Association of JJ stent insertion and sexual function: A cohort study [version 1; peer review: 1 approved with reservations]

Rizky Fawzi, Zulfikar Ali

1Department of Urology, Faculty of Medicine Universitas Indonesia/Cipto Mangunkusumo National Hospital, Central Jakarta, DKI Jakarta, 10430, Indonesia
2Division of Urology, Department of Surgery, Kardinah Regional Hospital, Tegal, Central Java, 52124, Indonesia

Abstract

Background: Indonesia is known as one of the world’s stone belt areas in Asia. Management of urolithiasis cannot be separated with the role of JJ stent insertion. However, a limited number of prior studies show that a patient with JJ stent is at risk for sexual function disorder. This study aims to evaluate the association of JJ stent insertion with sexual function, both in men and women.

Methods: This is a cohort study and the subjects were patients who had undergone JJ stent insertion in July - November 2017 at Kardinah Regional Hospital, Tegal, Central Java. This study was approved by the Research Ethic Committee of Kardinah Hospital (#445/3840/2017). Data were taken using standardized self-administered questionnaires before and after insertion of the JJ stent. Male sexual function was assessed using the International Index of Erectile Function (IIEF) score, while female sexual function was assessed using Female Sexual Function Index (FSFI).

Result: 60 male patients, with a mean of age 51.1 ± 10.6 years, and 33 female patients, with mean of age 49.6 ± 10.6 years old, underwent JJ stent insertion. A significant association was found in women before and after JJ stent insertion (p<0.05), with FSFI score 23.62 ± 0.64 before insertion and 16.7 ± 0.52 after insertion. A similar result was also found in men with total IIEF score 49.55 ± 2.3 before JJ stent insertion and 38.4 ± 1.7 after insertion.

Conclusion: This study confirms that JJ stent insertion may cause a disturbance of sexual function. However, the mechanism is not clear yet.

Keywords

sexual function, FSFI, IIEF, JJ stent, Tegal
Corresponding author: Rizky Fawzi (rizkyfawzi.urologi@gmail.com)

Author roles: Fawzi R: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Validation, Writing – Original Draft Preparation; Ali Z: Conceptualization, Methodology, Resources, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

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Introduction
Sexual function plays an important role in the quality of life both in men and women. Sexual function is influenced by the complex interactions between the nervous, vascular, endocrine, and psychological systems. Sexual function in men is closely related to erectile dysfunction. Erectile dysfunction is defined as the inability to achieve and maintain an erection in order to achieve sexual satisfaction. The prevalence of erectile dysfunction varies between 4.5 and 53.5% depending on various studies according to clinical, methodological, demographic and aetiological factors. In women the assessment of sexual disorders itself is quite difficult, unlike in men.

Risk factors for erectile dysfunction include drugs, diabetes, atherosclerosis, depression, anxiety disorders, hormones, radiotherapy, nervous system disorders, chronic renal failure, smoking, and surgical intervention. Major pelvic surgical procedures such as radical prostatectomy, trans-urethral resection of prostate, as well as other rectum or urethral surgery may cause sexual function impairment. In recent years, there have been reports of sexual dysfunction in other endo-urological procedures.

Urinary tract stones are the most common urological case in Indonesia. In the general population, the risk of formation of stones in a lifetime is about 10.2% with peak incidence occurring at the age of 20–40 years. The management of urinary stones varies depending on the position, size and number of stones, the patient’s anatomical condition, and the surgeon’s own experience. Percutaneous nephrolithotomy (PCNL), ureteroscopy (URS), laparoscopy or open ureter are the main procedures of the kidney and ureter for the removal of stones.

Procedures to remove urinary stones must be accompanied by JJ stent insertion. Insertion of a JJ stent is a routine procedure to ensure that the flow of urine from the kidneys can get to the bladder, preventing extravasation in the area of operation during urinary stone removal procedures. Although the usage is safe, JJ stents can cause quality of life disorders by causing pain, discomfort, urinary tract infection, haematuria, irritation, and reduction in sexual function, which in the long term can cause psychological disorders such as insomnia, depression, and anxiety. In a study conducted by Giannarini et al. there was a strong association between the location of stent distal loop with respect to midline to disturbance of sexual function after stent placement.

Symptoms caused by the insertion of JJ stents may be managed with administration of alpha blockers, anticholinergics, or a combination of both. In a previous study, the drug tadalafil is said to be better for treatment than tamsulosin, as it has an advantage in managing sexual complaints. The use of pregabalin has also been studied to manage post-stent insertion complaints, but it does not provide an improvement to the sexual disorders that occur.

There have been many studies that examine JJ stent insertion association with irritating and painful complaints, but studies that evaluate the correlation with sexual disorders are remain few. Therefore, the present study sought to investigate the association of JJ stent insertion with sexual function in men and women.

