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CASE REPORT

Electroacupuncture for sperm improvement in varicocele: a case report

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Background: *Varicocele is a common cause of male infertility, often associated with impaired sperm quality, hormonal imbalance, and increased DNA fragmentation. Electroacupuncture (EA) has been proposed as an adjunct therapy to improve reproductive parameters, but clinical evidence remains limited.*

Case Description: *This case report describes a 38-year-old male with a varicocele treated at Dr. Moewardi General Hospital, Indonesia. The patient underwent 16 sessions of EA therapy. Sperm parameters and serum testosterone levels were measured before and after treatment. Following EA, sperm concentration improved from 5.2 to 6.7 × 10^6/mL, motility increased from 43% to 60%, and normal morphology rose from 1% to 3%. Testosterone levels increased from 329.6 to 596.2 ng/dL, while the DNA Fragmentation Index (DFI) decreased from 40% to 19.6%.*

Conclusions: *This case suggests that EA therapy may improve sperm quality, enhance testosterone levels, and reduce DFI in a patient with varicocele. However, further controlled studies are needed to confirm these findings due to the limitations of a single case report.*

Key Words: electroacupuncture, infertility, sperm motility, case report

Introduction

A varicocele is characterized by the abnormal swelling and enlargement of veins in the scrotal pampiniform plexus, which are responsible for draining blood from the testicles.[1] This condition is relatively common, affecting approximately 15% to 20% of males, with a significantly higher prevalence of around 40% among males experiencing infertility.[2] Varicocele can impair sperm quality, reduce testicular function, and cause hormonal imbalances, ultimately affecting a couple's ability to conceive.[3] Research findings from observational studies indicate that men with varicocele tend to exhibit a higher percentage of spermatozoa with fragmented DNA, diminished total sperm counts, reduced progressive sperm motility, decreased sperm vitality, and a greater number of abnormal forms in comparison to control groups.[4] Given the significance of varicocele as a contributor to male infertility, there is a growing interest in developing effective treatment options to improve sperm outcomes and increase the chances of successful conception.

Conventional treatments for varicocele-associated infertility include surgical repair and assisted reproductive technologies (ART), such as intrauterine insemination (IUI), *in vitro* fertilization (IVF), or intracytoplasmic sperm injection (ICSI).[5] However, the cost remains unaffordable for many, without certainty about the results.[6] Consequently, interest in alternative and complementary therapies, such as acupuncture and electroacupuncture (EA), has surged as a means of improving sperm outcomes in men with varicocele.

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Acupuncture, known for its safety and minimal side effects, is often used to treat varicocele.[7] Acupuncture has a much lower rate of adverse reactions than drugs or conventional medical procedures. This is one of the main advantages of this treatment method.[7] Several studies have demonstrated that acupuncture can improve sperm quality, hormonal balance, and blood flow to the reproductive organs in infertile men.[8,9] Electroacupuncture (EA), a modern adaptation of acupuncture involving the application of a small electric current through acupuncture needles, has also shown promise in enhancing sperm parameters.[10] A previous case study showed that acupuncture is effective in reducing pain associated with varicoceles and can also slow or even reverse the progression of subclinical varicoceles.[11] Therefore, acupuncture can be an effective alternative therapy for treating subclinical varicoceles.[11] Despite these findings, further research is needed to establish the optimal protocols for EA therapy, such as selecting specific acupuncture points, treatment frequency, and duration. EA therapy efforts in male infertility with varicocele are expected to increase the success of IUI pregnancies through decreased DNA fragmentation index (DFI), normal sperm concentration, sperm morphology, sperm motility, and blood testosterone levels.

This article reports a case of EA therapy applied in the management of male infertility associated with varicocele.

This study was approved by the ethics committee of Dr. Moewardi General Hospital, with the reference number: 704/V/HREC/2023. The handwritten informed consent was obtained from the patient. Besides, this study was prepared according to the CARE case report guideline, and a CARE checklist was provided.[12]

Case Report

A 38-year-old man, who had been married for six years without children, presented to Dr. Moewardi General Hospital with a diagnosis of infertility due to a varicocele. He had normal-sized testicles and no detectable abnormalities in the epididymis. The patient has no significant past medical history, including chronic illnesses or prior surgeries. There is no known family history of infertility, genetic disorders, or chronic diseases such as diabetes or cancer. He had never received any prior medical or surgical interventions for infertility. Initial hormone tests revealed oligoteratozoospermia with a testosterone level of 329.6 ng/dL, and a sperm DNA fragmentation index (DFI) analysis indicated that 40% of his sperm were below the 30% DFI threshold.

