Detailed classification of second-degree perineal tears in the delivery ward: an inter-rater agreement study

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Abstract

Introduction: Second-degree perineal tears can vary widely as to the extent of trauma, which may be relevant for women's pelvic floor health postpartum. However, the short- and long-term consequences of second-degree perineal tears are poorly understood, likely due to the lack of a detailed classification system. Such a classification system for second-degree tears has been suggested but the inter-rater agreement has not yet been assessed. The aim of this study was to assess the inter-rater agreement of the already established classification system for perineal tears recommended by the Royal College of Obstetricians and Gynaecologists (RCOG classification) among midwives. Further, we aimed to assess the inter-rater agreement of a classification system that provides three sub-categories for second-degree perineal tears.

Material and methods: This was an inter-rater agreement study, conducted at Akershus University Hospital in Norway from 31 August to 29 November 2020. All midwives working in the delivery ward participated in the study. Midwives classified the integrity of the perineum of all women delivering vaginally within the study period. During the first month of the study, tears were classified by two midwives who were blinded to each other's findings, and the agreement of the RCOG classification was assessed. The following month, the detailed classification system was introduced to the midwifery staff. The last month, perineal tears were classified by two midwives using the detailed classification system, and the agreement was assessed. Inter-rater agreement was measured using Fleiss multirater kappa (κ) and Kendall's coefficient of concordance (KCCw).

Results: The inter-rater agreement for the RCOG classification was good to very good, with κ = 0.705 (95% confidence interval [CI] 0.62–0.79, P < 0.001), KCCw = 0.928 (P < 0.001). The inter-rater agreement for the detailed classification system was good to very good, with κ = 0.748 (95% CI 0.67–0.83, P < 0.001), KCCw = 0.956 (P < 0.001).

Conclusions: The inter-rater agreement among midwives using both the RCOG classification and the detailed classification system among midwives was good to very good. The detailed classification system provides additional information about the

Abbreviations: CI, confidence interval; KCCw, Kendall's coefficient of concordance; RCOG, Royal College of Obstetricians and Gynaecologists.
1 | INTRODUCTION

The tissue between the vagina and the anus is the most frequent site for childbirth-related trauma. Obstetricians and midwives refer to this region as the perineum, and tears in this area are called perineal tears. The internationally accepted classification system for perineal tears, recommended by the Royal College of Obstetricians and Gynaecologists (RCOG), is implemented in obstetric guidelines all over the world. Nevertheless, several studies show a lack of consistency in the classification of perineal tears. This may be due to uncertainty regarding definitions and suboptimal knowledge of the perineal anatomy. Until now, the focus for research has been on the correct classification of perineal tears involving the anal sphincter complex, but second-degree tears, defined as tears affecting the superficial perineal muscles, have received little attention. These tears can vary widely in depth and length, which may be relevant for women's pelvic floor health postpartum. However, the short- and long-term consequences are poorly understood, likely due to the lack of a detailed classification system. In fact, several publications suggest an association between perineal pain and dyspareunia and the degree of tissue trauma involved within the second-degree category. Further, a recent qualitative study describes bothersome urinary and anal incontinence, defecation problems, a sensation of vaginal tightness, or the feeling of a wide/loose introitus following second-degree perineal tears. A novel classification system where second-degree tears are sub-categorized based on the percentage of damage to the perineal body (<50% damage = 2A, >50% damage = 2B, entire perineal body = 2C) has been developed in Sweden, where it has been implemented in clinical practice by inclusion in the International Statistical Classification of Diseases and Related Health Problems (ICD). We have translated and introduced this detailed classification system to the midwifery staff at our delivery ward, as they are responsible for classifying first- and second-degree tears. For a new system to gain acceptance in clinical practice, it is important to ensure the reliability of the measurements, as well as ease of use. To our knowledge, neither the agreement of the RCOG classification in its entirety, nor the agreement or the feasibility of the detailed classification system for second-degree perineal tears has been assessed.

The aim of this study was to assess the inter-rater agreement using of the classification system for perineal tears recommended by RCOG among midwives. Further, we aimed to assess the inter-rater agreement and feasibility of a classification system that provides three sub-categories for second-degree perineal tears.

