Bowel Disturbances Are the Most Important Risk Factors for Late Onset Fecal Incontinence: A Population-Based Case-Control Study in Women

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See related article, Tantiphlachiva K et al, on page 955 in *CGH*.

BACKGROUND & AIMS: Age, diarrhea, and certain chronic illnesses are risk factors for fecal incontinence (FI). However, the contribution of obstetric injury to the development of FI later in life is unclear. We sought to better understand the risk factors for FI. **METHODS:** Through the Rochester Epidemiology Project, a nested case-control study of 176 randomly selected women with FI (cases; mean age, 58 years) and 176 age-matched community controls was conducted in a population-based cohort from Olmsted County, Minnesota. Risk factors for FI were evaluated by reviewing inpatient and outpatient medical (including original obstetric) records. Analyses focused on conditions that preceded the index date (incidence date of FI for case in each matched pair). **RESULTS:** In 88% of cases, FI began at age ≥40 years; severity was mild (37%), moderate (58%), or severe (5%). By multivariable analysis, current smoking (odds ratio [OR], 4.7; 95% confidence interval [CI], 1.4–15), body mass index (OR per unit, 1.1; 95% CI, 1.004-1.1), diarrhea (OR, 53; 95% CI, 6.1-471), irritable bowel syndrome (OR, 4.8; 95% CI, 1.6-14), cholecystectomy (OR, 4.2; 95% CI, 1.2-15), rectocele (OR, 4.9; 95% CI, 1.3-19), and stress urinary incontinence (OR, 3.1; 95% CI, 1.4-6.5), but not obstetric events, were independent risk factors for FI. **CONCLUSIONS: Bowel disturbances rather than prior obstetric injury are the main risk factors for FI. Measures to ameliorate bowel disturbances and other potentially reversible risk factors should be implemented before anal imaging is performed on women with FI.**

Keywords: Epidemiology; Forceps; Episiotomy; Constipation.

The cause of fecal incontinence (FI) among women in whom the symptom cannot be attributed to an underlying organic disorder (eg, inflammatory bowel disease) is unclear.[1] Although clinical practice guidelines often emphasize anal sphincter injury, which is frequently attributed to obstetric trauma, nearly 70% of community women with FI report that the symptom began after age 40 years.[2] Community-based studies have associated advancing age, diarrhea, rectal urgency, cholecystectomy, anal fistula, non–childbirth anal injury, urinary incontinence, chronic illnesses (eg, diabetes mellitus or stroke), and psychoactive medications, but not obstetric injury, with FI.[3–9] However, those studies focused on selected risk factors, which were ascertained by questionnaires rather than by reviewing medical records. Although several studies have evaluated obstetric risk factors for FI in selected populations (eg, after childbirth), only 3 truly population-based studies have evaluated the relationship between obstetric events and FI, and both depended on questionnaires; operative vaginal deliveries were[4] or were not[6,10] risk factors for FI. However, maternal recall of distant pregnancy events is variable, being excellent for certain items (eg, cesarean section) but weaker for other features (eg, induced labor or problems during delivery).[11] Perhaps the most important limitation of these studies, however, as enunciated by a State-of-the-Science Conference in Prevention of Fecal and Urinary Incontinence in Adults, is "the fact that most existing studies of fecal and urinary incontinence used a cross sectional design. Such studies let us examine associations with incontinence but not cause. We cannot be sure that the associated factor comes before the recurrence of incontinence or determine whether it is the cause of the incontinence and therefore whether changing the associated factor would reduce to eliminate the incontinence."[12] To address these issues and, in particular, to examine the temporal relationships among obstetric events, bowel symptoms, and other risk factors and FI, we conducted a nested case-control study of risk factors for FI among a community sample women from Olmsted County, Minnesota. An accurate understanding of the risk factors for FI is necessary to develop appropriate strategies to prevent and treat this problem.

Abbreviations used in this paper: BMI, body mass index; CI, confidence interval; FI, fecal incontinence; IBS, irritable bowel syndrome; OR, odds ratio.

