

Pregnancy Outcome and Complications in Women with Spina Bifida

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OBJECTIVE: To describe the antenatal complications, mode of delivery and outcome of pregnancy in women with spina bifida.

STUDY DESIGN: Case series of women known to have attended the spina bifida clinic at the Royal Children's Hospital. Medical records, postal questionnaire and telephone interview were utilized to collect data on the effect of pregnancy on the health of women and the effect of spina bifida on pregnancy outcome.

RESULTS: Of 207 women born between 1945 and 1975, 23 reported having a pregnancy, and 17 who had completed pregnancies agreed to participate. The 17 women had a total of 29 pregnancies, with 23 pregnancies progressing to births. Fourteen of 17 women had antenatal admissions, with wheelchair-dependent women requiring more-frequent and longer admissions. Recurrent urinary infections in pregnancy occurred in women with a prior history of urinary infections; stomal problems occurred but were not serious; mobility was reduced for two women during pregnancy, with full recovery afterwards; and preexisting pressure sores worsened during

pregnancy. Vaginal deliveries occurred in one in five pregnancies of women who were wheelchair dependent

and in ten of eighteen pregnancies in independently mobile women, including seven of eight pregnancies of independently mobile women without ileal conduits. Cesarean sections were accompanied by postoperative complications in 10 women.

CONCLUSION: Women with spina bifida who become

pregnant generally have a positive outcome, with relatively low complication rates. (J Reprod Med 2000; 45:743-748)

Keywords: spina bifida, pregnancy outcome, pregnancy complications.

Introduction

With improved medical management, many children born with spina bifida are now reaching adulthood with the opportunity to establish sexual relationships and the potential for pregnancy and childbirth.

For health professionals advising women with spina bifida about their prospects for pregnancy and childbirth, the experience in this population is generally positive.

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A number of case reports focus on complications arising in pregnancy secondary to spina bifida¹⁻³ and on the outcome of the newborn.^{4,5} Small series report the obstetric outcome in women with spina

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bifida,⁶⁻¹¹ but this was the first large series of pregnancies and complications in women with spina bifida.

Subjects and Methods

A retrospective, descriptive study was carried out to review the obstetric experience of women with spina bifida. The study was approved by the hospital ethics committee.

A total of 207 women born between 1945 and 1975 were identified from the records of the spina bifida clinic, a multidisciplinary clinic at Royal Children's Hospital. This is a tertiary pediatric hospital and has seen the majority of young people with spina bifida in Victoria. The women were contacted by mail and asked to participate in the study. Ninety-one women replied, 43 envelopes were returned because of wrong addresses, and 73 were nonresponders. Among the 116 nonresponders, 32 have had some contact with the spina bifida clinic physicians and have not been pregnant. Of those who replied, 23 reported having had a pregnancy, and 17 of the 21 with births agreed to participate. Data were collected by reviewing the medical records. Additionally, 11 women participated in a structured telephone interview.

Results

General Characteristics

Of the 17 participants, 14 had a diagnosis of myelomeningocele, and 3 had meningocele. Five had ventriculoperitoneal shunts.

With respect to functional mobility, four were wheelchair dependent (used a wheelchair but did not require assistance to propel it), four walked with aids (crutches and/or ankle-foot orthoses), and the remaining nine walked independently. Two women had lordosis, one kyphoscoliosis and two scoliosis. Pressure sores were present in five women prior to pregnancy. In the wheelchair-dependent women, the ulcers were located on the

thigh in one and on the sacrum in the other, and in the three ambulant women the ulcers were on the feet. Bowel function prior to pregnancy was reported (by telephone) as normal by seven women, requiring a regular program (no laxatives but used timed programs) in another two; the remainder had no specific program.

Regarding urologic status, 4 voided normally, 12 had ileal conduits, and the remaining one used clean intermittent catheterization following undiversion of an ileal conduit. Urinary tract infections prior to pregnancy were reported by seven women. Continence was not well recorded in the medical records; however, 10 of the 11 contacted by telephone reported that they were dry. Five had preexisting hydronephrosis. Another two women had hypertension, both with documented abnormalities in renal function; one had had a renal transplant two years prior to her pregnancy, and the other had had a transplant four years after pregnancy.

