S

exual dysfunction after pelvic frac-
ture can have a profound negative
effect on a patient’s life. Despite its
importance, this subject has received little
attention.1-7 Orthopedic investigators
focus primarily on the outcome of the
bony injury,8-11 whereas urologists are
concerned with urethra or bladder injuries
that occasionally accompany pelvic frac-
ture.12-21 Female reproductive and sexual
function after pelvic fracture has been
thoroughly documented1,3 and the physio-
logic cause of erectile dysfunction in male
pelvic fracture patients has been
reviewed.5 However, most reports regard-
ing male sexual function after pelvic frac-
ture are hindered by small sample size,7
short follow-up,2,6,13 or they provide only a
cursory examination of the subject.8,9,13,18
Although the outcome of fracture care and
urethral repair is important, to the patient,
the question “what will my sex life be
like?” also is important.

This study reports the sexual function of male patients with prior pelvic fracture who are at least 2 years postinjury. This study was approved by our medical center’s institutional review board.

MATERIALS AND METHODS

Trauma registry records between January 1, 1996 and December 31, 1998 were examined to identify male patients with pelvic fracture who were a minimum of 2 years postinjury. The registry identified 195 male patients with pelvic fracture who survived their initial hospital stay. Valid addresses or telephone numbers for 118 patients were unavailable. The remaining 77 patients had valid contact information and were asked to complete a questionnaire regarding sexual function.

The Brief Sexual Function Inventory (BSFI)22 is a self-administered questionnaire designed to elicit information regarding male sex drive, erection, ejaculation, perceptions of problems with sexual function, and overall satisfaction with sex life (Figure). This questionnaire has been validated by its developers, and has been used in several studies on male sexual function.23-27 Composed of 11 questions, it takes approximately 10 minutes to complete. Each question has 5 response alternatives—0, 1, 2, 3, or 4—with 4 being the highest, best response. Summation of the responses yields a total score ranging from 0-44.

Of the 77 patients, the questionnaire was mailed to 67. Thirty-seven (55%) returned a completed questionnaire. The 10 remaining patients were asked to complete the questionnaire at follow-up.

Four additional male patients with pelvic fracture were asked to complete the questionnaire. These 4 patients were injured outside the 1996-1998 study peri-
### SEXUAL DRIVE

Let's define sexual drive as a feeling that may include wanting to have a sexual experience (masturbation or intercourse), thinking about having sex, or feeling frustrated due to lack of sex.

1. **During the past 30 days, on how many days have you felt sexual drive?**
   - No days
   - Only a few days
   - Some days
   - Most days
   - Almost every day
   - 0
   - 1
   - 2
   - 3
   - 4

2. **During the past 30 days, how would you rate your level of sexual drive?**
   - None at all
   - Low
   - Medium
   - Medium high
   - High
   - 0
   - 1
   - 2
   - 3
   - 4

### ERECTIONS

3. **Over the past 30 days, how often have you had partial or full erections when you were sexually stimulated in any way?**
   - Not at all
   - A few times
   - Fairly often
   - Usually
   - Always
   - 0
   - 1
   - 2
   - 3
   - 4

4. **Over the past 30 days, when you had erections, how often were they firm enough to have sexual intercourse?**
   - Not at all
   - A few times
   - Fairly often
   - Usually
   - Always
   - 0
   - 1
   - 2
   - 3
   - 4

5. **How much difficulty did you have getting an erection during the past 30 days?**
   - Did not get erections at all
   - A lot of difficulty
   - Some difficulty
   - Little difficulty
   - No difficulty
   - 0
   - 1
   - 2
   - 3
   - 4

### EJACULATION

6. In the past 30 days, how much difficulty have you had ejaculating when you have been sexually stimulated?
   - Have had no sexual stimulation in past month
   - A lot of difficulty
   - Some difficulty
   - Little difficulty
   - No difficulty
   - 0
   - 1
   - 2
   - 3
   - 4

7. **In the past 30 days, how much did you consider the amount of semen you ejaculate to be a problem for you?**
   - Did not climax
   - Big problem
   - Medium problem
   - Small problem
   - No problem
   - 0
   - 1
   - 2
   - 3
   - 4