Ultrasonography showed that his right testicle measured 1.9 cm × 2.46 cm × 2.99 cm with a volume of 7.30 cc, and the left testicle measured 1.69 cm × 2.2 cm × 2.64 cm with a volume of 5.13 cc (Figure 1).

The right epididymis measured 0.79 cm × 0.43 cm × 1.27 cm with a volume of 0.23 cc, and the left epididymis measured 0.71 cm × 0.47 cm × 0.94 cm with a volume of 0.16 cc (Figure 2).

The right pampiniform plexus showed dilation of 0.26 cm at the upper pole and 0.28 cm at the lower pole, while the left pampiniform plexus showed dilation of 0.19 cm at the lower pole (Figure 3). Bilateral peri-epididymal and peri-testicular fluid collections

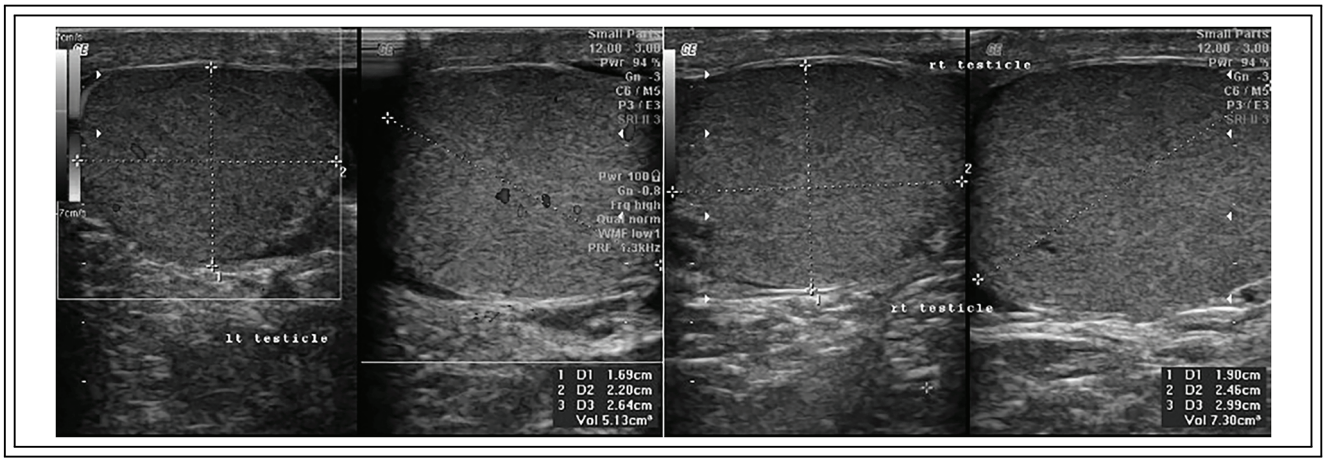

FIGURE 1. Doppler ultrasonography of the left and right testicles

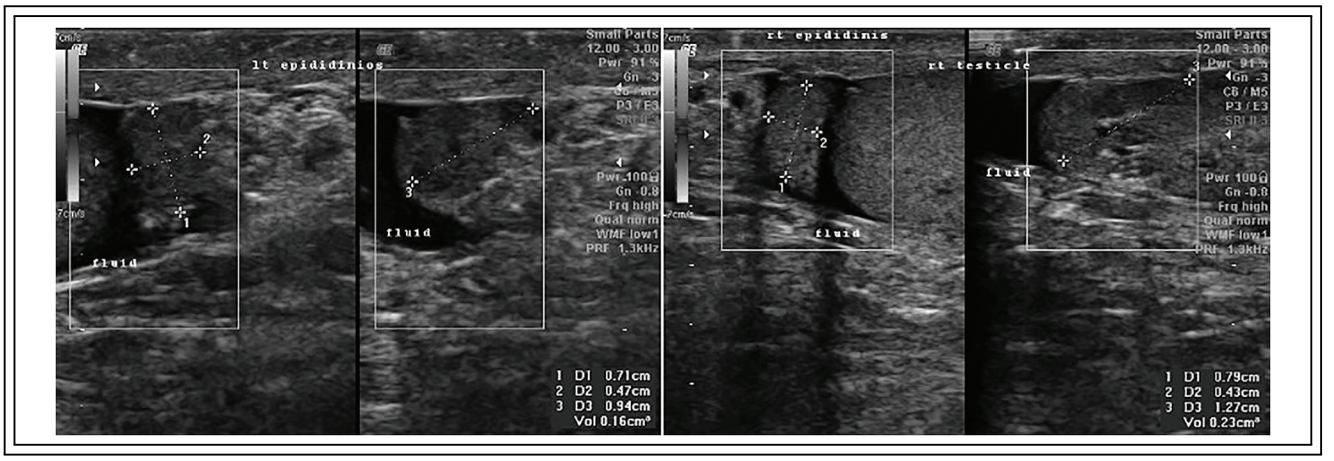

FIGURE 2. Doppler ultrasonography of the left and right epididymis

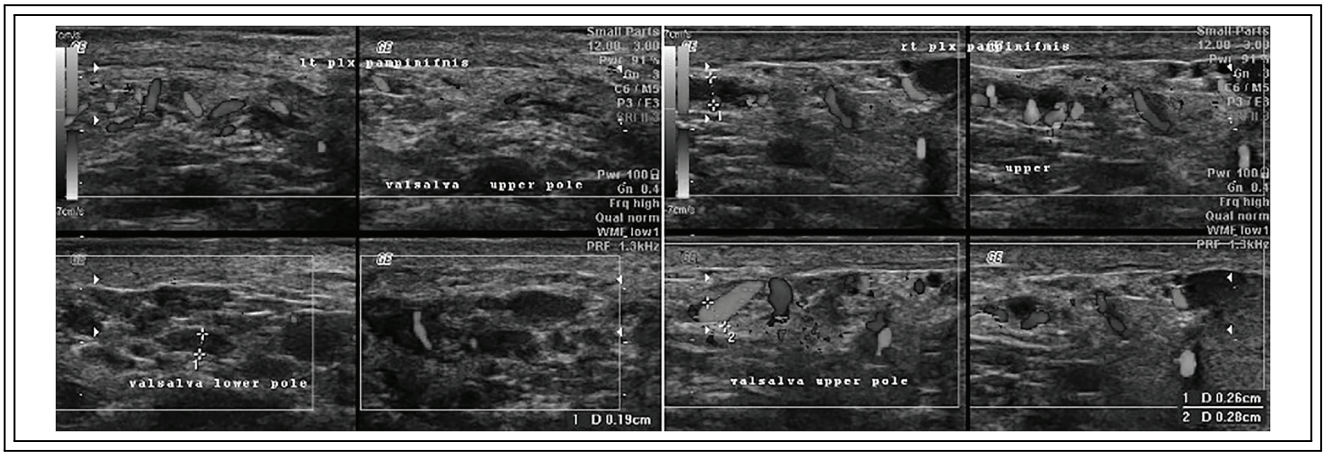

FIGURE 3. Doppler ultrasonography of the left and right pampiniform plexus

were noted, leading to a diagnosis of bilateral testicular atrophy, grade I left varicocele, grade III right varicocele, and hydrocele.

The patient underwent EA treatment, targeting specific acupuncture points (acupoints) known to improve fertility and sperm quality, including CV4 (Guanyuan), ST36 (Zusanli), KI3 (Taixi), CV6 (Qihai), SP6 (Sanyinjiao), ST29 (Guilai), and LI4 (Hegu)[13] (Table 1).

The treatment involved inserting sterile, disposable stainless steel needles (0.25 mm × 25 mm or 0.25 mm × 40 mm; Huanqiu, China) to a depth of 15–20 mm into the selected acupoints, with the needle size determined according to the patient's body mass index (BMI). Needle manipulation was adjusted to elicit a tolerable "deqi" sensation without discomfort.[14] The needles were connected to a Hwato SDZ V, Shanghai, China, stimulator set at a continuous wave frequency of 2 Hz for 15 min. Then, turn off the stimulator for 15 min, disconnect the electrode, and remove the needle. A total of 16 EA treatments were administered twice weekly.