Methods
Study design
This was a cohort study in which the subjects were all patients who received JJ stent installation at Kardinah General Hospital, Jakarta between July and November 2017.

This study was approved by the Research Ethic Committee of Kardinah Hospital (#445/3840/2017). The study was conducted in accordance with the principles of the Declaration of Helsinki, and all patients provided written informed consent to participate.

Participants
Participants were recruited during consultation about insertion of JJ stent.

The inclusion criteria in the study were men and women >18 years old, who were candidates for JJ stent insertion procedure and had regular intercourse over the last 4 weeks before interviews. Exclusion criteria in this study were patients with prior history of sexual disorders, pelvic surgery, pelvic radiotherapy, renal failure, and neurogenic bladder.

Data collection
Data were taken one day before JJ stent insertion procedure using standardized self-administered questionnaire and the questionnaire was repeated perioperatively before JJ stent removal procedure. Sexual function was assessed using the International Index of Erectile Function (IIEF) questionnaire for men and the Female Sexual Function Index (FSFI) for women. Higher questionnaire scores indicate better sexual function. Each question describes a specific domain and each domain has a “factor” for counting the number of scores. In IIEF, the score may vary from 5–75. Erectile function domain score interpretation are distinguished into 5 categories: severe erectile dysfunction (1–10); moderate erectile dysfunction (11–16); mild-to-moderate dysfunction (17–21); mild dysfunction (22–25); and no dysfunction (26–30). While, for the other 4 domains, a higher score indicates less dysfunction. Meanwhile in FSFI, the score may vary from 2–36, with a normal score ≥ 26. FSFI scores < 26 are assumed to indicate sexual dysfunction.

Data analysis
Statistical analysis was performed using SPSS 22. Data analysis was done descriptively and quantitatively. Descriptive data: age, operating procedure, and duration of JJ stent. Quantitative data: IIEF and FSFI scores at the time before installation and after insertion. Statistical analysis was performed using a paired T test and Wilcoxon signed-rank test.

Results
A total of 93 subjects from July to November 2017 were included in this study; 60 men and 33 women. The average age of men...
was 51.1 ± 10.6 years and women 49.6 ± 10.6 years. In both men and women the most frequent stone location was a proximal ureteral stone, with a higher stone burden seen in women. A total of 6.7% of the men underwent bilateral JJ stent insertion, while no women underwent this procedure. The length of stenting between groups of men and women was not different. Demographic data of participants can be seen in Table 1.

Table 2 shows the comparison of IIEF scores in the male group. There was a significant difference (p <0.05) in the IIEF total score results before (49.55 ± 2.3) and after (38.4 ± 1.7) JJ stent insertion. This is also seen in the scores of each subdomain of the IIEF questionnaire, where in the five subdomains showed a significant difference before and after stent placement.

Table 3 shows the comparison of FSFI score in women. There was a significant difference (p <0.05) in the total FSFI score before (23.62 ± 0.64) and after (16.7 ± 0.52) the insertion of the JJ stent. This is also seen in the scores of each subdomain, where each of the six subdomains showed a significant difference.

### Table 1. Demographic characteristics of participants.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>51.1 ± 10.6</td>
<td>49.6 ± 10.6</td>
</tr>
<tr>
<td>Location, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyelum</td>
<td>8.3</td>
<td>27.3</td>
</tr>
<tr>
<td>Proximal ureter</td>
<td>50.0</td>
<td>42.4</td>
</tr>
<tr>
<td>Distal ureter</td>
<td>41.7</td>
<td>30.3</td>
</tr>
<tr>
<td>Stone burden, mm²</td>
<td>1.48 ± 1.58</td>
<td>3.7 ± 5.7</td>
</tr>
<tr>
<td>Stent insertion side, %</td>
<td>46.7</td>
<td>66.7</td>
</tr>
<tr>
<td>Right</td>
<td>46.7</td>
<td>66.7</td>
</tr>
<tr>
<td>Left</td>
<td>46.7</td>
<td>33.3</td>
</tr>
<tr>
<td>Bilateral</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>Duration of stenting, days</td>
<td>38.3 ± 17.4</td>
<td>34.7 ± 12.2</td>
</tr>
<tr>
<td>Procedure, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCNL</td>
<td>3.3</td>
<td>6.1</td>
</tr>
<tr>
<td>URS</td>
<td>65.0</td>
<td>36.4</td>
</tr>
<tr>
<td>Pyeloilithotomy</td>
<td>5.0</td>
<td>21.2</td>
</tr>
<tr>
<td>Ureterolithotomy</td>
<td>26.7</td>
<td>36.4</td>
</tr>
</tbody>
</table>

