

Effects of pregnancy and childbirth on the incidence of urinary disorders in multiple sclerosis

A. Durufle^{1,2}, M.D.; B. Nicolas^{2,3}, M.D.; S. Petrilli^{2,3}, M.D.; S. Robineau^{2,3}, M.D.; F. Guillé⁴, M.D.; G. Edan², M.D.; P. Gallien^{1,2}, M.D.

¹Department of Physical Medicine and Rehabilitation, Centre Hospitalier Universitaire, Rennes-Cedex

²Multiple Sclerosis Clinic, Department of Neurology, Centre Hospitalier Universitaire, Rennes-Cedex

³Clinic of Physical Medicine and Rehabilitation Notre Dame de Lourdes, Rennes

⁴Department of Urology, Centre Hospitalier Universitaire, Rennes-Cedex (France)

Summary

Objective: Women with multiple sclerosis frequently pose questions to physicians regarding the potential negative impact of pregnancy, especially on urinary disorders. About 50 to 80% of patients suffer from urinary disorders during the course of the disease. Trauma to the pelvic floor and the urethral sphincter during vaginal delivery may lead to the development of stress urinary incontinence. The purpose of this work was to study the consequences of pregnancy and childbirth on urinary problems.

Study Design: An inception cohort of 368 consecutive women suffering from multiple sclerosis (MS), according to the Poser criteria, were included in the study between June 1999 and June 2000. For each patient a full urological and obstetrical record was obtained.

Results: Two hundred and seventy-three women (74%) had had at least one pregnancy. The parous women were older at the time of the study (mean age: 45.5 years vs 35.5 years), and were older at MS onset (mean age: 32.8 years vs 25.7 years). The nulliparous women were more rapidly disabled, with a shorter time to reach an EDSS score of 3 from MS onset (mean time of 5.9 years versus 8.2 years in parous women). In parous women, 259 (95%) had had at least one vaginal delivery and 14 (5%) had had a caesarean only. Delivery modalities had no influence on urinary disorder frequency or the type of problems.

Conclusion: On the basis of these data, there is actually no clear argument for systematically performing caesarean section in MS women. Urinary disorders in these women were mostly linked to the duration and the severity of the disease but not to pregnancy or delivery modalities. From our point of view, caesarean section must be decided only on classic obstetrical criteria as for healthy women independently of multiple sclerosis. However our data were open and retrospective.

Key words: Multiple sclerosis; Urinary disorders; Pregnancy.

Introduction

Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system, which affects twice as many women as men [1, 2]. Diagnosis of this potentially disabling disease is commonly made during the peak reproductive years. Women with multiple sclerosis frequently pose questions to physicians regarding the potential negative impact of pregnancy, especially on urinary disorders. About 50 to 80% of patients suffer from urinary disorders during the course of the disease [3-5]. Frequency, urgency, dysuria and incontinence are the most common disturbances. Incontinence varies from 37% to 72% [4, 6-8]. Urge incontinence is more frequent in female MS patients whereas stress incontinence is the main problem in women without neurological disorders [9]. The consequences of childbirth on the pelvic floor are still the subject of controversy [10-12]. Trauma to the pelvic floor and the urethral sphincter during vaginal delivery may lead to the development of stress urinary incontinence. The question of the impact of childbirth on urinary disorders in women with MS must then be raised: it can be hypothesised that vaginal delivery does increase such problems, leading to the proposal of caesarean

section. Thus the purpose of this work was to study the consequences of pregnancy and childbirth on urinary problems in a cohort of 368 women suffering from multiple sclerosis in order to have some insight into this question.

Method

This study was realised between June 1999 and June 2000. Three hundred and sixty-eight consecutive women who were referred during this period to our multiple sclerosis clinic were included. In all the cases the diagnosis of multiple sclerosis was made according to the Poser criteria [13]. For each patient neurologic history was collected in the European database EDMUS [14]. A full urological and obstetrical record was obtained from all patients with special emphasis on the onset and progression of urological symptoms and the results of any previous investigations. Each patient was interviewed about urinary disorders and pregnancies: total number of pregnancies, type of childbirth, pelvic floor damage, instrumental delivery, babies' weight, and so on.