Of the 17 women, 2 had infertility problems and achieved their first pregnancies with ovulation induction using clomiphene. In both women the second pregnancy occurred without assistance.

The mean age of the women at the time of their first delivery was 25.3 years (range, 18-30). A total of 29 pregnancies occurred in the 17 women, with 3 pregnancies electively terminated and 3 spontaneous first-trimester abortions. All births occurred between 1977 and 1994.

Antenatal Complications

Antenatal problems and complications occurred in 14 of the 17 women and included urinary infections, stomal and pressure sore problems, back pain, constipation, threatened premature labor and hypertension. Of these 14 women, each required at least one antenatal hospital admission (range, 1-8 admissions; mean, 2.88) with length of each stay varying from 1 to 39 days (mean, 7). The mean number of admissions and duration of inpatient stays antenatally for the independently mobile women as compared to the wheelchair-dependent women is shown in Table I. Antenatal admissions occurred for both obstetric indications and complications related to spina bifida. The admissions were often for multiple reasons.

Spina Bifida-Related Problems

Six women reported stomal problems (stenosis and/or ulceration) without associated morbidity. Ureteric obstruction occurred in the one woman

Table I Antenatal Admissions for Independently Mobile as Compared to Wheelchair-Dependent Women

Mobility	Mean no. of antenatal admissions (range)	Total duration of inpatient stay (range)
Independently mobile (13 women, 18 pregnancies)	1.9 (0-8)	17.3 days (2-46)
Wheelchair dependent (4 women, 5 pregnancies)	2.8 (1-5)	25.8 days (2.8-55)

with undiversion of the urinary system and required an indwelling catheter for a month. Based on the telephone interview, urinary continence deteriorated in three other women with ileal conduits. Among those women with a history of recurrent urinary infections, six of the seven presented with at least three further infections each during pregnancy. All but one had ileal conduits. In contrast, of the six women with no history of previous urinary infections, one had an infection during pregnancy; the total number of pregnancies in this group was nine. Apart from the two women with known renal impairment, there were no reports of change in renal function during pregnancy.

Only one woman developed a new pressure sore during pregnancy, and this did not cause significant morbidity. In two of the five women with pre-existing pressure sores, significant problems occurred, with a thigh pressure sore resulting in two lengthy admissions (19 and 31 days) and a foot ulcer in another woman causing a 14-day admission. In a third woman (wheelchair dependent) the pressure sores were problematic but not the major reason for admission.

Back pain or sciatica was reported in nine preg-

nancies and required admission in three cases, but neurologic deterioration was not reported in any women. The method of mobility changed in only two women during pregnancy, with a change to a wheelchair, but postnatally both returned to their previous mobility. No problems occurred with ventriculoperitoneal shunts during pregnancy.

In the 23 pregnancies, 8 women developed constipation, with 2 requiring hospital admissions.

Obstetric Problems

Five pregnancies were complicated by threatened premature labor, requiring admission and suppression with salbutamol; one delivered at 36 weeks, and the remainder delivered at term.

Of the 23 pregnancies, 6 had hypertension-related problems. Two had preexisting hypertension, and one of the two developed superimposed severe preeclampsia, necessitating premature delivery; three developed preeclampsia; and one had pregnancy-induced hypertension.

Delivery

The mean gestation for the 23 pregnancies was 36.6 weeks (range, 27-42), with 12 delivered by cesarean section and 11 by vaginal delivery.

In 12 of the 23 pregnancies, labor occurred spontaneously, and in another 2 labor was induced. The mean duration of labor was 8 hours (range, 1.56-17.2). Failure to recognize the onset of labor occurred in only one woman, and delivery occurred at home at 34 weeks' gestation. The emergency cesarean sections were for failure to progress in two cases, severe preeclampsia at 27 weeks and primigravida breech. The indications for the elective cesarean sections were breech presentation in a primigravida (2), preeclampsia (1), marked pelvic contraction (3, including 1 repeat), "maternal spina bifida" (1) and high head at term (1).