### PROBLEM ASSESSMENT

8. **In the past 30 days, to what extent have you considered a lack of sex drive to be a problem?**
   - Big problem
   - Medium problem
   - Small problem
   - Very small problem
   - No problem
   - 0
   - 1
   - 2
   - 3
   - 4

9. **In the past 30 days, to what extent have you considered your ability to get and keep erections a problem?**
   - Big problem
   - Medium problem
   - Small problem
   - Very small problem
   - No problem
   - 0
   - 1
   - 2
   - 3
   - 4

10. **In the past 30 days, to what extent have you considered your ejaculation to be a problem?**
    - Big problem
    - Medium problem
    - Small problem
    - Very small problem
    - No problem
    - 0
    - 1
    - 2
    - 3
    - 4

### OVERALL SATISFACTION

11. **Overall, during the past 30 days, how satisfied have you been with your sex life?**
    - Very dissatisfied
    - Mostly dissatisfied
    - Neutral or mixed (about equally satisfied and dissatisfied)
    - Mostly satisfied
    - Very satisfied
    - 0
    - 1
    - 2
    - 3
    - 4

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Figure. The Brief Sexual Function Inventory.22
od, but satisfied the criterion of being at least 2 years postinjury. All 4 patients completed the questionnaire, yielding 51 responders.

Overall, 51 (63%) of 81 patients completed the questionnaire. Thirty (37%) patients refused. Thus, the 118 patients we could not contact combined with the 30 who refused to complete the questionnaire comprised 148 non-responders.

Injury and demographic information was collected for patients who completed the questionnaire. Information included age, pelvic fracture pattern,28 urologic or neurologic injury at initial presentation, Glasgow Coma Score on presentation, and whether the pelvic fracture had been managed surgically.

Mean age of respondents was 43 years (range: 17-85 years). Pelvic fracture patterns included 17 Tile A fractures (stable to rotational and vertical stress), 20 Tile B patterns (rotationally unstable, vertically stable), and 14 Tile C patterns (rotationally and vertically unstable). Twenty had been treated nonoperatively. Eleven had a neurologic deficit on arrival, which included decreased rectal tone in 5 patients, foot drop in 1, isolated sensory deficit in the leg in 1, motor deficit in the leg in 3, and a sensory deficit in the perineum in 1 patient. Seven patients had urologic injuries, including urethral disruptions in 5 patients, bladder rupture in 1 patient, and a urethral disruption and bladder rupture in 1 patient. The mean Glasgow Coma Score on arrival was 14.4 (range: 3-15). Only 5 patients had an initial Glasgow Coma Score <15. These patients had scores of 3, 3, 11, 11, and 14, respectively.

Patients with pelvic fracture who completed the questionnaire were an average 38 months postinjury (range: 24-210 months). No patient had a preinjury diagnosis of sexual dysfunction, and no patient had any illness, such as diabetes, which might be expected to lead to sexual dysfunction.

The 51 respondents did not differ significantly from the 148 non-respondents regarding pelvic fracture pattern distribution (P=.11) or urologic injury (P=.9). Patients who responded to the questionnaire tended to have higher Glasgow Coma Scores than non-responders. Mean Glasgow Coma Score for responders was 14.4 versus a mean of 13.6 for non-responders (P=.06).

Responders differed significantly from non-responders regarding age. Mean age of non-responders was 37 years, whereas the mean age of responders was 43 years (P=.02). In addition, non-responders had a significantly (P<.01) larger proportion of patients treated nonoperatively (63%) than responders (39%).

Fifty-three of 55 male patients with isolated ankle fractures completed the questionnaire at their clinic visit. Mean patient age was 37 years (range: 18-64 years). No patient had a preinjury diagnosis of sexual dysfunction or any illnesses expected to lead to sexual dysfunction. These patients’ responses were used as a control for the responses of the pelvic fracture group.

A power analysis was conducted for the principal endpoint, the difference in sexual function scores between the pelvic and ankle fracture groups. For the Wilcoxon rank sum test, of interest is the probability, δ, that a randomly selected sex function score taken from the pelvic fracture group will be less than a randomly selected sex function score from the ankle fracture group. For a type I error of 0.05, samples of 51 and 53 are sufficient to detect a δ of 0.64 with a probability of 0.8 (80% power).29 This corresponds to an effect size (the difference in the means divided by their common standard deviation) of 0.51, which is termed “medium” in the testing literature.30

As an example of how a medium effect might be manifested, if the sexual function scores for each group were uniformly spread over a 10-point interval, then the sample size for this study is sufficient to detect a difference of 1.5 points between the two groups with a 0.8 probability, if the type I error is 0.05.