### Table 2. Comparison result for men using the International Index of Erectile Function score before and after JJ stent placement.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Pre-stenting</th>
<th>Post-stenting</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erectile function</td>
<td>21.78 ± 1.49</td>
<td>16.98 ± 0.89</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Orgasmic function</td>
<td>6.75 ± 0.65</td>
<td>5.00 ± 0.63</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Sexual dysfunction</td>
<td>6.92 ± 0.69</td>
<td>5.35 ± 0.60</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Intercourse satisfaction</td>
<td>7.25 ± 0.85</td>
<td>6.00 ± 0.72</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Overall satisfaction</td>
<td>6.85 ± 0.68</td>
<td>5.33 ± 0.62</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Overall</td>
<td>49.55 ± 2.30</td>
<td>38.40 ± 1.70</td>
<td>&lt;0.05**</td>
</tr>
</tbody>
</table>

*Wilcoxon signed-rank test; *T paired test

### Table 3. Comparison result of FSFI before and after JJ stent placement.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Pre-stenting</th>
<th>Post-stenting</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desire</td>
<td>3.67 ± 0.35</td>
<td>2.55 ± 0.34</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Arousal</td>
<td>3.77 ± 0.18</td>
<td>2.70 ± 0.19</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Lubrication</td>
<td>4.19 ± 0.19</td>
<td>3.06 ± 0.18</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Orgasm</td>
<td>3.60 ± 0.26</td>
<td>2.23 ± 0.24</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>4.18 ± 0.22</td>
<td>3.45 ± 0.24</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Pain</td>
<td>4.20 ± 0.20</td>
<td>2.70 ± 0.28</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Overall</td>
<td>23.62 ± 0.64</td>
<td>16.70 ± 0.52</td>
<td>&lt;0.05**</td>
</tr>
</tbody>
</table>

*Wilcoxon signed-rank test; *T paired test

### Discussion

Urinary tract stones are rare in urology. The prevalence of urinary tract stones in general is 5–12% in men and 4–7% in women worldwide\(^1\). The upper urinary tract procedure is inseparable from the use of JJ stents. URS, PCNL, laparoscopy or open ureterolithotomy surgery are all procedures that often use the JJ stent. Different complications can occur with the use of JJ stents, such as haematuria, dysuria, frequency, flank and suprapubic pain, to major complications, such as vesico-ureteric reflux, migration, malposition, encrustation, stent fracture, UTI, pyuria, incontinence, inadequate relief of obstruction, ureteric erosion or fistulation, a ‘forgotten stent’, necrosis and uretero-arterial fistula\(^2\). In addition, it should also be considered as having a possible effect on sexual function. Sexual dysfunction can cause physical and psychological health disorders that will interfere with quality of life.

The aim of this study was to assess the effect of stent insertion on sexual function. The study used the IIEF and FSFI questionnaires to be able to assess more specifically disturbed sexual function. The IIEF score in men and FSFI score in women decreased significantly in post-JJ stent insertion. This shows that sexual function has interference after the installation of the JJ stent in both men and women. However, a clear mechanism for how JJ stent may interfere with sexual function remains unclear.

The results in this study were not much different when compared with other studies. Bolat \textit{et al} made a study comparing sexual function using IIEF in patients undergoing URS procedures\(^3\). Follow-ups were made at one month and three months’ post-procedure. The study found no correlation between URS and sexual function disorder. Therefore, the sexual function disorder...
that occurred may be caused by the use of the JJ stent. In the study of Bolat et al., sexual dysfunction began in the first month of post-installation and improved 3 months post-op.

Akdeniz and Bolat performed a study comparing the FSFI score in patients undergoing URS procedures with JJ stent. Follow-up was done at one month and three months post-procedure with the average of long time of installation of JJ stent 15.7 ± 2.4 days. The mean FSFI score in the that study was perioperative 14.5 ± 9.6, one-month post-op 12.8 ± 6.8, and post-operative 17.7 ± 5.4. FSFI score worsened in the first month and improved after the third month.

Eryildirim et al. did a study comparing the IIEF score in men and FSFI in women undergoing URS procedures with a JJ stent. In the study, the assessment was done before and one-month post-JJ stent installation. There was a significant decrease in both IIEF and FSFI scores before and after the installation of JJ stents. Similar results were also obtained by Sighinolfi et al. but with different assessment times, i.e. before and 45–60 days’ post-installation.

Conclusion
The installation of the JJ stent is a common practice in urological procedures. However, the installation of the JJ stent may cause sexual function impairment. Patients undergoing JJ stent installation procedures should be advised of this as it may impair their quality of life. The use of JJ stents needs to be reviewed, and if it is necessary to use the JJ stent, the length of installation should be as short as possible.

