Sexuality and seeking medical help for erectile dysfunction in young adults with spina bifida

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Objectives: The objectives of this study were to evaluate the correlation between the sexual function of spina bifida (SB) patients and Sharrard classification, touch sensation on the penis, to examine if SB patients who are sexually active have erectile dysfunction (ED) on the International Index of Erectile Function-5 (IIEF5), and to clarify if they seek medical treatment for ED.

Methods: Thirty-six male SB patients aged over 18 years were enrolled. A questionnaire was sent to all patients that included the following items: touch sensation on the penis, psychogenic erection, rigidity at erection, ejaculation, orgasm and experience in sexual intercourse. In addition, patients who had experience in sexual intercourse were asked about ED through the use of the IIEF5 and whether or not they sought medical help for their ED.

Results: Twenty-six patients responded. The positive rates of psychogenic erection, rigidity at erection, ejaculation and orgasm were 85%, 54%, 88% and 65% respectively. Psychogenic erection and ejaculation correlated with Sharrard classification. Rigidity at erection and orgasm correlated with touch sensation on the penis. Eleven patients had experience in sexual intercourse and six of them were diagnosed as having ED on the IIEF5. There were no factors correlating with ED. None of the patients sought medical advice and none was treated for ED.

Conclusions: Sexual function of SB patients could be predicted by Sharrard classification and touch sensation on the penis to some degree. However, ED did not correlate with sexual function. Therefore, we should not evaluate the neurological loss but instead provide adequate information.

Key words erectile dysfunction, sexual function, spina bifida.

Introduction

The increasing life expectancy of spina bifida (SB) patients as a result of appropriate medical care depending on neurogenic disorder has become manifest in spite of the problems associated with growth to maturity.1,2 The quality of life (QOL) of SB patients, especially sexual dysfunction, has been investigated.3 As SB patients have various disorders in the lumbosacral spinal cord where the nuclei of the pelvic and pudendal nerves are located, it is predicted that they have some impairment in their sexual function. Nevertheless, the spinal cord injury in most SB patients is not so much complete as in mosaic injury. Therefore, SB patients potentially still have various survival levels of sexual function. It is important to make a precise diagnosis of the survival level of sexual function for providing SB patients with appropriate information and treatment for erectile dysfunction (ED). Some studies have focused on the relation between sexual functioning and neurological loss.4–6 It was reported that penile erection is related to sensory level and that the center of the remaining erectile and ejaculation function is L2/3.4 The relation between sexual functioning and neurological loss is still controversial. It is unknown if SB patients, who can erect and ejaculate, are able to be involved in sexual intercourse.

Recently, sildenafil has proved to be effective for ED in SB patients.7 Using adequate sildenafil seems to have the potential of improving the QOL of SB patients. Nevertheless, we do not know if SB patients actually seek medical help for their ED.

The classification of the surviving neurological function in SB patients includes Sharrard classification and touch sensation on the penis. Sharrard classification divides SB patients into six groups. The neurological loss and amputation of each Sharrard classification is as follows: Sharrard 1, Th12 and wheelchair; Sharrard 2, L2, walking on crutch; Sharrard 3, L4, walking with knee-ankle-foot orthosis; Sharrard 4, L5, walking with knee-ankle-foot or ankle-foot orthosis; Sharrard 5, S1, walking with ankle-foot orthosis or without orthosis; Sharrard 6, S3 walking with ankle-foot orthosis or without orthosis.

Although various correlations between the detrusor muscle and the urethral sphincter function of SB patients exist, the activities of detrusor in Sharrard 1–3 correlate with that of the urethral sphincter. Patients with detrusor overactivity have active urethral sphincter with detrusor-sphincter dyssynergia (DSD), while patients with hypoactive detrusor have hypoactive urethral sphincter. Conversely, the activities of detrusor in Sharrard 4–6 do
not correlate with that of the urethral sphincter, as patients with hypoactive detrusor have active urethral sphincter with DSD.9

Positive touch sensation on the penis indicates intact pudendal nerve function. Therefore, the objectives of this study were to evaluate the correlation between the sexual function of SB patients and Sharrard classification, touch sensation on the penis; to examine if SB patients who are sexually active have ED on the International Index of Erectile Function-5 (IIEF5); and to clarify whether or not they seek medical treatment for ED.