Urinary problems were classified as irritative (urgency and pollakiuria) and/or obstructive (dysuria), and/or incontinence (stress or urge incontinence).

Data obtained were analysed using the chi square and Mann-Whitney test with the value of 0.05 as the level of statistical significance.

Revised manuscript accepted for publication June 8, 2006

Results

In the total population, the mean age at the time of the study was 42.9 years, and the mean age at the onset of multiple sclerosis was 30.9 years (Table 1). The mean Expanded Disability Status Scale (EDSS) score was 4.4 and the mean time to reach EDSS 3 was 7.7 years. Two hundred and seventy-three women (74%) had had at least one pregnancy. Although disability at the time of the study and clinical forms were not significantly different between parous and nulliparous women, the parous women were older at the time of the study (mean age: 45.5 years vs 35.5 years), and were older at MS onset (mean age: 32.8 years vs 25.7 years). The nulliparous women were more rapidly disabled, with a shorter time to reach an EDSS score of 3 from MS onset (mean time of 5.9 years versus 8.2 years in parous women).

Two hundred and seventy-seven women (73%) experienced urinary disorders (Table 2), occurring at the mean age of 37.8 years, starting later in parous women (mean age: 39.7 years vs 32 years in nulliparous women). The mean time between the first symptoms of MS and the

Table 1. — Demographic data and neurological status of the MS patients and comparison between nulliparous and parous women.

| | Total MS women n = 368 | Parous women n = 273 | Nulliparous women n = 95 | Comparison of nulliparous vs parous women |
|---|---------------------------|-------------------------|-----------------------------|---|
| Mean age at the time of the study (years) | 42.9 ± 11.4 | 45.5 ± 10.4 | 35.5 ± 11 | p < 0.0001 |
| Mean age at the onset of MS (years) | 30.9 ± 9.4 | 32.8 ± 9.1 | 25.7 ± 8.3 | p < 0.001 |
| EDSS at the time of the study | 4.4 ± 2.2 | 4.5 ± 2.1 | 4.2 ± 2.4 | NS |
| Mean time to reach an EDSS score of 3 (years) | 7.7 ± 6.8 | 8.2 ± 7 | 5.9 ± 5.8 | p = 0.02 |
| Clinical Form | | | | |
| Relapsing/Remitting | 175 (48%) | 125 (46%) | 50 (53%) | NS |
| Secondary progressive | 126 (34%) | 94 (34%) | 32 (34%) | |
| Primary progressive | 67 (18%) | 54 (20%) | 13 (14%) | |

Table 2. — Urological disorders in the MS women and comparison between nulliparous and parous MS women.

| | Total MS women | Parous women | Nulliparous women | Comparison of nulliparous vs parous women |
|--|----------------|--------------|-------------------|---|
| Number of patients who experienced urinary disorders | 267 (73%) | 199 (73%) | 68 (72%) | NS |
| Mean age at the onset of urinary problems (years) | 37.8 ± 10.1 | 39.7 ± 8.9 | 32 ± 11.2 | p < 0.0001 |
| Mean time between the onset of urinary problems and the study (years) | 6.4 ± 6.7 | 6.5 ± 6.4 | 5.9 ± 5.4 | NS |
| Mean time between the first symptoms of MS and the onset of urinary problems (years) | 6.7 ± 8.3 | 7.0 ± 8.4 | 5.9 ± 7.8 | NS |
| Incontinence | 155 (58%) | 116 (58%) | 39 (57%) | NS |
| Irritative symptoms | 215 (81%) | 162 (81%) | 53 (78%) | NS |
| Obstructive symptoms | 162 (62%) | 120 (60%) | 42 (62%) | NS |

Table 3. — Demographic data, disability score and parity according to the presence or absence of urinary disorders.

