Short Communication: Comparison between the first and the second electroejaculate qualities obtained from neurologically intact men suffering from anejaculation

Yedidya Hovav1, Ohn Sibirsky, Rafael N.Pollack, Irit Kafka, Galit Elgavish and Haim Yaffe
 Male Fertility Unit, Department of Obstetrics & Gynecology, Bikur Cholim Hospital, Strauss 5, Jerusalem 91004, Israel
1To whom correspondence should be addressed. E-mail: spl113@netvision.net.il

BACKGROUND: Electroejaculation is an artificial method used to procure semen from neurologically intact men suffering from anejaculation that have failed other treatments. In order to establish the consistency of semen parameters in repeated electroejaculations, we compared retrospectively the quality of the first and the second electroejaculates of anejaculatory men who were not suffering from any known neurological problems.

METHODS: Between 1995 and 2004, 59 neurologically intact men suffering from anejaculation underwent multiple electroejaculations. Sperm quality of the first and the second ejaculates was compared.

RESULTS: A significant difference of 0.33 ± 0.16 ml in the volume of the antegrade portion was found (P = 0.023). The results showed no significant difference in the concentration, motility, count and total motile count of the antegrade ejaculates. In retrograde ejaculates there were no significant differences in the count, motility and total motile count. Neither was there any difference in the total count and the total motile count of both fractions. CONCLUSIONS: Electroejaculation is a reliable method for semen procurement in men suffering from anejaculation. Since semen parameters are consistent, repeated procedures are not justified for improving the sperm quality in anejaculatory, neurologically intact men.

Key words: anejaculation/electroejaculation/sperm quality

Introduction
Electroejaculation has become an accepted form of semen procurement in men suffering from anejaculation. Anejaculation is caused mainly by spinal cord injury (SCI). 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.

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). 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 (Hovav et al., 1996).

In a previous study, we showed extreme variability in sperm parameters among different patients suffering from psychogenic anejaculation (Hovav et al., 1996). The aim of our present study was to establish the consistency of semen parameters in repeated electroejaculates from the same neurologically intact patient.

During the last 10 years, we performed multiple electroejaculations on 59 men who were neurologically intact. In the present study we compared the characteristics of the first and the second electroejaculates of these men.

Materials and methods
Patients
During the last 10 years, 59 neurologically intact men suffering from anejaculation were treated by electroejaculation more than once. The mean age was 30.7 ± 6.7 years (range 22–48). Fifty-two patients suffered from psychogenic anejaculation. The diagnosis of psychogenic anejaculation was done 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 by post-coital urine analysis. The levels of thyroid-stimulating hormone, FSH, LH and prolactin were within the normal range. All the men were ultra-orthodox Jews and suf-
ferred from primary infertility of a duration ranging between 2.5 and 8 years. Psychotherapy and vibrator stimulation were suggested to all patients. Some were refractory to the treatment and others refused it. Seven other patients were single young males (average age 18 ± 5 years) with neoplastic disease. All these patients attempted, but failed, to produce semen by masturbation or by penile vibratory stimulation for cryopreservation before initiation of chemotherapy.

The mean time interval between the first and the second ejaculations was 134.6 ± 159 days (range 1–654, median 89).

**Electroejaculation procedure**

In all, 108 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). Prior to electrostimulation, the bladder was flushed with Ham’s F-10 medium (Sigma Chemical Co., St Louis, MO, USA) (pH 7.4) and 20 ml of medium was instilled for collection of retrograde-emitted sperm. Multiple electrical stimulations ranging from 5 to 20 V and lasting for ~2 s were administered. The urethra was manually milked into a sterile container both during and upon completion of electrostimulation to obtain the maximum volume of antegrade semen. After electroejaculation, a bladder catheterization was routinely performed for collection of retrograde specimens.

**Sperm analysis and preparation**

The sperm obtained in the antegrade and retrograde ejaculates were processed by the discontinuous Percoll gradient as previously described (Van Der Zwalmen et al., 1991). The concentration and motility of the antegrade and retrograde portions of the electroejaculates were assessed using a Makler counting chamber according to published guidelines (World Health Organization, 1993).

**Statistical analysis**

Statistical analysis was performed using the Wilcoxon rank test, appropriate for pair-matched observations. The probability values 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). The data presented as mean ± SEM.

**Results**

Sperm procurement was successful in all patients without any complications. The mean sperm characteristics of the antegrade and the retrograde portions of the first and second ejaculates are summarized in Table I. A significant difference of 0.33 ± 0.16 ml in the volume of the antegrade volume was found (P = 0.023). The results showed no significant difference in the concentration, motility, count and total motile count of the antegrade ejaculates. In retrograde ejaculates there were no significant differences in the count, motility and total motile count. Neither was there any difference in the total count and the total motile count of both fractions.