Methods

Thirty-six male SB patients over 18 years of age, who were followed up at Bobath Memorial Hospital and could answer our questionnaire, were enrolled. The questionnaire (Appendix I) was sent to all patients. It included the following items: (i) touch sensation on the penis; (ii) psychogenic erection; (iii) rigidity at erection by tactile stimulation; (iv) ejaculation; (v) orgasm at ejaculation; and (vi) experience in sexual intercourse. In addition, patients who had experience in sexual intercourse were asked about ED through the use of the IIEF5 and whether or not they sought medical help for their ED.

Patients were divided by Sharrard classification according to their physical functions in the medical records and touch sensation on the penis. Considering innervations, psychogenic erection and ejaculation, of which the neurological pathway is mainly the hypogastric nerve, were evaluated by dividing Sharrard classification into two groups; namely, patients of Sharrard 1 and patients above Sharrard 2 having faculties in the domain of the thoracic spinal cord. Rigidity of the penis and orgasm at ejaculation, of which the neurological pathway is mainly the pudendal nerve, were evaluated by dividing Sharrard classification into two groups; namely, patients under Sharrard 5 and patients above Sharrard 6 having faculties in the domain of S2.

In this study, none of the SB patients showed hydrocephaly on computed tomography (CT) scanning, although nine had a ventriculo-peritoneal shunt. Therefore, we did not evaluate if hydrocephaly influenced sexual function.

For statistical analysis, the χ² test and post-hoc tests were used for intergroup comparisons. A P-value of less than 0.05 was considered statistically significant. The StatView program, version 5.0 (SAS Institute, Cary, NC, USA) was used to conduct all statistical analyses.

Results

Patients

Twenty-six patients responded to the questionnaire (response rate 74.3%). Their mean age was 26.4 years (range 18–48 years). Regarding the number of patients in each category of Sharrard classification, there were three patients in Sharrard 1, five in Sharrard 2, three in Sharrard 3, two in Sharrard 4, seven in Sharrard 5, and six in Sharrard 6. Regarding the urination methods of patients, clean intermittent catheterization (CIC) or Valsalva voiding were performed (Sharrard 1: the number of patients performing CIC/that of Valsalva voiding: 1/2, Sharrard 2: 5/0, Sharrard 3: 3/0, Sharrard 4: 1/1, Sharrard 5: 4/3, Sharrard 6: 3/3). There was no difference in age among the various groups considering Sharrard classification and touch sensation on the penis (data not shown).

Correlation between Sharrard classification and touch sensation

The touch sensation on the penis was positive in 19 patients (73%). There was not a significant difference in the number of positive patients between the two groups of Sharrard classification (under Sharrard 5 vs. Sharrard 6: positive patients/total number: 14/20 vs. 5/6).

Psychogenic erection by audio-visual stimulation

Psychogenic erection by audio-visual stimulation was positive in 22 patients (85%) (Table 1). There was a significant difference in the number of positive patients between the two groups of Sharrard classification (Sharrard 1 vs. above Sharrard 2: positive patients/total number: 1/3 vs. 21/23, P < 0.05) but not in touch sensation (positive vs. negative: 17/19 vs. 5/7).

Rigidity at erection by tactile stimulation

Rigidity at erection by tactile stimulation was positive in 14 patients (54%) (Table 1). There was not a significant difference in the number of positive patients between the two groups of Sharrard classification (under Sharrard 5 vs. above Sharrard 6: positive patients/total number: 11/20 vs. 22/23, P < 0.05) but not in touch sensation (positive vs. negative: 17/19 vs. 5/7).