Responses to the questionnaire were analyzed using nonparametric statistical

### TABLE 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Pelvic Fracture Group</th>
<th>Ankle Fracture Group</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ...how many days felt sex drive?</td>
<td>2.3</td>
<td>3.1</td>
<td>.0008</td>
</tr>
<tr>
<td>2. ...rate level sex drive?</td>
<td>2.0</td>
<td>3.0</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>3. ...full erection when stimulated?</td>
<td>2.3</td>
<td>3.2</td>
<td>.0021</td>
</tr>
<tr>
<td>4. ...erection firm enough for intercourse?</td>
<td>2.2</td>
<td>3.4</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>5. ...difficulty getting an erection?</td>
<td>2.5</td>
<td>3.7</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>6. ...difficulty ejaculating when stimulated?</td>
<td>2.4</td>
<td>3.6</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>7. ...amount of semen ejaculated a problem?</td>
<td>2.6</td>
<td>3.7</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>8. ...lack of sex drive a problem?</td>
<td>2.4</td>
<td>3.5</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>9. ...erectile dysfunction a problem?</td>
<td>2.1</td>
<td>3.6</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>10. ...ejaculation a problem?</td>
<td>2.4</td>
<td>3.7</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>11. ...how satisfied with sex life?</td>
<td>1.7</td>
<td>3.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Average</td>
<td>25</td>
<td>37</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Abbreviation: CI=confidence interval.

*Arithmetic mean. All questions answered from 0-4, with 4 being best.
methods. In comparing two groups on various outcomes, the Wilcoxon rank sum test was used. A comparison of the three fracture patterns was accomplished with the Kruskal-Wallis test statistic. Contrasts of individual sexual function questionnaire responses were made with the Jonckheere-Terpstra test, whereas Spearman’s rank order correlation coefficient was computed in relating sexual function score and patient age. Statistical significance was P<.05.

RESULTS

Mean scores for each question are shown in Table 1. When responses to the questions were summed, totals given by patients with pelvic fracture were significantly lower than totals given by patients with ankle fracture (P<.001). An obvious decline in sexual function score was noted as patient age increased. Scores showed a tendency to be lower at age >20 years. No patient aged <20 years had a sexual function score total >30.

The effect of pelvic fracture pattern on sexual function score also was analyzed. Patients with Tile A, Tile B, and Tile C pelvic fractures were analyzed statistically using the nonparametric Kruskal-Wallis test. Types A and B tended to score higher than type C, but this difference was not significant (P=.16).

The sexual function scores of patients with neurologic deficits were not significantly different compared with those of patients with no deficits (P=.12). Sexual function scores of patients with urologic injuries were not significantly different than those of patients with no urologic injuries (P=.95). Scores of patients managed surgically were not significantly different than those of patients managed nonsurgically (P=.94).

![TABLE 2](image_url)

**Percentage of Patients With Pelvic Fracture Who Responded 0, 1, or 2**

<table>
<thead>
<tr>
<th>Item</th>
<th>Ankle Fracture Group</th>
<th>Pelvic Fracture Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15%</td>
<td>8%</td>
</tr>
<tr>
<td>2</td>
<td>12%</td>
<td>9%</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>4</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>6</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>7</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>8</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>9</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>10</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>11</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Abbreviated text of items given in Table 1. For each item, patients chose 0, 1, 2, 3, or 4 as a response. Higher scores are better.
To analyze the possible effect of head injury, sexual function scores of patients with pelvic fracture with Glasgow Coma Score equal to 15 were compared to those of the 5 patients with Glasgow Coma Score <15. The difference between these two groups’ scores was not significant ($P=.68$).