Key message

The inter-rater agreement among midwives using the RCOG classification system for perineal tears and a detailed classification system for second-degree perineal tears was good to very good. The detailed classification system was easy to implement in clinical practice.

2 | MATERIAL AND METHODS

This inter-rater agreement study was conducted at the delivery ward of Akershus University Hospital in Norway, from 31 August to 29 November 2020. Akershus University Hospital is a tertiary referral hospital, with the second largest delivery ward in Norway. Approximately 75 midwives assist 4800 deliveries per year.

All midwives working in the delivery ward participated in the study. Midwives classified the integrity of the perineum of all women delivering vaginally within the study period.

2.1 | Study procedure

The study period was divided into three parts, based on pragmatic reasons, with each part lasting 1 month. Within the first month (part one), perineal tears were classified according to the RCOG classification, which is currently used in the delivery ward, and the inter-rater agreement was assessed. Prior to the study, there was no additional focus or information regarding the classification of perineal tears. The midwives were asked to avoid discussing the classification in this part of the study.

In the following month (part two), the detailed classification system was introduced to the midwifery staff. We chose to involve midwives only to reflect common practice in the delivery ward. The classification system was adapted and translated from Swedish to Norwegian by the authors. All superficial tears not affecting the perineal body are explicitly defined as first-degree tears, regardless of being located anterior to the vaginal opening or in the area between the vagina and the anus (Table 1). The classification system provides three sub-categories for the extent of damage to the perineal body in second-degree perineal tears (Table 1). The perineal body was defined as a triangle-shaped fibromuscular structure, where fibers...
TABLE 1 Adapted Swedish classification system for first- and second-degree perineal tears

| Classification of first- and second-degree perineal tears |
|----------------------------------------------------------|
| First-degree tear                                        |
| Tear of the skin, mucosa, or labia                      |
| The shape of the vaginal opening is not altered.         |
| Second-degree tear                                       |
| A Tear involving less than half of the perineal body      |
| (without affecting the anal sphincter complex),           |
| and/or a lower vaginal tear < 2 cm in depth.             |
| B Tear involving more than half of the perineal body      |
| (without affecting the anal sphincter complex).           |
| May include a lower vaginal tear < 2 cm in depth.         |
| C Tear involving the whole perineal body (without         |
| affecting the anal sphincter complex), and/or a lower    |
| vaginal tear > 2 cm in depth.                            |
| Vaginal tear extending > 4 cm in length from the         |
| second-degree tear: YES/NO                                |

2.2 | Examination of the perineum

For all parts of the study, a systematic examination of the woman’s perineum was performed by two midwives after delivery of the baby and the placenta, regardless of the presence of a tear. First, the midwife in charge of the delivery assessed the woman's perineum. Thereafter, a second midwife assessed the perineum and classified the tear. When an obstetrician was present at the delivery, the second midwife was encouraged to classify before the obstetrician diagnosed the tear. The examination included a digital rectal examination. Local anesthesia was administrated when necessary to assure good pain relief and allow good examination conditions. In part three of the study, self-made rulers from pap-smear sticks were provided to measure the extent of the tear in centimeters.

In parts one and three of the study, midwives were blinded to each other’s findings. The classifications were documented on forms available in all delivery rooms. The midwives chose a signature/study name for the entirety of the study to allow anonymity.

2.3 | Collection of data

The classification form provided tick-boxes for all possible tears. For part one, the tick-boxes were equivalent to the hospital’s documentation system (Partus) used in the delivery ward: no tear, perineal tear according to the RCOG classification (first-, second-, third- or fourth-degree tear), vaginal tear (deep or high), cervical tear, and other superficial tears (eg injury of the labia majora and minora, and clitoris). For part three, tick-boxes were equivalent to the new classification system: no tear, first-degree tear, second-degree tear 2A, 2B, and 2C, and third- or fourth-degree tear. Vaginal tears extending > 4 cm in length from a second-degree tear and isolated vaginal tears were coded separately. The form also provided a box for episiotomy. Midwives were able to tick off more than one box. In cases of two-sided perineal tears, the most severe tear was used for analysis. All perineal tears may also include a vaginal tear. Episiotomies were excluded from analysis.

