period. Another aim was to study the relationship between memory of pain and overall evaluation of childbirth. Did women with a positive experience at 2 months postpartum forget pain more easily than women with a negative evaluation of childbirth?

Methods

The methods of the first part of this study have previously been described in detail.[21] The initial aim was to study women's experiences of childbirth and the first year with a newborn child from a wide range of perspectives. This study was approved by the Regional Research and Ethical Committee at Karolinska Institute, Stockholm. It was then decided to conduct a 5-year follow up after the birth, where one of the aims was to study the recollection of childbirth. This follow-up study was approved by the Regional Ethics Review Board, Uppsala.

Women were recruited to the study at their first booking visit in early pregnancy. Those whose skills in the Swedish language were insufficient to fill in questionnaires were excluded. A total of 593 antenatal clinics (97% of all clinics operating in Sweden at the time) helped to recruit the women during 3 weeks, evenly spread over 1 year (May and September 1999 and January 2000). Posted questionnaires were completed by 3061 women in gestational week 16 (mean), 2762 at 2 months postpartum (average 10 weeks) and 2563 at 1 year postpartum (average 1 year and 1 month).

The baseline cohort of the present study was defined from the time point of the first postpartum questionnaire (2 months after delivery). Only women who had been in labour (elective caesarean sections excluded) and who had filled in the antenatal questionnaire and the questions about labour pain and overall birth experience at 2 months, were included. This baseline cohort included 2485 women. The study group was then defined as women who had completed all the three questionnaires after the birth and the specific questions about pain and birth experience in the respective questionnaire. This study group included 1383 women. In order to assess the representativeness of the study group, background characteristics were compared with those of the baseline cohort and a national cohort of all 84 729 women who gave birth in Sweden in 1999, when the majority of index births took place.

The two principal outcome measures were answers to identically phrased questions asked at 2 months, 1 year and 5 years after the birth: 'How did you experience the intensity of labour pain?' and 'How was your experience of labour and birth?'. The response format to the first question was a seven-point scale with the anchors verbally defined (1 = no pain at all, 7 = worst imaginable pain). This scale format has previously been used to measure memory of intrapartum experiences,[16] and the pain assessments were highly correlated with the use of obstetric pain relief.[22] The five response alternatives for the second question were 'very positive', 'positive', 'both positive and negative' (in the following defined as 'mixed'), 'negative' and 'very negative'. Information about demographic background was collected during pregnancy in the first questionnaire, and information about labour, such as epidural analgesia, in the second questionnaire 2 months postpartum. Data from the total national birth cohort were obtained from the Swedish Medical Birth Register.

Analyses

Women's responses at 2 months, 1 year and 5 years after the birth are presented as percentages or average scores (mean). When analysing changes over time at an individual level, the assessments at 2 months were compared with the 5-year

assessments. Women were categorised into three groups: those who made the same assessment at the two time points and those who changed their assessment in either a positive (less pain) or a negative (more pain) direction. Continuous data were tested by means of Student's *t* test, and categorical data by chi-square test.

Results

The study group was fairly similar to the baseline cohort regarding background characteristics and labour outcomes, despite the fact that only 56% of the original cohort provided complete data up to 5 years (Table 1). Compared with the total national Swedish birth cohort, the study group was skewed towards a higher percentage of primiparas (47 versus 42%) and women of Swedish-speaking background (93 versus 82%). Elective caesarean sections were deliberately excluded in the study group but not in the national birth cohort, and this explains the small differences in pain relief and mode of delivery.

Thirty-eight percent of the women had given birth to at least one more child during the 5 years following the index birth.

Memory of pain

The average pain scores declined from 5.6 at 2 months to 5.3 at 1 year ($P < 0.001$), and to 5.0 at 5 years after the birth (1 versus 5 years, $P < 0.001$). Figure 1 illustrates the percentage of women with a specific pain score at each time point (scores 1–3 were merged because of few observations in the lower end of the pain scale).