| | Total population | | | Parous women | | | Nulliparous women | | |
|---------------------------------|------------------|-------------|------------|--------------|------------|------------|-------------------|-------------|------------|
| Urinary problems | no (101) | yes (267) | comparison | no (74) | yes (199) | comparison | no (27) | yes (68) | comparison |
| Mean age (years) | 38.4 ± 10 | 44.6 ± 11.5 | p < 0.0001 | 41.2 ± 8.3 | 47 ± 10.7 | p < 0.0001 | 30.6 ± 10.4 | 37.5 ± 10.7 | p = 0.0057 |
| EDSS | 2.6 ± 1.9 | 5 ± 1.9 | p < 0.0001 | 2.8 ± 1.9 | 5 ± 1.7 | p < 0.0001 | 2.1 ± 1.8 | 4.9 ± 2.1 | p < 0.0001 |
| Mean age at onset of MS (years) | 30.9 ± 9.3 | 30.9 ± 9.5 | NS | 32.6 ± 9.3 | 32.8 ± 9.7 | NS | 26.3 ± 9.3 | 25.5 ± 7.8 | NS |
| Parity | 1.5 ± 1.1 | 1.6 ± 1.2 | NS | 2.1 ± 0.77 | 2.1 ± 0.86 | NS | 0 | 0 | |

onset of bladder dysfunction and the mean time between the onset of urinary disorders and the time of the study were comparable in the parous and nulliparous women. Irritative symptoms were the most frequent (81%), and incontinence was present in 58% of the women, with no difference between parous and nulliparous women. In 50% of the patients both irritative and obstructive symptoms were present (not shown in table).

In the total population (and similarly in parous and nulliparous women) women with urinary disorders (Table 3) were older (mean age 44.6 years vs 38.6 in the MS population with no urinary problems). Fifty-five percent of the population was suffering from urinary disorders at the age of 30 years and 84% at the age of 50 years (not shown in table). EDSS scores were higher in the MS women with urinary problems (mean EDSS: 5 vs 2.6 in women with no urinary problems). However, mean age at MS onset and parity were not significantly different in either group.

In parous women, 259 (95%) had had at least one vaginal delivery and 14 (5%) had had a caesarean only (Table 4). Delivery modalities had no influence on urinary disorder frequency and the type of problems. Perineal trauma and birth weight had also no influence on urinary disorder frequency (not shown in table).

Among the 368 women, 580 pregnancies were registered (Table 5), including eight gemellar pregnancies, giving a fecundity level for all the cohort of 1.65. Four hundred and forty-six births occurred before the diagnosis of multiple sclerosis and 134 afterwards. The mean age at the time of the first pregnancy was 24.6 years in the parous women, at an older age in the women who had had their first pregnancy after the diagnosis of multiple sclerosis (mean age: 27.4 years vs 24 years in those who had the first pregnancy before the diagnosis of multiple sclerosis). In parous women, the mean parity level was 2.1, significantly lower in the women who had their first child after the MS diagnosis (mean parity level: 1.6 vs 2.2 in those who had the first child before the MS diagnosis).

Vaginal delivery was noted in 531 cases (92%) and caesarean section was performed in 49 cases (8%). Instrumental delivery was necessary in 68 cases and 213 episiotomies were done. Perineal tears were reported in 83 cases (16%) (data not shown).

Discussion

The characteristics of the population of our multiple sclerosis cohort were similar to those that have been previously published [3-8, 15]. The rate of nulliparous women in our study was close to that observed in previous works [16]. In nulliparous women, multiple sclerosis started earlier, disease was more aggressive when considering the time to reach the score of 3 on the EDSS scale. The fact that the disease seemed to be more rapidly disabling in this population could explain the reduced number of pregnancies. Confavreux *et al.* [17] and Nelson *et al.* [18] have underlined the influence of a diagnosis of MS on reproductive planning in women.