Each midwife also documented the following background information: Mode of delivery (spontaneous vaginal birth, vacuum extraction, forceps), episiotomy, work experience in years, and type of information received regarding the new classification system.

The feasibility of the detailed classification system was evaluated in terms of time spent teaching and discussing the system, as well as measuring agreement for midwives only receiving written information. A sub-analysis was performed to evaluate whether years of experience in the delivery ward influenced agreement. Less than 5 years of experience was considered low. The following pairings were made for both classification systems: inexperienced and fascia of several pelvic floor muscles are connected. It is located in the midline, anterior to the anal sphincter. Further, vaginal tears extending > 4 cm from a second-degree tear were documented. When the anal sphincter muscle was involved in the tear, RCOG classification of third- and fourth-degree perineal tears was applicable.

Structured 45-min teaching sessions were held by the first author. The teaching sessions included a review of perineal anatomy, a definition of the term perineal body, and a theoretical review of structured examinations of the perineum to assess the depth and length of perineal tears. The importance of bi-digital rectal examination was emphasized for the assessment of the thickness of the perineum. In addition, the first author held daily 15-min briefings in the delivery ward for the first 2 weeks, explaining the detailed classification system. Written information was sent by email to all midwives. Laminated pocket cards with the new classification were placed in all delivery rooms and given to each midwife. The first author was present in the delivery ward three or four times per week throughout the period to discuss and explain the classification further. Within this month, the midwives were encouraged to assess perineal tears together and to discuss their findings with the goal of reaching an agreement.

In the last month of the study (part three), the detailed classification system was used and the inter-rater agreement was assessed.
with experienced (<4 and >5 years), both experienced (>5 years), and both unexperienced (<4 years).

### 2.4 Statistical analyses

Statistical analysis was completed using IBM SPSS version 27 and R version 4.0.5. The inter-rater agreement was analyzed using Fleiss' multirater Kappa ($k$) and Kendall's coefficient of concordance (KCCw). Fleiss Kappa was used for the sub-analysis for years of experience in the delivery ward, and for mode of information regarding the detailed classification system. Kappa values of <0.20 were considered poor, 0.21–0.40 fair, 0.41–0.60 moderate, 0.61–0.80 good, and 0.81–1.00 very good. Kendall's coefficient of concordance incorporates the degree of association of ranked, ordinal ratings, giving a higher penalty for larger disagreements. KCCw values can be interpreted using the same scale as for Kappa values. However, a KCCw >0.9 is usually considered very good.

### 2.5 Ethical approval

Ethical approval was granted by the Regional Medical Ethics Committee, Norway nr 116 952 on 19 May 2020 and the Norwegian Center for Research Data, NSD nr 20/05527 on 20 August 2020. No patient-identifying data were retrieved.

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### 3 Results

When using the RCOG classification (part one), 216 (70.8%) of all vaginal deliveries within the 1-month period were classified by two midwives. When using the detailed classification system (part three), 166 (65.9%) of all vaginal deliveries within the 1-month period were classified by two midwives. We excluded 20 deliveries in part one and 12 deliveries in part three because an episiotomy was performed, leaving 196 cases in part one and 154 cases in part three for analysis. Figure 1 shows the midwives’ participation and the deliveries included in part one and part three of the study. An overview of background data from the participating midwives and delivery data for part one and part three is presented in Table 2.

#### 3.1 Inter-rater agreement

The inter-rater agreement when tears were classified using the RCOG classification was good, with $k = 0.705$ (95% CI 0.62–0.79, $P < 0.001$). Kendall’s coefficient of concordance was very good, with $KCC_w = 0.928$ ($P < 0.001$). The distribution of classification according to midwife one, as well as the agreement between midwives, is shown in Figure 2. The agreement was very good for no tear and second-degree tears, and good for first-degree tears. Kappa values for individual categories are demonstrated in Table 3.

The inter-rater agreement for the detailed classification was good, with $k = 0.748$ (95% CI 0.67–0.83, $P < 0.001$). Kendall's...
The coefficient of concordance was very good, with $K_{CC} = 0.956$ ($P < 0.001$). The distribution of classification according to midwife one and the agreement between midwives is shown in Figure 3. The agreement for no tear, first-degree tear and second-degree tears (2A, 2B, 2C combined) was very good. Kappa values for individual categories are demonstrated in Table 3.