Table 1 Correlations between sexual function and Sharrard classification, and touch sensation of the penis

<table>
<thead>
<tr>
<th>Sharrard classification</th>
<th>Physiological erection</th>
<th>Rigidity at penis</th>
<th>Ejaculation</th>
<th>Orgasm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3* (33%)†</td>
<td>17/20 (85%)</td>
<td>13/19 (68%)†</td>
<td>18/19 (94%)†</td>
<td>16/19 (84%)†</td>
</tr>
<tr>
<td>Above 2</td>
<td>21/23 (91%)</td>
<td>16/20 (80%)</td>
<td>20/23 (91%)</td>
<td>15/20 (75%)</td>
</tr>
<tr>
<td>Under 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Touch sensation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>17/19 (89%)</td>
<td>13/19 (68%)†</td>
<td>18/19 (94%)†</td>
<td>16/19 (84%)†</td>
</tr>
<tr>
<td>Negative</td>
<td>5/7 (71%)</td>
<td>1/7 (14%)</td>
<td>5/7 (71%)</td>
<td>1/7 (14%)</td>
</tr>
</tbody>
</table>

*The number of positive patients/total number. † P < 0.05; χ² test.

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Sharrard 6: positive patients/total number: 10/20 vs. 5/6), but there was a significant difference in touch sensation (positive vs. negative: 13/19 vs. 1/7, \( P < 0.05 \)).

**Ejaculation**

Ejaculation was positive in 23 patients (88%) (Table 1). There was a significant difference in the number of positive patients between the two groups of Sharrard classification (Sharrard 1 vs. above Sharrard 2: positive patients/total number: 1/3 vs. 22/23, \( P < 0.05 \)), but not in touch sensation (positive vs. negative: 18/19 vs. 5/7).

**Orgasm at ejaculation**

Orgasm at ejaculation was positive in 17 patients (65%) (Table 1). There was not a significant difference in the number of positive patients between the two groups of Sharrard classification (Sharrard 6 vs. under Sharrard 5: positive patients/total number: 5/6 vs. 12/20), but there was a significant difference in touch sensation (positive vs. negative: 16/19 vs. 1/7, \( P < 0.05 \)).

**Erectile dysfunction**

Eleven patients (42%) had experience in sexual intercourse. Six of them were diagnosed as having ED on the IIEF5. There was a significant difference in the number of ED between the various groups of Sharrard classification and touch sensation. The rate of ED was not influenced by the rigidity of the penis (Table 2).

**Seeking medical help**

All patients did not seek medical help and were never treated for ED.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Correlations between erectile dysfunction (ED) and Sharrard classification, touch sensation of the penis and rigidity at erection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ED on IIEF5</td>
</tr>
<tr>
<td>Sharrard classification†</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1/3 (0%)</td>
</tr>
<tr>
<td>2</td>
<td>2/2 (100%)</td>
</tr>
<tr>
<td>3</td>
<td>1/2 (50%)</td>
</tr>
<tr>
<td>4</td>
<td>3/6 (50%)</td>
</tr>
<tr>
<td>Touch sensation‡</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>5/9</td>
</tr>
<tr>
<td>Negative</td>
<td>1/2</td>
</tr>
<tr>
<td>Rigidity at erection‡</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>3/8</td>
</tr>
<tr>
<td>Negative</td>
<td>3/3</td>
</tr>
</tbody>
</table>

†Post-hoc tests were used for intergroup comparisons. There were no significant differences among the various Sharrard classifications. ‡The \( \chi^2 \) test was used for intergroup comparisons. There were no significant differences between the patients with positive and negative touch sensation of the penis. There were no significant differences between patients with positive and negative rigidity of the penis. IIEF5, International Index of Erectile Function-5.

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**Discussion**

Because SB patients have various disorders in the lumbosacral spinal cord where the nuclei of the pelvic and pudendal nerves are located, it is predicted that they have some trouble in their sexual function. Nevertheless, the spinal cord injury of most SB patients is not so much complete as in mosaic injury. They apparently do not have intact touch sensation, because patients of under Sharrard 5 theoretically have disturbed neurological function under S1. However, there was no difference in touch sensation between the Sharrard 5 group and the Sharrard 6 group whose S2 had surviving neurological function. This confirms that the spinal cord injury of most SB patients is not so much complete as in mosaic injury. Therefore, the neurological loss in SB may not be properly predicted by the level of the surviving motor function.

In our present study, the high survival rates of physiological erection and ejaculation, of which the neurological pathway is mainly the hypogastric nerve, were equal to those of others reports.4,5 Although these phenomena could be predicted by Sharrard classification, touch sensation did not have any relationship with them.