**DISCUSSION**

Copeland et al\(^1\) published a thorough report on the effect of pelvic fracture on genitourinary, sexual, and reproductive function in women. Sexual function was evaluated by questioning the ability to achieve physiologic arousal and orgasm, and the presence and location of dyspareunia. Their study showed that, although pelvic fracture negatively affected genticourinary and reproductive function of female patients, problems with sexual arousal and orgasm were rare. They also found that dyspareunia was more common in women whose fractures were displaced >5 mm.

Machtens et al\(^3\) reviewed the results of interdisciplinary evaluations of 31 male patients with erectile dysfunction after pelvic trauma. They reported that neurologic injury appeared to be the cause of most erectile dysfunction after pelvic fracture. However, they focused solely on erectile function, and did not comment on the subjective complaints of their male patients or whether the patients noted difficulty with sex drive or ejaculation. They also did not report whether patients were satisfied with their sex lives.

A large percentage of patients with pelvic fracture in our study had problems with sexual function after injury. Many facets of sex life were affected. Many patients gave low scores on questions concerning sex drive, erection, ejaculation, and overall satisfaction with sex life. Not only were the patients’ physical abilities to have sex affected, but they were psychologically affected as well. Pelvic fractures increased the risk of sexual dysfunction to a greater degree than ankle fractures. Not just skeletal trauma, but pelvic skeletal trauma, negatively affected sex function.

Predicting sexual dysfunction after pelvic fracture is difficult. In our study, neither pelvic fracture pattern, urologic injury, neurologic deficit on arrival, Glasgow Coma Score on arrival, nor surgical or non-surgical management of the fracture was significantly associated with sexual function score. However, older patients did have significantly lower sexual function scores, highlighting the increased risk faced by elderly patients.

This study is limited by several factors. First, the study group was not a consecutive series of patients, nor were they selected in a random fashion. Although these patients were not selected for any particular complaint or finding (other than that they sustained a pelvic fracture at least 2 years prior), they were a sample of convenience. They may not be representative of all male pelvic fracture patients. Second, a selection bias may have been introduced by our use of the questionnaire. Patients with sexual dysfunction may have been more inclined to complete the questionnaire than those with normal sexual function. This would raise the apparent prevalence of sexual dysfunction in our study group. Third, our sample size is small. Inclusion of more patients may alter our findings, especially in instances where an observed significance of $P>.05$ was found. However, since completion of this study, conversations with other male pelvic fracture patients have led us to believe that the findings in this study are typical. Our experience is that many men express dissatisfaction with their sex life after pelvic fracture, if their doctor will only broach the subject. Male sexual dysfunction after pelvic fracture is probably under-reported rather than over-reported.

Patients who responded were older than non-responders. As increased age was linked to poorer sexual function scores, our sample may be skewed to include more patients with poor results. A group of pelvic fracture patients with a lower mean age may have had better scores.

The cause of erectile dysfunction after pelvic fracture is controversial. Nerve damage has been implicated by Machtens et al\(^3\) and Mark et al.\(^18\) King\(^4\) noted that damage to the penile blood supply is at fault. Many of our patients noted a decreased sex drive, raising the possibility that a psychological component to this problem may exist. However, our data provides no answers regarding the ultimate cause of poor sexual function after pelvic trauma. Multiple factors may contribute to sexual difficulty after pelvic fracture.

### What is already known on this topic

- Prior studies have found a higher risk of sexual dysfunction with higher energy pelvic fractures. Greater displacement leads to greater risk of sexual problems.
- Sexual dysfunction has a profound negative effect on outcome.

### What this article adds

- Prediction of sexual dysfunction is difficult. No link was found between fracture pattern and sexual dysfunction—even low energy fractures can lead to sexual problems. In addition, no link was found between sexual dysfunction and genitourinary injury, nerve injury, or Glasgow Coma Score.
- Many facets of sex life are affected. Patients reported decreased sex drive, problems with erectile function and ejaculation, and decreased satisfaction with their sex life.
- The questionnaire—Brief Sexual Function Inventory—was well accepted and may prove useful as a way to broach this subject in clinical practice.
The usefulness of the BSFI may lie in its application as a screening tool. It takes little time to complete and may spur communication between patients and their surgeons. Many sexual problems can be improved with urological treatments, either surgical or pharmacological. Open discussion, such as that encouraged by the BSFI, may help identify patients who would benefit from such treatments.

REFERENCES