To rule out a possible influence of the time interval on the ejaculate quality, we divided the patients into two groups according to the length of time between the first and the second electroejaculation. In the first group the time interval was between 1 and 89 days (the median of the period). In this group there were 30 patients. The time interval of the second group (with 29 patients) was 90–654 days. Significant difference was found only in the volume of the antegrade portion between the first and the second ejaculate of the first group (0.57 ± 0.21 ml, P = 0.001). We divided the first group into two smaller groups: 1–35 days (n = 18), 36–89 days (n = 12). The only significant difference between the first and the second ejaculates was again only in the antegrade volume (0.44 ± 0.19 ml, P = 0.034 and 0.77 ± 0.45 ml, P = 0.039 respectively).

**Discussion**

The aim of the present study was to evaluate how consistent the semen parameters were in repeated electroejaculations of the same neurologically intact patients.

The sperm concentration and motility were unsatisfactory in both the antegrade and retrograde fractions in the first and in the second procedures. These findings are consistent with our previous study (Hovav et al., 1996).

The only significant difference shown between the first and the second testing was in the antegrade volume when the time interval was <3 months. Because spontaneous semen emission is very rare in these men there is a possibility of

| Table I. Sperm characteristics of the first and second electroejaculates |
|-----------------------------|-----------------------------|-----------------------------|
|                             | 1st ejaculate               | 2nd ejaculate               | P              |
| Antegrade                   |                             |                             |                |
| Volume (ml)                 | 1.46 ± 0.17                 | 1.13 ± 0.11                 | 0.023          |
| Concentration (×10^6/ml)    | 35.41 ± 5.78                | 42.11 ± 7.43                | 0.496          |
| Motility (%)                | 11.50 ± 1.93                | 12.72 ± 1.79                | 0.397          |
| Count (×10^3)               | 73.68 ± 17.04               | 50.78 ± 9.85                | 0.409          |
| Total motile count (×10^9)  | 1040.21 ± 263.92            | 826.56 ± 191.49             | 0.831          |
| Retrograde                  |                             |                             |                |
| Count (×10^6)               | 45.23 ± 9.00                | 45.04 ± 11.04               | 0.470          |
| Motility (%)                | 10.41 ± 2.48                | 14.45 ± 2.98                | 0.083          |
| Total motile count (×10^9)  | 418.05 ± 110.62             | 471.05 ± 130.99             | 0.691          |
| Antegrade + retrograde      |                             |                             |                |
| Count (×10^6)               | 120.43 ± 22.56              | 95.81 ± 17.80               | 0.190          |
| Total motile count (×10^9)  | 1484.24 ± 278.25            | 1297.61 ± 262.14            | 0.712          |

Values are mean ± SE.
stasis of the seminal fluid. Therefore, in the first electroejaculate the volume may be greater than in the subsequent short-interval ones.

During emission and ejaculation in normal men, the internal urinary sphincter closes under the influence of sympathetic innervation from the T10–L2 spinal cord segments, causing semen to be expelled from the penis. In men with spinal cord injury, whose innervation may be disrupted, the retrograde ejaculation after electroejaculation is related to their neuropathology. Retrograde ejaculation was ruled out in all our patients who were neurologically intact. However, most of them did have retrograde ejaculation with electroejaculation. These findings suggest that the appearance of a retrograde fraction with electroejaculation, in men with spinal cord injury, may be due to methodological issues rather than due to the neuropathology.

In the electroejaculate from men with spinal cord injury, sperm motility is higher in the antegrade versus the retrograde fraction. However, the concentration is usually higher in the retrograde specimen (Brackett and Lynne, 2000). In our study, the count and the total sperm motility were higher in the antegrade versus the retrograde fraction.

The quality of the electroejaculate obtained from men suffering from spinal cord injury is low. Some investigators have reported improvement in the semen parameters after repeated electroejaculations (Wang et al., 1992; Witt et al., 1992; Ohl, 1993; Mallidis et al., 2000), but others have not observed this association (Denil et al., 1992; Chung et al., 1997; Brackett et al., 1998; Heruti et al., 2001). Recently, a prospective, randomized, controlled study suggested that multiple electroejaculations have a positive effect on semen parameters in men with spinal cord injury. The author suggests that the repeated procedures diminish the negative effect related to sperm and sex organ fluid stasis (Giulini et al., 2004). In the current study we found no improvement in the sperm parameters in the second electroejaculation, even in the 30 patients in which the interval between the procedures was <3 months. This may be because these men have nocturnal emissions and therefore they do not suffer from seminal fluid stasis.

Our study helps to establish the consistency of semen parameters in the first versus second electroejaculates of neurologically intact men.

We conclude that repeated electroejaculations for the purpose of improving the sperm quality may not be justified in anejaculatory, neurologically intact men.

References

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