As Shapira *et al.* [19], we noted a decrease in the number of childbirths per women who had their first child after knowledge of the diagnosis: 1.6 against 2.2 (1.43 and 2.25 in Shapira *et al.*'s study). The women had probably planned to have fewer children because of the fear of the outcome of the disability. Nelson and colleagues reported such an attitude in 80% of their patients [18]. Furthermore Poser and Poser postulated that 30% of women suffering from MS experienced difficulties in taking care of their children in the postpartum period [20].

In our population the diagnosis of MS had no influence on childbirth modalities. The rate of caesarean section was close to that of the entire population, which was 10.5% in 1998 in France [21]. The prevalence of urinary disorders in our MS population (72%) was similar to

rates reported in previous studies [3, 5, 7, 8]. Pregnancy and delivery modalities had no influence on the prevalence and type of such problems. However the number of women who had undergone only caesarean section was limited. The differences in urinary tract disorders between parous and nulliparous women seemed more linked to the severity of the disease than to obstetrical events. The nulliparous women were younger and had earlier urinary disorders than the parous population with a similar handicap. The well known relation between sexual and urinary disorders may also explain the reduced pregnancy rate in these women [5, 22].

The influence of pregnancy and delivery modalities has been widely studied in healthy women. McLennan *et al.* found a prevalence of urinary disorders of 15% in nulliparous women versus 59% in parous women in a cohort of 1,546 women with a mean age of 44.8 years [23]. They concluded that parous women are more prone to urinary disorders (with an increased prevalence with advancing age). Keskes *et al.* [24], Kuh *et al.* [25] and Sengler and co-workers [26] reported similar results. The frequency of urinary disorders in nulliparous women was high in our population which means that urinary disorders were more influenced by disability than parous status. The relation between parity and incontinence was strongly correlated for Keskes *et al.* [24] and Samuelsson and colleagues [27], whereas the fourth birth was partially correlated for Thom *et al.* [12] and Wilson and colleagues [28] without any correlation in the studies by Tapp *et al.* [29], Skoner *et al.* [30] and Kuh *et al.* [25].

The question of delivery modalities should be stressed in multiple sclerosis. Some practitioners tend to propose caesarean sections in multiple sclerosis cases because of a higher risk of urinary disorders in this population. Trauma to the pelvic floor and the urethral sphincter might effectively lead to the development of genital prolapse and urinary incontinence. Damage to the levator ani muscle occurs either by direct mechanical trauma or indirectly by trauma to the pelvic nerves leading to denervation and muscular atrophy [10, 11]. Caesarean section, however, has its own risks of morbidity with an increased mortality. Viktrup and Lose have demonstrated that caesarean section has a protective effect on the pelvic floor but only during the three months after childbirth [31]. Moreover reinnervation following denervation of the pelvic floor has been shown to occur in up to 80% of women following their first vaginal delivery [32].

As our study was conducted openly and retrospectively, interpretation must be cautious. However, on the basis of these data, there is actually no clear argument for systematically performing caesarean section in multiple sclerosis women. Urinary disorders in these women were mostly linked to the duration and the severity of the disease but not to pregnancy and delivery modalities. From our point of view, caesarean section must be decided only on classic obstetrical criteria as for healthy women independently of multiple sclerosis. Nonetheless our data were open and retrospective.

Table 4. — *Clinical status and frequency of urinary tract disorders at the time of the study in parous MS women and according to modalities of childbirth.*

| | Parous | At least one vaginal delivery | Caesarean only | Comparison of vaginal delivery vs caesarean only |
|---|-------------|-------------------------------|----------------|--|
| | 273 | 259 (95%) | 14 (5%) | |
| Mean age (years) | 45.5 ± 10.4 | 45.6 ± 10.4 | 42.3 ± 11.4 | NS |
| EDSS | 4.5 ± 2 | 4.4 ± 2.1 | 4.6 ± 2 | NS |
| No. of patients who experienced urinary disorders | 199 (73%) | 187 (72%) | 12 (86%) | NS |
| No. of patients who experienced incontinence | 116 (58%) | 109 (45%) | 7 (50%) | NS |

