Comparison of semen quality obtained by electroejaculation and spontaneous ejaculation in men suffering from ejaculation disorder

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BACKGROUND: Electroejaculation has become an accepted form of semen procurement in men suffering from anejaculation. However, sperm in these ejaculates often exhibit low motility. The aetiology of asthenozoospermia remains uncertain. It may be related to primary low-grade motility of sperm from anejaculatory men or to detrimental effects of the electroejaculation process itself. The aim of this study was to determine whether the procedure of electroejaculation alters the quality of the semen by comparing the characteristics of the electroejaculates with those of the normal ejaculates of the same patients.

METHODS: Nine men suffering from ejaculation disorders underwent 14 procedures of electroejaculation. The sperm concentration and motility of the 14 samples from electroejaculation were compared with 20 collected at a later date after successful ejaculation by the same patients.

RESULTS: The mean ± SD concentration of the electroejaculates was (52.3 ± 42.1)×10⁶/ml and of the natural samples (67.4 ± 38.1)×10⁶/ml. No statistical difference was found between the two groups. The mean percentage of sperm showing progressive motility following electroejaculation was 23.1 ± 18.8% and 36.3 ± 16.7% after spontaneous ejaculation. No statistical difference was found between the groups (P = 0.082). Likewise, the quality of sperm motility was similar after both methods of procurement.

CONCLUSIONS: In our small-sized study group (nine men with ejaculation disorders), the concentration and the motility of sperm obtained by electroejaculation were not significantly different from sperm obtained naturally.

Key words: anejaculation/electroejaculation/sperm quality

Introduction

Anejaculation is caused mainly by spinal cord injury. Other relatively uncommon causes include retroperitoneal lymph node dissection, diabetes mellitus, transverse myelitis and multiple sclerosis. Psychogenic anejaculation is a unique problem. Men who suffer from it are otherwise healthy individuals who cannot consciously ejaculate even by masturbation, although they may have erections and nocturnal emissions. Electroejaculation has been successfully used for sperm procurement in anejaculatory men desiring fertility.

Previous studies demonstrated that electroejaculated sperm exhibited severe asthenozoospermia. This was the case in patients with spinal cord injuries (Chung et al., 1995) as well as those who suffered from psychogenic anejaculation (Hovav et al., 1996).

The asthenozoospermia in spinal cord-injured patients may be related to increased scrotal temperature, urinary infection, stasis of seminal fluid, neural effects on physiology of the testis and epididymis, sperm autoimmunity and external testicular pressure effects of the ‘closed-leg’ position (Chung et al., 1995). It has recently been suggested that abnormal seminal plasma contributes to asthenozoospermia in men with spinal cord injuries (Brackett et al., 2000). The sperm quality of patients with psychogenic anejaculation is similar to that of patients with spinal cord injuries, despite the fact that the former patients do not have a neurological disorder and its complications. Therefore, electroejaculation may be associated with significant effects detrimental to sperm motility (Hovav et al., 1996).

In psychogenic anejaculatory men, the aetiology of the asthenozoospermia remains uncertain. It may be related to primary low-grade motility of sperm or to detrimental effects of the actual procedure of electroejaculation.

During the last 5 years, we performed electroejaculation on nine men who later succeeded in ejaculating spontaneously. In the present study, we compared the characteristics of the electroejaculates with those of the spontaneous ejaculates in these patients.

Materials and methods

Patients

During the last 5 years, nine men suffering from ejaculation disorders and treated by electroejaculation succeeded in ejaculating spontan-
The mean age of the men was 30.4 years (range 22–42). Patients 1–8 suffered from psychogenic anejaculation. Psychogenic anejaculation was diagnosed on the basis of lack of physical causes for the problem, presence of occasional nocturnal emissions and sexual relations without conscious ejaculations. Retrograde ejaculation was ruled out after urine examination. The levels of thyroid-stimulating hormone, FSH, LH and prolactin were within the normal range.

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Patient 9 was a single, 22 year old man with non-Hodgkin’s lymphoma. Before chemotherapy was initiated, he managed once to produce sperm for cryopreservation by masturbation. Since his additional attempts during the following 7 days had failed even with penile vibratory stimulation, he agreed to undergo treatment by electroejaculation.

Electroejaculation and semen analysis

In all, 14 procedures of electroejaculation, approved by the Institutional Review Board, were performed under general anaesthesia while the patients were placed in lateral decubitus as previously described (Hovav et al., 1996), with the use of the Seager Model 14 Electroejaculator (Dalzell Medical System, The Plains, VA, USA). Sperm procurement was successful in all patients without any complications.

The spontaneous ejaculates were produced during coitus using a condom without spermicide and were assessed within 40 min. Patient 9 provided semen by masturbation into a sterile cup.

The concentration and motility of the antegrade portions of the electroejaculates and of the natural ejaculates were assessed using a Makler counting chamber according to published guidelines (World Health Organization, 1993).