Sperm quality was monitored using Olympus microscopes (Olympus CX 33, Japan), DFI using the Sperm Chromatin Dispersion (SCD) method, and enzyme-linked immunosorbent assay (ELISA) for testosterone.

The results of sperm analysis and testosterone levels before and after EA treatment are shown in Table 2. The sperm analysis after treatment was carried out immediately following the final EA session. Drug therapy prescriptions for the follow-up, which began immediately after the EA treatment and lasted for two months, included dietary supplements (including vitamins A, E, C, and B complex,

TABLE 1. **Acupoints utilized in this case report**

Acupoint	Name	Laterality	Location description
CV4	Guanyuan	Midline	3 cun below the navel
CV6	Qihai	Midline	1.5 cun caudal from the navel
ST36	Zusanli	Bilateral	Above the lateral side of the anterior ligament, 1 middle finger width from the anterior tibial crest
SP6	Sanyinjiao	Bilateral	3 cun proximal to the medial malleolus
ST29	Guilai	Bilateral	1 cun cranial to the pubic bone, 2 cun lateral to midline
KI3	Taixi	Bilateral	Between the malleolus internus and the Achilles tendon, level with the internal malleolus peak
LI4	Hegu	Bilateral	The highest point of the dorsal interosseous muscle on the hand

TABLE 2. **Sperm analysis results before and after EA**[15]

Parameter	Reference range	Patient	
		Before EA	After EA
Concentration ($\times 10^6$/mL)	≥15	5.2	6.7
Motility (%)	≥40		
Fast-linear		50	54
Slow-linear		5	6
Immotile		57	40
Total of Motility (%)	≥40	43	60
Normal Morphology (%)	≥4	1	3
Oligozoospermia	–	+	–
Teratozoospermia	–	+	+
DFI (%)	<25	40	19.6
Testosterone (ng/dL)	300–1000	329.6	596.2

Note. EA, electroacupuncture; DFI, DNA Fragmentation Index; "+", present; "–", absent.

glutathione, pantothenic acid, coenzyme Q, and carnitine) and micronutrients (such as zinc, selenium, and copper). These may increase levels of antioxidant enzymes and decrease levels of inflammatory markers. Moreover, two weeks after the first EA session, the patient reported no symptoms associated with varicocele, indicating a positive immediate response to the treatment.

In Table 2, before the EA treatment, the patient's sperm quality profile was characterized by a sperm concentration of 5.2 million/mL, with 50% fast-linear motility, 5% slow-linear motility, and 43% total motility. The percentage of sperm with normal morphology was low at 1%. Additionally, the patient exhibited oligozoospermia and teratozoospermia, with a high DFI of 40%. The testosterone level was recorded at 329.6 ng/dL.

After the EA treatment, we noticed a marked improvement in the sperm quality profile. The sperm concentration increased to 6.7 million/mL. There was an increase in fast-linear motility to 54% and slow-linear motility to 6%, with a total motility of 60%. Notably, the percentage of sperm with normal morphology improved to 3%. The DFI showed a reduction to 19.6%, and the testosterone levels increased to 596.2 ng/dL.

Discussion

Varicocele is more common in infertile men, with a prevalence of 35% of men with primary infertility and 81% of men with secondary infertility.[5] This condition affects testicular function due to blood accumulation in the pampiniform plexus, which causes increased

testicular temperature and reactive oxygen species (ROS) levels. These factors contribute significantly to decreased sperm quality.[16] Previous studies have shown that acupuncture therapy can reduce sperm ROS levels, especially in patients with varicocele or genital tract inflammation.[17] EA can acutely enhance testicular hemodynamics: low-frequency stimulation at abdominal points increases testicular arterial blood flow in men on Doppler, and improves perfusion in rodent models after ischemic injury.[18]