### 3.2 | Feasibility

Four 45-min teaching sessions and 10, 15-min briefings were held during part two of the study. Fourteen midwives (19%) participated in one teaching session and one or more briefings, 20 (28%) participated in one teaching session only, and 17 (24%) participated in one briefing only. Fifteen (21%) midwives received written information only. For six midwives there were missing data (8%). Agreement for cases where one of the two midwives received written information only ($n = 49$) was very good ($k = 0.817, 95\% CI 0.68–0.96; P < 0.001$). In cases where both midwives participated in at least one teaching session ($n = 36$), agreement was good ($k = 0.752, 95\% CI 0.59–0.98; P < 0.001$). The agreement was good for all groups based on experience in the delivery ward using both classification systems. Feedback was mainly positive, and midwives reported that the system was easy to understand as well as allowing for a more precise diagnosis. The term “perineal body” required some clarification, as midwives were accustomed to the term “perineum” when referring to this area.

## 4 | DISCUSSION

The results of this study demonstrate good to very good agreement among midwives using both the internationally recommended RCOG classification and the detailed classification system for second-degree perineal tears. The introduction of the detailed classification system in the delivery ward was straightforward with a reasonable amount of time spent teaching.

The good to very good agreement using the RCOG classification was achieved without additional focus on perineal anatomy or review of the classification system prior to the study. This could be interpreted as the midwives having profound knowledge of the classification system and confidence using it.

In recent years, there has been an increasing focus on second-degree perineal tears. Several publications suggest more short- and long-term complications following second-degree perineal tears than previously assumed. The perineal body has been described as the “anchor of the pelvis”, and the support of the pelvic structures and the pelvic floor functionality depend upon the integrity of the perineal body. Therefore, it is plausible that the degree of trauma to the perineal body is of clinical relevance.

### TABLE 2

Overview of background data from the participating midwives and delivery data for part one: classification of perineal tears according to the RCOG-classification, and part three: classification of perineal tears according to the detailed classification

| Midwives | Part one: RCOG classification | Part three: Detailed classification |
|----------|------------------------------|-----------------------------------|
| Number of classifications per midwife | Range | Median | Range | Median |
| Experience in the delivery ward (years) | 0-30 | 9 | 0-37 | 7.5 |
| All midwives participating in the study | n | % | n | % |
| Unexperienced midwives, <4 years | 17 | 23.6 | 25 | 34.7 |
| Experienced midwives, >5 years | 50 | 69.4 | 37 | 51.4 |
| Missing data on work experience | 5 | 7 | 10 | 13.9 |
| Deliveries | n | % | n | % |
| All women delivering in the study period | 377 | 100 | 303 | 100 |
| Nulliparous | 154 | 40.8 | 129 | 42.6 |
| Cesarean section | 72 | 19.1 | 51 | 16.8 |
| Normal vaginal delivery | 267 | 70.8 | 221 | 73 |
| Vacuum extraction | 38 | 10.1 | 31 | 10.2 |
| Episiotomy | 49 | 13.1 | 49 | 16.3 |
| Diagnosis of a sphincter tear | 3 | 0.8 | 4 | 1.3 |
| Vaginal deliveries included in analysis | 196 | 100 | 154 | 100 |
| Nulliparous | 65 | 33.2 | 53 | 34.4 |
| Normal vaginal delivery | 186 | 94.9 | 150 | 97.4 |
| Vacuum extraction | 10 | 5.1 | 4 | 2.6 |
| Diagnosis of sphincter tear | 1 | 0.5 | 1 | 0.6 |
and requires sub-classification. Further, midwives already have a habit of subjectively describing second-degree tears as "small" or "large". Various systems for sub-classification of second-degree perineal tears have been suggested. In a recent study where damage to the separate perineal muscles (bulbospongiosus and transversus perinei) was assessed, very good agreement was found. However, the classification system was only tested among six clinicians, making the results less transferable to an entire staff.