Table 1. Background characteristics of women in the study group compared with those of the baseline cohort and the total birth cohort in Sweden in 1999

Characteristics in relation to index pregnancy	Study group (n = 1383), %	Baseline cohort* (n = 2485), %	National birth cohort** 1999 (n = 84 729), %
Parity			
After index birth			
Primipara	47	44	42
Multipara	53	56	58
Another baby during following 5 years	38		
Demographics			
Age (years)			
<25	15	15	16
25–35	76	75	72
>35	10	10	12
Single status	4	5	5
Education			
9-year comprehensive school	5	6	—
Upper secondary school	52	55	—
College or university	43	39	—
Native language			
Swedish	93	91	82
Other than Swedish	7	9	17
Labour and birth data			
Pain relief			
Epidural	29	28	27***
Pethidine	5	6	—
Nitrous oxide	72	70	78***
Induction	9	9	—
Mode of delivery			
Normal vaginal	85	85	79
Instrumental vaginal	8	8	7
Elective caesarean	Excluded	Excluded	
Emergency caesarean	7	7	14****

*Elective caesarean sections excluded.
**Elective caesarean sections included.
***Vaginal births only.
****All caesarean sections.

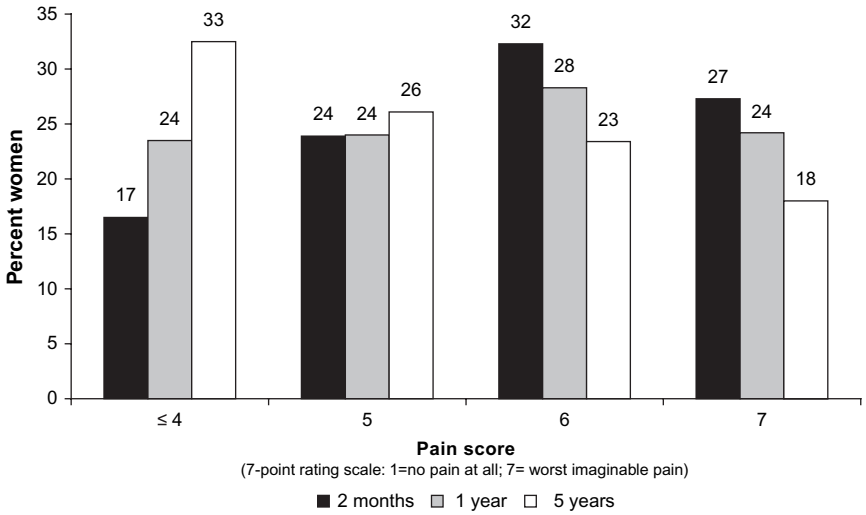

Figure 1. Memory of labour pain at 2 months, 1 year and 5 years after the birth.

At the individual level, 49% of the women remembered less pain at 5 years than at 2 months after the birth, 35% made the same assessment and 16% remembered labour as more painful.

Figure 2 illustrates the decline in average pain scores in relation to parity and whether women had a subsequent baby before the last follow up. No statistical differences were found between primiparas' and multiparas' average pain scores at 2 months and 1 year after the birth, but multiparas had a lower score at 5 years ($P = 0.002$).

The differences within each parity group, between those who had given birth to another baby and those who had not, were not statistically significant (Figure 2). Higher pain scores might have been expected at the 5-year assessment in women who had another baby after the index birth, since the time that had elapsed after having re-experienced labour pain was shorter. However, the findings suggest that primiparas as well as multiparas were able to distinguish the experience of the index birth from the experience of the following birth.

Women who had an epidural block remembered pain as more intense than those who did not have this form of analgesia, and the differences between the two groups were statistically significant at all three time points (Figure 3). The recollected pain scores declined over time in both groups.

Overall evaluation of childbirth and memory of labour pain

Figure 4 shows that women who evaluated childbirth as a very positive experience when asked 2 months after the birth reported the lowest pain scores, and women with a negative overall experience reported the highest scores. The figure also shows that women who had a very positive or positive memory of childbirth at 2 months changed their assessment of labour pain over time. They remembered pain as less and less intense. The decline was statistically significant both when

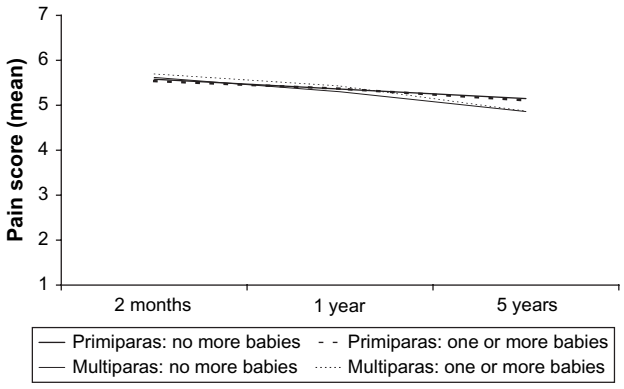

Figure 2. Memory of labour pain at 2 months, 1 year and 5 years after birth in primiparas and multiparas, with and without a subsequent birth.