Another critical element in the pathophysiology of varicocele is oxidative stress.[19] This oxidative stress negatively impacts sperm quality, impacting both standard sperm parameters and the integrity of sperm DNA.[20] In addition, the inability to regulate the temperature of the scrotum causes the testicles to overheat, known as testicular hyperthermia, creating heat stress conditions in the genital area. This negatively affects the process of sperm production, resulting in the creation of lower-quality spermatozoa.[21] The body has a mechanism that helps maintain a low temperature in the testicles, which is the vascular heat exchange system in the pampiniform plexus, characterized by a direct connection between the arteries and veins.[22] Furthermore, because varicocele pathophysiology involves venous stasis, hyperthermia, hypoxia, and excess ROS, which impair sperm quality and increase DNA damage, EA's reported effects in reducing oxidative/inflammatory stress provide a plausible redox-mediated pathway for benefit.[23,24]

In this case study, the subject's sperm parameters after EA showed a sperm concentration of 6.7 million/mL, total motility of 60%, with progressive motility (PR) of 54%, non-progressive motility (NP) of 6%, and immobility (IM) of 40%. The percentage of sperm with normal morphology was 3%, DFI was 19.6%, and testosterone levels were 596.2 ng/dL. These findings are consistent with a number of studies showing that acupuncture can improve sperm quality, hormonal balance, and increase blood flow to the reproductive organs in infertile men.[9] EA may modulate the HPG axis, with animal data showing up-regulation of hypothalamic GnRH and downstream steroidogenesis, potentially supporting testosterone production.[25] Kucuk et al. showed that the efficacy of acupuncture was comparable to varicocelectomy in men with primary infertility and abnormal semen parameters. This study found that sperm concentration was significantly greater in the acupuncture group than in the varicocelectomy group, while pregnancy rates were similar in both groups.[26] Another study by Ketabchi and Salajegheh showed that acupuncture treatment was effective in improving semen quality and fertility outcomes in infertile men with varicocele, especially when combined with varicocelectomy.[17]

However, the evidence is not always positive. A systematic review found that although acupuncture significantly improved sperm motility and concentration, it did not improve pregnancy rates compared with placebo or co-therapy alone.[27]

We recognize that acupuncture is not established as a standard of care for infertility or varicocele, and would like to clarify that the purpose of this study was to investigate the potential of EA as an alternative treatment option for infertile men with varicocele. A previous case report by Zhang et al. stated that acupuncture may act as an effective alternative therapy for varicocele and slow the progression of subclinical varicocele, but did not directly evaluate its impact on infertility.[11] However, the findings of this case report suggest that EA may be a potential area for further investigation. This case report also has potential confounding factors, particularly the concurrent use of nutritional supplements during follow-up, which may have influenced sperm parameters. Therefore, caution is warranted in attributing observed improvements solely to EA. Moreover, this report represents a single case and not a comparative study against other interventions such as sham acupuncture, standard care, or alternative treatments, which further limits the generalizability of the findings.

In conclusion, although EA appeared to improve sperm quality, testosterone levels, and reduce DFI in this case, the evidence level of a single case report is low. These findings cannot be generalized, and further studies with larger sample sizes and appropriate controls are needed to confirm the potential role of EA in managing varicocele-related infertility.

Patient perspective

I am very grateful to have undergone electroacupuncture therapy as part of my infertility treatment. During the therapy process, I did not experience any disturbing side effects, and the results were very encouraging for me and my partner. After undergoing the therapy, I felt more optimistic and confident, especially after noticing the improvement in sperm quality and hormone levels.

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Author Contributions

Ida Nurwati was involved in the intervention, data analysis, and reviewed the article for important intellectual content. Uki Retno Budihastuti contributed to the conception or design of the study, drafted and submitted the manuscript, and reviewed and edited the manuscript. Bhisma Murti was responsible for data acquisition, manuscript review, and editing. Teguh Prakosa contributed to the interpretation, manuscript review, and editing. Metanolia Sukmawati handled patient recruitment and material support. All authors reviewed the results and approved the final version of the manuscript.

Availability of Data and Materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics Approval

The study received ethical clearance from the Dr. Moewardi General Hospital Health and Research Ethics Committee in Surakarta, Jawa Tengah, Indonesia, number 704/V/HREC/2023.

Conflicts of Interest

The authors declare no conflicts of interest to report regarding the present study.

Informed Consent

The patient provided written informed consent for the publication of this case report and any accompanying images.

Supplementary Materials

The supplementary material is available online at https://www.techscience.com/doi/10.32604/cju.2025.068548/s1.

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