It was reported that many patients with sacral spinal cord injury retain psychogenic erectile ability even though the reflexogenic erection is abolished, and these cerebrally induced erections are noticed more frequently in patients with lower motor neuron lesions below T12.10 In patients with psychogenic erection, elongation and engorgement of the penis are observed but rigidity is insufficient.11 In patients with sacral spinal cord lesion, the cerebral impulses can still travel by means of the sympathetic pathway to inhibit noradrenaline release, and nitrous oxide (NO) and acetylcholine can still be released through synapses with the postganglionic parasymptomatic and somatic neurons. Because the number of synapses between the thoracolumbar outflow and the postganglionic parasympathetic and somatic neurons is less than the sacral outflow, the resulting erection will not be very strong.12

The continuing and increasing rigidity of the penis and orgasm at ejaculation (both actions are mediated by the pudendal nerve) occurred less than psychogenic erection and ejaculation. Although these phenomena could not be predicted by Sharrard classification, touch sensation had relationships with them. This is natural because positive touch sensation implies surviving function of the pudendal nerve.

In this study, the rate of experience in sexual intercourse was 42%, being significantly less than that of healthy subjects.13 It was noteworthy that many SB patients who had the potential of increasing rigidity of the penis were diagnosed as having ED by IIEF5. ED in SB patients did not correlate with Sharrard classification and touch sensation. This phenomenon may imply that ED in those patients could not be predicted only by the level of surviving neurological function, and that the sexual function was affected by other factors such as psychological factors, that is, similar to ED in the healthy subjects.

None of the SB patients in this study received treatment for ED. Verhoef et al. reported that almost all patients...
received some sex education and three quarters of their subjects thought that it met their needs. However, the role of health care professionals in sex education was only marginal, and sex education specifically concerning SB patients’ problems was rarely provided. Evaluation of sexual function in SB patients in Japan hardly yielded acceptable results. It is highly doubtful if we can fully respond to demand concerning ED in SB patients.

Regarding the therapies for ED in SB patients, it is especially important to encourage these persons to empty their bladder and bowel before sexual intercourse because they are susceptible to urinary and fecal incontinence, which definitely interferes with sexual intercourse, due to neurological loss in the sacral spinal cord. Sildenafil could provide some help for ED in SB patients. Goldstein et al. demonstrated the effectiveness of oral sildenafil for the treatment of men in the general population with ED. Palmer et al. have recently reported their preliminary results, including a 63% success rate for SB patients. The pharmacological properties of sildenafil include selective inhibition of phosphodiesterase-5, which is a hydrolytic enzyme for cGMP NO increases cGMP, which induces relaxation of the smooth muscle of the corpus cavernosum. Consequently, erection of the penis occurs. Therefore, sildenafil is a potentially useful therapeutic agent for ED, even in SB patients who have only psychogenic erection. Nonetheless, the precise dosage of sildenafil for ED in SB patients has not yet been established. Accordingly, we must use sildenafil very carefully to avoid the development of serious side-effects.

Sharrard classification was a predictive factor for the survival of functions of psychogenic erection and ejaculation. Positive touch sensation on the penis indicated increasing rigidity of the penis and feeling orgasm at ejaculation. However, Sharrard classification and penile sensation could not predict ED. Therefore, we should not evaluate the neurological loss but provide adequate information, such as advising SB patients complaining of ED to evacuate the urinary bladder and bowel before sexual intercourse.

References


Appendix I: Questionnaire on sexuality

1 Do you feel any sensation on touching the penis? (Y/N)
2 Does the penis erect by audiovisual stimuli or fantasy? (Y/N)
3 Does the penile rigidity increase by tactile stimuli to the penis? (Y/N) (meaning whether the penile rigidity increases at masturbation)
4 Does ejaculation occur? (Y/N)
5 Do you feel orgasm at ejaculation? (Y/N)
6 Do you have experience in sexual intercourse? (Y/N)
7 The next question is for those having experience in sexual intercourse.

8 Do you feel any sensation on touching the penis? (Y/N)
9 Do you feel orgasm at ejaculation? (Y/N)
10 Does ejaculation occur? (Y/N)
11 Does the penis erect by audiovisual stimuli or fantasy? (Y/N)
12 Has your experience in sexual intercourse been satisfactory? (Y/N)
13 Have you sought any medical help for your erectile dysfunction? (Y/N)