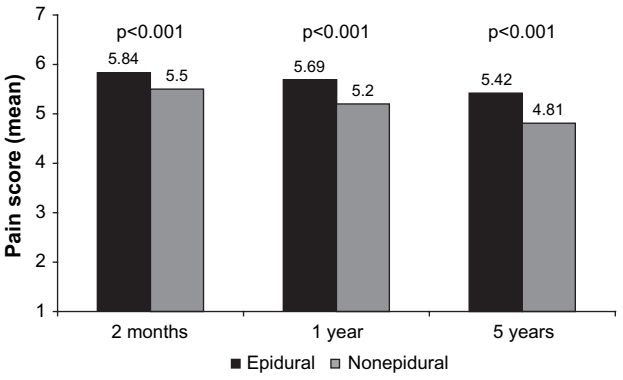

Figure 3. Memory for labour pain at 2 months, 1 year and 5 years after birth in women who had and who did not have epidural analgesia.

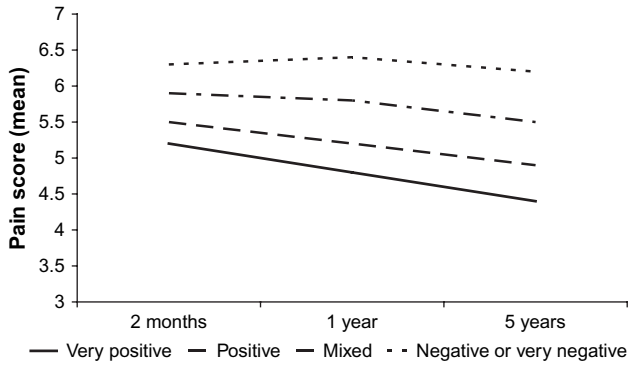

Figure 4. Recollection of labour pain in relation to women's overall birth experience at 2 months postpartum (seven-point pain rating scale: 1 = no pain at all, 7 = worst imaginable pain). All comparisons made with the mean scores at 2 months postpartum.

comparing the 2-month with the 1-year assessment ($P < 0.001$) and when comparing the 1-year with the 5-year assessment ($P < 0.001$). A similar decline, but not as obvious, was observed in women with mixed feelings, and these differences were also statistically significant at the level $P < 0.01$. However, women who said childbirth was a negative or very negative experience did not change their assessment of labour pain ($P = 0.41$ and 0.65).

These findings suggest that it is predominantly women with a positive overall experience of childbirth who forget the intensity of labour pain over time. Women with positive evaluations of childbirth ('very positive' or 'positive') comprised around 60% of the total sample, whereas those with a negative evaluation ('very negative' or 'negative') included less than 10%, figures that were relatively stable over time. These figures help explain the decline in average pain scores of the total sample described earlier (Figure 1).

Discussion

This study showed that women's recollection of labour pain intensity changed over time. The average pain scores declined from 2 months to 1 and 5 years after the birth. The magnitude of this decline should, however, be interpreted with caution because of the methodological problems associated with pain measurement. The assessments were made on a seven-point rating scale and remembering exactly which figure was ticked several months and even years ago would have been difficult. Variations by chance, towards a lower or higher score, would have been natural. Since the distribution of the pain scores were skewed, with more women scoring 7 than 1, and since these women could change their assessments in only one direction, there was a risk of overestimating women's ability to forget labour pain. However, it was obvious that women who scored 6 when asked 2 months postpartum and who could move in both directions of the scale, more often remembered labour pain as less severe at 1 and 5 years after birth. The systematic change towards a lower average score at each follow up supports the conclusion that there are more women who forget the intensity of labour pain than those who do not.

Even if the average pain scores declined over time, this was explained by memory changes in only about half of the women. The other half made the same assessment as several years earlier or remembered labour as more painful. These findings illustrate the significance of individual variation in recollection of pain and do not support general conclusions about labour pain as easily forgotten.