Table II Mode of Delivery with Respect to Mobility and Urologic Status

Status	Wheelchair dependent	Independently mobile
Ileal conduit	Vaginal delivery, 1 Cesarean section elective, 3 Emergency, 1	Vaginal delivery, 3 Cesarean section elective, 4 Emergency, 1
No ileal conduit		Vaginal delivery, 7 Cesarean section elective, 1
Clean, intermittent catheterization		Vaginal delivery, 0 Cesarean section, 1

Table II summarizes the data on mode of delivery by the mobility of the woman and the presence of an ileal conduit.

Anesthesia

Of the women who had cesarean sections, 11 had general anesthesia (1 after a failed lumbar epidural), and only 1 had a spinal anesthesia.

Of the women with vaginal deliveries, 4 did not require any analgesia, 2 used nitrous oxide, 4 had pudendal anesthesia associated with forceps delivery, and 1 had an epidural. With respect to lumbar epidural anesthesia, one case was uneventful, there were problems in identifying the space in another but the anesthesia was successful, and the third was ineffective despite the fact that the epidural space was identified. One woman had spinal anesthesia, and although there were problems identifying the space, regional anesthesia was achieved.

Postnatal Period

In 7 of the 11 vaginal deliveries there were no postpartum complications, and the postnatal stay in these women ranged from two to seven days. In the remaining cases the postnatal stay was complicated by postpartum hemorrhage with endometritis (8 days), pregnancy-induced hypertension (8 days), pressure sore in a wheelchair independent woman (11 days), and persistent headache and breakdown of the episiotomy (10 days). The mean stay after cesarean section was 14.6 days (range, 5–26). After an uncomplicated cesarean section (two cases) the stay was five and six days. The remaining 10 cesarean sections were complicated by small bowel perforation, wound infection (two), chest infection, endometritis, sciatica, mastitis, urinary infection (two) and persistent hypertension associated with preeclampsia.² The two women with secondary hypertension had the longest stays.

Newborn Information

Of the 23 infants (16 females and 7 males), 8 were born before 37 weeks of gestation, 14 at term and one after 42 weeks of gestation.

Three of the preterm infants were born to women with hypertensive disorders and all but two to women with a history of urinary tract infection during pregnancy. None of the preterm infants were growth retarded.

At 2 years of age, the very-low-birth-weight infant born at 27 weeks' gestation was reported to be having spastic hemiplegia and hydrocephalus sec-

ondary to ventricular hemorrhage.

The birth weight of term infants ranged from 2,270 to 4,235 g (mean, 2,847). Seven infants were growth retarded (<10th percentile); in three the only apparent factor was smoking, two were born to a nonsmoker who had recurrent urinary tract infections in pregnancy, and in another one the mother had urinary tract infections and was a smoker. The remaining case did not have any apparent risk factors.

Among the 23 infants there were no spina bifida lesions, although three were born with congenital malformations. One had Klippel-Feil syndrome, another had a de novo 8q chromosome abnormality, and one had dysmorphic features, with low-set ears, small occiput, flattened cranium, congenital hip dislocation, ureteric reflux but normal chromosomal analysis.

Twelve infants had postnatal complications, including 4 with hypoglycemia; 3 had mild jaundice, 3 premature infants had respiratory distress syndrome, 1 had transient tachypnea of the newborn, and the remaining infant had tetralogy of Fallot as part of Klippel-Feil syndrome and required intubation for the first two days of life.