Sperm motility was assessed as the percentage of sperm showing progressive motility, while the quality of motility was assessed as being good if forward movement with progression was observed, moderate if definite forward progression was seen and poor if only weak or sluggish progression was present.

### Statistical analysis

Statistical analysis was performed using the Wilcoxon rank test, appropriate for pair-matched observations. The statistical significances reported are exact and not asymptotic. \( P < 0.05 \) was considered significant. The analysis was performed using Stat Xact 4.0 (Cytel Software Corporation, Cambridge, MA, USA). When more than one semen sample (either spontaneous or by electrostimulation) was provided, the ejaculates obtained in the shortest time interval were compared.

### Results

A total of 14 samples of semen from electroejaculation and 20 samples from natural emission were obtained. For statistical analysis, only a single electroejaculate sample and a single spontaneous sample provided within the shortest time interval were evaluated (Table I). The mean ± SD concentration of these electroejaculates was \( (52.3 ± 42.1) \times 10^6/ml \) and of the natural samples \( (67.4 ± 38.1) \times 10^6/ml \) (\( P \) = not significant). The mean ± SD motility was 23.1 ± 18.8 and 36.3 ± 16.7% respectively (\( P = 0.082 \), not significant).

### Discussion:

The main methods to obtain sperm are natural intercourse, masturbation, penile vibratory stimulation (PVS) and electroejaculation. Comparison of semen quality among the different methods may contribute to our knowledge of the physiology of ejaculation, because the information in the literature is limited. The concentration of sperm has been found to be less after masturbation than after intercourse (Sofikitis and Miyagawa, 1993). There were no significant differences in quantity and quality of the ejaculates produced by PVS and masturbation in six normal males (Toussaint et al., 1993).

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**Table I. Sperm characteristics of samples used for statistical analysis: electroejaculates versus natural ejaculates**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Interval (months)</th>
<th>Electroejaculates</th>
<th>Natural ejaculates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sperm concentration ( (\times 10^6)/ml )</td>
<td>Sperm motility (%)</td>
<td>Sperm concentration ( (\times 10^6)/ml )</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>120</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>0.2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>85</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>65</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>36</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>9</td>
<td>0.25</td>
<td>35</td>
<td>18</td>
</tr>
</tbody>
</table>

\*aShortest interval between the samples that were compared.

\( bP = 0.133 \).

\( cP = 0.082 \).
There is conflicting evidence about damaging effects of electroejaculation on sperm motility with some studies showing an effect (Linsenmeyer et al., 1989; Rajasekaran et al., 1994; Sikka et al., 1994) while others showing none (Ohl et al., 1994). Brackett et al. found that in 10 men with spinal cord injury sperm motility was significantly higher when sperm were obtained by PVS as compared with electroejaculation (Brackett et al., 1997). Sperm concentration however, was similar in the two methods.

Ohl et al. showed no difference in the concentration of sperm obtained with PVS versus electroejaculation in 11 men suffering from spinal cord injury. However, the motility was lower in the electroejaculates (10.7 versus 26%) (Ohl et al., 1997).

The favourable results with PVS may be attributed to the fact that ejaculation by PVS is considered more physiological than electroejaculation. Thus, spontaneous ejaculation should be better than electroejaculation. Indeed, it has been demonstrated that in men suffering from spinal cord injury the quality of semen obtained using masturbation and PVS was better than that collected using electroejaculation (Brackett and Lynne, 2000).

To the best of our knowledge, our study is the first to compare the characteristics of the electroejaculates and spontaneous ejaculates in neurologically intact men. A better study would be to perform electroejaculation on a larger group of normal men and to compare the electroejaculate with the spontaneous ejaculates obtained during the same period. However, for obvious reasons such a study cannot be conducted. Despite these limitations our study showed no statistical difference between the two methods.

In a previous study, we found low sperm motility in electroejaculates obtained from men suffering from psychogenic anejaculation (Hovav et al., 1996). It was not known if the patients actually suffered from asthenozoospermia or if the electroejaculation procedure lowered otherwise normal sperm motility of these patients. The present study indicates the first option. If so, the cause for the low sperm motility produced by these patients needs to be explained.

It seems reasonable to assume that, in these patients due to their rare ejaculation by nocturnal emission, the prolonged storage of sperm results in a gradual loss of their motility. Indeed, in a previous study we found that sperm with very low motility can be obtained by prostatic massage in men with psychogenic anejaculation (Hovav et al., 2000).

Because abnormal seminal plasma may influence sperm motility in men with spinal cord injuries (Brackett et al., 2000), it would be of interest to compare the compositions of seminal plasma obtained by electroejaculation or spontaneous ejaculation in men suffering from psychogenic anejaculation.

In summary we have shown that in nine men suffering from psychogenic anejaculation, the concentration and the motility of sperm obtained by electroejaculation were not significantly different from sperm obtained naturally.

References

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