Table 5. — *Number, age and type of delivery in parous women and according to the knowledge of the diagnosis of multiple sclerosis.*

| | Parous | Before the diagnosis of multiple sclerosis | After the diagnosis of multiple sclerosis | Comparison before vs after MS diagnosis |
|---|------------|--|---|---|
| No. of deliveries | 580 | 446 (77%) | 134 (23%) | |
| No. of childbirths per woman | 2.1 ± 0.8 | 2.2 ± 0.8 | 1.6 ± 0.6 | p < 0.0001 |
| Mean age at the time of the first pregnancy (years) | 24.6 ± 5.2 | 24 ± 3.6 | 27.4 ± 4.3 | p < 0.0001 |
| At least one vaginal delivery | 531 (92%) | 409 (92%) | 122 (91%) | NS |
| Caesarean only | 49 (8%) | 37 (8%) | 12 (9%) | NS |

References

- [1] McDonald W.I., Compston A., Edan G., Goodkin D., Hartung H.P., Lublin F.B.: "Recommended diagnostic criteria for multiple sclerosis: guidelines from the International Panel on the diagnosis of multiple sclerosis". *Ann. Neurol.*, 2001, 50, 121.
- [2] Weinshenker B.G., Bass B., Rice G.P., Noseworthy J., Carriere W., Baskerville J., Ebers G.C.: "The natural history of multiple sclerosis: a geographically based study. I: clinical course and disability". *Brain*, 1989, 112, 133.
- [3] Chancellor M.B., Blaivas J.G.: "Urological and sexual problems in multiple sclerosis". *Clin. Neurosci.*, 2:189-195.
- [4] Gallien P., Robineau S., Nicolas B., Le Bot M.P., Brissot R., Verin M.: "Vesicourethral dysfunction and urodynamic findings in multiple sclerosis: a study of 149 cases". *Arch. Phys. Med. Rehabil.*, 1998, 79, 255.
- [5] Gallien P., Robineau S.: "Sensory-motor and genito-sphincter dysfunction in multiple sclerosis". *Biomed. Pharmacother.*, 1999, 53, 380.
- [6] Mayo M.E., Chetner M.P.: "Lower urinary tract dysfunction in multiple sclerosis". *Urology*, 1992, 39, 67.
- [7] Amarenco G., Kerdraon J., Denys P.: "Bladder and sphincter disorders in multiple sclerosis. Clinical, urodynamic and neurophysiological study of 225 cases". *Rev. Neurol.*, 1995, 151, 722.
- [8] Litwiler S.E., Frohman E.M., Zimmern P.E.: "Multiple sclerosis and the urologist". *J. Urol.*, 1999, 161, 743.
- [9] Blaivas J.G.: "Classifying stress urinary incontinence". *Neurourol. Urodyn.*, 1999, 18, 71.
- [10] Danneker C., Anthuber C.: "The effects of childbirth on the pelvic floor". *J. Perinat. Med.*, 2000, 18, 175.
- [11] Sultan A.H., Stanton S.L.: "Preserving the pelvic floor and perineum during childbirth-elective caesarean section?". *Br. J. Obstet. Gynaecol.*, 1996, 103, 731.
- [12] Thom D.H., Van Den Eeden S.K., Brown J.S.: "Evaluation of parturition and other reproductive variables as risk factors for urinary incontinence in later life". *Obstet. Gynecol.*, 1997, 90, 983.
- [13] Poser C.M., Paty D.W., Scheinberg L., McDonald W.I., Davis F.A., Ebers G.C. *et al.*: "New diagnostic criteria for multiple sclerosis: guidelines for research protocols". *Ann. Neuro.*, 1983, 13, 227.
- [14] Confavreux C., Compston D.A.S., Hommes O.R., McDonald W.I., Thompson A.J.: "EDMUS, an european database for multiple sclerosis". *J. Neurol. Neurosurg. Psy.*, 1992, 55, 671.
- [15] Weinshenker B.G., Hader W., Carriere W., Baskerville J., Ebers G.C.: "The influence of pregnancy on disability from multiple sclerosis: a population-based study in Middlesex County, Ontario". *Neurology*, 1989, 39, 1438.