Women's recollection of labour pain was associated with their first overall evaluation of childbirth. A positive birth experience was not only associated with lower pain scores but also with the ability to forget labour pain over time. A negative overall experience, on the other hand, was associated with high pain scores, and these women did not forget the intensity of pain years later. These findings may help to elucidate why research on satisfaction with childbirth has been inconclusive as far as the role of pain is concerned. In a review of pain and women's satisfaction with childbirth, it was concluded that 'the influences of pain, pain relief, and intrapartum medical interventions on subsequent satisfaction are neither as obvious, as direct, nor as powerful as the influences of the attitudes and behaviours of the caregivers'.[23] In contrast to this conclusion, we have previously reported that memory of pain is an important predictor of not being satisfied with childbirth.[24] We found that, next after an emergency caesarean section, the experience of 'worst imaginable pain' was the strongest factor associated with a negative evaluation of childbirth 1 year after the event. Lack of support from caregivers was also important, but the odds ratio was lower. The different findings, compared with the review, may be explained by the focus on risk factor for a *negative* birth experience in our article. In our study, we compared the small group of women who rated childbirth overall as negative or very negative with all the other women. The findings might have been different if we had dichotomised the satisfaction scale differently, for instance by focusing on why women are 'very positive'.

It may well be that the relationship with caregivers is the most relevant factor for the majority of women, such as those who remember labour pain as manageable. However, for the relatively small group of women who rate the overall experience as negative or very negative, the memory of pain definitely seems important; otherwise, pain scores in this study would have declined over time, as for other women.

In this study, the percentage of women with a negative or very negative experience of childbirth at 2 months postpartum was 6%, whereas more than four times as many (27%) remembered labour pain as the worst imaginable (score 7). This means that in most cases, memory of severe pain was not associated with a negative overall experience. These findings

suggest that memory of severe labour pain may not be a helpful criterion for caregivers seeking to identify women who may suffer from long-term negative consequences of childbirth. Asking about the overall experience seems better. When women with a negative overall experience have been identified, the issue of labour pain may need to be addressed in order to help these women cope with their childbirth experience.

Our finding that women who had epidural analgesia remembered pain as more intense than those who did not have this form of analgesia suggests that women do not retrospectively make a comprehensive assessment of the entire experience, including the relatively pain-free episode after the administration. They seem to remember pain when it is most severe, that is peak pain. This is in line with research on memory of other forms of pain.[25]

Our suggestion that perceived pain during labour and memory of labour pain after the birth should be regarded as separate outcomes, which may be difficult to compare, is supported by the seemingly contradictory findings regarding the effect of epidural analgesia. Research is unanimous regarding the short-term effect of epidural analgesia during labour: it is a very effective form of obstetric pain relief.[26] The long-term effect, on the other hand, seems to work in the opposite direction. However, definite conclusions about long-term effects of epidural analgesia on memory of pain may be hazardous since our findings are observational and causality cannot be established. To our knowledge, there are no randomised controlled trials of epidural analgesia that include long-term follow up of women's experiences, which could support or challenge our findings.

One explanation of the contradictory findings could be related to the previously discussed differences regarding dimensions of pain[13] and memory systems.[15] When asking about the effect of epidural analgesia during labour, women compare pain before and after the administration, and most women will then feel that the pain has become less intense. When asking about memory of pain, women will remember if they had an epidural or not, thus triggering the episodic memory system for events. The semantic memory system, which refers to general knowledge about epidural analgesia, may also be involved. The general view may be that epidural analgesia is given only when labour pain is severe, and the logical conclusion would then be to tick a high pain score since epidural analgesia had been needed. Some women may also want to justify their use of epidural by high pain ratings, and this would then also be affected by a general view that natural childbirth is the best.

In summary, this study showed that there are more women who forget labour pain than those who do not and that the process of forgetting continues many years after the birth. It also showed great individual variation, including a significant minority who remembered pain as even more intense at 5 years that at 2 months postpartum. A positive overall experience of childbirth was associated with remembering less pain over time, but this was not the case in women with a negative childbirth experience. These findings suggest that for most women, labour pain is a manageable life experience.

The findings of this descriptive study do not provide simple answers as to how caregivers could help women deal with labour pain or with the long-term memory of pain. We will continue to explore what factors affect long-term memory of pain, for instance the role of expectations and events during labour.

Disclosure of interests

There is no conflict of interest.

Contribution to authorship

U.W. was responsible for the study conception, design of the study, data collection and drafting of the manuscript. E.S. was responsible for the study conception, performed the data analyses and contributed to the writing of the manuscript. U.W. obtained funding for the study.

Details of ethics approval

Approval was obtained from the Regional Research and Ethical Committee at Karolinska Institutet in Stockholm, and the Regional Ethics Review Board in Uppsala.

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