Data availability
F1000Research: Dataset 1. Answers pre and perioperatively to the International Index of Erectile Function (IIEF) and Female Sexual Function Index (FSFI) questionnaires for men and women, respectively, who underwent JJ stent insertion., https://doi.org/10.5256/f1000research.16608.d227254.

Grant information
The author(s) declare that no grants were involved in supporting this work.

References
Ekrem Akdeniz
Urology Department, Samsun Training and Research Hospital, Health Sciences University, Samsun, Turkey

The authors present a prospective study about effect on sexual functions of JJ stent. The manuscript presents basic results. This was a useful and interesting article. Your manuscript is clear and understandable without discussion section. A few issues, however, need to be addressed:

Abstract
1. Background section: Please erase this sentence:
   "Indonesia is known as one of the world’s stone belt areas in Asia."
2. Method section: Please erase this sentence:
   "This study was approved by the Research Ethic Committee of Kardinal Hospital (#445/3840/2017)"
3. Result section: Please, define it. Are there any differences of sexual functions male patients before and after procedure?
4. Keywords: Complete change without sexual function.

Introduction
Generally well written.

First and second paragraph: First reference, Bolat et al. made a study comparing sexual function about URS procedures in males\textsuperscript{1}. But you refer to this article about the prevalence of erectile dysfunction (ED) and cause of ED. Bolat et al. did not study prevalence of ED. So you have to change this reference.

Third paragraph: Second reference, Akdeniz and Bolat worked on female sexual functions in their article\textsuperscript{2}. But you refer to this article about the prevalence of urolithiasis. Akdeniz did not study prevalence of urolithiasis. You cannot use these articles about prevalence of urolithiasis and ED. So you have to change this reference too.

Third paragraph: Please add shock wave lithotripsy, and reference this sentence:
"Percutaneous nephrolithotomy (PCNL), ureteroscopy (URS), laparoscopy or open ureter are the main procedures of the kidney and ureter for the removal of stones."
Fourth paragraph: You wrote: "Procedures to remove urinary stones must be accompanied by JJ stent insertion." Why? Routine stenting after uncomplicated URS is not necessary (EAU guideline 2018). How did you come to this opinion? What is your reference for this claim?

An introduction section should include precise, accurate and clear information. Please change the first and second references. You should choose suitable new references about prevalence of urolithiasis and ED.

Methods
Generally well written.
1. What was the JJ stent insertion reason? Only urolithiasis? Please define it.
2. When was the JJ stent removed for each operations?
3. The authors did not mention about surgical procedure especially URS.

Results
Generally well written.
1. What was the educational status of the patients? Were patients predominantly urban based or rural based?
2. What was the body mass index of the patients?
3. Were patients evaluated for depression? (For example, Beck depression scale).
4. Did the patients get medication for stent complications (urgency, dysuria, etc)? (Alpha blockers, anticholinergics, combined, etc.).
5. Have patients developed any complications?
6. When was the JJ stent withdrawn for each procedure? Was the same JJ stent used in the patients?
7. URS is more painless and more effortless procedure than PCNL, pyeloilithotomy and ureterolithotomy. Pain is the cause of sexual dysfunction. So these operations cannot be evaluated at the same level. In my opinion, the authors should evaluate only same operations not all the stone surgery (only URS or only PCNL or only open surgery patients).

Discussion
Generally well written.
1. More details about similar studies should be provided.
2. Please clearly explain, what is the difference between this study and others?

Conclusion
Please clearly explain what are the strengths and weaknesses of your manuscript?

Tables
Generally well written.

Table 1. Written PCNL and URS. It is necessary to write the abbreviation explicitly under the table.
Table 1. Authors wrote stone burden were 1.48 ± 1.58 mm² (men) and 3.7 ± 5.7 mm² (women). Is there a mistake here? I think, operation of such small stones is unnecessary.
Table 3. Written FSFI. It is necessary to write the abbreviation explicitly under the table.

Strengths of the manuscript:
1. Article is appropriately organized and the headings are indicative of content.
2. Article clearly written. Simple, plain and legible.
3. References are satisfactory.
Weaknesses of the manuscript:

1. This article not contain new ideas or useful synthesis of existing material.
2. The subject matter is suitable for the intended audience but the results need to be developed.
3. The article does not include a single operation.

I regret to say that the article needs to be improved. The amount of patients data is very small, and not satisfactory. The data (especially demographic and patients) should be developed (addition new data), give more details about surgical procedure, results need to be improved, and discussion should give more details about similar studies. Briefly, the manuscript should be re-written. The manuscript should be revised by authors and reconsidered for possible indexing.

References

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Urologist

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.
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