Discussion

This is the largest series of pregnancies in women with spina bifida and represents traceable pregnancies from women born between 1945 and 1975 and attending a tertiary children's hospital. This is largely the same population reported on by Smith and Smith in 1973.¹²

The level of spina bifida and its complications in the women in this study was generally similar to those in other populations. Of the 13 women (76%) who were reported as having a motor level from L3-4 and below, all were ambulatory. This is consistent with the 90% with motor levels of L4-5 ambulating, as reported by Shurtleff.¹³ The number of ventriculoperitoneal shunts (5 in 17 women, or 30%) in our study population was lower than the 85% reported in the spina bifida population.¹³ We suspect this is related to the better prognosis and hence long-term survival of infants born with meningomyelocele 20–30 years ago. The lower level of disability in these women would contribute to their greater level of social function.

From the perspective of spina bifida-related complications, there were fewer significant problems in this population of women than were expected. Apart from the temporary reduction in mobility in

two women, pregnancy did not cause any significant back pain or deterioration in neurologic function or affect motor, urologic or bowel function.

Urinary tract infections were common, particularly in those with ileal conduits, as is consistent with case reports.^{2,6,7-10,14} Ileal conduits in this geographic area were standard management prior to 1980, and hence 12 of 17 women with conduits are representative of this population. Since the mid-1970s, management has changed to predominantly clean, intermittent catheterization. In our series only minor complications with ulcers of the stoma, stenosis and leakage occurred, with conduits draining well throughout pregnancy. The only patient with ureteric obstruction had previously had an undiversion. In this series, no woman who voided normally had urinary tract infections. The women with ileal conduits, particularly those with a history of recurrent urinary tract infections, had a number of admissions associated with further infections. We cannot comment on complications in pregnancy in association with clean, intermittent catheterization or on the problems that may arise at cesarean section with new approaches to bladder management, such as cystoplasty.

This study demonstrated that in some individuals, pressure sores can be troublesome and cause prolonged hospitalization. The distribution of pressure sores is similar to that in reports in other populations of adults with spina bifida.¹³

Ventriculoperitoneal shunt malfunction has been reported predominantly in the third trimester,¹⁵ and problems arising after cesarean section have been postulated³ due to the potential of fibrin deposition. In our study none of the five women developed symptoms attributable to shunt malfunction or obstruction.

From the perspective of pregnancy complications in these women, there were more antenatal admissions. It is difficult to quantify and compare this to the general population as the admission practices have changed significantly over the 20-year period during which these pregnancies occurred. Preeclampsia occurred more frequently in this population, but as half the women had a history of repeated urinary tract infections and two had known renal impairment, the prevalence of preeclampsia is not excessively high. The four women who were wheelchair dependent (with five pregnancies) had an average of 2.8 admissions, with an average total duration of inpatient stay of 25.8 days, whereas the independently mobile women had an average of 1.9

admissions with an average of 17.3 days of inpatient stay.

Vaginal deliveries occurred in 1 of 5 pregnancies in women who were wheelchair dependent and in 10/18 pregnancies in independently mobile women. The cesarean section rate was 48% in this series, significantly higher than in the general population. Both the elective and emergency cesarean section rates were increased. Cesarean sections were not without problems both intraoperatively and postoperatively. A number of cesarean sections appeared to be undertaken for relatively minor indications, and in view of the risk of complications, this management option needs careful consideration.

Difficulties and failure in attempting regional analgesia in patients with spina bifida have been reported previously, with the recommendation that the puncture site be above the lesion.^{16,17} In our series, identification of the space was a problem in three of four cases, resulting in an incomplete regional block in one woman.

The number of neonates born with anomalies (3 in 24) is higher than the expected risk in the "normal" population, 1 in 30,¹⁸ although there were no infants with spina bifida. Today all women are advised to take preconceptional folate to reduce the risk of neural tube defects,¹⁹ but this information was not available to women in the earlier years of this retrospective study.

For health professionals advising women with spina bifida about their prospects for pregnancy and childbirth, the experience in this population is generally positive. The risk of inpatient stays was considerable for some women, although admission practices and assessment management have altered over the years, reducing this possibility. Ileal conduits are no longer created in infants with spina bifida, and hence some of the problems discussed above are no longer applicable.

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