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Materials and Methods

The Olmsted County population comprises approximately 124,000 persons, of whom a majority are white; sociodemographically, the community is similar to the United States white population.[13] Residents receive their medical care almost exclusively from 2 large group practices: Mayo Medical Center and Olmsted Medical Center. Annually, >80% of the entire population is attended by one or both of these 2 practices, and nearly everyone is seen at least once during any given 3-year period. A unique medical records linkage system, the Rochester Epidemiology Project, provides an enumeration of this population (including both free-living and institutionalized) from which samples can be drawn.[13] A random sample of 5300 Olmsted County (including 84 nursing home) residents, stratified by age (10-year intervals between 20 and 29 and ≥80 years), was drawn from a sampling frame consisting of the unique Olmsted County residents seen at least once during the 10-year period, 1992–2002. A questionnaire-based study on the prevalence and risk factors for FI was conducted in 2800 of 5300 respondents, of whom 507 had FI, defined as accidental leakage of liquid or solid stool unrelated to a short-term, self-limited, diarrheal illnesses in the past year.[2,14] The present investigation is a nested case-control study, which was approved by the Institutional Review Boards at Olmsted Medical Center and Mayo Clinic, from that cohort.

Identification of Cases and Controls

This study was designed to enroll 200 randomly selected cases and 200 age-matched control women without FI. Women who reported FI during the previous questionnaire-based study were approached in random order to participate in this study; to facilitate a proportional distribution of younger and older women, separate lists of women aged <50 and ≥50 years were prepared. Then, a brief structured telephone interview was conducted to confirm that prospective participants were residing in Olmsted County; cases did, whereas controls did not, have FI unrelated to a temporary diarrheal illness over the past year; and cases did not have organic diseases known to be associated with FI. Because our objective was to better understand the cause of FI in women without an organic cause for FI, 26 women with other conditions identified during the interview (ie, dementia, stroke, Parkinson's disease, multiple sclerosis, myotonic dystrophy, motor neuron disease, inflammatory bowel disease, congenital anorectal conditions, short bowel syndrome, metastatic disease) were excluded. Thus, the 176 cases who agreed to participate were matched to a control subject of the same age (±5 years) without FI whose first contact with the local medical system for inpatient or outpatient medical care occurred in the same year (±5 years) as the index case. Among potential controls for each index case, the volunteer with the closest medical registration year was enrolled. Because unique registration numbers are assigned at the initial visit for each patient, this matches for the duration of documented clinical history.

Study Protocol

During a single study visit lasting 2 hours, participants completed validated questionnaires pertaining to the characteristics of FI. Severity of FI was calculated by the validated Fecal Incontinence and Constipation Assessment.[14,15] The incidence date of FI was ascertained both by reviewing community medical records and interviewing subjects; the earlier date was used in the analysis. If the incidence date could not be assessed from either source, it was obtained from the original mailed questionnaire. For each case and control, the complete (inpatient and outpatient) medical records from all medical care providers who attended the subject were retrieved and reviewed to determine any history of a long list of diagnoses and other conditions conceivably associated with secondary FI.[1] The mean duration of prior medical record documentation was 44 years (median, 46.5 years; range, 16–71 years) for cases and 44 years (median, 46.5 years; range, 15–75 years) for controls; the records spanned more than a decade for all cases and controls and more than 20 years for 95% and 95% of cases and controls, respectively.

Conditions were considered present (ever vs never) if there was mention of them in the documented medical history before the incidence date among cases and before the corresponding index date among the matched controls, with 3 exceptions: Bowel symptoms were also recorded if they were known to be present within 3 months of the index date; because smoking status in the distant past was not always available from records, this was classified relative to the date of interview rather than the incidence date as never, current, or past; and height and weight were taken from the most recent data available adjacent to the index date. The medical and surgical conditions documented in the medical records were diagnosed largely by specialists at Mayo Clinic. Bowel symptoms (diarrhea, constipation, irritable bowel syndrome [IBS]) were considered present only if symptoms were present for 6 months. A gastroenterologist (A.E.B.) categorized the bowel disturbance according to the original clinical diagnosis and a description of symptoms in the records. Thus, IBS was defined by bowel disturbances with abdominal discomfort, whereas diarrhea and constipation were defined by bowel disturbances without abdominal discomfort. Diarrhea was defined as loose watery stools or soft stools without abdominal discomfort. Constipation was defined by 2 of the following 6 symptoms: excessive straining, anal digitation, or anorectal blockage during defecation, hard stools, infrequent stools, or sense of incomplete evacuation. Stress and urge urinary incontinence were identified as occurring in the context of physical activity and a sudden urge to urinate, respectively. Pelvic organ prolapse and rectoceles were deemed present only when documented at surgery.

Obstetric records from providers in and outside Olmsted County were reviewed in detail. For a total of 727 live births in 137 of 176 cases and 135 of 176 controls, information for all live births was obtained directly from

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