Previous classification systems are primarily based on measurements of depth in centimeters using different cut-off values for sub-categories. In contrast, the detailed classification system introduced in this study uses the percentage of trauma to the perineal body to determine sub-categories. This approach is simple, as it does not rely on the evaluation of each superficial perineal muscle, which could be challenging due to bleeding and edema. Further, it takes individual variations of women's pelvic floor anatomy, e.g., differences in perineal height, into account. In the detailed classification system, vaginal tears extending >4 cm in length from a second-degree tear receive special attention, as they may cause damage to the rectovaginal fascia and consequently increase the risk of rectocele.

In our study, the agreement for the individual categories first-degree and overall second-degree tear was slightly better when using the detailed classification system. This may partly be explained by the additional focus on perineal anatomy and classification during the implementation period. For analysis, we chose to exclude cases where an episiotomy was performed. As episiotomy may be considered an iatrogenic second-degree tear, there was some inconsistency among midwives about whether an episiotomy should be coded as episiotomy only or as episiotomy and second-degree perineal tear.

The detailed classification system was implemented within 1 month for an entire midwifery staff with a wide range of work experience. The very good agreement for midwives only receiving written information, in addition to the fact that work experience did not influence agreement, highlights the feasibility of the classification system. However, 18.4% of deliveries in part one and 23.8% of deliveries in part three were not classified by two midwives because midwives reported a high workload. We cannot rule out that midwives in some cases did not feel comfortable participating, and therefore refrained from contributing to the study.

A major strength of this study is the assessment of agreement of the widely used RCOG classification in its entirety, as well as the introduction and assessment of agreement of the detailed classification system, in a realistic, clinical setting. We included the entire midwifery staff of a large delivery ward in all parts of the study.
Common practice is reflected in the results when assessing the RCOG classification, since we avoided drawing attention to the classification of perineal tears prior to commencement of the study and during part one.

Furthermore, the selected mode of analysis using both Fleiss multirater kappa and Kendall’s coefficient of concordance encompasses essential components for the inter-rater agreement in a complementary manner. Fleiss kappa takes chance agreement and the
fact that raters are randomly selected from a pool of raters into account. Kendall's coefficient of concordance provides the weighting factor and is less sensitive to the distribution of classifications.23,24

A weakness of our study is that complicated deliveries were underrepresented. Despite the encouragement to do so, there were fewer classifications by a second midwife when an obstetrician was involved in the delivery and/or the postpartum management. These tears might have been more complicated and thereby more difficult to classify. Further, the prevalence of sphincter tears in women classified according to protocol was lower than the overall sphincter tear rates during the study period, with only one diagnosed sphincter tear in each part of the study.

Another possible shortcoming was that no independent clinical verification from a trained expert, eg first author or an ultrasound of the anal sphincter, was performed. The rates of sphincter tears in the study period was 0.8%-1.3%, which is comparable to the sphincter tear rates in our institution within the last year (1.3%) as well as to national numbers.27 However, in previous studies, higher rates of sphincter tears were found when a trained assessor re-examined the perineum or an ultrasound examination of the woman's perineum was performed after delivery.11,28,29 Nevertheless, current practice does not recommend an ultrasound examination as a routine as verification from a trained expert, eg first author or an ultrasound. Fletcher and associates re-examined the perineum of 108 women (40% of the study population) in a cohort study and found that the rate of diagnosed sphincter tears was 1.9%, which is lower than the overall rate of diagnosed sphincter tears in the study.30 Further, the inter-rater agreement between midwives may have changed when using the detailed classification system for a longer time-period. However, a new inter-rater agreement assessment in a longer follow-up was not performed.

5 CONCLUSION

The inter-rater agreement of the internationally recommended RCOG classification and the detailed classification system for perineal tears was good to very good. The fact that the detailed classification system achieved good to very good inter-rater agreement for a large staff after a short time spent teaching and practicing, highlights its feasibility. The detailed classification system for second-degree tears could be an important contribution to the RCOG classification, allowing precise diagnosis, beneficial for both research and postpartum care. The validity of the classification system needs to be tested against clinical findings, such as pelvic floor dysfunction symptoms and anatomical alterations of the pelvic floor, eg by gynecological examination or ultrasound.

CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

All authors contributed to the intellectual content of the study. MEE and FS conceptualized and designed the study. MM was responsible for data collection, data management, writing and editing. All authors contributed to the interpretation of results, writing and editing of the paper.

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