- [16] Verdru P., Theys P., D'Hooghe M.B., Carton H.: "Pregnancy and multiple sclerosis: the influence on long term disability". *Clin. Neurol. Neurosurg.*, 1984, 96, 38.
- [17] Confavreux C., Hutchinson M., Hours M., Cortinovis-Tourniaire P., Grimaud J.: "Multiple sclerosis and pregnancy: clinical issues". *Rev. Neurol.*, 1999, 155, 186.
- [18] Nelson L.M., Franklin G.M., Jones M.C.: "Risk of multiple sclerosis exacerbation during pregnancy and breast-feeding". *JAMA*, 1988, 259, 3441.
- [19] Shapira K., Poskanzer D.C., Newell D.J., Miller H.: "Marriage, pregnancy and multiple sclerosis". *Brain*, 1996, 89, 419.
- [20] Poser S., Poser W.: "Multiple sclerosis and gestation". *Neurology*, 1983, 33, 1422.
- [21] Durufle A., Petrilli S., Nicolas B., Robineau S., Guillé F., Edan G., Gallien P.: "Effects of pregnancy and child birth on vesico-urethral disorders in multiple sclerosis. An urodynamic study". *Int. Uro.-Gynecol. J.*, 2006, 17, 352.
- [22] Catanzaro M., O'Shaughnessy E.J., Clowers D.C., Brooks G.: "Urinary bladder dysfunction as a remedial disability in multiple sclerosis: a sociologic perspective". *Arch. Phys. Med. Rehabil.*, 1982, 63, 472.
- [23] MacLennan A.H., Taylor A.W., Wilson D.H., Wilson D.: "The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery". *Br. J. Obstet. Gynaecol.*, 2000, 107, 1460.
- [24] Keskes J., Khairi H., Ben Said A., Hidar M., Pigne A.: "Stress urinary incontinence in women. Epidemiologic inquiry. A propos of 500 cases". *J. Gynecol. Obstet. Biol. Reprod.*, 1988, 17, 453.
- [25] Kuh D., Cardozo L., Hardy R.: "Urinary incontinence in middle aged women: childhood enuresis and other lifetime risk factors in a British prospective cohort". *Community Health*, 1999, 53, 453.
- [26] Sengler J., Sambuc R., San Marco P., Grosse D., Barbellion M.: "Epidemiological survey of micturitional disorders in women". *Ann. Read. Med. Phys.*, 1993, 36, 251.
- [27] Samuelsson E., Victor A., Svardsudd K.: "Determinants of urinary incontinence in a population of young and middle-aged women". *Acta Obstet. Gynecol. Scand.*, 2000, 79, 208.
- [28] Wilson P.D., Herbison R.M., Herbison G.P.: "Obstetric practice and the prevalence of urinary incontinence three months after delivery". *Br. J. Obstet. Gynaecol.*, 1996, 103, 154.
- [29] Tapp A., Cardozo L., Versi E., Montgomery J., Studd J.: "The effect of vaginal delivery on the urethral sphincter". *Br. J. Obstet. Gynaecol.*, 1988, 95, 142.
- [30] Skoner M.M., Thompson W.D., Caron V.A.: "Factors associated with risk of stress urinary incontinence in women". *Nurs. Res.*, 1994, 43, 301.
- [31] Viktrup L., Lose G.: "Epidural anaesthesia during labour and stress incontinence after delivery". *Obstet. Gynecol.*, 1993, 82, 984.
- [32] Allen R.E., Hosker G.L., Smith A.R., Warrel D.W.: "Pelvic floor damage and childbirth: a neurophysiological study". *Br. J. Obstet. Gynaecol.*, 1990, 97, 770.

Address reprint requests to:
P. GALLIEN, M.D.
Department of Physical Medicine
and Rehabilitation
Centre Hospitalier Universitaire
Rue Henri Le Guillou
35033 Rennes-Cedex (France)